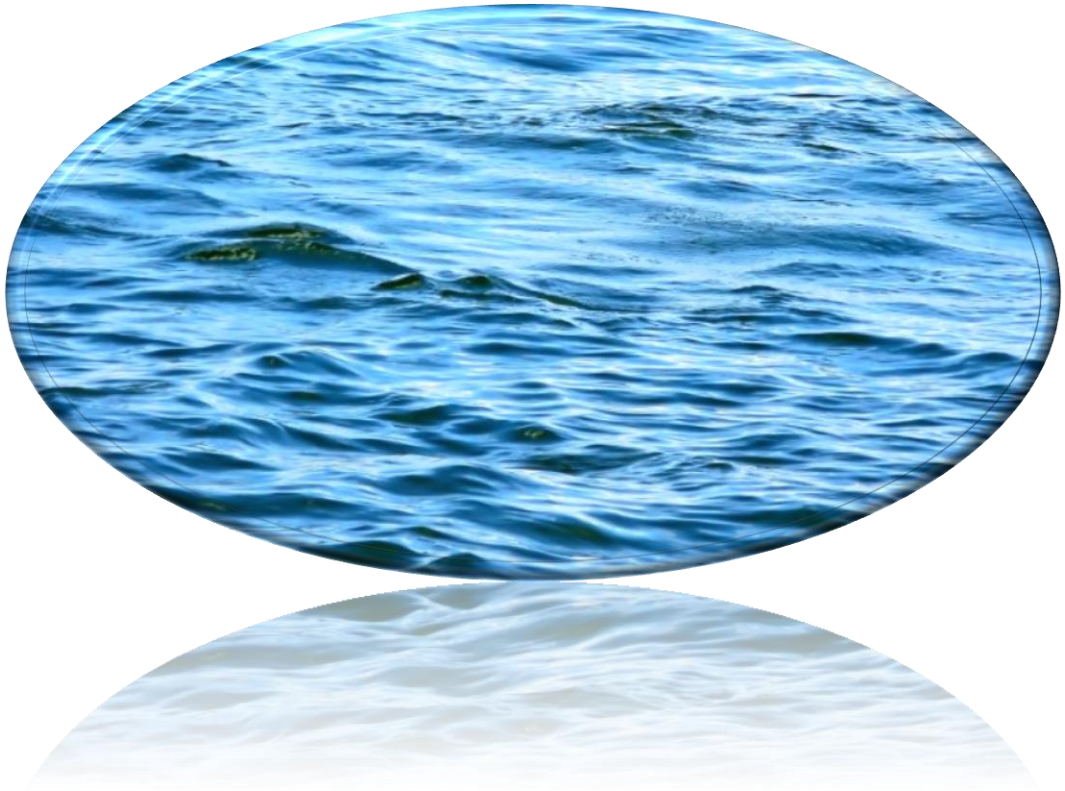
Annual Report 2015-16

Central Water Commission



सत्यमेव जयते

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 (2015)	3566 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 (2011-12)	195.2 M ha
•	Net Sown Area (2011-12)	140.8 M ha
•	Irrigation Potential Created (upto March 2012)	113.5 M ha
•	Gross Irrigated Area (2011-12)	91.5 M ha
•	Net Irrigated Area (2011-12)	65.3 M ha

HYDRO-POWER

•	Ultimate Hydropower Potential	148701 MW
•	Potential Developed by 31.3. 2016 (Installed Capacity)	47056 MW

FROM CHAIRMAN'S DESK

It is our pleasure to bring out this Annual Report of the Central Water Commission (CWC) for the year 2015-16. 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 2015-16. Officers of CWC represented 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 2015-16, CWC has provided design consultancy for DPR preparation and project construction in respect of 59 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 25 projects comprising of 12 major & medium irrigation projects and 13 flood control projects by the Advisory Committee. CWC has undertaken monitoring of projects as well as examination of release proposals which resulted in release of funds to 33 Major and Medium Irrigation Projects to the tune of `2327.80 Crore under 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. The timely issue of 4055 flood forecasts (with 98.1 % accuracy) during the monsoon period of 2015 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. As a first step, the Dam Safety Organisation, CWC has acquired ISO 9001: 2008 certification for its Quality Management Systems from the Bureau of Indian Standards.

(NARENDRA KUMAR)
CHAIRMAN

HIGHLIGHTS OF THE YEAR 2015-16

❖ DESIGNS

- CWC provided design consultancy to States / Project Authorities for 59 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.
- Provided Flood Forecasting Service at 176 flood forecasting stations (including 28 inflow forecasting stations) spread over 10 major river basins. During the flood season 2015, 4055 flood forecasts (3483 level forecast and 572 inflow forecasts) were issued, out of which 3978 (98.1%) forecasts were within prescribed limits of accuracy. Daily flood bulletins and weekly flood news letters were also issued during the flood season. Satellite based telemetry system is being used at 501 stations for acquisition of data on real time basis. Work for installation of Satellite based telemetry system at 74 more stations is under process.
- Provided technical assistance to Royal Government of Bhutan for maintenance of 33 Hydro-Meteorological sites in Bhutan.

❖ WATER PLANNING

- During the year 2015-16, 52 major / medium irrigation projects were under appraisal in CWC. 25 projects comprising 12 major / medium irrigation projects and 13 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 CLA 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. 2327.80 crore of Central Grant under AIBP programme to 33 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 36 training programmes during 2015-16 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 2648.
- The Dam Safety Organisation, CWC has received ISO 9001: 2008 certification for its Quality Management Systems from the Bureau of Indian Standards.

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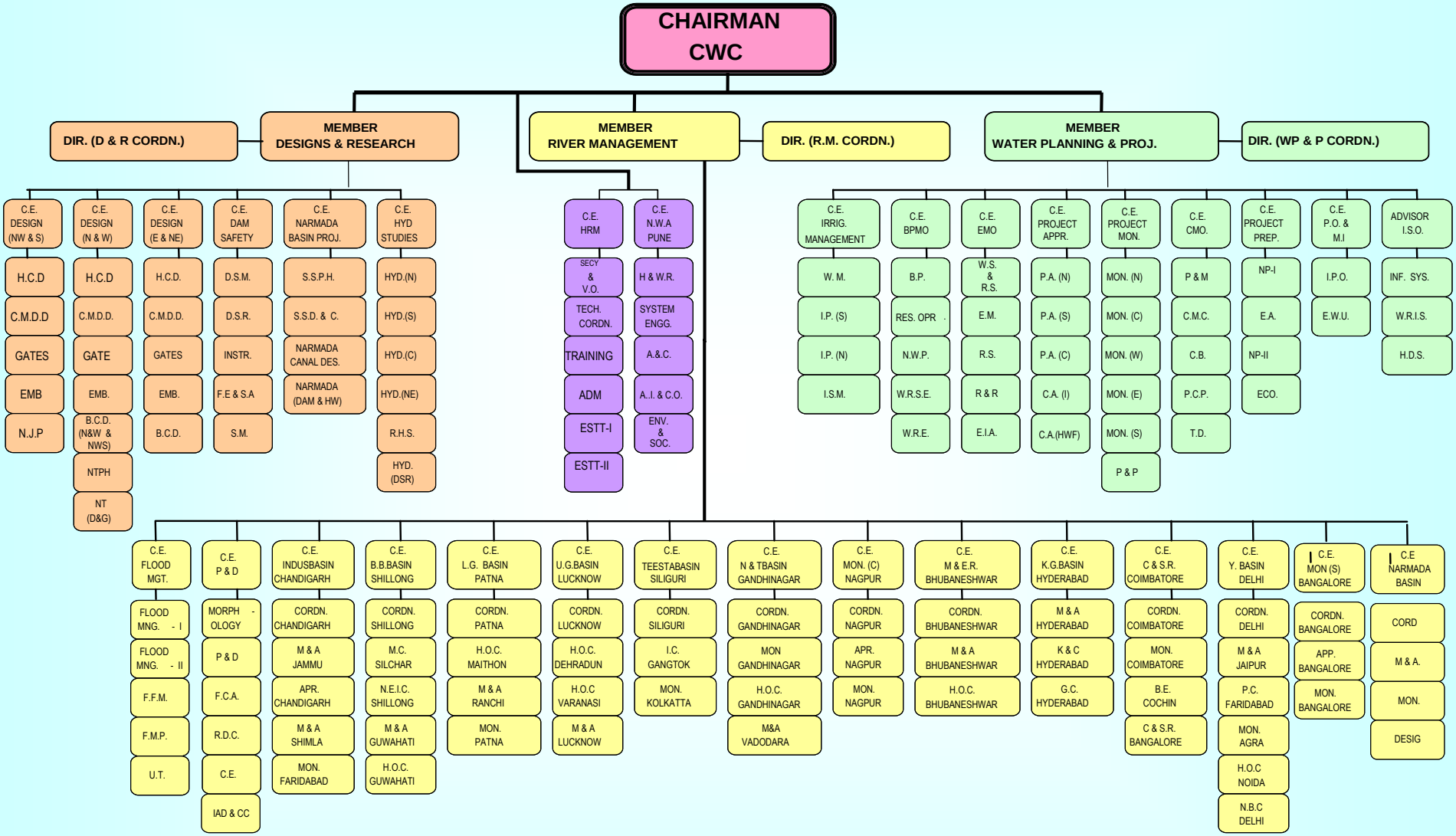
Organogram of Central Water Commission



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 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 2015-16 were:

1.	**Chairman**, CWC	:	Sh. A. B. Pandya (01-04-2015 to 31-12-2015) Sh. G.S. Jha (01-01-2016 to 31-03-2016)
2.	**Member** (D&R)	:	Sh. C.K Agrawal (01-04-2015 to 31-10-2015) Sh. G.S. Jha (09-11-2015 to 31-03-2016)
3.	**Member** (RM)	:	Sh. Narendra Kumar (01-04-2015 to 31-03-2016)
4.	**Member** (WP&P)	:	Sh.A.Mahendran (01-04-2015 to 30-06-2015) Sh. Narendra Kumar (01-07-2015 to 27-03-2016) Sh. S. Masood Husain (28-03-2016 to 31-03-2016)

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.

A total grant of Rs. 2327.80 Crore has been released to 33 Major & Medium Irrigation Projects under AIBP during 2015-16. Since its inception, cumulative Central Loan Assistance / Grant totalling to Rs. 55570.59 Crore has been provided to States till 31.03.2016 for 297 projects included under AIBP.

Flood Management Programme

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 were funded under FMP and an amount of Rs. 3566.00 Crore released. The scheme has been approved during XII Plan period (2012-17) for providing total assistance amounting to Rs. 10,000 Crore.

During XII Plan period, the Inter Ministerial Committee for Flood Management Programme (IMC-FMP) has approved 99 schemes of various States having total estimated cost of Rs. 5344.15 Crore for funding under FMP. Further, an amount of Rs. 1157.07 crore has been released till 25.1.2016 during the XIIth Plan. 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

Under DWRIS Plan scheme, CWC & ISRO has jointly developed India-WRIS during 11th plan. Initially, the India-WRIS comprised 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 was launched in December 2010. The URL of the portal is www.india-wris.nrsc.gov.in. So far, four versions of portal India-WRIS have been launched. The Ver. 4.0 was launched in March' 2014 and is available in public domain at 1:250000 scale. All unclassified data collected by CWC has been uploaded at India-WRIS portal as per Hydro-meteorological data Dissemination Policy 2013.

The center maintaining India-WRIS was transferred to CWC HQ at Sewa Bhawan in February 2015. The following activities were taken up by the center during 2015-16:

a. Work related to updation and refinement of canals and command boundaries of major and medium irrigation projects has been taken up. Work in respect of 20 States has been completed and for remaining 9 States namely, Maharashtra, Andhra Pradesh, Telangana, West Bengal Uttar Pradesh, Uttarakhand, Karnataka, Odisha and Rajasthan is under progress.

b. Reservoir Module for real time data entry of reservoir data with users and administrator access control and Automatic Report Generation facility has been created.

c. PMP Module to indicate Probable Maximum Precipitation values at grid points, patterns of key storms, temporal distribution patterns of rainfall etc. is under development. This module will be helpful for direct assessment of applicable PMP value for a catchment.

d. A near real-time HO Data Entry Module for entry of gauge/discharge data using SMS has been developed. Testing and operationalization of this module is to be done.

e. Web-based Water Quality Data Entry Module for entry of water quality data has been developed. Testing and operationalization of this module is to be done.

f. Ground water data of CGWB like Ground Water Aquifer, Industrial Cluster and Ground Water Resources has been included in the portal.

g. Canal re-alignment mapping of Sankosh – Mahanadi Inter-basin Link Project showing canal, existing/ proposed structures and proposed alternate links has been done in consultation with NWDA.

h. Development of CWC Website, INCSW Website has been completed and development of Executive Record Sheet (ERS) Management System for CWC officers is under progress.

Besides maintenance & development of India-WRIS portal, the India-WRIS team has also facilitated CWC and MoWR, RD & GR officials in conducting various studies /activities using GIS Platform and the data available under India-WRIS portal. Details of some of the important tasks are as under:

I. Study of Inter Basin Transfer link of Mahanadi-Godavari: The study envisaged mapping of New Canal alignment of Mahanadi-Godavari Inter-Basin Transfer Link Project including analysis of proposed dams (Barmul, Manibhadra, Lower Lant, Raul at Taprang, Under, Salki, Bugh and kharang) and preparation of

Submergence Area Report showing of Submergence area, Volume and Villages Affected. The assessment of feasibility of using the Mahanadi-Godavari Link for transport of goods from Gopalpur Port (proposed) was also carried out.

II. Identification of water bodies within 5 Km of main stem of River Ganga and assessment of their water spread area to facilitate field survey.

III. Probable Irrigation Facility Assessment Study for Jhansi District and 13 Districts in Bhundelkhand Region

IV. Preparation of Water Body Maps of area along Ganga and Yamuna River.

V. Preparation of Surface Profile Graph from Bargi Reservoir to Chitrakoot for assessment of feasibility of supplying water from Bargi Dam to Chitrakoot Ghat.

VI. Delineation of submergence area of Siang Reservoir (Arunachal Pradesh) and Ichampalli Reservoir (Andhra Pradesh, Odisha and Maharashtra)

VII. Preparation of Coastal District Maps with thematic layers, such as, Ground Water EC, Topography, LULC, Population Density, Soil (Depth, Texture, Productivity, Erosion), River Network, Identified Low Land Area along the coast, Ground Water Level pre/post monsoon.

VIII. Preparation of maps showing status of construction of Polavaram Right Bank and Left Bank Canals under Polavaram Project showing construction gaps in the main canals along with the associated head work location (Polavaram Dam), rivers and other structures.

IX. Study for Crop Area Estimation in respect of 15 completed and 23 ongoing projects to assess irrigation potential utilization.

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. The work for modernization and renovation of remaining floors has now been awarded to National Projects Construction Corporation Ltd (NPCC). The work for 7th floor (South Wing) is in progress.

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 regulalrly 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 2015 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 2015-16 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-IX 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₹ 15,000/-
- Long Term Relief up to₹ 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₹ 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 2015-16 are as under:

- CWC Men Carrom Team participated in the Inter-Ministry Carrom Tournament during 2015-16 and stood at Runners-up position.
- CWC Athletics Team won the March-Past Trophy in the Inter Ministry Athletics Meet 2015-16.
- Sh. Ashwani Kumar, Esst. IV Section, CWC won the Gold Medal in Men Veteran 100 m Race in the Inter Ministry Athletics Meet 2015-16. He also represented Central Secretariat Badminton Team in the AICS (National) Badminton Tournament 2015-16 held at Thiruvananthapuram(Kerala).

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 31.03.2016)

Category	No. of Filled Posts	No. of SCs	No. of STs	No. of OBCs
Group A	598	86	31	45
Group B	1131	161	58	176
Group C	697	170	41	141
Total	**2426**	**417**	**130**	**362**

Note *All Group 'D' Posts upgraded to Gr 'C' and re-designated as MTS.*

Table 1.2

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

(As on 31.03.2016)

Category	Orthopaedic Handicaped (OH)	Visually Handicaped (VH)	Hearing Handicaped (HH)	TOTAL
Group A	06	00	00	06
Group B	21	01	04	26
Group C	03	04	00	07
Total	**30**	**05**	**04**	**39**

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

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.

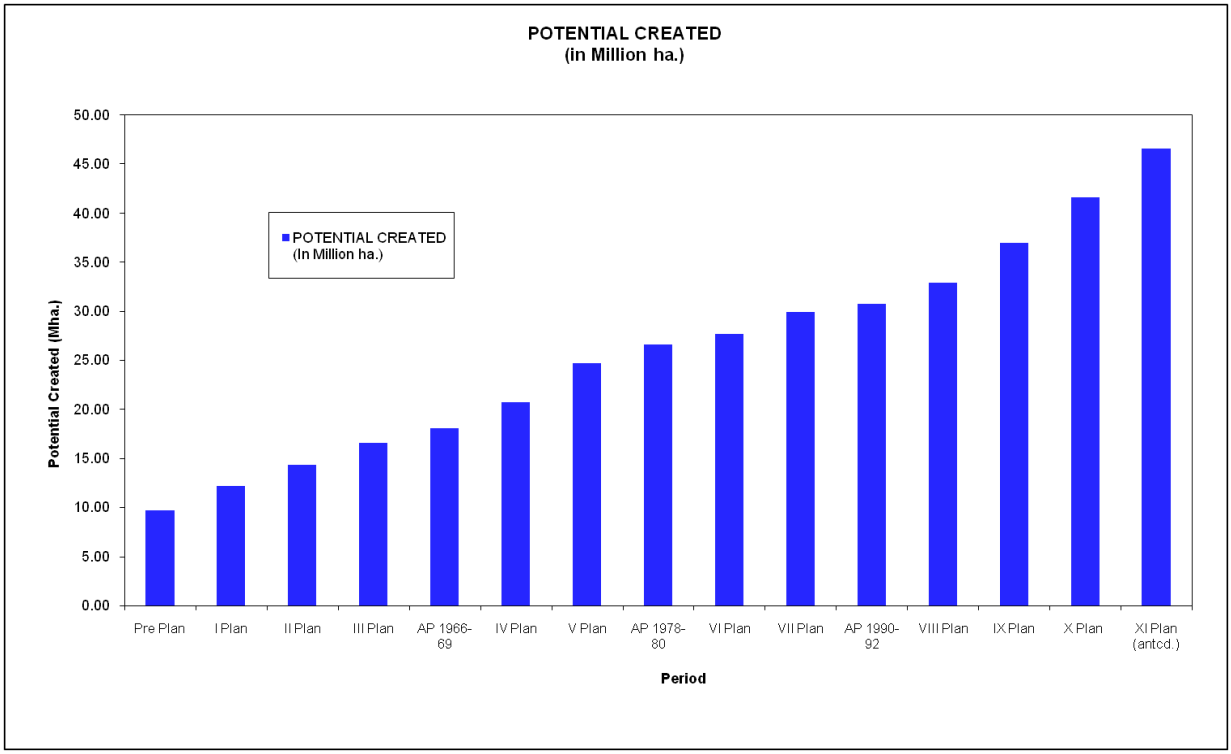


Fig 2.1 Growth of Irrigation Potential Created During Pre-Plan and Plan Period (Cumulative) (Major and Medium Irrigation Sector)

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.)	Target 2012-13**
1	Andhra Pradesh	5000.00	3303.22	439.44	3600.21	1203.52	4803.73	392.000
2	Arunachal Pradesh	0.00	0.00	1.20	1.20	0.00	1.20	0.00

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.)	Target 2012-13**
3	Assam	970.00	243.92	68.98	302.69	153.27	455.96	6.562
4	Bihar	5223.50	2680.00	279.00	2879.00	175.46	3054.46	60.000
5	Chattisgarh	1146.93	922.50	888.18	1137.00	132.32	1269.32	15.882
6	Goa	62.00	21.17	16.48	33.75	21.80	55.55	2.969
7	Gujarat	3000.00	1430.37	788.13	2230.50	1448.59	3679.09	235.000
8	Haryana	3000.00	2099.49	91.87	2193.70	12.59	2206.29	0.00@
9	Himachal Pradesh	50.00	13.35	2.10	15.45	15.00	30.45	4.200
10	Jharkhand	1276.50	354.47	23.61	397.77	132.94	530.71	45.000
11	Jammu Kashmir	250.00	179.69	249.50	187.30	138.31	325.61	42.910
12	Karnataka	2500.00	2121.12	6.63	2637.71	328.12	2965.83	111.390
13	Kerala	1000.00	609.49	480.98	669.49	46.20	715.69	15.000
14	Madhya Pradesh	4853.07	1386.90	65.00	1931.90	574.53	2506.43	230.000
15	Maharashtra	4100.00	3239.00	255.15	3494.15	634.56	4128.71	NF
16	Manipur	135.00	91.15	11.90	106.55	51.95	158.50	26.085
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	46.500
21	Punjab	3000.00	2542.48	62.19	2574.67	109.72	2684.39	64.000
22	Rajasthan	2750.00	2482.15	408.20	2861.58	305.55	3167.13	25.950
23	Sikkim	20.00	0.00	0.00	-	-	-	-
24	Tamil Nadu	1500.00	1549.31	11.75	1562.56	15.71	1578.27	0.00@

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.)	Target 2012-13**
25	Tripura	100.00	4.90	13.80	14.05	15.20	29.25	4.078
26	Uttar Pradesh	12154.00	7910.09	871.26	8781.97	506.12	9288.09	199.240
27	Uttarakhand	346.00	280.30	9.35	288.98	0.00	288.98	0.00
28	West Bengal	2300.00	1683.29	86.52	1754.81	146.60	1901.41	140.000
29	Union Territories	98.00	6.51	0.00	0.00	0.00	0.00	0.00
	Total	**58465.00**	**36981.43**	**5295.63**	**41637.86**	**6341.06**	**47972.41**	**1666.77**

***Figures under reconciliation with states**

@ No new potential creation. Only stabilisation

NF: Not Furnished by the State

****As reported by the states in their Annual Plan 2012-13 documents and during the Working Group meetings in the Planning Commission.**

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.

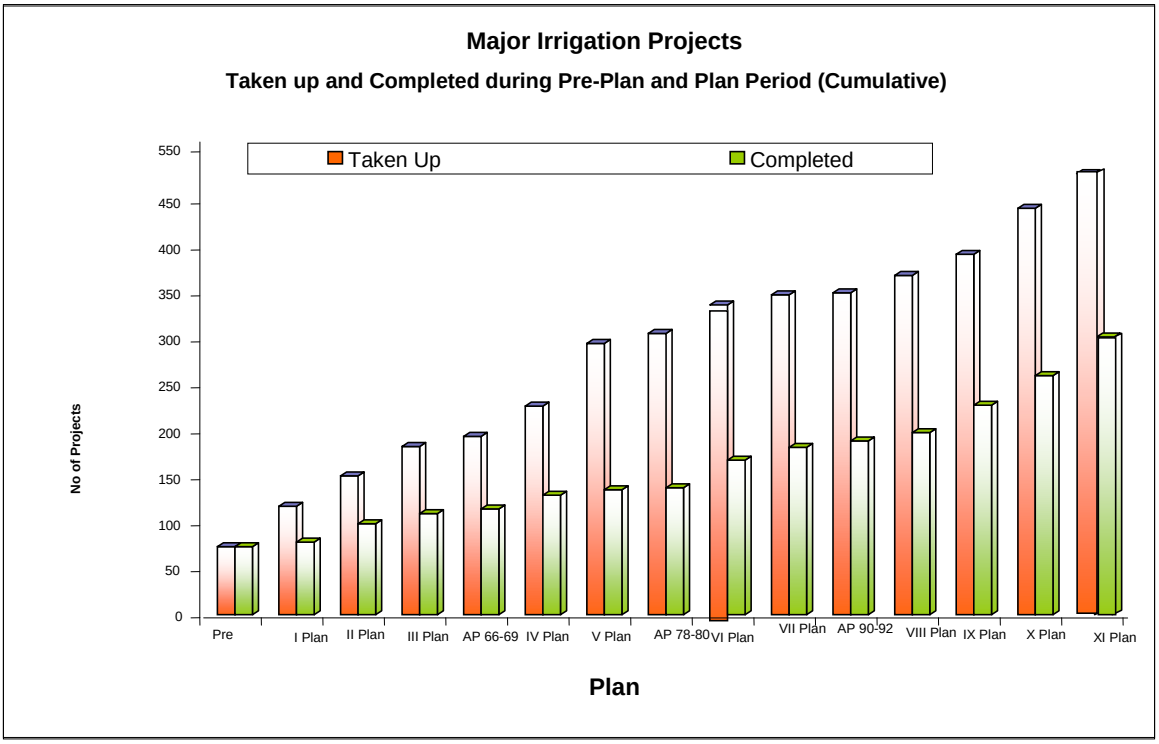


Fig 2.2 Major Irrigation projects taken up and completed (Cumulative)

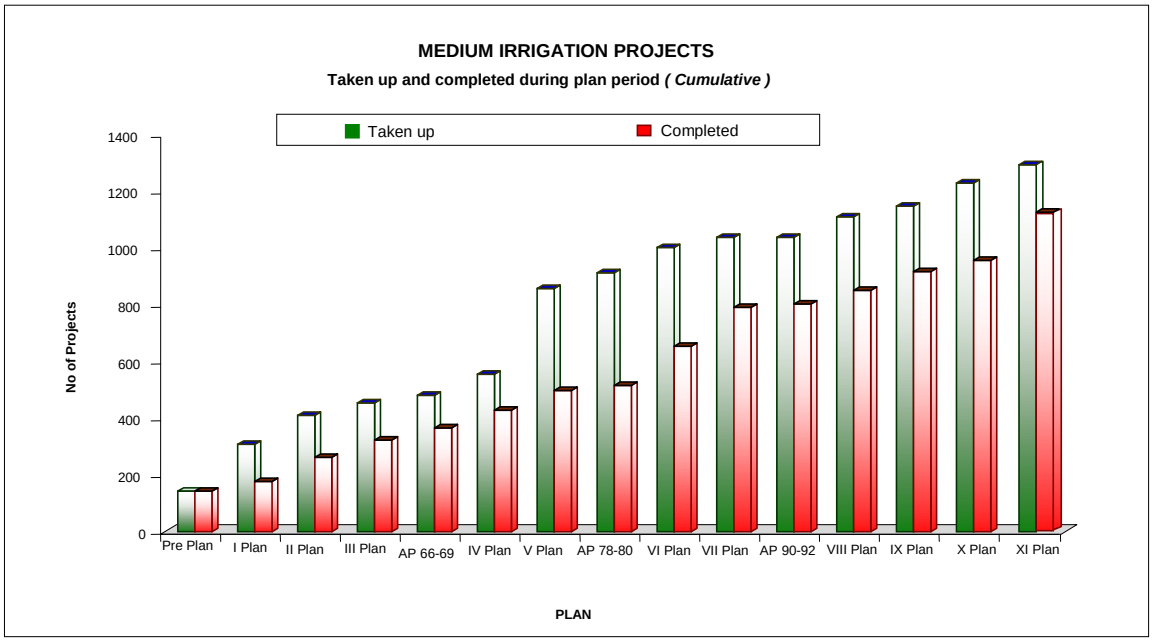


Fig 2.3 Medium Irrigation projects taken up and completed (Cumulative)

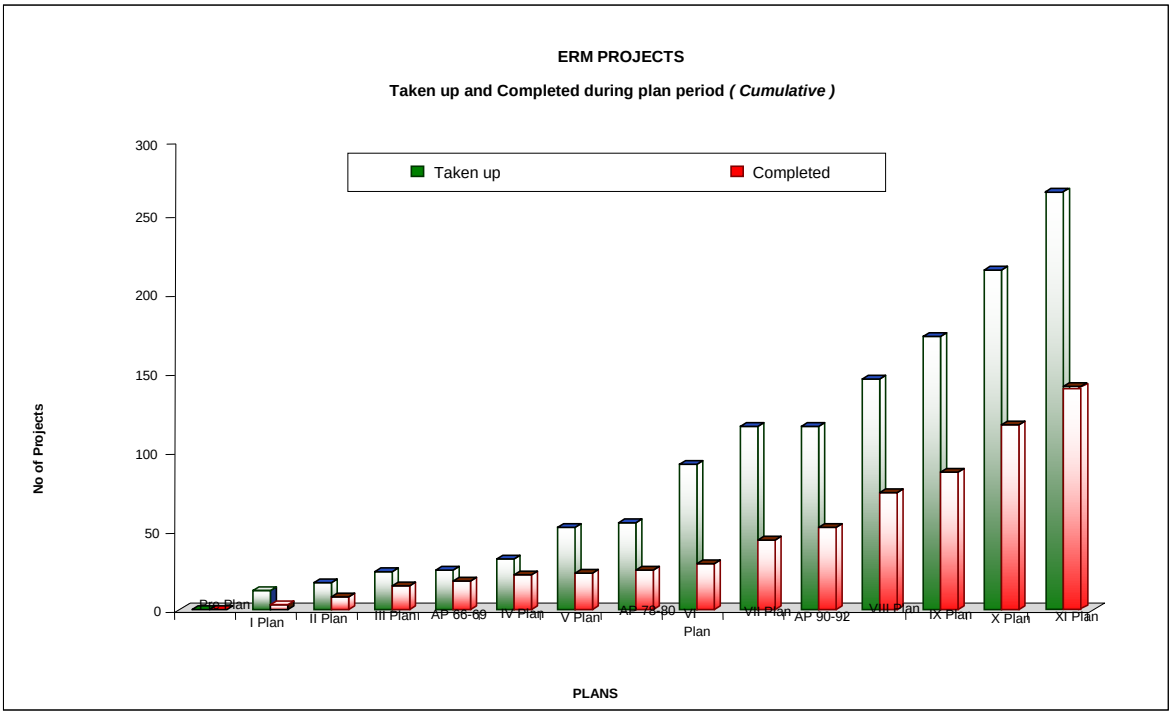


Fig 2.4 Modernization of ERM Projects taken up and Completed (Cumulative)

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

S. No.	Name of Basin	No. of Sites
14.	Subernarekha Basin	12
15.	Tapi Basin	18
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

In addition to above, it also operates 76 exclusive meteorological observations stations in various basins in the country.

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

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.

Five Regional Data Centers were set up at Nagpur, Bhubaneswar, Hyderabad, Gandhinagar and Coimbatore for storage of data under Hydrology Project. At National Surface Water Data Centre, New Delhi data of above regions of CWC is stored and combined catalogue of metadata is hosted on website.

During the year 2015-16, hydro-meteorological data at all 954 sites has been observed. A few sites have been upgraded with modern hydrological equipment such as Acoustic Doppler Current Profiler (ADCP). Water quality monitoring has been strengthened by providing sophisticated water quality analysis equipments in the laboratories.

To expand and strengthen the above activities, provision has been made to upgrade the existing 100 Hydrological Observation Stations, upgrade 23 water quality laboratories and opening of 800 new sites under component "Hydrological Observations Monitoring

System" of the 12th Five Year Plan Scheme, namely, Development of Water Resources Information System. An outlay of Rs. 1024 Crore has been kept for the purpose. This will help in addressing the data requirement of the country more precisely and in better scientific manner. Till now, Central Water Commission has opened 217 new sites. However, measurement of few parameters with reduced frequency is being done at these sites due to paucity of required manpower. Central Water Commission has also upgraded 100 existing sites as envisaged in the Plan.

3.1.1 Water Quality Monitoring

Central Water Commission is monitoring water quality at 433 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 407 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 proposed to be analysed. 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.

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 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. The project was cleared by the CCEA in October, 2005. The

agreement for the project between the Govt. of India and the World Bank was signed on 19th January, 2006 and approved by the GOI in the month of May, 2006. The original completion period of HP-II was June, 2012. The project completion period was extended upto May, 2014 by the World Bank. The project has since been completed.

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 is planning to undertake "National Hydrology Project (NHP) - Approach towards Integrated Water Resources Management" with assistance from The World Bank.

Under the National Hydrology Project (NHP), Central Water Commission plans to focus on core area activities for improvement of overall efficiency of the organisation. Keeping in view the challenges in the field of water management to deal with increasing inter-state disputes, CWC is planning to develop its ability to support optimum use of water resources and also to manage water related disaster. The following activities are proposed for development of better forecasting and real-time management facilities:

i) Flood management for rivers specially originating from the Himalayan regions using state of art technologies.
ii) Extended hydrological prediction for key reservoirs located across India and river basins for reservoir operation and optimal utilisation of water resources.
iii) Flood inundation Modelling of selected reach on pilot basis
iv) Development of tools for Water Resource Management to guide water sharing of the interstate rivers of India – in particular guiding the planting

advice for farmers at the beginning of Rabi based on assessment of stored water resources following monsoon season.

v) Development of aquatic life assessment in major rivers of India
vi) Preparation reference Evapo-transpiration Atlas for country
vii) Development of Regional Models for water availability
viii) Physical based mathematical modelling for sediment rate estimation and sediment transport in the river basin.

The estimated cost of Central Water Commission Component under NHP is about Rs. 275 Crore and the project is proposed to be implemented over a period of eight years since inception.

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 176 flood forecasting stations, of which 148 are level forecasting and 28 are inflow forecasting stations on major dams/ barrages, spread over 17 States viz. Andhra Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Haryana, Jammu & Kashmir, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Telangana, Tripura, Uttaranchal, Uttar Pradesh & West Bengal and one union territory Dadra & Nagar Haveli and the National Capital Territory of Delhi. It covers 10 major river systems in the country, including 72 river sub-basins.

On an average, over 6000 forecasts are being issued every year by Central Water Commission during flood season. Normally, these forecasts are issued 12 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 is being observed at 708 sites and communicated through a network of 544 wireless stations. Synoptic weather situations, weather forecast/ heavy rainfall warnings etc. are also being collected from Flood Meteorological Offices (FMOs) of IMD.

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 2015 and Role of Newly Launched Website e-SWIS.

During the flood season 2015 (May to October), 4055 flood forecasts (3483 level forecasts and 572 inflow forecasts) were issued out of which 3978 (98.10%) were found within accuracy limit (± 0.15 m for level forecast and ± 20% for inflow forecast).

Since the flood season of 2014, the entry of hydrological data of base stations is being done by all Divisions of CWC on real time basis in the newly launched web-based software e-SWIS. This has enabled real time monitoring of the current status of the river.

The e-SWIS portal has user friendly features like map based display of latest status of Flood Forecasting sites, display of hydrograph based on past 72 hours actual observed data plus forecast, if any, etc. The eSWIS flood forecast module has inbuilt programme for generation of email/ SMS for flood alert which can be sent to various users using bulk SMS services. These utilities of flood forecast module of eSWIS has been fully utilized by Divisions of CWC as well as CWC HQ during 2015.

During the flood season of 2015 (May to October), out of 148 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 one flood forecasting stations, namely, at Chenimari on River Buridehing in Dibrugarh District of Assam.

High flood situations were experienced at 4 (four) forecasting stations where peak level had attained within 0.5m of previous HFL, viz., River Jia-bharali at NT Road Crossing in Sonitpur district, River Beki at Beki Road Bridge in Barpeta district, River Katakhal at Matizuri in Hailakandi district and River Brahmaputra at Dibrugarh in Dibrugarh district of Assam.

3.2.2 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 its own field formations. During the year 2015, 184 daily bulletins (once daily), 17 Orange Bulletins for High Flood Situation (Twice daily) and 12 Red Bulletins (every 3 hours) were issued as per Standard Operating Procedure (SOP) issued by National Disaster Management Division of Ministry of Home Affairs (MHA) .

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

3.2.3 Communication System of CWC used for flood forecasting purposes

Central Water Commission has been operating wireless stations covering almost all river basins to transmit and receive the data since beginning. In addition to this, Telephone, Mobile, SMS, FAX and E-mail are also used by the Divisional Flood Control Rooms and Central Flood Control Room under CWC, New Delhi for transmission of data and information. The Central Flood Control Room at Delhi was operated on 24x7 basis during monsoon. The information regarding High and Unprecedented Flood Situation for Base stations as well as Forecasting stations were also sent to concerned authorities by SMS. The forecast, water level and rainfall information were regularly uploaded on web site http://india-water.gov.in/ffs during monsoon season 2015.

3.2.4 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.

During IX Plan, telemetry system was installed at 55 stations in Chambal and Upper Mahanadi basins for real time data collection and transmission to forecast formulation centres 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.

The 12th Plan (2012-17) proposal for Flood Forecasting activities in CWC with an estimate cost of Rs 281.00 Crore has been approved in Dec 2015. The proposal includes provisions for installation of telemetry system at remaining 219 sites of existing Flood Forecasting Network; establishment of six Modelling Centres (MCs) at Bengaluru, Bhopal, Chennai, Gangtok, Jammu and Lucknow; and installation of telemetry system at 410 sites for starting flood forecasting activity at 100 new forecasting stations. There

is also provision for development of inundation forecast model for few basins using DEM already available with NRSC.

The installation of telemetry at remaining 219 stations of the existing Flood Forecasting network is proposed to modernize the entire network by providing facility of sensor based automatic data collection and satellite based data transmission. Out of this, works for installation of telemetry system at 130 sites have been taken up so far. Installation of telemetry at 56 stations has been completed and installation at 09 stations is in progress. The work for remaining stations shall be taken up shortly.

Moreover, establishment of three modelling centres at Chennai, Bhopal and Lucknow have been taken up. Out of this, establishment of Modelling Centre at Chennai has been completed.

The data in respect of all above stations will be received at ERS Delhi (installed under 11th plan) and subsequently shall be sent to respective Modelling Centres.

3.2.5 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 and 2014 is under confirmation from States.

3.2.6 Mathematical Modeling 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 progress of use of mathematical model for flood forecasting is as under:

a. Inflow Forecasting for Gandhi Sagar Dam in Chambal River is under operation.

b. Rainfall based modelling in Mahanadi upto Naraj and Inflow Forecast at Hirakud Dam is under operation.

c. Hydrodynamic (HD) based model for Brahmaputra has been developed. The model for the reach from Tejpur to Dhubari has been calibrated and operationalised. Further extension of the model is under progress.

d. Rainfall based model for Hathnikund Barrage on river Yamuna is in calibration stage. The Hydrodynamic (HD) based model for Yamuna in downstream reach is operational upto Delhi. Further extension of the model is under progress.

e. Rainfall based model for Alaknanda upto Srinagar; inflow forecast model for Bhagirathi at Tehri Dam and model for Ganga for Rishikesh and Haridwar has been developed.

f. Rainfall based modelling in Jhelum upto Ram Munshi Bagh has been developed. Advisory Flood forecast using above model and QPF inputs from IMD were issued in 2015.

g. Models for Inflow forecasting of Hathnur & Ukai Reservoir in Tapi River and Madhuban Reservoir in Damanganga River in Tapi basin have been developed.

h. Rainfall based Runoff Modelling in Sharda (upto Sharda barrage), Sutlej (upto Rampur) and Ghagra (upto B K Ghat). The model for Sharda (upto Sharda barrage) has been calibrated for the year 2012-14, while model for Satlej (upto Rampur) has been calibrated for year 2013-14 and Ghagra (upto B K Ghat) initially calibrated for the year 2015. These models will be further calibrated and validated in next monsoon.

3.2.7 Future Activities

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. CAP increases warning effectiveness and simplifies the task of activating a warning for responsible officials. CWC has partnered with Google to disseminate the flood warning through its Public Alert platform based on Common Alerting Protocol (CAP). This service has been launched in November 2015 and it would available to users from monsoon season 2016. It aims to disseminate emergency messages such as likely flood situation with current water level and forecasted water level, recommended action for affected people and website address for current water level information etc. These official alerts would be seen when a person falling in the affected area searches on Google Search, Google Maps, and when one activates Google Now on Android device. This service would provide the public with information it needs to make informed decisions in times of crisis.

Development of flood forecasting model using the concept of rainfall-runoff module coupled with Hydrodynamic routing module has been taken up in CWC. The model

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. Such model development for Alaknanda, Cauvery and Southern Rivers, Godavari, Jhelum, Mahanadi, Tapi and Yamuna river basins is ready to use during 2016.

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), a total of 420 works were approved out of which 252 works were physically completed and Central Assistance totaling to Rs. 3566 crore was released. 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.

The Government of India has approved the continuation of "Flood Management Programme" with total estimated cost amounting to Rs. 10,000 core during XII Plan period (2012-17). The above State Sector scheme under Central Plan envisages provision for 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. The spillover of works approved under Flood Management Programme during XI Plan would also be supported under this scheme during XII Plan.

During XII plan period (2012-17), the Inter Ministerial Committee of MoWR for Flood Management Programme (IMC-FMP) has approved 99 schemes of various states having estimated cost of Rs. 5344.15 crore for funding under FMP. Further, an amount of Rs. 1157.07 crore has been released till 25.1.2016 during the XII plan.

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 2015-16 to States for areas other than Ganga and Brahmaputra basins are given in Table 3.2.

Table 3.2

State-wise fund released under Flood Management Programme during 2015-16		
Sl No.	Name of State	Amount released (Rs. in Crore)
1	HP	27.00
2	J&K	46.58
3	Uttar Pardesh	2.50
Total		76.08

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 has been 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 IITs /NITs on consultancy basis. The scheduled completion period for these studies is two years.

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 implementation of this TA is scheduled to be completed by June, 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. Under this project, 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 of the Ministry. The first meeting of the National Technical Committee was held at CWC Headquarters, New Delhi on 22/12/2015.

3.5.2 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.

3.5.3 Coastal Management Information System(CMIS)

Considering the importance of collection of data on coastal processes relevant for evolving plans and coastal protection measures, a new component 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)" during the XII-Plan (2012-17). 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 issue was deliberated with 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. During the workshop, it has been recommended that CWC may suitably associate with the maritime State/UT Governments and Institutes/Agencies for development of CMIS. A Model tripartite Memorandum of Understanding (MoU) was drafted accordingly. 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.

The Indian Institute of Technology, Madras had agreed for the taking up the role of Project Executor in the States of Tamil Nadu, Kerala and UT of Puducherry. The respective State Govts. and UT administration have also given concurrence for the implementation model. The project proposal for the implementation of CMIS in the states of Tamil Nadu, Kerala and UT of Puducherry is under process of approval from the Competent Authority.

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 Hydro meteorological observations on common border rivers with neighbouring countries

The hydro-meteorological observations at 16 sites in Mahakali Basin for Pancheshwar Multipurpose project are continuing.

3.6.2 Investigation of WR projects in neighbouring countries

M/s WAPCOS Ltd. has been entrusted to carry out the work of preparation of Detailed Project Report (DPR) and CEIA studies of Pancheshwar Multipurpose Project on river Mahakali.

3.6.3 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 proposal for bank protection /anti erosion works on common border rivers between India and Bangladesh received in Central Water Commission from Government of West Bengal and Tripura for release of Grants-in-Aid under the programme is as given below-

(Rs. in Lakh)

Sl. No.	Particular of the scheme	Estimated cost	Fund released upto March 15	Amount recommended for release / released during 2015-16	Status
	West Bengal				
1	Protection of IBB Road Fencing Bridge & Gate near village Mahismari	505.36	237.5	210.52	Completed in April 2013
2	Bank protection work at Jhaukuthi area	394.6	185.5	184.13	Completed in January 2013
3	Protection of IBB Road and Fencing at Kayatribari	100.15	47.5	**39.79**	Completed in February 2013
	Total	**1000.11**	**470.5**	**434.44**	
	Tripura				
1	Jenai to Beltali (Segment-I)	1161.57	580.79	290.39	
2	Baishnpur to Barunighat (Segment-II)	833.89	416.95	208.47	
3	Anandapara to Chotokhil (Segment-III)	1374.53	634.00	370.26	
4	Ranirbazar to Ramendra Nager (Segment-IV)	1234.25	617.13	306.06	
5	Harbatali to Amlighat (Segment-V)	909.11	454.55	227.28	
	Total	**5513.35**	**2703.42**	**1402.46**	

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.

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.

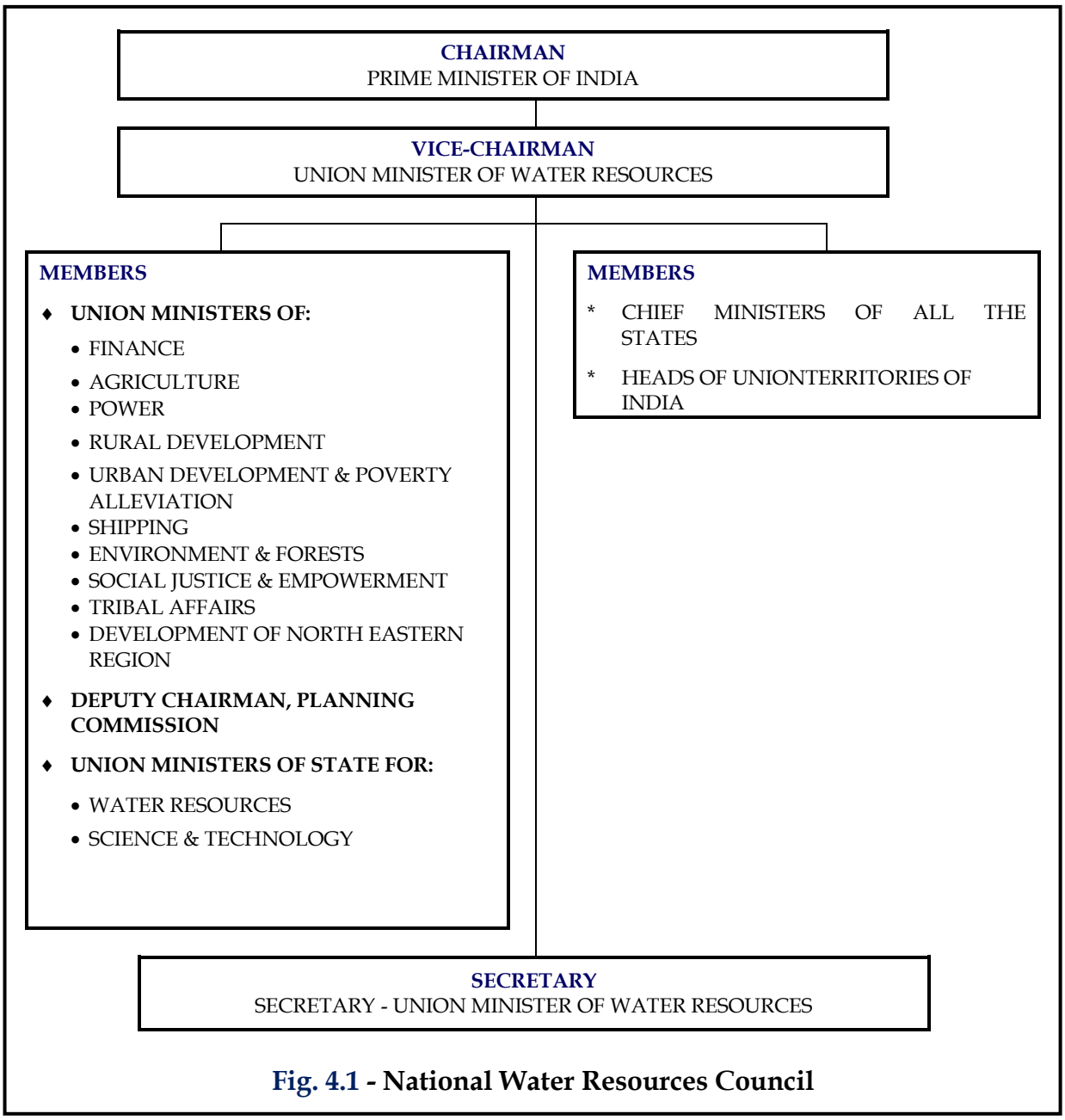


Fig. 4.1 - National Water Resources Council

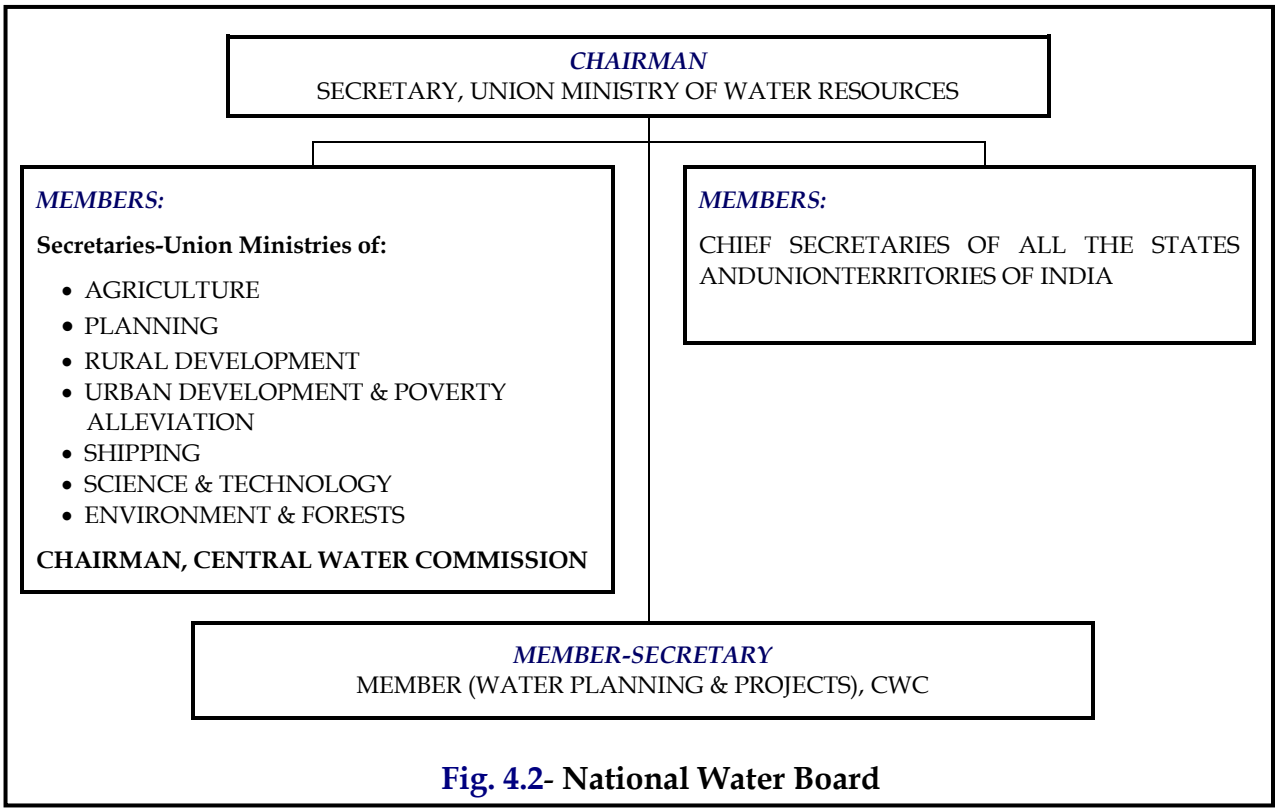


Fig. 4.2- National Water Board

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 revised in 2002. Subsequently, the National Action Plan on Climate Change (NAPCC) adopted by the Government of India in ___ envisaged the need for review of National Water Policy. It inter-alia stated that "the National Water Policy would be revised in consultation with states to ensure basin level management strategies to deal with variability in rainfall and river flows due to climate change". Accordingly, the Ministry of Water Resources initiated the process of revision of National Water Policy 2002. Various workshops were organized for consultation with Policy Makers, Academia, Experts and Professionals, NGOs and Panchyati Raj Institutions for review of National Water Policy. The "National Water Policy – 2012" was finally adopted by the National Water Resources Council in its 6th meeting held in December 2012.

Later a Committee was constituted by the MoWR for suggesting roadmap for implementation of National Water Policy - 2012 under the Chairmanship of Dr. S.R. Hashim, Former Chairman, UPSC & Former Member, Planning Commission. The Committee has submitted its report in September, 2013. The roadmap for implementation of the National Water Policy – 2012 prepared by the Committee constituted by MoWR, RD&GR is likely to be discussed in the next meeting of the National Water Board. National Water Planning Directorate has been closely associated with the process of preparation of the roadmap for implementation of the policy.

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

4.5 Integrated Water Resources Management

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 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. MoWR,RD&GR vide their order dated 30.01.2015 conveyed the Administrative Approval and Expenditure Sanction for the study with a total estimated cost of Rs. 6.44 Crore. Accordingly, two customized trainings for the studies were conducted by NRSC from 25-29 May and 05-16 Oct, 2015 at NRSC, Hyderabad for officers of CWC involved in the study.

Later, it was found that the estimated cost of the study will have to be been enhanced mainly due to increase in the cost of the software required for study. Accordingly, a revised proposal was submitted to MoWR,RD&GR for approval in February, 2016. MoWR,RD&GR vide its order dated 22.03.2016 conveyed the approval for revised estimated cost of the study amounting to Rs. 10.33 Crore.

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 most of the field offices. The process for signing of MoU with NRSC for their support for the study is under progress. The work for study will be started after finalisation of MoU with NRSC for their support.

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 work for generation of various scenarios, including the impacts of climate change, for Baitarani basin is under progress. The project will continue up to June, 2016.

4.7 Interaction with NWDA on Inter–Basin Transfer of Water

The National Water Development Agency is engaged in carrying out water balance studies, link canals studies for diversion of surplus waters to water deficit areas including inter-basin transfers and field surveys and investigations for preparation of feasibility reports of the link canals for water resources development with a national perspective. Now NWDA's function has been extended/amended to prepare pre-feasibility/feasibility/DPR 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 62 meetings of the Governing Body have been held.

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 the forecasting activity has been started from April 2012. Refinements of models are under progress as per observed data received from field offices of CWC.

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". Management Committees have been constituted for each of the Institute separately under the chairmanship of Chairman, CWC which has to meet once in a year.

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.

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 28 meetings of JOC have taken place. The last meeting (28th meeting) was held in New Delhi on 16th October 2015 in which the actual releases made from Rihand reservoir during 2014-15 were discussed and the operation plan for 2015-16 was finalized.

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 59 projects has been carried out in the design organisations of D&R Wing during the year 2015-16 as under:

Sl. No.	Category	No. of Projects
1.	Projects at construction stage.	30
2.	Projects at investigation and planning stage (for which detailed project reports are being prepared)	13
3.	Projects with special problems	16
	Total	**59**

This includes 5 foreign projects, 1 in Afghanistan and 2 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

I. 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, namely, Arjun, Kabrai and Chandrawal. The construction stage design and drawing for the earthen dam, head sluice outlet and its entrance block of feeder canal from Arjun Dam and Kabrai Main Canal have been prepared. Three (3) drawings of Right Training Wall at upstream side were finalised and issued to Project Authorities. Design Memorandum for Right Training walls has been prepared.

II. 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. Specification drawings have already been issued. Project authority is finalising the agency for execution of the project. Construction drawings are to be taken up.

III. Kalisindh Dam Project, Rajasthan

All the construction drawings have been vetted and issued to the Project Authorities. Construction of dam completed under Phase-I in June, 2014. Phase-II construction is yet to be started. Issues regarding widening of downstream river section are under examination. Review comments on further hydraulic studies on 3D Model study report of IRI, Roorkee is under progress.

IV. Kharkai Barrage under Subarnarekha M.P.P. ,Jharkhand

13 Nos. construction drawings pertaining to head regulator, flared out wall double pier and fish pass have been issued during the period. Scrutiny of 29 Nos. construction stage drawings of Hydro-mechanical equipments are also under progress.

V. 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. This project has been declared as a National Project and design consultancy will be provided by Design (N&W) Unit. CWC team visited the project in August 2015. It was decided to finalise the overflow & non-overflow section for the onward submission to project authorities to get the dynamic analysis done based on MEQ studies. Over Flow and Non over Flow Section are in the process of finalisation.

VI. Koteshwar H. E. Project, Uttarakhand

Project has already been commissioned. Technical Consultancy for the post commissioning balance civil work is continued to be provided.

VII. Lhasi Medium Irrigation Project, Rajasthan

Major revisions/modifications in 8 Nos. of construction drawings related to spillway in respect of gate arrangement & protection works in immediate downstream of spillway bucket have been finalized.

VIII. 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 related to various hydro civil & mechanical components of the project, as and when necessary, are being provided by Central Water Commission to WAPCOS. Design & drawings of civil structure have already been vetted/examined and released to WAPCOS in a time bound manner.

IX. Tapovan Vishnugad Project – NTPC, Uttarakhand

The Tapovan Vishnugad Project is situated on river Dhauliganga / Alaknanda in the district of Chamoli about 280 Km. from the nearest rail head Rishikesh. The Project envisages construction of an underground Power House with installed capacity 4x130 MW. The Project consists of Barrage, Surface Desilting Basin, Intake Structure, Head Race Tunnel and Penstock. Silt flushing tunnel is envisaged to flush off accumulated silt back into river Dhauliganga. Project consisting of 11.7 Km long head race tunnel is being constructed by conventional 'Drill & blast method' as well as with the help of Tunnel Boring Machine. The detailed design of the above mentioned structures, the corresponding construction drawings of this structure as per requirement of project authorities and also assistance to site specific problems are being provided by CWC. 46 Nos. Construction Drawings and 03 Nos. revised drawings and Design memorandum on Control Room Building (Super Structure) and Generator Barrel were issued during the period.

X. Loharinag Pala HEP (600MW) - Uttarkashi, Uttarakhand

Loharinag Pala Hydro Project which was under construction on river Bhagirathi, has been discontinued by Ministry of Power (MoP), GoI in December, 2010 as per the direction of National Ganga River Basin Authority. CWC is engaged in safety measures works in the project area to mitigate the hazards associated with leaving the project incomplete. Construction/Tender drawings are being issued as per requirement from Project Authorities from time to time.

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

Punatsangchhu-I H.E. Project which intercepting total catchment area of 6390 sq. km. envisages construction of a concrete gravity type dam, 130m high above the deepest foundation and 240.0 m long at the top. The overall length of the spillway section of the

dam is 120.0 m comprising of seven nos. of sluice spillway bays, each of 8 m width with crest elevation at 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 12.49 MCM and live pondage of 5.00 MCM between MDDL 1195m and FRL 1202m to enable the power station envisaged under the project, to cater to diurnal variations in power requirements. The project has an installed capacity of 1200 MW and construction of the project is underway.

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

The Punatsangchhu-II H.E. Project envisages construction of 86m high concrete gravity dam with an installed capacity of 1020 MW. The dam is located 29km downstream of the Wangdue Bridge and 3 km downstream of TRT outfall of PHEP-I on Wangdue Tshirang National Highway. The dam comprises of seven sluice blocks and five non-overflow blocks. The length of the dam is 213.00m. The top of dam is at El.846.00m with FRL at El. 843.00m and MDDL at El.825.00m. Seven sluices of gate size 8m (w) x 13.2m (H) have been provided at EL.797.00m for discharging simultaneously PMF of 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.

XIII. Garudeshwar Weir Project:

Garudeshwar Weir to be constructed across Narmada river 12.10 KM downstream of Sardar Sarovar dam has 389m long rockfill dam on left bank, 1137m long proposed concrete gravity type weir comprising a total of 38 blocks (29 OF blocks and 9 NoF blocks). The purpose of constructing the weir is to create reservoir pool on the downstream of Sardar Sarovar dam for enhancing power generation capacity of Sardar Sarovar Power House using turbine in pumping mode during lean power demand and generation mode during peak demand.

XIV. Halon Irrigation Project:

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

XV. Upper Narmada Irrigation Project:

This project envisages construction of 2.12 km long composite dam of maximum height of 35.80 m near village Rinatola of Mandla District of Madhya Pradesh and proposed to irrigate 3879 hectares of CCA of Rajendranagaram Tehsil of Shahdol district and 17397 ha CCA of Dindori Tehsil of Madhya Pradesh with an Irrigation intensity of 143%. The proposed project site is located at 70 km from the origin of Narmada river. The main dam consists of overflow blocks (concrete dam) and the length of the spillway is 224 m with 12 Nos. of 15.0m x 9.15m size crest gates.

XVI. Upper Beda Dam Project:

The Upper Beda Project is an irrigation project and comes under the category of medium projects. The proposed Upper Beda Dam is situated near Bhikhangaon in Khargaon District, MP across river Beda in Narmada Basin about 70 Km from Khandwa and 150 Km from Indore. This is a composite dam consisting of an earthen embankment 2206m long (max. height 23.73m) and masonry dam (Spillway + NOF) of 191m long with maximum height of 40m. It will provide an annual irrigation to 13365 hectare with irrigation intensity of 135%.

XVII. Lower Goi Project:

The project is proposed on the river Goi, which is a tributary of the river Narmada. Dam site is situated in Lower Narmada Zone in District Barwani. The site is located at a distance of 21 Km. from Barwani District Head Quarter. The project envisages construction of 2226.50 m long earth dam having maximum height of 43.80 m and side spillway 203.50 m long with 10 nos. gates of size 13.5 m x 12 m located in the river bed. Gross storage capacity of the project is 143.18 MCM whereas the river capacity is 112.24 MCM. Irrigation is proposed through a tunnel of 2.60 m diameter and 5.7 km long on the right flank. Net cultivable command area proposed for irrigation is 13760 ha. and an annual irrigation @ 130% intensity i.e 17888 ha.

Projects at DPR Stage

I. Par-Tapi-Narmada Link Project, Gujarat / Maharashtra

CWC is rendering consultancy for preparation of DPR for the proposed Par- Tapi-Narmada Link Project. It envisages transfer of surplus water from west flowing rivers between Par and Tapi to water deficit areas in North Gujarat. There are 6 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. Total 376 nos DPR stage drawings have been issued.

II. Saptakosi & Sunkosi Multipurpose Project, 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.

III. Pancheshwar Multipurpose Project (Indo-Nepal)

An 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). CWC officers visited the project site in July 2015. Alternative layout studies are being carried out for power house, dam and spillway. WAPCOS has requested for time extension for completing and submission of the updation of DPR. Design and Preparation of drawings in respect of Spillway and Gooseneck connection to diversion tunnels and various hydel civil components such as intake, pressure shaft, power house complex, TRT are under progress. Total 58 nos. of drawings were prepared and issued to WAPCOS during 2015-16.

IV. Ujh Multipurpose Project, 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. All the 37 drawings and design chapter prepared and have been incorporated in the DPR prepared by IBO, CWC, Chandigarh. Drawing and design chapters related to Ujh Multipurpose Project of 26 MW have also been completed & submitted to IBO, CWC.

Special Problems Projects

1. Rehabilitation of Garada Dam (Rajasthan)

The Garada Project is a medium irrigation project developed for meeting the irrigation and drinking water requirements of the Bundi District region. The Garada Dam has been constructed on river Mangli, Doongri and Ganeshi Nalla near Holaspur village in Bundi Tehsil of Bundi District. The Garda Dam has been designed as a zonal earthfill dam comprising of central impervious core with semi-previous upstream and downstream shell. The work on the dam commenced in the year 2003-2004 and completed in the year 2008-09. The reservoir filling commenced in the year 2010-11 (since July 26, 2010). The dam breached on August 15, 2010 when the water level in the reservoir was at EL 291.0m (FRL-295-90m, Reservoir Deepest bed surface level 269.04m). The Rajasthan Government, thereafter, conducted an enquiry into the incident which concluded that the breach was primarily due to deficiencies in the construction process of closure section.

2. Pulicat Lake, Andhra Pradesh

Director, BCD (NW&S) visited Pulicat Lake as member of the Committee constituted in the context of PMO reference on the opening of mouths at Tettupets and Raidoruvu between sea (Bay of Bengal) and Pulicat Lake from 13.04.2015 to 16.04.2015. Interim Report on remedial measure have been submitted. Final Report will be submitted after additional survey by National Institute of Ocean Technology, Chennai.

3. Parichha Dam (Betwa River), Uttar Pradesh:

Director, BCD (NW&S), Director (CMDD) NW&S and Director (Gates) NW&S visited Parichha Dam (Betwa River) and Bariyarpur Weir (Ken River) on October 14-15, 2015 as a member of CWC team for assessing renovation and modernization requirement of these structures. Joint Inspection Report has been submitted.

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

Director, BCD (NW&S) visited Rajasthan Feeder, Indira Gandhi Main Canal and Sirhind Feeder in the territories of Punjab, Haryana and Rajasthan during the period Nov. 16-18, 2015 as a member of CWC Team to assess seepage losses, water logging problems and irrigation aspects for the proposed relining of these canals. Joint Report prepared and submitted to MoWR, RD &GR.

5. DPR of remodeling of Right Bank Low Level Canal, Andhra Pradesh

DPR received from Tungabhadra Board was examined and comments/suggestions sent to the Chairman, Tungabhadra Board.

6. DPR of remodeling of Right Bank High Level Canal, Andhra Pradesh

DPR received from Tungabhadra Board examined and site visit undertaken to the project. Inspection note and observations/ suggestions sent to the Chairman, Tungabhadra Board.

7. Srisailam Right Bank Hydro Electric Scheme, (Andhra Pradesh)

Strengthening measures for B-line wall of power house of Srisailam Right Bank Hydro Electric Scheme has been suggested to the Project Authority.

8. Rampur H.E.Project, Himachal Pradesh

AGM, Design Department of SJVNL Shimla informed CWC that vibrations have been noticed in the existing trash rack structures of Rampur H.E.Project. CWC officers had visited the site and held discussions with SJVNL officers at the site as well as at CWC (HQ), New Delhi. Proposal of replacing trash rack submitted by SJVNL has been examined by CWC and further course of action has been suggested to SJVNL.

9. Dah and Hanu, Jammu & Kashmir

Dah and Hanu Small Hydroelectric Projects are located in Laddakh District of Jammu & Kashmir on Dah nala and Hanu Nala, a tributary of river Indus. The project sites are located at about 160/180 km from Leh city. Examination of possibility for exclusion/provision of Surge Shaft in both projects has been referred by WAPCOS Ltd to CWC. Studies and documents submitted by the WAPCOS Ltd has been examined in HCD (NW&S) Directorate. CWC's observations on the matter have been conveyed to WAPCOS Ltd and further analysis submitted by WAPCOS Ltd is under examination.

10. Jeori Small H.E.Project, Himachal Pradesh

Jeori Small HEP (9.6MW) has been proposed in the close vicinity of Head Race Tunnel of Nathpa Jhakri Hydro Power Scheme (1500 MW). GM, Civil (Design) SJVNL informed CWC about the matter for safeguarding the HRT of NJHPS as HRT of the Jeori SHEP proposed to pass over and above the HRT of NJHPS. CWC examined the documents

submitted by SJVNL and conveyed its views regarding location of Weir and Water conductor system of Jeori SHEP

11. Indira Sagar Project , Madhya Pradesh

Rehabilitation of damaged slotted roller bucket is under progress based on drawings issued by CWC. Consultations provided for construction problems referred by Project Authority as and when required.

12. 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.

13. Additional Spillways for Hirakud Dam, Odisha

For increase the design flood additional spillway is proposed to be provided for the safety of Dam.

14. 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.

15. Ken Betwa Link-I, Parichha Wier, Uttar Pradesh

Rehabilitation/ Proposal for new barrage is under examination.

16. Sardar Sarovar Project, Gujarat:

i)The adequacy of design of Pier reinforcement considering 20% less reinforcement after the damage in reinforcement, ii) Remedial measures for additional safety and iii) Provision for fixation of Hydraulic Hoist in respect of piers of Sardar Sarovar Project are being carried out.

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.

DPRs of various projects as mentioned below were submitted by the project authorities for technical examination. A list of 68 projects for which technical examination has been completed or under examination is as follows:

Hydro-Electric Project(28 nos.):

S.No.	State	Name of the Project
1	Arunachal Pradesh	Kamala H.E.Project (1800 MW)
2	Arunachal Pradesh	Subansiri Lower H.E.Project (2000 MW)
3	Arunachal Pradesh	Subansiri Upper H.E.Project (1800 MW)
4	Arunachal Pradesh	Attunli H.E.Project - Cleared
5	Arunachal Pradesh	Oju H.E.Project
6	Arunachal Pradesh	Tato-I H.E.Project – Cleared
7	Arunachal Pradesh	Noa-Dehing H.E. Project
8	Himachal Pradesh	Thana Plaun H.E. Project (191MW) - DPR Level-I
9	Himachal Pradesh	Nakthan H.E. Project (520 MW) - DPR Level-I
10	Himachal Pradesh.	Dugar H.E. Project (30MW) DPR Level-I
11	Himachal Pradesh	Reoli Dugli H.E. Project (420+9.2MW) - DPR Level-I
12	Himachal Pradesh	Luhri H.E. Project Stage-I (184 MW)
13	Himachal Pradesh	RCE of Chamera Stage-III (231 MW)

S.No.	State	Name of the Project
14	Himachal Pradesh	RCE of Parbati Stage-II HEP (800 MW)
15	Himachal Pradesh	R&M for life extension of Proposal of Baira-Suil Hydro Power station – Cleared
16	Himachal Pradesh	Sach Khas H.E. Project (260+7MW) - Cleared
17	Jammu & Kashmir	Kiru H.E. Project (660MW) - Cleared
18	Jammu & Kashmir	Kwar H.E. Project (660MW)
19	Jammu & Kashmir	Bursar H.E. Project (800MW)
20	Jammu & Kashmir	Kirthai-I H.E Project (390MW)
21	Jammu & Kashmir	Sawalkot H.E Project (1856MW) - Cleared
22	Manipur	Loktak Downstream H.E. Project - Cleared
23	Meghalaya	Umngot H.E.Project
24	Meghalaya	Mawphu H.E. Project(75 MW) – Layout cleared
25	Mizoram	Turial H.E.Project (60 MW) – Revised cost estimate
26	Uttarakhand	Tiuni Plasu H.E. Project
27	Uttarakhand	Bowalanand Prayag H.E. Project, - Cleared
28	Uttarakhand	Sirkari Bhyol Rupsiyabagar H.E. Project

Irrigation Project (33 Nos.)

S.No.	State	Name of the Project
1	Andhra Pradesh	Pulicat lake at Tellupeta & Raidoruvu between the sea and Pulicat Lake (Special Studies.)
2	Andhra Pradesh	B.R.R.Vamsadhara Project in Srikakulam District - Phase-II of Stage-II
3	Andhra Pradesh	Remodelling of Right Bank High Level Canal of Tungabhadra Board of A.P.
4	Andhra Pradesh	Remodelling of Right Bank Low Level Canal of Tungabhadra Board
5	Bihar	Burhi Gandak None-Baya Link Project
6	Bihar	Kosi Mechi Interstate Link Project

S.No.	State	Name of the Project
7	Chhattisgarh	Arpa Bhaisajhar Barrage Project
8	Chhattisgarh.	Rajiv Samoda Nisda Phase-II
9	Gujarat & Maharashtra	Damanganga Pinjal Link Project – Cleared
10	Haryana	Mewat Feeder Canal
11	Haryana	Proposal of ERM of Surface Irrigation Schemes
12	Himachal Pradesh	Renuka Dam Project
13	Jharkhand	Burhai Reservoir Project
14	Jharkhand	Kanhar Barrage Project
15	Karnataka	Yettinahole Flood Water Project
16	Karnataka	Shiggon Lift Irrigation Scheme
17	Maharashtra	Sulwade Lift Irrigation Project – Cleared
18	Maharashtra	Jihea Kathapur Lift Irrigation Scheme
19	Maharashtra	Lower Tapi Project
20	Madhya Pradesh	ERM of Sanjay Sarovar (Upper Wainganga) Project
21	Madhya Pradesh	Bina Complex Irrigation & Multi Purpose Project
22	Punjab	Relining of Sirhind Feeder Canal, Punjab – Cleared
23	Punjab	Relining of Rajasthan Feeder Canal - Cleared
24	Rajasthan	DPR of Relinging of IGF RD 496 to 671 & IGMN RD 0 to 200.
25	Rajasthan	Rajasthan Water Sector Restructuring Project in Desert Area
26	Rajasthan	ERM works in IGMN Stage-I, Excluding KSL
27	Rajasthan	Rehabilitate Water-logged Area of IGMN Stage-I
28	Rajasthan	Diversion of Drinking Water supply in IGNP
29	Telengana	Dr. B.R. Ambedkar Pranahita Chevella Sujal Sarvanthi Project
30	Uttar Pradesh	Bhaunrat Dam Irrigation Project

S.No.	State	Name of the Project
31	Uttar Pradesh	Flood protection work on right bank of Ganga from Kalyanpur- Bithoor road to Ganga Barrage
32	Uttar Pradesh	Badaun lift Canal Irrigation Project,
33	West Bengal	Turga Pumped Storage Project – Layout Cleared

Multi Purpose Project (7 nos.)

S.No.	State	Name of the Project
1	Assam	Kulsi Multi Purpose Project
2	India & Nepal	Pancheshwar Multi Purpose Project
3	India & Nepal	Sapta Kosi High Dam Multi Purpose Project
4	Jammu & Kashmir	Ujh Multi Purpose Project
5	Madhya Pradesh	Mohanpura Major Multi Purpose Project
6	Madhya Pradesh	Sher-Shekkar-Machhrewa Multi Purpose Project
7	Uttarakhand	Lakhwar Multi Purpose 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 2015-16, 144 projects were technically appraised in HSO from hydrological studies point of view. Out of this, 75 projects have been cleared and the observations were conveyed to the project authorities for compliance in respect of remaining projects

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

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

(c) Development of Hydrological Design Aids (HDA) under Hydrology Project-II

Development of Hydrological Design Aids (HDA) has been taken up under Hydrology Project-II to streamline and standardize the current hydrological design practices. The work of development of HDA is being carried out by Central Water Commission through Consulting Engineers Services (India) Pvt. Ltd. The duration of the study is 37 months. The HAD (SW) has following three major components as listed below.

1. Assessment of Water Resources Potential - Availability/Yield (HDA-Y)
2. Estimation of Design Flood (HDA-F) and
3. Sedimentation Rate Estimation (HAD-S)

The final report of Sedimentation Rate Estimation (HAD-S) has been submitted by the consultant.

(d) Preparation of Generalized Probable Maximum Precipitation (PMP) Atlas

Design precipitation (viz. PMP/SPS) estimates, are basic inputs in computing design flood magnitudes. Estimation of design storm depths has been found to be a major bottleneck in design flood studies since necessary data and expertise is available with only a few organizations like IMD and CWC. To overcome this, it was decided to publish generalized PMP Atlases covering the whole country, to give a first hand - estimate of design storm depths. The existing PMP Atlases prepared in the nineties are being widely used. Further work of preparation of new PMP Atlases and updating of existing PMP Atlases as listed under has been taken up in the XI plan scheme "Dam Safety Studies and Planning":

(i) Preparation of New PMP Atlases for:

- Ganga River Basin
- Brahmaputra River Basin

(ii) Updating of six existing PMP Atlases for:

- Cauvery and other East Flowing Rivers
- Godavari and other East Flowing Rivers.
- Mahanadi and Adjoining Rivers Basins.
- Chambal, Betwa, Sone and Mahi Basins.
- Narmada, Tapi, Sabarmati, Banas and Luni River Systems and Rivers of Saurashtra & Kutch Region.
- West Flowing Rivers of Western Ghats

The study has been completed in all respects in June, 2015 and the reports were circulated to the states, IITs and important academic institutes.

(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.

(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 coastal 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. Two meetings of the committee have been held on 30th September and 27th November, 2014. Four chapters of draft report on "Salinity ingress problem in coastal areas of coastal States/UTs of the country" has been prepared and circulated to the concerned coastal States/UTs in December, 2015 for comments and updates from States/ UTs side. Additional information is received from Gujarat, Maharashtra & Andhra Pradesh: other States are yet to respond.

(g) Technical Co-ordination

CWC is represented on a large number of committees under many organizations relating to Hydrology. HSO interacts with organizations /Committees such as National Institute of Hydrology, Indian National Committee on Surface Water, Bureau of Indian Standards (BIS), India Meteorological Department, World Meteorological Organisation etc. Some Committees related to Hydrology which are dealt in HSO are as under:

(i) Environmental Appraisal Committee (EAC) for River Valley & Hydroelectric Projects in MoEF

(ii) Yamuna Standing Committee

(iii) National Institute of Hydrology Society

(iv) Governing Body of National Institute of Hydrology

(v) Technical Advisory Committee of National Institute of Hydrology

(vi) Working Group of National Institute of Hydrology

(vii) World Metrological Organization

(viii) National Water Development Agency

(ix) Hydrometry Sectional Committee (WRD-1) of Bureau of Indian Standards (BIS)

(x) Reservoir & Lakes Sectional Committee (WRD-10) of Bureau of Indian Standards (BIS)

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 Modeling and foundation problems.
- Computer Aided Designs.
- Rehabilitation of aged & distressed dams

The Dam Safety Organisation, CWC has received ISO 9001: 2008 certification for its Quality Management Systems from the Bureau of Indian Standards during the year 2015. Central Water Commission also received "CBIP Award 2016" for promoting Health and Safety of Large Dams under DRIP.

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, 2016 there are 5174 large dams in the country, out of which 4862 are completed and 312 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 three new members i.e State of Himachal Pradesh, State of Telangana and Meghalaya Power Generation Corporation (MePGCL) have been included. The Committee now consists of 31 members from 18 States and 5 other organizations. The 35th and 36th meetings of NCDS were held on 28.09.2015 and 11.01.2016 respectively.

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 225 large 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 31.03.2016 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.
- Preparatory Activities for rehabilitation completed for 208 dams.
- 187 tender documents prepared. NIT issued for 183 dams, while work awarded for 150 dams.
- Training programs with focus on DRIP implementation were initiated well in advance for building up in-house technical capabilities of participating states. 46 (Forty six) trainings conducted by the CPMU, wherein about 1550 officials trained on different aspects of DRIP implementation.
- Works for Asset Management Tool (Dam Health and Rehabilitation Monitoring Application) is in advanced stage.
- Two National Dam Safety Conferences organized, First at IIT Madras (24-25th March, 2015) & Second at IISc, Bangalore (12-13th Jan, 2016).
- Study regarding unusual dam behaviour and distress in respect of Iddukki Arch Dam; Geophysical investigation for 3 dams; De-siltation study for 3 dams have been completed
- Major intervention for Hydro Mechanical (HM) works of very old dams initiated. For example- Krishna Raja Sagar Dam in Karnataka.
- People-inclusive approach for Dam Safety for additional spillway work of Hirakud dam.
- Vital activities of Emergency Action Plan (EAP) agreed for all DRIP dams; activities in process.
- So far 13 (thirteen) meetings of Technical Committee for DRIP have been held. World Bank has also completed seventh of its Review Missions, wherein road blocks as well as way forward in project implementation have been discussed.

The project has a very good progress in terms of physical indicator such as review of design flood for the DRIP dams, inspection by Dam Safety Review Panel, evaluation of project screening template, preparation of tender documents, capacity development of the officers/staffs of Dam Safety Organizations by organizing various dam safety related trainings, site visit etc.

Total expenditure incurred under DRIP up to March 2016 is Rs. 293 Crores. The financial progress has been slow owing to complex project preparation requirements of the project. Project is now gearing up and it is expected that financial progress will improve subsequently with more number of work awards.

5.4.4 Consultancy Services on Instrumentation in Hydraulic Structures

Detailed Project Report/ Compliance report of seven (7) river valley projects in various States namely, Arunachal Pradesh, Assam, Manipur, Uttarakhand and West Bengal have been examined, out of which six (6) projects have been 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: Hirakud Dam- additional spillway on the left of Gandhi Hillock.
(ii) Preparation of Instrumentation drawings: 04 nos. instrumentation drawings of Punatsangchhu-I, Bhutan have been prepared and submitted.

5.4.5 Seismic and Foundation Aspects

Detailed Project Reports (DPR) of 13 Nos. of river valley projects in various States, namely, Arunachal Pradesh, Jammu & Kashmir, Meghalaya, Manipur, Uttarakhand and West Bengal were examined with respect to geological investigations related to foundation engineering and Seismic aspects. 7 Nos. of DPR's have been cleared and compliance from the project authorities is awaited in respect of 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 2015-16, two meetings (29th & 30th) of NCSDP were held. In the 29th meeting, held on 19th May, 2015 the Committee discussed the issues of estimation of possible zone of effect of any future earthquake based on its magnitude and location of epicentre, so as to generate information on the large dams located in the affected area. The 30th meeting of NCSDP was held on 15thSeptember, 2015 wherein the site specific seismic study reports of 11 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. 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 of Nakthan H.E Project, Himachal Pradesh has been examined and observations were issued. Alkananda H.E.P, Uttarakhand and Dibang Multi Purpose Project, Arunachal Pradesh has been examined and cleared. Further, Dam Break Analysis in respect of Subansiri Lower Project (SLP), Arunachal Pradesh has been completed and report issued to concerned project authorities.

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 2015-16, 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	
			2014-15	2015-16
Number of Reservoirs			85	91
Total Designed live storage in BCM			155.046	157.799
ACTUAL STORAGE	On June, 1st (Start of Monsoon)	In BCM	42.621	41.857
		In % of Designed Live Storage	27.5	26.5
		In % of last 10 Years Average Live Storage	154	136
	On September, 30th (End of Monsoon)	In BCM	121.885	95.693
		In % of Designed live Storage	79	61
		In % of last 10 Years Avg. live Storage	103	77

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, a sub scheme under the scheme DWRIS namely "Telemetry Based Reservoir Monitoring System" with the estimated cost of ₹15.00 Crore has been framed and the same has been approved. The scheme is proposed to be executed during the XIIth Five Year Plan.

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 under the component namely "Telemetry Based Reservoir Monitoring System" under the DWRIS scheme with an estimated cost of Rs.15.00 crore for 12th Plan period.

6.2 Cauvery Water Bulletin:

Weekly storage position of five important reservoirs in the Cauvery basin is also monitored and a bulletin is issued every week .It includes four reservoirs of Karnataka namely Kabini, Hemavathy, Harangi, Krishnaraja Sagar and one reservoir in the state of Tamilnadu namely Mettur. Four such bulletins are issued every month.

6.3 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 21.05.2013. So far one meeting of the reconstituted ICAR-CWC joint panel has been held.

6.4 Reservoir Sedimentation-Capacity survey of Reservoirs

6.4.1 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 XI plan, the capacity survey work of 36 reservoirs has been completed.

During XII plan, the capacity survey work of 25 reservoirs has been targeted. Process for taking up Capacity Survey of 8 reservoirs out of these 25 reservoirs has been initiated.

A "Compendium on Silting of Reservoirs in India" was published by CWC in April 2015. The compendium is based on data on 243 reservoirs in the country as provided by the dam owners including data of 36 reservoir capacity survey carried out by CWC.

6.4.2 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 2015-16 is as under:

i.) CWC has completed in-house studies of Satellite Monitoring of AIBP funded project in respect of two projects namely, (i) Dudhganga Irrigation project (June 2015) and (ii) Bawanthadi Irrigation Project (October 2015). The high resolution (2.5 m) satellite data of Cartosat-1 were used in these studies.

ii.) Satellite Remote Sensing based Reservoir Sedimentation Assessment Study (In-house) of Gandhisagar Reservoir (Madhya Pradesh) was completed in December, 2015. Another similar study in respect of Ghatprabha Reservoir (Karnataka) is under progress.

iii.) The work for Sedimentation Assessment of 30 reservoirs using Remote Sensing Technique has been awarded to MERI Nashik. Out of this, work in respect of 9 reservoirs is in progress.

6.5 Project Performance Evaluation

Performance Overview and Management Improvement Organization (PO & MIO), Central Water Commission is undertaking Post Project Performance Evaluation and Water Use Efficiency studies of completed major/medium irrigation projects in the country. It is also involved in benchmarking of completed irrigation projects and implementation of water Audit and Water conservations in the States.

A) Post Project Performance Evaluation study of Completed Irrigation Projects:

The study 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 2015-16, the Post Project Performance Evaluation studies of following six major/medium irrigation projects are ongoing.

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

During 2015-16, the following five new proposals (2 in Uttar Pradesh and 3 in West Bengal) for conducting Post Performance Evaluation studies are in under process of approval.

(i) Gunta Nala Dam Project, Uttar Pradesh
(ii) Maudha Dam Project, Uttar Pradesh
(iii) Mayurakshi Reservoir Project, West Bengal

(iv) Kumari Irrigation Scheme, West Bengal
(v) Saharajori irrigation Scheme, West Bengal

B) Water Use Efficiency Studies in Irrigation System

Irrigation Sector is the biggest consumer of developed water resources and its share in the overall demand of water is about 80%. However, water use efficiency in irrigation sector is relatively low. Central Water Commission is undertaking water use efficiency studies of completed major/ medium irrigation projects in the country. The studies cover the following aspects of irrigation projects:

i. Reservoir filling Efficiencies (inflow and release pattern)
ii. Delivery System/Conveyance Efficiency
iii. On Farm Application efficiency
iv. Drainage Efficiency
v. Irrigation Potential created and utilized

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

In view of unsatisfactory progress, the Water Use Efficiency studies of following five major/medium irrigation projects have been recommended for foreclosure.

(i) Dekadong Irrigation Project, Assam.
(ii) Kaldiya Irrigation Project, Assam.
(iii) Singda dam Irrigation Project, Manipur.
(iv) Sekmai Barrage Irrigation Project, Manipur.
(v) Imphal Barrage Irrigation Project, Manipur.

Further during 2015-16, the process for awarding Water Use Efficiency studies of following four major/medium irrigation projects were under progress.

(i) Mahanadi Delta Stage-I
(ii) Baitarani Irrigation System
(iii) Bahuda Irrigation Project
(iv) Baghua Stage-I Irrigation Project

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 1456 projects have been considered and accepted by the Advisory Committee of Ministry of Water Resources on Irrigation, Flood Control and Multipurpose projects.

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 2015-16, 42 major/ multipurpose projects (27 new & 15 revised) have been appraised up to 31st March 2016. Out of that, 9 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 2015-16 is shown at **Fig-7.1**

7.3 Appraisal of Medium Irrigation Projects

During the year 2015-16, 10 medium projects (8 new & 2 revised) have been appraised in field units of CWC. Out of that, 3 medium projects (1 new & 2 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.

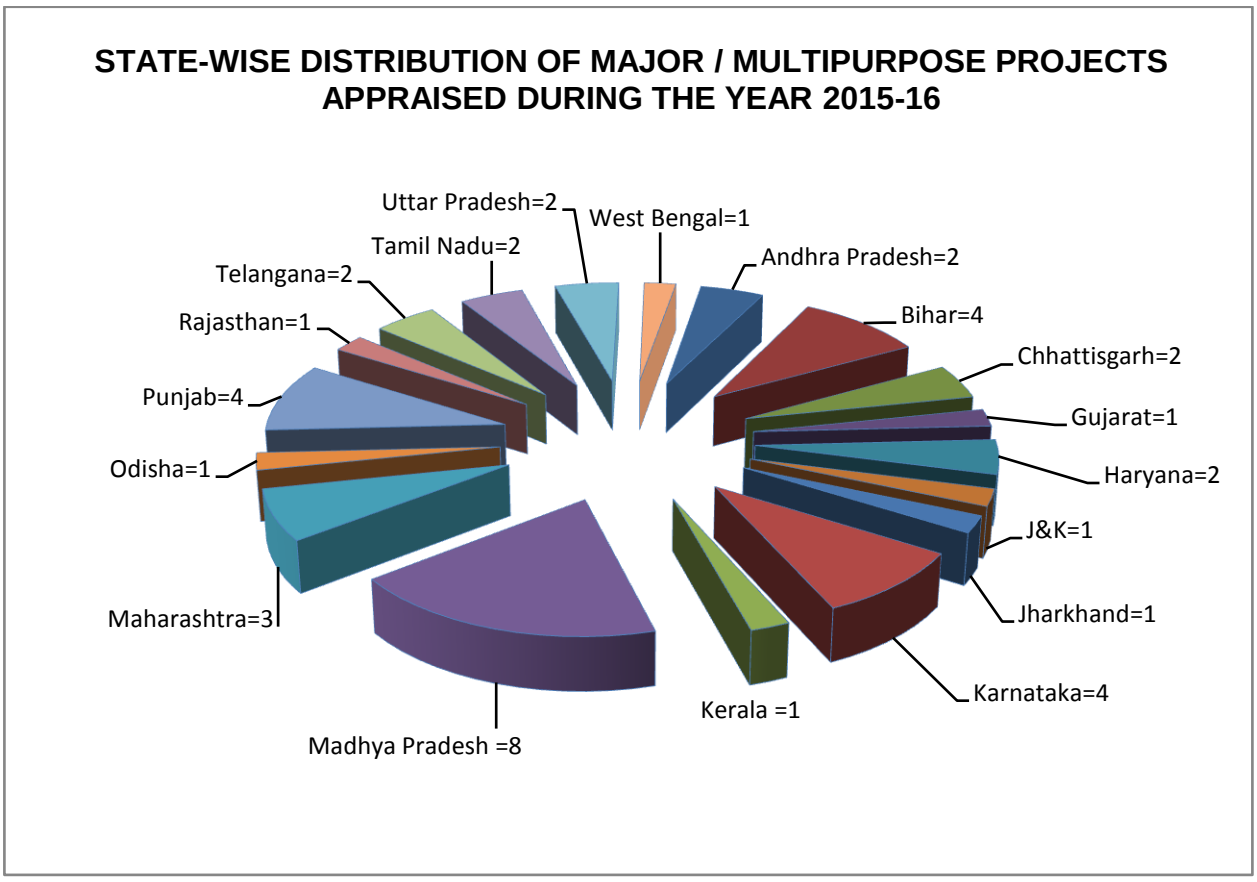


Fig. 7.1

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. Also internal review meetings were also chaired by Member (WP&P), CWC. During the year 2015-16, meetings with following review meetings were hosted by the Project Appraisal Organization in which issues related to projects were resolved:

i)	1st Internal review meeting by Member(WP&P), CWC	10.04.2015 at CWC HQ, New Delhi
ii)	2nd Internal review meeting by Member(WP&P), CWC	21.08.2015 at CWC HQ, New Delhi
iii)	1st Review meeting by Chairman, CWC	15.02.2016 at CWC HQ, New Delhi

7.5 Meeting of the Advisory Committee

During year 2015-16 the Advisory Committee of MoWR, RD & GR, under the Chairmanship of Secretary (WR) accepted 25 projects comprising 12 Major & Medium Irrigation / Multipurpose projects and 13 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 2015-16 envisages annual irrigation benefits to 984373 hectare in the 8 States of the country. The Flood Control Scheme, accepted during 2015-16 envisages protection to the population of about 20,21,587 persons & area of about 8,05,899 hectares in the states of Bihar, West Bengal, J&K, Himachal Pradesh, Uttar Pradesh and Jharkhand. Pie Chart showing State-wise distribution of 12 Nos. major & medium irrigation / multipurpose projects accepted by the Advisory Committee during the current year is enclosed as **Fig. 7.2**

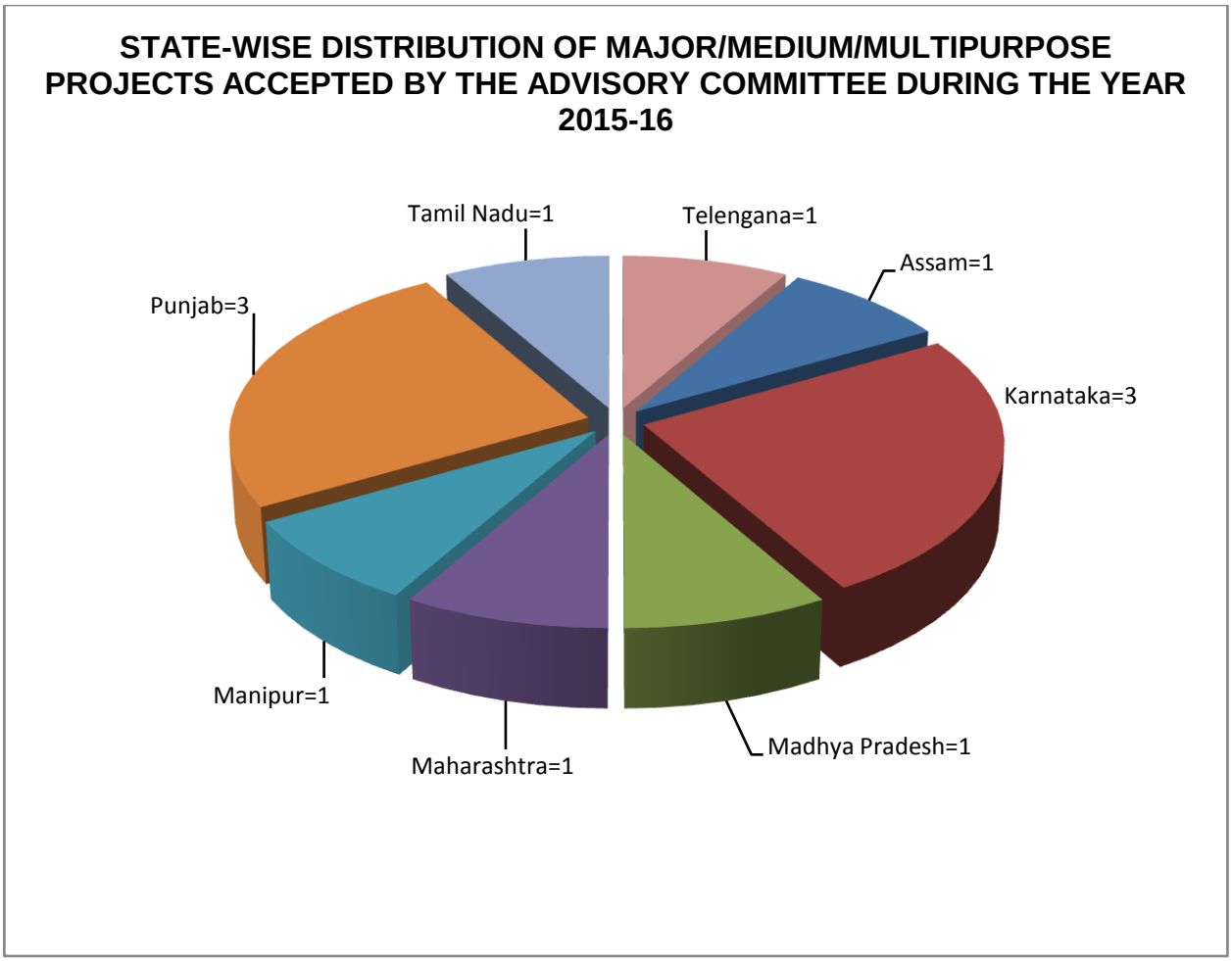


Fig. 7.2

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. Other aspects of Hydro-Electric Projects are appraised in CEA and TEC to the project is also accorded by the CEA. During 2015-16, CEA has accorded TEC to 2 Nos. Hydro-Electric Projects having total installed capacity of 426 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, 2016. 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 2016. Saryu Nahar Pariyojana started receiving funding under the scheme of National Project during 2012-13 and an amount of Rs. 1159.58 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. 850.00 crore has been released upto March 2016.

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.

Six projects, viz Renuka Dam Project (Himachal Pradesh), Kishau MPP (HP and UK), Ujh MPP (J & K), Ken Betwa link Ph-I (Madhya Pradesh), Noa-Dihing Dam Project (Arunachal Pradesh) and Kulsi Dam Project (Assam) are under appraisal in CWC/CEA.

Two projects, viz. Bursar Project (J & K) and Gyspa Project (Himachal Pradesh) are at DPR preparation stage. Remaining two projects, viz. 2nd Ravi Beas Link Project and Upper Siang Project are 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.

Nine meetings of High Powered Steering Committee for implementation of National projects have been held so far. The last meeting was held on 26th September, 2014

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 are in rural areas and balance 1000 water bodies in urban areas would be covered. The proposal of water bodies where the Integrated Water Management Programme (IWMP) is implemented/propose to be implemented would be considered for inclusion under the XII Plan scheme of RRR of water bodies.

Empowered Committee (EC) of MOWR,RD&GR under the chairmanship of Spl. Secretary/Additional Secretary (WR) in its two meetings held during the FY 2015-16 accepted 297 water bodies costing Rs 195.21 crore located in 3 states [Uttar Pradesh (66), Tamil Nadu (49) and Telangana (182)] for inclusion under the XII Plan scheme of RRR of water bodies.

Details of Projects accepted by Empowered Committee for inclusion under RRR during 2015-16

Sl No	State	No. of Water Bodies	Estimated Cost (Rs. in crore)
1.	Uttar Pradesh	66	46.33
2.	Tamil Nadu	49	23.426
3.	Telangana	182	125.454
	Total	**297**	**195.21**

Funds Released to States during 2015-16 under the XII Plan Scheme of RRR of Water Bodies

(Rs. in crore)

Sl. No.	Name of State	No. of Water Bodies	Total Project Cost	CCA to be restored (ha)	Fund released during 2015-16
1	Odisha	760	361.52	60026	54.75
2	Uttar Pradesh	20	49.50	3447	16.41
3	Rajasthan	32	89.688	7583	35.93
4	Tamil Nadu	105	54.68	2458	9.23
5	Telangana	182	125.454	6220	44.88
	Total	**1099**	**680.84**	**79734**	**161.20**

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 2015-16, 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 2015-16 is as under:

S. No.	Item	Target	Achievement
1	General Monitoring by Regional Offices	47	8
2	AIBP Monitoring by Regional Offices	149	57
3	Inter State Projects Monitoring by HQ	13 (out of the above 149)	3

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 Installment) after release of at least of 50% of State Share. And balance 10% (IInd Installment) after obtaining the UC of minimum of 50% of CA released earlier and
(ii) For projects receiving higher than 50 % CA: - 50% (Ist Installment) after the State releases its full Share and balance 50% (IInd Installment) 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.

A grant of Rs. 2327.80 Crores has been released to 33 Major & Medium Irrigation Projects under AIBP during 2015-16 till 31.03.2016. The cumulative total Central Loan Assistance / Grant provided to States is Rs. 55570.59 Crores under AIBP since its inception of the programme till 31.03.2016 to 297 projects.

The number of States benefited from the programme is 25 till 31.03.2016. 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.

As reported by the State Governments 8.858 Mha of additional irrigation potential has been created under AIBP since the start of the scheme till March, 2015.

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.

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.

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, 24 project reports of Irrigation, Power and Multipurpose projects of various states of the country were technically examined from plant planning angle. Out of these 14 projects reports were accepted with provisions worth Rs. 5049.97 Lakhs in respect of construction equipment. In respect of the remaining 10 nos. of project reports, the observations/comments were conveyed to the project authorities for compliance and further review.

9.3 Consultancy

MoUs was signed with NWDA regarding Three River inter-linking Projects viz., “Daman Ganga-Pinjal River Link Project”, “Par-Tapi-Narmada River Link Project” and “Ken-Betwa Link Project, Phase-2” for preparation of a chapter on "Construction Equipment Planning & Methods" including carrying out equipment planning, scheduling and preparation of construction programme. The same had been completed and was sent in September 2015.

Further, a chapter on Construction Methodology & Equipment Planning for Detail Project Report of Kirthai-II Project had also been prepared and sent to Executive Engineer, Chenab Division, CWC on 11.02.2016.

9.4 Manpower Planning

A study were conducted on "Expenditure & Employment Statistics in Major & Medium Irrigation Project (under construction) during XIth Five Year Plan period from 2007-08 to 2009-10". Necessary data pertaining to 156 M&MI projects were collected as per format. After scrutiny and validation of data, 92 (55 major and 37 medium) irrigation projects were taken up for study. Preparation of report is under progress.

A study was also 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, 80 Major & Medium Irrigation Projects with requisite information have been considered for the preparation of report.

9.5 Other Activities

- Punatsangchhu-I & II Hydro-Electric Project – Clarification on C2 factor for estimation of fuel and energy charges of Hauling Equipment.
- Vetting of updated Project Report of Tato-I Hydro Electric Project (3x62 MW), Arunachal Pradesh.
- Analysis of Acceleration of Dam Concreting of Punatsangchhu-II Hydro-Electric Project, Bhutan (1020MW) has been done and the final suggestion through "Minute of Meeting" has been provided.
- The proposal in respect of Jal Shakti Vikas Pump invented by Shri Syoraj Tany received from President's Secretariat was examined from technical angle and observation/comment were sent to President's secretariat and Shri Syoraj Tany.

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

10.1.1.1 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.

During the year 2015-16, 5th meeting of the Supervisory Committee was held on 28.09.2015 under the Chairmanship of Secretary, Ministry of Water Resources, RD&GR, at New Delhi. Secretary, MoWR RD & GR and Chairman of the Committee requested Chief Secretary, Govt. of Karnataka to release as much water as possible.

During the water year since 1st June, 2015 to 31st March, 2016, 152.9841 TMC of water passed through Billigundulu Site against 187 TMC of water as per CWDT Final order.

10.1.1.2 Sub Committee on Cauvery

As decided by Secretary, MoWR, RD&GR in the 5th meeting of Supervisory Committee on Cauvery, a Sub-Committee consisting of representative from the basin States, IMD, MoWR, RD& GR and CWC under the Chairman, CWC was constituted on 21.10.2015 by MoWR, RD & GR to analyse the prevailing situation of rainfall, inflows and storages as well as monthly distribution of 80 TMC in a water year in the basin and suggest procedure for determining distress in an ongoing year in accordance with provisions of CWDT order.

The Sub-Committee of Supervisory Committee on Cauvery held 3 meetings under the Chairmanship of Chairman, Central Water Commission at New Delhi on 6.11.2015, 24.11.2015 and 21.12.2015. The Sub Committee analysed the rainfall distribution over different meteorological homogeneous sub-basin as recorded by IMD and information on inflows and storages as furnished by party States. It discussed in detail monthly distribution of 80 TMC from intermediate catchment and the procedure to be followed for determining and sharing distress in an ongoing year.

A draft report of the Sub-Committee was circulated to all party States on 10.12.2015 for their views/comments and to be discussed in the third meeting of the Sub- Committee. In view of extremely divergent views of State of Karnataka and Tamil Nadu on the draft report, Chairman, CWC and Chairman of the Sub-Committee felt during 3rd meeting that a consensus report of the Sub-Committee may not be possible. He therefore requested the party States to submit their version of the report on terms of reference of the Sub- Committee.

The Majority Report of the Sub-Committee (incorporating the updated rainfall figures as received from IMD) and Karnataka version of the report sent to MoWR, RD & GR on 31.12.2015.

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

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.

Three meetings of Supervisory Committee on Babhali Barrage were held on 27.02.2014, 30.06.2014 and 17.10.2014 under the Chairmanship of Member (WP&P), CWC and Chairman of the Committee. In 2015, the 4th meeting of the Committee was held on 4.2.2015 at Hyderabad. In the meeting, Representative of Telangana maintained their stand that the judgment of the Supreme Court mentions unconditional release of 0.6 TMC of water. It was felt by the Committee that in the present circumstances Maharashtra is not in a position to release any water from Babhali Barrage and in view of such unexpected situation, the affected States may seek clarification in this matter from the Hon'ble Supreme Court, if required.

No further meeting was held thereafter during the year 2015. However, as per direction of Member (WP&P), CWC and Chairman of Supervisory Committee on Babhali Barrage, the gates were opened on 1.7.2015 and lowered on 29.10.2015 in the presence of officers nominated by the Committee.

10.2 Updation of Legal Instruments on Rivers in India (Vol. III)

The publication titled "Legal Instruments on Rivers in India (Vol. III) - Agreements on Inter-State Rivers" was brought out by CWC in 1995 in which agreements for sharing of river waters signed up to the year 1994 were included.

During the year, the above publication has been revised and updated after incorporating the Inter-State River Water Agreements (signed after 1994) received from concerned States. The publication has been split in two parts namely "Legal Instruments of Rivers in India (Volume-III) – Part-I" containing Inter-State River Water Agreements on water sharing and project implementation in respect of Ganga, Indus and Brahmaputra Basins and "Legal Instruments of Rivers in India (Volume-III) – Part-II" containing Inter-State River Water Agreements on water sharing and project implementation in respect of Peninsular rivers. The publications are available on CWC website.

10.3 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.

10.4 Inter-State Projects- Control Boards/ Committees

10.4.1 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 crores at 2009 price level. The total expenditure for an amount of Rs. 1778.226 crores up to March, 2016 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 31.03.2016 of Rs. 1778.23 Crore is as under:

Status of Contribution of Fund as on 31.03.2016

(in Crore Rs.)

Period	Total Expen-diture	Share Due			Share Received			Balance Share		
		MP	UP	Bihar	MP	UP	Bihar	MP	UP	Bihar
Up to 31.03.15	1696.06	848.03	424.02	424.02	868.19	408.82	419.05	20.17 (+)	15.20 (-)	4.97 (-)
During 2015-16	82.17	41.09	20.54	20.54	81.03	1.14	0	39.94 (+)	19.40 (-)	20.54 (-)
Total as on 31.03.16	1778.23	889.12	444.56	444.56	949.22	409.96	419.05	60.11 (+)	34.60 (-)	25.51 (-)

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 and4478 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 last meeting (74th) of Executive Committee of Bansagar Control Board was held on 28.11.2013. In the meeting, it was observed that the project is almost complete and the party states requested to Executive Committee of Bansagar Control Board to consider for closer of the project and finalise the project cost and there after the project may be declared in O&M Stage. It was decided that Engineer-in-Chief of all three co-basin States would finalise the project construction cost.

However, the states could not arrive on the any consensoius on final projects cost as well as sharing of O& M cost of Bansagar Project among themselves. In this regard, a meeting was taken by Secretary, Ministry of Water Resources, River Development and Ganga Rejuvenation (WR, RD&GR) to discuss issues related to Bansagar Dam Project on 21.5.2015, wherein, it was felt that the issue needs to be resolved on a consensus basis between beneficiary States. Accordingly, Ministry of Water Resources, River Development & Ganga Rejuvenation, vide Officer Order No. 14/2/2015-Estt.IV/965 dated 2nd June, 2015 constituted a Committee under Chairman, CWC and Chairman, Executive Committee, Bansagar Control Board comprising of Engineer-in-Chiefs of Bihar, Madhya Pradesh and Uttar Pradesh and concerned Chief Engineers of CWC as Members to reconcile the construction costs, including the cost of rehabilitation, as well as to arrive at sharing of O&M costs.

The Committee had three meetings on 6th June, 2015, 11th August, 2015 and 27th August, 2015. As per the discussion held during the above meeting, the draft report of the Committee on "Apportionment of cost of Bansagar Multipurpose Project and Rationalization of Operation & Maintenance Expenditure" was prepared and circulated to the party States on 01.10.2015. The process for arriving consensous on the report is under progress.

10.4.2 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. Now O&M stage of the project has been started. 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 2015-16. The three units of Power House have been tested and commissioned during 1999-2000. Power generation was 369 lakh units during 2015-16.

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, Govt. of India. In this Board meeting the financial, technical and administrative matters of the Board were discussed/decided.

The 89th meeting of the Executive Committee was held on 9.02.2016. The Committee discussed/decided the financial, technical and administrative matters of the Board.

10.4.3 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.

10.4.4 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.

10.4.5 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 meeting of the Committee was held on 28.04.2016 under the Chairmanship of Member RM, CWC. The minutes of the meeting was finalized and circulated among the Members.

10.4.6 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.

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.

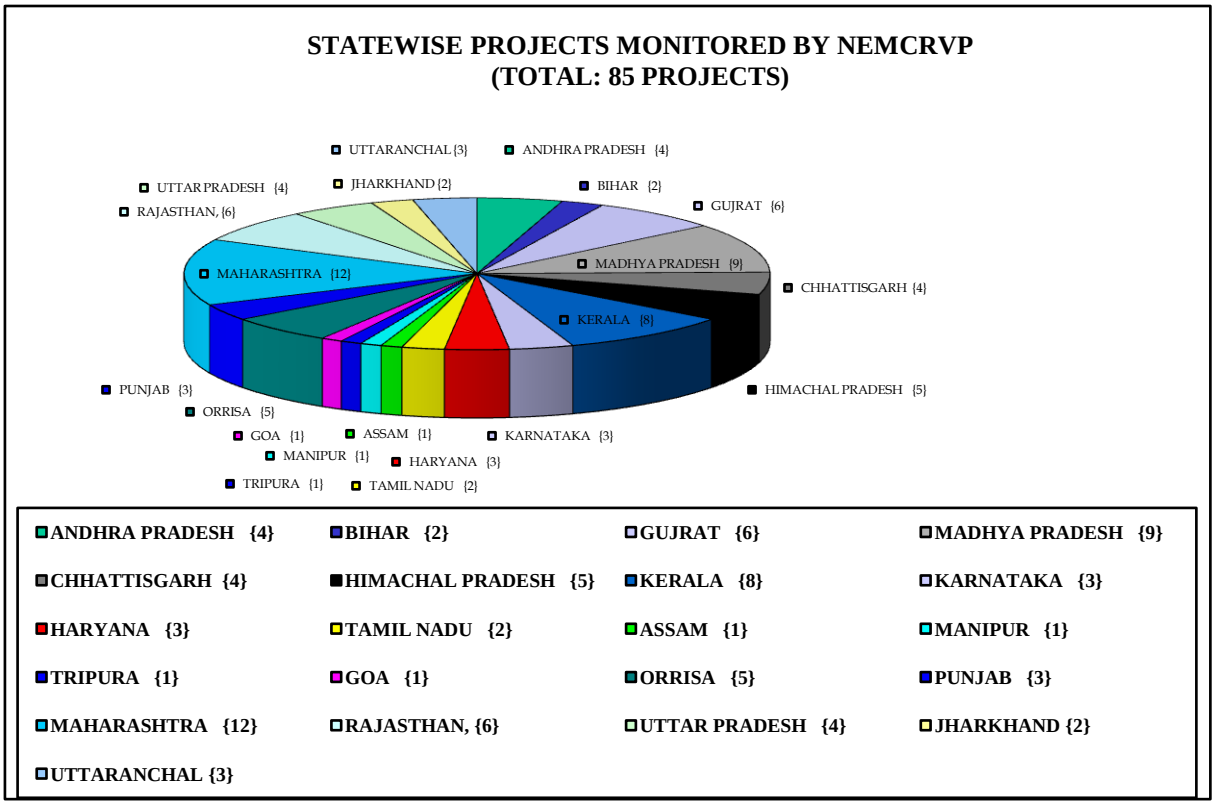

STATEWISE PROJECTS MONITORED BY NEMCRVP
(TOTAL: 85 PROJECTS)
UTTARANCHAL {3}
ANDHRA PRADESH {4}
UTTAR PRADESH {4}
JHARKHAND {2}
BIHAR {2}
RAJASTHAN, {6}
GUJRAT {6}
MADHYA PRADESH {9}
MAHARASHTRA {12}
CHHATTISGARH {4}
KERALA {8}
PUNJAB {3}
HIMACHAL PRADESH {5}
ORRISA {5}
GOA {1}
ASSAM {1}
KARNATAKA {3}
MANIPUR {1}
HARYANA {3}
TRIPURA {1}
TAMIL NADU {2}
ANDHRA PRADESH {4}
BIHAR {2}
GUJRAT {6}
MADHYA PRADESH {9}
CHHATTISGARH {4}
HIMACHAL PRADESH {5}
KERALA {8}
KARNATAKA {3}
HARYANA {3}
TAMIL NADU {2}
ASSAM {1}
MANIPUR {1}
TRIPURA {1}
GOA {1}
ORRISA {5}
PUNJAB {3}
MAHARASHTRA {12}
RAJASTHAN, {6}
UTTAR PRADESH {4}
JHARKHAND {2}
UTTARANCHAL {3}

Fig.1

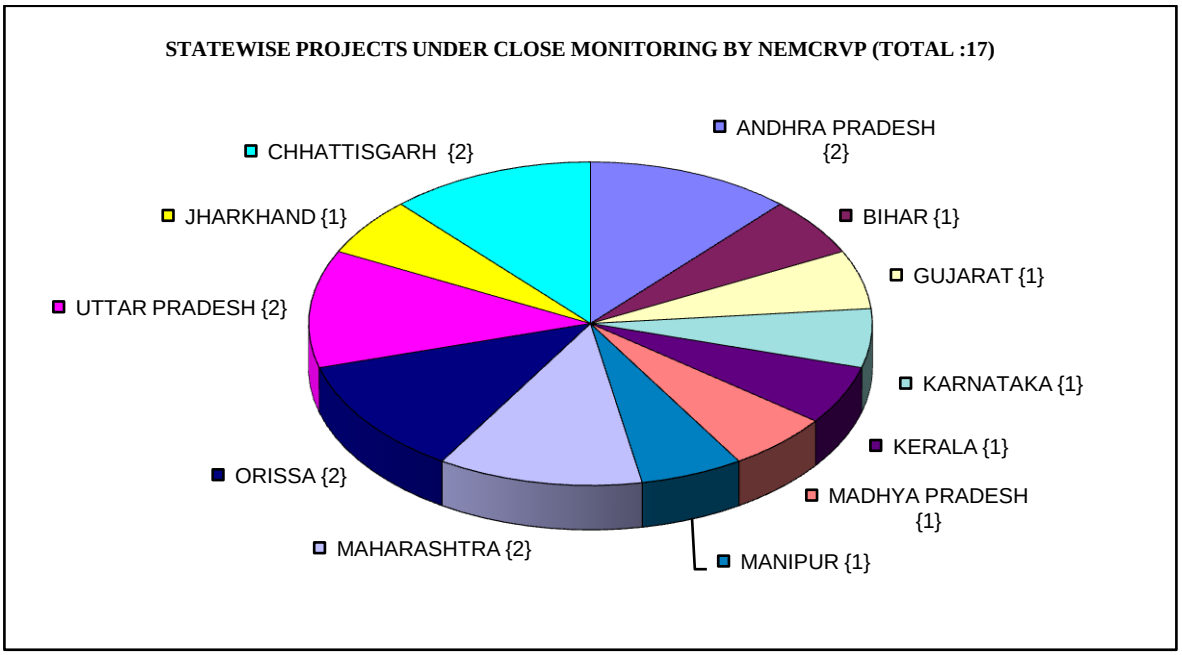

STATEWISE PROJECTS UNDER CLOSE MONITORING BY NEMCRVP (TOTAL :17)
ANDHRA PRADESH {2}
CHHATTISGARH {2}
BIHAR {1}
JHARKHAND {1}
GUJARAT {1}
UTTAR PRADESH {2}
KARNATAKA {1}
KERALA {1}
ORISSA {2}
MADHYA PRADESH {1}
MAHARASHTRA {2}
MANIPUR {1}

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 61 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.

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.

11.4 Environmental Impact Assessment (EIA)

On the recommendation of an Inter- Ministerial Group, Central Water Commission (CWC) had taken up Environmental Impact Assessment studies of Subansiri and Siang Sub Basins through consultancy. The final report on EIA study of Siang sub basin was submitted in December 2013 and same has been accepted by the MoEF&CC. Cumulative Impact & Carrying Capacity study of Subansiri sub basin has now been completed and Final Report has been circulated and uploaded on CWC web site.

Administrative Approval of MoWR, RD&GR for carrying out Cumulative Impact & Carrying Capacity (CI&CC) Studies of Kameng and Dibang sub basins have also been accorded. As per decision taken in PMO, the said study is now to be carried out by MoEF&CC. Accordingly, file of these studies has been transferred to MoEF&CC in April, 2015.

Studies of Environmental Impact Evaluation Studies of seven completed irrigation projects have already been carried out by CWC. Proposal for Environmental Impact Evaluation Studies of 6 more completed water resources project is under consideration in MoWR, RD&GR.

11.5 Other Important Activities Related to Environment Management

1. A report regarding development of Greenfield Airport at Itanagar, Arunanchal Pradesh was prepared and submitted to Joint Secretary, Ministry of Civil Aviation. CWC was requested to send views on Flood plains of two rivers namely Hollongi and Kokila, flowing either side of the proposed runway.

2. In compliance to NGT order, a study to determine environment flow for maintaining Son Ghariyal Sanctuary was carried out and submitted to MoEF& CC and NGT, Bhopal on 04.01.2016.

3. A committee has been constituted 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 on 08.03.2016.

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.

Detailed Project Report of Noa Dihing Dam Project was examined and comments in respect of R&R has been provided to concerned authorities.

Draft R&R Plan of Upper Siang Single Storage Project was prepared in August 2015 as per guidance of Chairman, CWC; the same is being made innovative incorporating the

best provision in various R&R plans and "Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Rules-2013.

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

Three major projects proposed for JBIC (JICA) assistance and one major project proposed for ADB assistance were under appraisal in CWC during 2015-16. 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.	Yettinahole Project	18546.00
2.	Rajasthan Water Sector Livelihood Improvement Project (RWSILIP).	3461.00
3.	Rajasthan Water Sector Restructuring Project in Desert Area (RWSRPD).	3264.00

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 Closed Credit/Loan Agreements

Out of 44 World Bank aided projects, 41 projects have been closed and the assistance utilized is as shown in Table 12.3

Table 12.3

Details of Closed Agreements

SI. No.	State	No. of Projects	Assistance in million US $	
			As per Staff Appraisal Report (SAR)	Utilised
1.	Andhra Pradesh	6	995.30	802.62
2.	Bihar	2	142.00	158.61
3.	Gujarat	7	921.50	805.82
4.	Haryana	3	519.00	505.98
5.	Karnataka	2	451.00	291.96
6.	Kerala	1	80.00	79.08
7.	Madhya Pradesh	2	360.00	318.18
8.	Maharashtra	5	778.00	779.03
9.	Orissa	5	544.90	457.55
10.	Punjab	2	294.00	290.06
11.	Rajasthan	1	XDR 93.45 M	XDR 76.39 M
12.	Tamil Nadu	3	340.90	268.36
13.	Uttar Pradesh	2	125.00 + XDR 87.27M	125.76 + XDR 85.67M
	Total	**41**	**5551.60+XDR 180.72M**	**4883.01+XDR 162.06 M**

12.2.3 On-going Credits / Loans Agreements

There are three projects under The World Bank funding. The assistance utilized is given in Table 12.4.

Table 12.4
External Assistance to Projects (World Bank)

Sl. No.	Name of Project	Credit No/ Loan No.	Agency	Time Slice		Estimated Cost (in Million Rs.)		Assistance	
				Starting month	Closing month	Total as per SAR	Latest	Total	Utilized ending 03/2016
1.	Madhya Pradesh Water Sector Restructuring Project	LN 4750-IN	IBRD	11-2004	06-2015	20402.23	20402.23	387.40 M, USD	323.99 M, USD
2.	Andhra Pradesh Water Sector Improvement Project	LR 7897-IN	IBRD	08-2010	07-2018	44444.00	44444.00	450.60 M, USD	142.50 M, USD
3..	Uttar Pradesh Water Sector Restructuring Project Phase-II	5298-IN	IDA	10-2013	10-2020	-----	-----	239.40 M, XDR	19.11 M, XDR

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 12.5.

Table 12.6
External Assistance to Project (JICA)

S. No	Name of Project	Loan Agreement No.	Loan Period		Estimated Cost as per agreement (in Million Rs.)	Total Assistance (M Yen)	Assistance utilized ending 03/2016 (M yen)	Remarks
			Starting Date	Closing Date				
1.	Rengali Irrigation Project	ID-P-210	03/10	11/15	36036.70	3047.00	3047.00	New loan agreement has been signed for balance works
	Rengali Irrigation Project–(III)*	ID-P-210A	03/10	11/15		25.00	20.75	Ongoing
	Rengali Irrigation Project, Phase-2	IDP-244	03/15	03/26		32378.00	----	---
	Rengali Irrigation Project, Phase-2	IDP-244	03/15	03/26		1581.00	----	---
2.	AP Irrigation and Livelihood Improve-ment Project	IDP 181	03/07	07/16	11377.00	23974	11251.54	Ongoing
Total						**27046**	**15519.34**	

* Separate Loan Agreement signed for additional financing to ID-P-210.

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 one on-going project under ADB funding. The assistance utilized is given in Table 12.6.

Table 12.6
External Assistance to Project (ADB)

S. No	Name of Project	Loan Agreement No.	Loan Period		Estimated Cost as per agreement (`Million)	Total Assistance (M Yen)	Assistance utilized ending 03/16 (M yen)	Remarks
			Starting Date	Closing Date				
1.	Orissa Integrated Irrigated Agriculture and Water Management Investment Program (OIIAWMIP)	2444-IND	02/09	09/15	4714.3	16.5	14.88	On-going
2	Karnataka Integrated and Sustainable Water Resources Management Investment Program-I	3172-IND	05/15	03/19	1187.5	31.00	-------	-------

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 four times so far and the last meeting was held on 12-13 September, 2013 Kathmandu, Nepal 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 9 times and the last meeting was held in February, 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 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 and is currently targeted for closure in February, 2017.

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.

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.

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 33 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 31st meeting of Joint Expert Team (JET) was held in December, 2015.

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 17th - 18th February, 2016 at New Delhi.

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, three meetings of the reconstituted Joint Technical Team (JTT) between Government of India and Royal Government of Bhutan (RGoB) have been held.

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. In the recent past, nine Mini Hydel Projects executed by CWC were handed over to RGoB. The investigation of major hydro power projects like Chukha, Tala, Sankosh, Kurichu and Punatsangchhu were also carried out by BID, CWC.

River protection works at Paro airport has also been completed by BID, CWC. Presently, consultancy work for replacement of originally installed rope drum hoist with hydraulic system for radial gates and integration of remote automatic operation of gates of Chhukha Hydropower Plant, Bhutan is being executed by BID, CWC, Bhutan.

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.

13.6 Cooperation with Pakistan

Under the Indus Waters Treaty 1960, India and Pakistan have created permanent posts of Commissioners for Indus Waters, one each in India and Pakistan. Each Commissioner is representative of his Government for all matters arising out of the Treaty and serves as the regular channel of communication on all matters relating to implementation of the Treaty. The two Commissioners together form the Permanent Indus Commission. In fulfilment of the requirements of Indus Water Treaty, the daily data of 280 hydrological sites in six basins, viz., Indus, Jhelum, Chenab, Ravi, Beas and Sutlej of Indus system is being sent to Pakistan every month. Flood flow data for agreed sites on the rivers Ravi, Sutlej, Tawi and Chenab is also communicated by India to Pakistan for their benefit through telephone during the period from 1st July to 10th October to undertake advance flood relief measures.

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. 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..

Physical Progress:

a. Work related to updation and refinement of canals and command boundary of major and medium irrigation projects is under progress. Work in respect of 20 States has been completed and of remaining 9 States namely, Maharashtra, Andhra Pradesh, Telangana, West Bengal Uttar Pradesh, Uttarakhand, Karnataka, Odisha and Rajasthan is under progress.

b. Reservoir Module for real time entry of reservoir data with users and administrator access control and Automatic Report generation has been created.

c. PMP Module with Probable Maximum Precipitation at grid points and patterns of key storms, temporal distribution patterns of rainfall etc. is under development. This module will be helpful for direct assessment of applicable PMP value for a catchment.

d. A near Real-time Hydrological Observation Data Entry Module using SMS for entry of Gauge/Discharge data has been developed. Testing and operationalization of this module is to be done.

e. Web based Water Quality Data Entry Module for entry of water quality parameters has been developed. Testing and operationalization is to be done.

f. Ground Water data of CGWB like Ground Water Aquifer, Industrial Cluster and ground water resources included in the India-WRIS portal.

g. Canal re-alignment mapping of Sankosh – Mahanadi Inter-basin Link project showing canal, the existing/ proposed structures and alternate links for NWDA.

h. Development of CWC Website, INCSW Website has been completed and development of ERS Management System for CWC officers is under progress.

Besides maintenance & development of India-WRIS portal, the India-WRIS team has also facilitated CWC and MoWR, RD & GR officials in conducting various studies /activities using GIS Platform and the data available under India-WRIS portal. Details of some of the important tasks are as under:

a. Study of Inter Basin Transfer link of Mahanadi-Godavari: The study envisaged mapping of New Canal alignment of Mahanadi-Godavari Inter-Basin Transfer Link Project including analysis of proposed dams (Barmul, Manibhadra, Lower Lant, Raul at Taprang, Under, Salki, Bugh and kharang) and preparation of Submergence Area Report showing of Submergence area, Volume and Villages Affected. The assessment of feasibility of using the Mahanadi-Godavari Link for transport of goods from Gopalpur Port (proposed) was also carried out.

b. Identification of water bodies within 5 Km of main stem of River Ganga and assessment of their water spread area to facilitate field survey.

c. Probable Irrigation Facility Assessment Study for Jhansi District and 13 Districts in Bhundelkhand Region

d. Preparation of Water Body maps of districts along Ganga River.

e. Preparation of Surface Profile Graph from Bargi Reservoir to Chitrakoot for assessment of feasibility of supplying water from Bargi Dam to Chitrakoot Ghat.

f. Delineation of submergence area of Siang Reservoir (Arunachal Pradesh) and Ichampalli Reservoir (Andhra Pradesh, Odisha and Maharashtra)

g. Preparation of Coastal District Maps with thematic layers, such as, Ground Water EC, Topography, LULC, Population Density, Soil (Depth, Texture, Productivity, Erosion), River Network, Identified Low Land Area along the coast, Ground Water Level pre/post monsoon.

h. Preparation of maps showing status of construction of Polavaram Right Bank and Left Bank Canals under Polavaram Project showing construction gaps in the main canals along with the associated head work location (Polavaram Dam), rivers and other structures.

i. Study for Crop Area Estimation in respect of 15 completed and 23 ongoing projects to assess irrigation potential utilization.

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.

To expand and strengthen the above activities, provision has been made to upgrade the existing 100 Hydrological Observation Stations, upgrade 23 water quality laboratories and opening of 800 new sites under component "Hydrological Observations Monitoring System" of the 12th Five Year Plan Scheme, namely, Development of Water Resources Information System. An outlay of Rs. 1024 crore has been kept for the purpose. This will help in addressing the data requirement of the country more precisely and in better scientific manner. Till now, Central Water Commission has opened 217 new sites. However, measurement of few parameter with reduced frequency is being done at these sites due to paucity of required manpower. Central Water Commission has also upgraded 100 existing sites as envisaged in the Plan.

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 and 2015. 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, 2015, cloud free data of 437 GL/WBs was available. Amongst these, 234 GL/WBs have shown decrease in water spread area, 55 have shown increase, 145 have not shown any significant charge (+/-5%) while one glacial lake and two water bodies have dried up. 9 out of 234 have decreased by more than 30% and 6 out of 55 water bodies have shown increase in area by more than 30%.

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.

After hearing the views of the maritime State/UT Governments and Expert Institutes/Agencies at the "One day Brainstorming Workshop on Implementation & Creation of CMIS" organized by CWC on 13th May, 2014 at New Delhi, a Model tripartite Memorandum of Understanding (MoU) was drafted. 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.

The Indian Institute of Technology, Madras had agreed for the taking up the role of Project Executor in the States of Tamil Nadu, Kerala and UT of Puducherry. The respective State Govts. and UT administration have also given concurrence for the implementation model. The project proposal for the implementation of CMIS in the states of Tamil Nadu, Kerala and UT of Puducherry is under process of approval from the Competent Authority.

14.5 Irrigation Census

Under this component of the scheme there are the following two sub-components

(i) Rationalization of Minor Irrigation Statistics (RMIS) Scheme

A Centrally Sponsored Scheme, "Rationalization of Minor Irrigation Statistics (RMIS)" was launched in 1987 in the Ministry of Water Resources with 100% Central Assistance to the States/UTs. During the 11th Five Year Plan, the RMIS scheme was converted to as one of the components of the Central Sector Plan Scheme 'Development of Water Resources Information System (DWRIS)' scheme of the Ministry of Water Resources. The main objective of the RMIS scheme is to build up a comprehensive and reliable database in the Minor Irrigation (MI) sector for effective planning and policy making.

Under RMIS scheme, each State/UT has identified a nodal department for compilation of minor irrigation statistics for the entire State/UT. A Statistical Cell consisting of suitable number of officers/staff has been set up in the nodal department for taking up the work relating to the MI sector. These cells are responsible for collection, compilation and reporting of data of minor irrigation relating to their State/UT on a regular basis. For this purpose, they coordinate with departments of Rural Development, Agriculture and Irrigation etc. at the State level. These cells are also responsible for conducting census of MI schemes on quinquennial basis with the help of staff of State/UT Governments posted at district/block/village levels.

In the MI census, detailed information on irrigation sources, namely, Dug well, Shallow Tube well, Deep Tube well, Surface Flow and Surface Lift schemes including the irrigation potential created and potential utilized is collected and compiled on systematic basis throughout the country. Besides this, information on their ownership, the social class and holding size of the owner, number of electrical/diesel devices used for lifting water is also collected. Information in respect of adoption of water and energy conserving devices such as sprinkler and drip irrigation, use of non-conventional energy sources such as solar pumps, water mills is also collected in the MI census.

The National Informatics Centre unit in the MoWR is associated with processing of data and generation of tables. Detailed database on minor irrigation works in the country has been generated through four censuses carried out under the scheme so far with reference years 1986-87, 1993-94, 2000-01 and 2006-07 respectively. The census reports of 2nd, 3rd & 4th MI Census are available on the website of the Ministry of Water Resources (www.mowr.gov.in). The conduct of 5th Minor Irrigation Census is in progress.

(ii) Census of Major and Medium Irrigation Projects

The Census of Major and Medium Irrigation Projects is to be undertaken through outsourcing. The schedules for Phase-I & Phase-II for collection of data along with guidelines for filling up the same have been finalized. Expression of Interest (EOI) and Note on Prequalification criteria and Scope of Work for outsourcing Phase-II work of the Pilot Census of MMI Projects were uploaded on CPP Portal and CWC's site. Also EOI was published in national dailies, local language news papers and India Trade Journal (ITJ) published by Director General of Commercial Intelligence and Statistics (DGCI&S).

14.6 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. During the financial year 2015-16, 20 nos. Computer Notebook (Laptop) and 03 nos. Work Stations are purchased. The work of establishing and integrated software solution for Digital Archival and Retrieval of Engineering Drawing has been completed. Purchasing of networking components and providing of LAN connectivity at renovated 8th floor of Sewa Bhawan has been successfully completed. AMC of ACR / APAR anagement System & AMC of Simulia Abacus Software is going on. Supply order for the purchase of Laptop-34 nos. and Server-2 nos. has been placed with DGS&D.

In addition, the following activities have also been undertaken in CWC.

1) Development of Integrated Software Solution for Digital Archival and Retrieval of Engineering Drawings in Central Water Commission.

2) Development of Web Based Portal ÄIBP-PMS" to track the status of proposals and expedite examination/approval of proposals.

3) Development of Web based Software for Executive Record Sheet (ERS) Management

4) Implementation of e-procurement on TCIL Portal.

5) Procurement of IT hardware's /software's /consumables, maintenance of IT hardware's/software's/extension of LAN, updating of information on CWC website/circular portal etc.,

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 Porjects 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 taken initiative into the field of 'Distance Learning Program' in association with World Meteorological Organisation (WMO).

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 531 training programmes up to March 2016 and trained total 12769 officers. During the year 2015-16, 36 training programs were conducted at National Water Academy, CWC, Pune.

The important activities of NWA during the year 2015-16 are as under:

i) Training of officials of Flood Warning Section, Royal Government of Bhutan was conducted at NWA during 20-24 April 2015.

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, a 26 weeks 27th Induction Training Program for newly appointed CWES

officers has been concluded in June 2015. The 28th Induction Training Program has been started from 7th December 2015.

iii) Capacity Building for State Government Organisations: Numerous tailor made programs have been conducted on the request of State Governments. Some of the prominent Capacity Building activities include programs on Dam Safety and Instrumentation for officers of Government of Bihar. Training Program on "Dam Break Analysis" for the officers of Government of Himachal Pradesh.

iv) 3 Weeks Core Area Training (CAT) on Basin Planning Management for middle level CWES officers has been conducted during the period from 16th November to 4th December 2015.

v) Capacity Building Programs for training on "District Irrigation Plan" for IAS / IFS officers under Pradhan Mantri Krishi Sinchai Yojana (PMKSY) : Under the Pradhan Mantri Krishi Sinchai Yojana (PMKSY), the module of the first training program was formulated, designed and conducted at NWA during 24-28 August 2015. 18 IAS/ IFS officers of various States participated in this program. The same module was repeated at other regional centres wherein NWA faculty actively associated.

vi) Distance Learning Programs as Regional Training Centre of WMO: Being recognized as Regional Training Centre of WMO in 2012, NWA has successfully conducted one program on Basic Hydrological Sciences for Asian Region Countries in this year in which 40 officers have been trained. The program was widely acclaimed by WMO and the participating officers. The program is getting popular and more programs are planned to be conducted. One more program on Advanced Hydrological Sciences has been planned to be conducted during February- March 2016.

vii) Apart from above, training program on "Environmental Issues", Water Law, RS&GIS Application in Water Sector etc. have also been organized wherein participants from State and Central agencies participated.

The list of traning courses, workshops and seminar organised / conducted / coordinated by Training Unit of CWC and by NWA during 2015-16 are given at **Annexure - 15.1 and Annexure - 15.2** respectively.

15.2.2 Other Important Activities

- Based on its outstanding performance, National Water Academy, CWC, Pune has been conferred CBIP Award during December 2015 for Capacity Building and Training for multidimensional and customized capacity building program in Water Resources Sector.
- The Vigilance Awareness Week, Hindi Pakhwada-2015; Quami Ekta Week; Workshop on "Impact of Climate Change on Water Resources Sector"; were celebrated with great fervor

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 2015-16, 27 new complaints/cases were taken up for investigation. Final decision was taken in respect of 26 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')
a)	No. of cases pending at the beginning of the year	17	17	14
b)	No. of cases added during the year	17	7	3
c)	No. of cases disposed of during the year	12	11	3
d)	No. of cases pending at the end of the year	22	13	14

Out of the 26 cases disposed of, officials in 3 cases were awarded major penalty and in 1 case minor penalty. Vigilance Awareness Week was observed at CWC Headquarters and its field offices from 26th October to 31st October, 2015.

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 various 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 the Committee
1	Science and Technology Advisory Committee (STAC-MOWR)	Chairman, CWC	Member
2	Water Resources Division Council (WRDC) of BIS	Chairman, CWC	Chairman
3	Technical Advisory Committee to the Governing Council for Central Water and Power Research Station, Pune.	Chairman, CWC	Chairman
4	National Committee on Dam Safety(NCDS)	Chairman, CWC Member(D&R)	Chairman Vice Chairman
5	Standing Technical Advisory Committee (STAC) to the Governing Council for CSMRS, New Delhi.	Member (D&R)	Chairman
6	National Institute of Hydrology Society (NIH Society)	Chairman, CWC Member(D&R)	Member Member
7	Technical Advisory Committee of National Institute of Hydrology.	Chairman, CWC Member(D&R)	Chairman Member
8	Committee to monitor & supervise the overall work for preparation of DPR of Par-Tapi-Narmada and Damanganga-Pinjal Link Project	Chairman, CWC Member (D&R)	Chairman Member

Sl. No.	Name of Committees/Boards/Panel of Experts/Technical Groups etc.	Representation of CWC	
		Officer	Position in the Committee
9	Committee of International Commission on large dams, India (INCOLD)	Member (D&R)	Member
10	Technical Advisory Committee of National Water Development Agency.	Chairman, CWC Member(WP&P) Member(D&R)	Chairman Member Member
11	Society of National Water Development Agency.	Chairman, CWC Member(D&R) Member(WP&P)	Member Member Member
12	Governing body of National Water Development Agency.	Chairman, CWC Member(D&R) Member(WP&P)	Member Member Member
13	Governing Council for Central Soil & Materials Research Station.	Chairman, CWC Member (D&R)	Member Member
14	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
15	Committee of CEA to accord of techno-economic appraisal of Power Schemes.	Member (D&R)	Permanent Special Invitee
16	Indian Meteorological Department (IMD)	Member (D&R)	Hydrological Advisor
17	Governing Body of National Institute of Rock Mechanics (NIRM)	Member (D&R)	Member
18	Research Advisory Committee (RAC) of National Council for Cement and Building Materials.	Member (D&R)	Member
19	National Committee on Seismic Design Parameters of River Valley Projects (NCSDP)	Member (D&R)	Chairman
20	Standing Advisory Committee(SAC) for R&D Programme	Member (D&R)	Chairman
21	National Level Steering Committee (NLSC) for Dam Rehabilitation and Improvement Project (DRIP)	Member (D&R)	Member

Sl. No.	Name of Committees/Boards/Panel of Experts/Technical Groups etc.	Representation of CWC	
		Officer	Position in the Committee
22	Technical Committee (TC) for Dam Rehabilitation and Improvement Project (DRIP)	Member(D&R)	Chairman
23	World Meteorological Organization	Member (D&R)	Principal Representative
24	Committee to assess Quantum on Excess Ravi Water Flowing Across International Border and suggest its diversion	Member (D&R)	Chairman
25	Sectional Committee of BIS, WRD-15	Member (D&R)	Chairman
26	Board of Directors of Tehri Hydro Development Corporation	Member (D&R)	Part Time Director
27	Technical Advisory and Review Committee (TARC) for preparation of PMP Atlas	Member (D&R)	Chairman
28	Technical Advisory Committee of the Farakka Barrage Project.	Member (D&R)	Chairman
29	Board meeting of Punatsangchhu-I H.E. Project Authority (PHPA)	Member (D&R)	Permanent Invitee
30	Technical Coordination Committee (TCC) for Punatsangchhu - I H.E Project, Bhutan	Member (D&R)	Co-Chairman
31	Governing Body of NIH	Chairman, CWC Member(D&R)	Member Alternate Member
32	Review Committee for the development of Hydrological Design Aids, Surface Water (SW) under HP-II	Member (D&R)	Member (D&R)
33	CEDC(Civil Engineering Divisional Council)	Member (D&R)	Member
34	CED 48 Sectional Committee of BIS	Member (D&R)	Principal Member
35	Programme Advisory Committee (PAC) for Fly Ash Unit constituted by Department of Science and Technology	Member (D&R)	Member
36	Committee to finalise the Action Plan on full utilisation of Eastern Rivers flowing across International Border	Member (D&R)	Chairman
37	Committee for monitoring the progress of Farakka Barrage Project	Member (D&R)	Chairman

Sl. No.	Name of Committees/Boards/Panel of Experts/Technical Groups etc.	Representation of CWC	
		Officer	Position in the Committee
38	Tender Committee of Farakka Barrage Project	Member (D&R)	Chairman
39	Expert Group for finalization of Specifications for relining of Rajasthan and Sirhind Feeder	Member (D&R)	Chairman
40	Committee to explore possibility of storing water on both banks of river during flood and to explore feasibility of New Barrage D/s of Okhla.	Member (D&R)	Chairman
41	Monitoring Committee for Basin Wise reassessment of Hydro Electric Potential in the country	Member (D&R)	Member
42	Punatsangchhu-II Hydro Electric Project Authority Meetings.	Member (D&R)	Permanent Invitee
43	Technical Co-ordination Committee (TCC) of Punatsangchhu-II Hydro Electric Project	Member (D&R)	Co-Chairman
44	Mangdechhu HE Project Authority Meetings.	Member (D&R)	Permanent Invitee
45	Technical Co-ordination Committee (TCC) Mangdechhu HE Project	Member (D&R)	Co-Chairman
46	Empowered Joint Group meetings (EJG) (for monitoring of implementation of Hydro-power projects in Bhutan).	Member (D&R)	Permanent Invitee
47	Standing Technical Committee (STC) for deciding project parameters of R-O-R Hydro-power scheme which were initially envisages as storage scheme.	Member (D&R)	Co-Chairman
48	Indian National Committee in Geo-Technical Engineering & Construction Material (INCGECM), CSMRS	Member (D&R)	Member
49	High Powered Steering Committee for Implementation National Projects.	Member (D&R)	Sp. Invitee
50	Committee for Prevention of Salinity ingress in Coastal States/U.T	Chairman, CWC	Chairman
51	Farakka Barrage Project Advisory Committee (FBP-AC).	Member (D&R)	Chairman
52	Committee for formulating guidelines on planning of structures of Hydro-power projects on sediment management considerations.	Member (D&R)	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 Chief Engineer, EMO, CWC as Member Secretary. There are 12 members representing MoWR/CWC, CSMRS, CWPRS, NIH, DST/DSIR/CSIR, Min.ofAgr., 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 2015-16:

- Over 75 research schemes are under progress. Service requests from PIs of 12 ongoing Research schemes were processed and a fund of Rs. 60, 99,640/- has been released towards these service requests.
- Web page of INCSW has been launched. As many as 16 publications [published by Earstwhile Indian National Committee on Irrigation & Drainage (INCID)] and Final Reports of 9 research projects funded under R&D Programme of MoWR,RD&GR have been uploaded on the web portal.
- The Vision Document for INC-SW Research Programme 2025 has been prepared.
- Process for hosting 9th International Micro Irrigation Conference 2019 at Aurangabad has been initiated. MoWR is being approached to accord ''In Principal'' approval for organizing the event.
- Process initiated for collecting information from State Governments for preparation of Register of Heritage Irrigation Structures and their recognition.
- Process for creation of Indian Irrigation Forum (IIF) specifically dealing with ICID has been initiated.

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 its Members.

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.

42nd meeting of Working Group of NIH was held on 19th to 20th March, 2015 at NIH Roorkee. The 68th meeting of TAC was held on 21.07.2015 at New Delhi.

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. 111th meeting of TAC of FBP was held from 9th to 10th December 2015 at Farakka, West Bengal.

17.2.4 Standing Technical Advisory Committee of CSMRS

The Standing Technical Advisory Committee (STAC) was constituted 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. The 31st meeting of STAC was held on 17.4.2015 at New Delhi under the Chairmanship of Member (D&R), CWC.

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 15 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 11 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.

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. About 7816 numbers composed pages and 36293 numbers of copies of various Publications/forms were printed during the year. The press also carried out binding/trimming works for Publications and Reports etc. which were completed during the period from 01.04.2015 to 31.03.2016. 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.	Printing of Annual Report (English) of CWC 2013-14	TC Dte.	170	300
2.	Printing & Binding of Slip Books 1 – 1000 Books (20 Pages) 2 – 1000 Books (40 Pages)	PCP	1	2000
3.	Printing & Binding of APAR Forms CWES Group 'A' Officers/ Directors/ Chief Engineers	Estt.I	10	300
4.	Printing & Binding of APAR Forms CWES Group 'A' Officers Members and Chairman	Estt.	16	50
5.	Printing of Bhagirath (Hindi) October – December 2014	Bhagirath Hindi Section	64	1000
6.	केन्द्रीय सरकार के कार्मिकों को सरकारी काम हिन्दी में करने में दक्ष बनाने हेतु अभ्यास आधारित नया पाठ्यक्रम 'पारंगत' लागू करने के बारे मे ंपरिपत्र की छपाई	हिन्दी अनुभाग	4	120

Sl. No.	Name of the Job	Nodal Agency	No. of composed pages	No. of copies
7.	केन्द्र सरकार के मंत्रालयों/ विभागों/सार्वजनिक उपक्रमों/ सरकारी क्षेत्र के बैंकों एवं वित्तीय संस्थाओं के मुख्यालयों द्वारा वर्ष 2014–15 में प्रकाशित हिन्दी पत्रिकाओं के लिए पुरस्कार योजना	हिन्दी अनुभाग	3	750
8.	Printing of Forms to be filled at the time of joining by AD/AE	Estt.III	23	1840
9.	Spiral Binding of A Comprahensive booklet on R&D Division	R&D Division	22	220
10.	Printing of Consolidated instructions on compassionate appointment	O&M Dte.	14	700
11.	Binding of Book Guidelines for the Design and Construction of Small Embankment	SSPH Dte.	84	1
12.	राजभाषा विभाग द्वारा हिन्दी पखवाड़ा 2015 के लिए विभिन्न प्रतियोगिताओं की जानकारी एवं नामांकन प्रपत्र मुद्रण हेतु	हिन्दी अनुभाग	3	600
13.	हिन्दी पखवाड़ा–2015 के उपलक्ष में अध्यक्ष केन्द्रीय जल आयोग की अपील	हिन्दी अनुभाग	1	60
14.	Printing of Certificates to be distributed for O&M Workshop	O&M Section	1	35
15.	Printing of Forms (Classification/Date Input Sheets for vouchers)	O&M Section	1	10000
16.	Printing of Forms (Fully Vouched Contingent Bill)	O&M Section	1	10000
17.	Printing of Compendium of Important Orders/Advisories (June 2012 to July 2015)	O&M Section	239	400
18.	संसदीय राजभाषा समिति की निरीक्षण प्रश्नावली की स्पायरल बाईंडिंग	राजभाषा विभाग	58	116
19.	राजभाषा कार्यान्वयन समिति की 121वीं बैठक की कार्यवृत का मुद्रण हेतु	राजभाषा विभाग	5	1000

Sl. No.	Name of the Job	Nodal Agency	No. of composed pages	No. of copies
20.	Binding of Project Report from Narmada, Hydro Mechanical Design Dte.	N.H.M.D. Dte.	70	4
21.	Bhagirath (Hindi) January-March,15	Bhagirath (Hindi)	56	1000
22.	भगीरथ हिन्दी अप्रैल–जून, 2015	भगीरथ हिन्दी	60	1000
23.	Printing of Acquittance Roll Forms	DDO-II	2	1000
24.	Printing of G.A.R.-30 Forms	DDO-II	1	500
25.	Printing of APAR of CWES Group 'A' Officers	Estt. I	12	1
26.	Internal Telephone Directory 2015 (English)	TD Dte.	30	500
27.	Internal Telephone Directory 2015 (Hindi)	TD Dte.	30	500
28.	Printing of Legal Instruments on Rivers in India Vol.III, Part-1	ISM Dte.	226	40
29.	Printing of Legal Instruments on Rivers in India Vol.III, Part-2	ISM Dte.	352	40
30.	Printing of Log Book	Publication	2	300
31.	List of Publications by CWC	TD Dte.	64	500
32.	Printing of Indent Voucher	Publication	1	500
33.	अति विशिष्ट व्यक्तियों से प्राप्त पत्रादि के निपटान के लिए डायरी रजिस्टर बनवाने के लिए छपाई हेतु	संगठन एवं पद्धति विभाग	1000	10
34.	Printing of an updated summary report of Water Use Efficiency Studies	IPO	134	20
35.	Printing of Token Register	DDO-II	2	200
36.	Printing of Token Register (PFMS)	DDO-II	2	200
37.	Binding of Book	NP Dte.	100	1
38.	Binding and Stapling of R.E.-2015-16	Budget Section	3800	38
39.	राजभाषा कार्यान्वयन समिति की 123वीं बैठक का मुद्रण	हिन्दी अनुभाग	15	30

Sl. No.	Name of the Job	Nodal Agency	No. of composed pages	No. of copies
40.	Binding and Pasting of 18 Nos. Files of Work Charged Staff of Publication Division (Service Book & Personnel File)	TD Dte.	18	50

18.2 Activities of Information System Organisation

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

i. Water and Related Statistics

The biennial publication titled 'Water and Related Statistics April, 2015 was brought out by CWC which inter-alia provides the following information.

- 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.
- Land use Statistics and flood Damage i.e. Area Affected
- Coverage of Rural Habitations under Rural Water Supply.
- 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.

ii. Hand Book on Water Related Information:

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

- Abstract of New Projects under Appraisal in CWC by States as on 31.12.2015
- List of Projects under Appraisal in CWC as on 31.12.2015
- List of Projects Accepted by Advisory Committee of MoWR in 2015.
- Details of Projects which have been accorded Investment Clearance by Planning Commission upto December, 2014
- Number of Major, Medium and ERM Irrigation Projects by State
- State-wise and Category-wise Details of Projects Reported Ongoing at The End of XI Five Year Plan for XII Plan Formulation
- Achievements of Bharat Nirman on Irrigation Potential Creation including Minor Irrigation by State
- Central Loan Assistance (CLA) / Grant Releases On Major, Medium, ERM Projects for the Period 2004-05 to 2014-15 Under AIBP
- Project-wise Irrigation Potential Created (IPC) under AIBP
- Details of Declared National Projects
- Details of Ongoing Externally Aided Irrigation Projects
- Ongoing Irrigation projects Aided by Japan International Co-operation (JICA) - Expenditure Reimbursement
- Ongoing Irrigation projects Aided by Asian Development Bank (ADB) - Expenditure Reimbursement
- State Wise Central Assistance Released under the Command Area Development and Water Management Programme
- Details of State wise Water User Associations (WUA)s formed and Area Covered.
- Water Quality Criteria
- Water Quality Standards in India (Source IS:2296:1992)
- Rainfall in different Meteorological Sub-Divisions of the country for 2014

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 2015 containing data up to 2011-12 is in progress and will be up-loaded on the website of CWC on its finalization.

iv. Financial Aspects Flood Control Anti-sea erosion and Drainage Projects

This publication contains information on Financial Aspects at All India, States/UTs & Union Government level on Gross Receipts, Capital Outlay and Working Expenses which mainly focuses on 3 aspects:

- Major & Medium Irrigation Projects
- Minor Irrigation Projects
- Command Area Development Program

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.

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

This publication provides the following information:

- Distribution of Revenue & Capital Expenditure
- Quantum of damage due to flood / heavy rain.

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

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 - Jan-Jun 2014 - 1 **Issues**
2. Bhagirath (Hindi) Journal Oct-Dec 2014,Jan-Mar 2015 & Apr-Jun 2015 - 3 **Issues**

CWC is publishing Administrative News Bulletin on montly basis to highlight activities on CWC. 12 issues of CWC Administrative News Bulletin were brought during April, 2015 to March, 2016.

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 2015-2016:

- Verification of Microfilm roll - 1 No.
- old Bhagirath Journals (English / Hindi) - 19 Nos
- Scanning of Newspapers clippings related to water sector published in 16 Newspaper/periodicals and circulation through CWC website for wide dissemination - 4150 pages
- Conversion of Microfilmed Drawings in soft copy & distribution – 25 nos.

18.5 Mass Awareness Activities:

The mass awareness acitivity undertaken by CWC during the period from 1st April, 2015 to 31st March, 2016 are as under:

- CWC participated in 35th India International Trade Fair (IITF) - 2015 at Pragati Maidan, New Delhi from 14th to 27th November, 2015 on the theme "Jal Kranti Abhiyaan – Water Conservation, Water Use Efficiency, Stop River Pollution and Ganga Cleaning". 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 "Ganga Rejuvenation" 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 14.11.2015 by Shri Shashi

Shekhar, Secretary, Ministry of Water Resources, River Development and Ganga Rejuvenation..

- The Jal Manthan - 2 was organuised during 22-23 February, 2016 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 Organisations, 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 activities undertane by CWC are as under
  - The inaugural workshops was organised by CWC on 5.6.2016 at two locations namely Jhansi and Shimla.
  - CWC coordinated activities under the Jal Gram component of the Abhiyan in 21 States/UTs in the country. In this regards 655 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.
  - CWC has organised 19 workshops and 15 training in the country during 2015-16 under the MoWR,RD&GR Plan Scheme "Information, Education and Communication (IEC)".

Annexure – 5.1

List of Consultancy Projects in D&R Wing during the Year 2015-16

Sl. No.	Name of Project
Construction Stage Projects	
Andaman & Nicobar Islands	
1	Kamsarath Water Supply Scheme
Andhra Pradesh	
2	Indira Sagar (Polavaram) Project
Arunachal Pradesh	
3	Kameng H.E. Project
Assam	
4	Amjur Drainage Development Scheme
Gujarat	
5	Garudeshwar Weir Project
6	Sardar Sarovar Project
Jharkhand	
7	Kharkai Barrage under Subarnarekha M.P. Project
8	Icha Dam Under Subarnarekha M.P.Project
Madhya Pradesh	
9	Lower Goi Project
10	Pench Diversion Project
11	Upper Beda Dam Project
12	Halon Irrigation Project
13	Upper Narmada Project
Manipur	
14	Dholaithabi barrage Project
15	Thoubal M.P. Project
Meghalaya	
16	New Umtru H.E. Project
17	Ganol H.E.Project
Mizoram	
18	Tuirial H.E. Project
Odisha	

Sl. No.	Name of Project
19	Anandpur Barrage Project
20	Subarnarekha Main Canal Irrigation Project
Uttar Pradesh	
21	Arjun Sahayak Pariyojna
Uttarakhand	
22	Tapovan Vishnugad Project - NTPC
23	Loharinag Pala H.E. Project
24	Koteshwar H. E. Project
25	Lakhwar Multi Purpose Project
Rajasthan	
26	Lhasi Medium irrigation project
27	Kalisindh Dam Project
Afghanistan	
28	Salma Dam Project
Bhutan	
29	Punatsangchu Stage-I H.E. Project
30	Punatsangchu Stage-II H.E. Project
DPR Stage Projects	
Andhra Pradesh	
1	Manuguru Open Cast Flood Protection Embankment
Chattisgarh	
2	Minimata (Hasdeo) Bango Project
Jammu & Kashmir	
3	Ujh Multipurpose Project (DPR)
4	Kirthi (Stage-II) H.E.Project
Karnataka	
5	Donimalai Iron Ore Tailing Dam
Orissa	
6	Chheligada Irrigation Project
7	Hirakund Dam
Sikkim	
8	Suntaley H.E. Project(DPR)
9	Kalezkhola H.E. Project(DPR)

Sl. No.	Name of Project
West Bengal	
10	Turga Pumped Storage (DPR)
NWDA (Gujarat & Maharashtra)	
11	Par-Tapi-Narmada link Project (DPR)
Nepal	
12	Sapta Kosi & Sunkosi Multi Purpose Project (DPR)
13	Pancheshwar Multipurpose Project
Sp. Problem Projects	
Andhra Pradesh	
1	Pulicat Lake
2	DPR of remodeling of Right Bank Low Level Canal
3	DPR of remodeling of Right Bank High Level Canal
4	Srisailam Right Bank Hydro Electric Scheme
Chattisgarh	
5	Minimata (Hasdeo) Bango Project
Gujarat	
6	Sardar Sarovar Project
Himachal Pradesh	
7	Rampur H.E.Project
8	Jeori Small H.E.Project
Jammu & Kashmir	
9	Dah and Hanu
Madhya Pradesh	
10	Indira Sagar Project
Odisha	
11	Kanupur Irrigation Project
12	Additional Spillways for Hirakund Dam
Punjab	
13	Rajasthan Feeder, Indira Gandhi Main Canal and Sirhind Feeder
Rajasthan	
14	Rehabilitation of Garada Dam
Uttar Pradesh	
15	Ken Betwa Link-I, Parichha Wier

Sl. No.	Name of Project
16	Parichha Dam (Betwa River)

Annexure-7.1

List of the irrigation / multipurpose projects accepted by the Advisory Committee during 2015-16

Sl. No.	Project Name	Name of the State	Major/ Medium	Est. Cost Rs. crore	Irrigation Benefits in Ha
1	Borolia Irrigation Project	Assam	Medium-RCE	157.03 (2013)	13562
2	Modernisation of Tunga Anicut Canal Network	Karnataka	ERM-Med.	239.75 (2012-13)	11732
3	Modernisation of canal system of Bhadra reservoir Project	Karnataka	ERM, Major-RCE	1175.79 (2014)	177337
4	Sonthi Lift Irrigation Scheme	Karnataka	Major, New	673.9 (2013-14)	16800
5	ERM of Rajghat Canal Project	Madhya Pradesh	ERM, Major-RCE	56.83 (2014-15)	164789
6	Dolaithabi Barrage Project	Manipur	Med., RCE	509.70 (2013)	7545
7	Formation of Flood Carrier Canal from Kannadian Channel to drought prone area of Sathankulam, Thisaiyanvilay by interlinking Tamirabarani, Karumediyar and Nambiyar Rivers in Tirunelveli and Thoothukudi Districts, Tamil Nadu	Tamil Nadu	Major, New	872.45 (PL 2014-15)	23040
8	Revised Cost Estimate of Extension, Renovation and Modernisation of canals being fed from river Sutlej	Punjab	ERM, Major-RCE	918.25 (2013-14)	207068
9	Revised Cost Estimate of Relining of Sirhind Feeder from RD 119700 to 447927, Punjab	Punjab	ERM, Major-RCE	671.478 (2015)	69086
10	Revised Cost Estimate of Relining of Rajasthan Feeder from RD 179000 to 496000, Punjab	Punjab	ERM, Major-RCE	1305.267 (2015)	98739
11	Jigaon Irrigation Project	Maharashtra	New, Major	5708.11 (2014-15)	101088
12	Indiramma Flood Flow Canal Project	Telangana	Major, RCE	5940.09 (2015-16)	93587

Annexure - 7.2

List of the Flood Control schemes accepted by the Advisory Committee During 2015-16

Sl. No.	Project Name	Name of the State	Est. Cost In crore Rs.	Flood Protection
1	Anti-erosion work near Khairpur, Raghopur, Akidatpur and Shankarpur villages on the left bank of river Ganga. Restoration of spur and maintanence of service road and approach road.	Bihar	70.68 (2012)	Area Protected=18285.714 Population protected = 1,00,000
2	Channelisation of River Pabbar from Tikkari to Hatkoti, Tahsil Rorhu, Distt. Shimla	Himachal Pradesh	190.82 (2014)	Area Protected - 177 Houses Protected- 2000
3	Swan River Flood Management Project Downstream of Santokhgarh Bridge Upto H.P –Punjab Boundary	Himachal Pradesh	46.80 (2013-14)	Area Protected - 477.5 Population Benefitted- 20607 Nos. in 5 Villages.
4	Project Report for priority works- Comprehensive plan for Flood management works on Jhelum, Phase-I	Jammu & Kashmir	399.29 (2014)	Area Protected - 33613 Population Benefitted- 135,000 Nos.
5	Project for construction of Aile Persauli Lolpur bund on the left bank of river Ghagra/ Saryu in Gonda district of Uttar Pradesh	Uttar Pradesh	43.55 (2014)	Area Benefitted - 32815.74 Population Benefitted- 112410
6	Phase-I works of Ghatal Master Plan in Paschim Medinipur and Purba Medinipur districts of West Bengal	West Bengal	1214.92 (2013-14)	Area Benefitted - 65700 (Approx.) Population Benefitted- 8,74,000
7	Revised detailed project report for construction of embankments along river Jhim and Jamura (Adhwara Group) from Sonbarsa Bajar to Sonbarsa village in Sitamarhi District, Bihar.	Bihar	134.20 (2013-14)	Area protected = 17400 ha. & Population 5.26 lakh
8	Revised Bagmati Flood Management Scheme Phase-II	Bihar	1283.50 (2012)	Area protected = 3.13 lakh ha. & Population 123.85 lakh
9	Bagmati Flood Management Scheme Phase-III (a)	Bihar	912.45 (2013-14)	Area protected = 2.90 lakh ha. & Population 12 lakh

Sl. No.	Project Name	Name of the State	Est. Cost In crore Rs.	Flood Protection
10	Anti-erosion work on the right bank of the Ganga river from Rafatola to Srighar 10 Nos. in Sahibganj District	Jharkhand	52.63	Area protected = 3700 ha Population Benefitted = 85,000
11	Scheme for protection of Haha Nala Bund, Chainpur Gulaura pump canal & Shiv Mandir at village Chainpur Gulaura between 0.800Km to 2.400 Km of Haha Nala bund, Protection of village group Sangapur, Gorauli, Kakarghatta between 39.800 Km to 41.600 Km of Turtipar-Shrinagar bund & protection of Bakulaha Sansar Tola bund and village group of Ibrahimabad Naubrar between 4.800 Km to 5.175 of B.S.T. bund on right bank of river Ghaghra in district Ballia of Uttar Pradesh	Uttar Pradesh	47.39 (2013)	Area protected = 11120 ha Population Benefitted = 89870
12	Scheme for construction of Bairiya Sarya Bund on right bank of River-Rapti in the district-Gorakhpur of Uttar Pradesh.	Uttar Pradesh	75.8219 Cr (2013)	Area protected = 9640.5 ha Population Benefitted = 30000
13	Scheme for construction of Embankment from village Joulpur to Patwayee (From 0.000 Km to 28.500 Km) on left Bank of River Kosi in Rampur district, Uttar Pradesh.	Uttar Pradesh	66.63 Cr (2013-14)	Area protected = 9970 ha Population Benefitted = 40700

Annexure - 7.3

The list of H.E Project accepted by TEC During 2015-16

Sl No.	Project Name	State	Capacity (MW)
1.	Heo (Private HEP)	Arunachal Pradesh	3X80=240
2.	Talo-I (Private HEP)	Arunachal Pradesh	3x62=186
Total			426

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) 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) 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) 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	-	Ph-I under appraisal in CWC/CEA. DPR of Phase-II is awaited.
8.	Bursar, J&K	1) 1 lakh (indirect) 2) 1230 MW 3) 1 MAF	-	DPR under preparation by NHPC
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	-	Under appraisal in CWC/CEA.
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) 9500 MW 3) 17.50 MAF 4) Flood moderation	-	Under PFR stage

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
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) Total = 1159.585	Project is under execution.
16.	Indirasagar Polavaram, Andhra Pradesh	1) 4.68 lakh ha 2) 960 MW 3) 23.44 TMC of water to Vizag city for drinking and Industrial Purpose and Diversion of 84.70 TMC to Krishna.	2014-15 (250.00) 2015-16(600.00) Total = 850.00	Project is under execution.

Annexure - 8.1

State-Wise and Project-Wise List of Projects under General Monitoring - Target & Achievements of Monitoring Visits during 2015-16

Sl.No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Date of issue of Report
ANDHRA PRADESH/ TELANGANA				
1	1-Peddagedda Reservoir Project-AP	Medium		
2	2-Godavari Lift Irrigation Scheme-TS	Major		
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		
	Batane Reservoir Project -			
	TOTAL- 02			
GUJARAT				
8	1-Und-II	Medium	17-18.12.15	
	Total-01			
HIMACHAL PRADESH				

Sl.No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Date of issue of Report
9	1-Phina Singh Irrigation Project	Medium	5.8.15	30.9.15
10	2-Nadaun Area Medium Irrigation Project	Medium	6.8.15	19.10.15(Drft)
	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	11.6.15	
19	3-Bennathora	Major	9.6.15	
20	4-Lower Mullamari	Medium	9.6.15	
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		

Sl.No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Date of issue of Report
25	3-Sonapur Tomta Lift Irrigation Scheme	Medium		
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	22.9.15	
31	9-Urmodi Irrigation Project	Major		
32	10-Tembhu Lift Irrigation Project	Major		
33	11-Bodwad Parisar Sinchan Yojna	Major		
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			

Sl.No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Date of issue of Report
RAJASTHAN				
39	1-Takli Irrigation Cum Drinking Water Project	Medium		
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	1	
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**	**2**

Annexure - 8.2

State-Wise and Project-Wise List of Projects under AIBP - Target & Achievements of Monitoring Visits during 2015-16

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Date of issue of Report
	ANDHRA PRADESH			
1	Yerrakalva Res.	Med.		
2	Tadipudi LIS	Maj.		
3	Pushkara LIS	Maj.		
4	Gundlakdamma	Maj.		
5	Thotapally Barrage	Maj.		
6	Tarakarama thirtha Sagaram	Med.		
7	Musurumilli	Med.		
8	Indira Sagar (Polavaram)	Maj.		
	Maddigedda Res. Project			
	TOTAL=08			
	ASSAM			
9	Dhansiri	Maj.	11-13.9.15	22.3.2016
10	Champamati	Maj.	1-3.12.15 & 22.12.15	29.02.2016 & 01.01.16
11	Borolia	Med.	23.8.15	
12	Burhi Dihing lift	Med.		
	Mod. Of Jamuna-ERM			
	TOTAL=04			
	BIHAR			
13	Western Kosi	Maj.		
14	Durgawati	Maj.	28-29.2.16	
	Bansagar			
15	Batane	Med.		
16	Punpun	Maj.	16.12.15	13.01.16
	Eastern Kosi Canal System-ERM			
	TOTAL=04			
	CHHATISGARH			
17	Kelo Project	Maj.		
18	Kharung	ERM		
19	Sutiapat	Med.		

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Date of issue of Report
20	Maniyari Tank (ERM)	Maj		
	TOTAL=04			
	GOA			
21	Tillari	Maj.		
	TOTAL=01			
	GUJARAT			
22	Sardar Sarovar	Maj.	Sep,2015 & 16-17.02.2016	
	TOTAL=01			
	HIMACHAL PRADESH			
23	Shahnehar Irr. Project	Maj.		
24	Sidhata	Med.		
25	Balh Vally (Left Bank)	Med.	25.8.15	20.11.2015
	TOTAL=03			
	JAMMU & KASHMIR			
26	Mod. of Ranbir Canal*	ERM		
27	Mod. of New Pratap Canal*	ERM		
28	Rajpora Lift	Med.		
29	Tral Lift	Med.	9-12.12.15	01.01.16
30	Mod. Of Dadi Canal	ERM		
31	Mod. Kandi Canal	Med		
32	Prakachik Khows Canal	Med.	9-12.12.15	01.01.16
33	Mod. Of Ahji Canal	ERM		
34	Restoration & Mod. Of Main Ravi Canal	ERM	9-12.12.15	01.01.16
	TOTAL=09			
	JHARKHAND			
35	Gumani	Med.		
36	Sonua	Med.		
37	Surangi	Med.		
38	Upper Sankh	Med.		
39	Panchkhero	Med.		
40	Subernarekha Multipurpose	Maj		
	TOTAL=06			
	KARNATAKA			
41	Upper Krishna St.I	Maj.		

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Date of issue of Report
42	Malaprabha	Maj.		
43	Karanja	Maj.	8-9.6.15	23.7.15
44	Upper Krishna St.II	Maj.		
45	Varahi	Maj.	21-23.7.15	
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.	10.6.15 & 18-19.12.15	& Dec 2015
51	Guddada Malapura Lift	Med		
52	Upper Tunga Irrigation Project	Major	21-23.7.15 & 16-17.12.15	& Dec 2015
53	Sri Rameswar Irrigation	Major	July	
54	NLBc System Project(New ERM)	ERM	July	
	TOTAL=14			
	KERALA			
55	Muvattupuzha	Maj.	1	
56	Karapuzha	Med.	1	
57	Kanhirapuzha	ERM	1	
58	Chitturpuzha	ERM	1	
	TOTAL=04			
	MADHYA PRADESH			
59	Indira Sagar Unit II (Ph I &II)	Maj.	15-18.12.15	28.12.15
	Indira Sagar Canal Ph. III		15-18.12.15	28.12.15
	Indira Sagar Unit IV		15-18.12.15	28.12.15
	Indira Sagar Unit V			
	Bansagar Unit-II			
60	Sindh Phase II	Maj.	15-18.12.15	28.12.15
61	Mahi	Maj.		
62	Bariarpur LBC	Maj.		
63	Bawanthadi	Maj.		
64	Mahan	Maj.		
65	Omkareshwar Ph - I	Maj.		

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Date of issue of Report
	Omkareshwar, Ph.-II			
	Omkareshwar, Ph.-III			
	Omkareshwar, Ph.-IV			
66	Bargi Diversion Ph - I	Maj.	6-8.5.15	18.8.15
	Bargi Diversion Ph -I I			
	Bargi Diversion Ph -I I I			
	Bargi Diversion Ph-IV			
67	Pench Div-I	Maj.		
68	Upper Beda	Maj.		
69	Punasa lift	Maj.		
70	Lower Goi	Maj.		
71	Jobat	Med		
72	Sagar(Sagad)	Med.		
73	Singhpur	Med.		
74	Sanjay Sagar (Bah)	Med.		
75	Mahuar	Med.		
	TOTAL=17			
	MAHARASHTRA			
76	Gosikhurd [NP]	Maj.		
77	Waghur	Maj.	21.9.15 & 11-19.12.15	& 31.12.15
78	Upper Manar	Med.		
79	Upper Pen Ganga	Maj.		
	Bawanthadi [IS]		11-19.12.15	31.12.15/Mar 2016
80	Lower Dudhna	Maj.	11-19.12.15	31.12.15
	Tillari		11-19.12.15	31.12.15
81	Warna	Maj.		
82	Punad	Maj.		
83	Lower Wardha	Maj.	11-19.12.15	31.12.15
84	Khadakpurna	Maj.		
85	Dongargaon	Med.		
86	Gul	Med.		
87	Bembla	Maj.	Dec/Jan15	Mar-16
88	Uttermand	Med.		
89	Sangola Branch Canal	Maj.		
90	Tarali	Maj.	Oct/Nov 15	Mar-16

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Date of issue of Report
91	Dhom Balakwadi	Maj.	Oct/Nov 15	
92	Morna (Gureghar)	Med.		
93	Arjuna	Med.	Apr-15	
94	Lower Pedhi	Maj.		
95	Upper Kundalika	Med		
96	Wang Project	Med		
97	Lower Panzara	Med	16.12.15 & 11-19.12.15	& 31.12.15
98	Aruna	Med		
99	Krishna Koyana Lift	Maj.	Oct/Nov 15	Mar-16
100	Naradave (Mahammadwadi)	Med		
101	Gadnadi	Med	Apr-15	
102	Kudali	Med		
	Nandur Madhmeshwar Ph-II		21.9.15 11-19.12.15 & 19.3.16	31.12.15
	TOTAL=27			
	MANIPUR			
103	Khuga	Maj.		
104	Thoubal	Maj.	4-7.11.15 & 17-19.12.15	31.12.15& 23.12.15
105	Dolaithabi Barrage	Med.	4-7.11.15& 17-19.12.15	31.12.15& 23.12.15
	TOTAL=03			
	ORISSA			
106	Upper Indravati(KBK)	Maj.	6-7.7.15 & 25.2.2016	31.07.2015 &
107	Subernarekha	Maj.	5-6.10.2015 & Mar 2016	11.12.15 &
108	Rengali	Maj.	9.10.2015	31.12.15
109	Anandpur Barr./ Integrated Anandpur Barr.	ERM	22.12.15	31.12.15
110	Lower Indra(KBK)	Maj.	7-8.7.15 & 14-17.12.15	31.8.2015 & 28.12.15
111	Lower Suktel(KBK)	Maj.	8.7.15	31.8.2015
112	Telengiri(KBK)	Maj.	23.2.2016	
113	RET Irrigation(KBK)	Med.	6.7.15	31.7.2015

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Date of issue of Report
114	Kanupur	Maj.	7.10.2015	28.12.15
115	Chheligada Dam	Med.		
116	Rukura-Tribal	Med	8.10.2015	11.12.15
	TOTAL=11			
	PUNJAB			
117	Shahpur Kandi dam (N.P)	Maj.	3-4.11.2015	7.1.15
118	Kandi Canal Extension (Ph.II)	ERM	12.1.16	29.3.16
119	Rehabilitation of Ist Patiala Feeder and Kotla Branch Project	ERM	4.2.16	31.3.16
120	Relining of Rajasthan Feeder Cannal & Sirhind Feeder	ERM		
	TOTAL=04			
	RAJASTHAN			
121	IGNP Stage-II	Maj.		
122	Narmada Canal	Maj.	14-17.12.15	18.12.15
123	Mod. of Gang Canal	ERM		
	TOTAL=03			
	TELANGANA			
124	Indiramma FFC of SRSP	ERM		
125	SRSP St.II	ERM		
126	Ralivagu	Med.		
127	Gollavagu	Med.		
128	Mathadivagu	Med.		
129	Peddavagu at Jagannathpur	Med.		
130	J. Chokka Rao LIS	Maj	14-16.12.15	21.12.15
131	Neelwai (Peddavagu)	Med.		
132	Sri Komaram Bheem	Med.		
133	Palemvagu	Med.		
134	Rajiv Bhima LIS	Maj		
	TOTAL=11			
	TRIPURA			
135	Manu	Med.		
136	Gumti	Med.		
137	Khowai	Med.		
	TOTAL=03			

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Date of issue of Report
	UTTAR PRADESH			
138	Saryu Nahar NP	Maj	1-4.12.2015	15.12.2015
139	Bansagar Canal	Maj.	22-26.6.15	1
140	Mod. of Lachhura Dam	ERM		
141	Improving Irr. Intensity of Hardoi Branch System	ERM		
142	Madhya Ganga Canal Ph-II	Maj.		
143	Kachnoda Dam	Maj.		
144	Arjun Shyak	Maj.		
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**	**57**	**43**

Annexure - 8.3

State-Wise and Project-Wise List of Inter-State Projects to be Monitored by CWC (HQ) during 2015-16

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)	22-26.6.15
5	Indira sagar Polavaram	Major	ANDHRA PRADESH (ORISSA)	
6	Dudhganga project	Major	KARNATAKA (MAHARASTRA)	
7	Subernarekha irrigation project	Major	ORISSA (JHARKHAND)	5-6.10.15
8	Rajasthan Feeder Canal	Major	RAJASTHAN (PUNJAB)	
9	Sardar Sarovar (Narmada)	Major	GUJARAT (RAJASTHAN)	Sep. 2015
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 2015-16

Sl. No.	Name of the State	Target	Achievement	Status Reports Prepared
1	A.P.	8	0	0
2	ASSAM	4	3	2
3	BIHAR	4	2	1
4	CHATTISGARH	4	0	0
5	Goa	1	0	0
6	GUJARAT	1	1	0
7	HIMACHAL PRADESH	3	1	1
8	J&K	9	3	3
9	JHARKHAND	6	0	0
10	KARNATAKA	14	6	3
11	KERALA	4	4	0
12	M.P.	17	5	5
13	MAH	27	13	10
14	MANIPUR	3	2	2
15	ODISHA	11	10	9
16	PUNJAB	4	3	3
17	RAJ.	3	1	1
18	Telangana	11	1	1
19	TRIPURA	3	0	0
20	U.P.	8	2	2
21	WEST BENGAL	4	0	0
	Total	**149**	**57**	**43**

Annexure - 8.5

Details of Completed Projects Under AIBP as on 31.03.2016

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 2015-16

Traning / Workshops Within Country

Sl. No.	Topics of Program	Date	Venue	No. of Partcipants
A. In House Program at CWC (H/Q), New Delhi				
1.	Preparatory training on 'Sources' Software of e-Water Australia.	06-08 May, 2015	New Delhi	35
2.	Training Program on "Record Management", in complaisance of OM No. T-17/1/2014-CTP(CSS) dated 17.10.2014 of DoPT	08 May, 2015	New Delhi	29
3.	Training Program on "Record Management", in compliance of DoPT,s OM no. T-17/1/2014-CTP(CSS) dated 17.10.2015	25 May, 2015	New Delhi	34
4.	2nd training program on "Implementation of e-procurement" of CWC conducted by TCIL, New Delhi.	26-27 May,2015	New Delhi	10
5.	Training Program on "Record Management", in compliance of DoPT,s OM no. T-17/1/2014-CTP(CSS) dated 17.10.2015	12 Jun, 2015	New Delhi	32
6.	हिन्दी कार्यशाला	18 Jun, 2015	New Delhi	54
7.	Training Program on "Application Software (Math CAD)"	31 Jul,2015	CWC(HQ), New Delhi	14
8.	3rd Training Program on "Implementation of E-Procurement" in CWC	20-21 Aug, 2015	TCIL, New Delhi	8
9.	"हिन्दी कार्यशाला	18 Sep,2015	New Delhi	47
10.	Training Course on "Application Software (HEC-RAS)"	08-09 Oct, 2015	New Delhi	14
11.	Training Program on "Application of finite Element Analysis for Water Resources Structures"	26-27 Oct, 2015	New Delhi	10

Sl. No.	Topics of Program	Date	Venue	No. of Partcipants
12.	Training Program on "Application Software (Auto Cad)".	28-29 Oct, 2015	New Delhi	13
13.	Training Program on "Mike-11 for Flood Routine/ Dam Break/GLOF"	19-20 Nov, 2015	New Delhi	8
14.	हिन्दी कार्यशाला	20 Nov, 2015	New Delhi	36
15.	Training Program on "Network Security Active Directory/LDAP for CWC Officers".	02 Dec, 2015	New Delhi	24
16.	Workshop on "Lessons learnt from ongoing Dam Rehabilitation & Improvement Projects."	18 Feb, 2016	New Delhi	30
17.	Training program on "Generation of Isohyets pattern on GIS system and updation of the same in PMP Atlases" and Hands-on,	01 Mar,2016	New Delhi	14
18.	हिन्दी कार्यशाला"	22 Mar, 2016	New Delhi	48
B. In-House Training Program in Field Office				
19.	Training program on "Accounts for different level of Official"	22-26 Jun ,2015	Hyderabad	15
20.	Training for Junior Engineers associated with "Hydrological observation flood Forecasting".	18-20 Jan,2016	Guwahati	21
21.	Training program on Work Charged staff associated with "Hydrological observation & flood forecasting".	21-23 Jan, 2016	Guwahati	25
C. Training Organized by Other Organization				
22.	Tunneling Asia 2015 underground space development for better environment and safety issues & challenges org. by TAI&CBIT New Delhi	13-14 Apr, 15	New Delhi	11
23.	Training Program on"Bilateral dialogue for effective and sustainable water resource management of Brahmaputra Basin" Organized by South Asia Construction Limited.	06 Aug, 2015	Guwahati	3

Sl. No.	Topics of Program	Date	Venue	No. of Partcipants
24.	Training Program on "Water Logging and Soil Salinity in Irrigated Agriculture" organized by CBIP, New Delhi.	03-04 Sep, 2015	Chandigarh	5
25.	Training on "River Rejuvenation: The Singapore Experience" Module–I organized by National Mission for Clean Ganga (NMCG) New Delhi.	14-16 Sep, 2015	New Delhi.	3
26.	Training of Trainers-Professional Development Programme on "Post Disaster Needs Assessment Tools for India" organized by NIDM, New Delhi.	14-18 Sep, 2015	New Delhi	2
27.	Training on "Integrated Water Resources Development and Management" organized by NIH, Roorkee.	14-19 Sep, 2015	Roorkee	16
28.	Training on "River Rejuvenation: The Singapore Experience" Module–II organized by National Mission for Clean Ganga (NMCG) New Delhi.	17-18 Sep, 2015	New Delhi.	2
29.	Training Course on "Laboratory Assessment of Rock (With Practical Demonstration)" organized by CSMRS.	22-23 Sep, 2015	New Delhi	2
30.	Training Program on "Integrated Water Resources Development and Management (II-Training)" organized by NIH Roorkee.	24 Sep - 03 Oct, 2015	Roorkee	6
31.	Training Course on "Water & Waste Water Management" organized by Everything About Water Pvt. Ltd.	14-16 Oct, 2015	Channai	1
32.	Training Program on "Enabling a Digital India: Using Geographic Information System (GIS)" Organized by TARA	29-30 Oct, 2015	New Delhi	2

Sl. No.	Topics of Program	Date	Venue	No. of Partcipants
33.	Training Program on "Policy for Science and Science for Policies" organized by National Institute of Advance Studies (NIAS)	16-20 Nov, 2015	Bengaluru	1
34.	"Integrated Water Resources" Development & Management" (III-Training) Conducted by National Institute of Hydrology (NIH)	30 Nov- 05 Dec, 2015	Roorkee	6
35.	Training program on "Disaster Risk Reduction (DRR) Strategies for sustainable Development Planning and Policy Instrument"	17-18 Feb, 2016	New Delhi	1
D. Workshop/ Seminar/Conference etc. organized by other Organization				
36.	Workshop on "Tunnel Design and Construction Issues & Challenges" organized by TAI & CBIP.	13-14 Apr, 15	New Delhi	2
37.	Seminar on "National Ganga River Basin Project". Mid-term Review Mission for clean Ganga (NMCG) MoWR, RD&GR.	01-04 Jun, 2015	Faridabad/ New Delhi	3
38.	Workshop on " SaansadAdarsh Gram Yojana(SAGY)" on good practice in the field of Rural Devlopment organized by MoWR, RD&GR	08-09 Jun, 2015	Bhopal	1
39.	Participation in "Geo Water Seminar" Conducted by Geospatial Media & Communication.	14 Jul, 2015	Hotel Meridien, New Delhi	2
40.	"Workshop on Best Practices in Agriculture and Allied sectors including Water Management"	10-11 Aug,2015	Hyderabad	1
41.	"Workshop for "Liaison Officer of Ministries/ Department and other Government Organization on Reservation in Service for SC/ST/OBC" organized by ISTM.	25-26 Aug ,2015	ISTM New Delhi	1
42.	"One day Workshop on "e-Governance Initiative and its Mission Mode Project (MMPS.) organized by ISTM.	28 Aug, 2015	ISTM New Delhi	1

Sl. No.	Topics of Program	Date	Venue	No. of Partcipants
43.	Workshop on "Recruitment/ Reservation Roster (Preparation and Maintenance) organized by ISTM.	25 Sep, 2015	New Delhi	5
44.	Workshop on "Service Book/Pension rules/ Pay fixation organized by ISTM, New Delhi.	19 Oct, 2015	New Delhi	3
45.	Workshop on "Pumped Storage Development and Integration of Renewable Energy" Organized by Central Electricity Authority	27 Oct, 2015	New Delhi	1
46.	6th Annual Conference of the International Society for Integrated Disaster Risk Management IDRIM-TIFAC 2015"	28-30 Oct, 2015	New Delhi	6
47.	International Symposium "Geosynthetic – The Road Ahead" Organized by Central Board of Irrigation and Power (CBIP), New Delhi	05-06 Nov, 2015	New Delhi	5
48.	"8th National Hydro Power Convention 2015" Organized by India Tech Foundation.	19-20 Nov, 20015	Guwahati	2
49.	"2nd NISAR Science Workshop at Space Application Center (SAC-ISRO)	19-20 Nov, 2015	Ahmadabad	1
50.	Workshop on "Role of Water Resources Management in Changing Environment" Organized by NIH, Roorkee.	19-20 Nov, 2015	Roorkee	1
51.	2nd World Congress on Disaster Management (2nd WCDM) Organized by Govt. of Andhra Pradesh and Disaster Management Infrastructure Control Society (DMICS)	19-22 Nov, 2015	Visakhapatnam (AP)	2
52.	"Integrated Water Resources" Development & Management" (III-Training) Conducted by National Institute of Hydrology (NIH)	30 Nov - 05 Dec, 2015	Roorkee	11

Sl. No.	Topics of Program	Date	Venue	No. of Partcipants
53.	16th ESRI India user 3rd- 4th Conference organized by ESRI India,	03-04 Dec, 2015	New Delhi	14
54.	Participation in the "20th International Conference on Hydraulics Water Resources and River Engineering in Hydro-2015	17-19 Dec, 2015	IIT Roorkee	1
55.	India Canada workshop on "Best practices for sustainable Hydro Development" Organized by Ministry of Power, Government of India.	21-22 Jan, 2016	New Delhi	2
56.	International workshop on "Integrated Water Management for Irrigation Networks and Flood Management- Irrigation Best Practice" organized by The Irrigation/Water Resources Department, Government of UP.	21-22 Jan, 2016	Lucknow U.P	5
57.	Workshop on "Urban Flood Mitigation Lessons Learnt and RoadMap for Future" conducted by National Disaster Management Authority (NDMA).	12-13 Feb, 2016	New Delhi	6
58.	Symposium on "Geospatial Technology in Water Management Conducted by National Remote Sensing, India Society of Remote Sensing and India Society for Geosmatics.	01-03 Mar, 2016	Greater Noida	1
59.	BAS Education Workshop for CWC attendance system organized by NIC.	08 Mar, 2016	New Delhi	3
60.	"National Water Summit" Organized by PHD Chamber, New Delhi.	22 Mar, 2016	New Delhi	10
61.	Workshop on "Use of GIS in Informed Planning and Decision Making" Organized by Govt. of India, CIPS in association with National e-Governance Division (NeGD), Department of Electronics & Information Technology (Deit) at India Habitate Centre.	29 - 30 Mar, 2016	New Delhi	5

Sl. No.	Topics of Program	Date	Venue	No. of Partcipants
E. Programmes under Plan Scheme of Ministry				
62.	Management Development Program on Competency Building:" A way of effective job performance Organized by NIFM, Faridabad.	06-10 Apr, 2015	NIFM, Faridabad	1
63.	5 Days Customized residential training program on "Basic Concept of Remote Sensing/GIS"	25-29 May, 2015	NRSC, Hyderabad	34
64.	Training workshop on "Sewage Effluent Management with Zero Liquid Discharge"	06-07 Aug, 2015	New Delhi	4
65.	Training Program on" Totality of Project Management Leading to Certificate in Project Management (CIPM)" Organized by CBIP and (i2P2M)	17-19 Aug, 2015	New Delhi	2
66.	Training Program on"Application Software (ARC GIS)"	19-21 Aug, 2015	CWC(H/q) New Delhi	14
67.	Training Course on "Laboratory Assessment of Rock (With Practical Demonstration)" organized by CSMRS.	22-23 Sep, 2015	New Delhi	2
68.	Training Course on "Geo-Engineering and Climate Change Technologies for Sustainable Environmental Management (GCCT-2015)" organized by MNTT, Allahabad	09-11 Oct, 2015	Allahabad	3
69.	Training Course on "Rock fill Material Survey, Testing, Design and Quality Assurance for Rock fill Dams" organized by CSMRS.	14-16 Oct, 2015	New Delhi	5
70.	Training Program on " Project Hydrology – Hydrological Aspects in Planning & Preparation of DPR"	16-20 Nov, 2015	New Delhi	31
71.	IX World Aqua Congress International Conference 2015-Reviving Traditional Water & Environment Conservation Technique organized by Aqua Foundation	26-27 Nov, 2015	New Delhi	4

Sl. No.	Topics of Program	Date	Venue	No. of Partcipants
72.	Conference and Exhibition on "Structural Connection" Organized by India Concrete Institute Delhi	28 Nov, 2015	New Delhi	2
73.	Training Program on "Symposium on Hydrology"	22-23 Dec, 2015	New Delhi	27
74.	National Summit on" Sustainable Water & Sanitation" to be organized by Nispana Innovative Platforms Pvt. Ltd.	07-08 Jan, 2016	Banglore	1
75.	Training program on "Geotechnical Issue Related to Earthen Embankments" organized by CSMRS.	10-12 Feb, 2016	CSMRS New Delhi	3
76.	Water Ex Gujrat 2016 Conference on "Waste Water Management Technologies and Salinity Control" organized by Chem Tech.	10-12 Feb, 2016	Ahmedabad	3
77.	3 days workshop on "Official Language and its implementation".	17-19 Feb, 2016	Coimbatore	20
78.	Training course on " Geotechnical Instrumentation for Hydroelectric Projects" at CSMRS	18-19 Feb, 2016	New Delhi	1
79.	Training program on "Hydrological Observation & Flood Forecasting".	29 Feb - 04 Mar,2016	Bhubaneswar	16
80.	Training course on "Diagnostic Investigation and Rehabilitation of Structures under Distress" to be organized by CSMRS	03-04Mar,2016	CSMRS, New Delhi	1
81.	Training program on "Surface Water Data Entry System (SWDES)".	05-11 Mar,2016	Bhubaneswar	19
82.	Training program on "Establishment, Accounts, Budget Vigilance and Legal Issues"	09 - 11 Mar,2016	Kochi	20
83.	"Basic Computer Training including MS Word, Excel & Power Point etc."	07-08 Mar, 2016	New Delhi	28
84.	Training program on "Establishment, Accounts, Budget Vigilance and Legal Issues"	09 - 11 Mar, 2016	Kochi	20

Sl. No.	Topics of Program	Date	Venue	No. of Partcipants
85.	"Basic Computer Training including MS Word, Excel & Power Point etc."	15-16 Mar, 2016	New Delhi	30
86.	"Basic Computer Training including MS Word, Excel & Power Point etc."	28-29 Mar, 2016	New Delhi	29

Traning / Workshops Abroad

Sl. No.	Topics of Program	Date	Venue	Participants S/Sh
1	Regional Workshop on Flood Management for All Asian RWPs- Hosted by GWP China, Sanya, Hainan Province.	14-16 Dec, 2015	China	1
2	Invitation India-UK Water seniority Exchange Delegation to the UK.	13-20 Feb, 2016	United Kingdom (UK)	1
3	Training Program on "Managing Water Organizations" Organized by UNESCO-IHE, Delft, Netherland.	29 Feb- 18 Mar, 2016	Netherland	1
4	SCPTA Course on "Public- Private Partnership in Development of Infrastructure Project"	16-20 Nov, 2015	Singapore	1
5	Training Program on "Coastal System" organized by UNESCO-IHE, Delft, Netherland.	08-26 Feb, 2016	Netherland	2
6	Training Program on "Managing Water Organizations" Organized by UNESCO-IHE, Delft, Netherland.	29 Feb - 18 Mar, 2016	Netherland	2

Annexure - 15.2

Details of Training Programs completed by National Water Academy, Pune till March 2016

Sr. No	Details of the Programs	Dates	Duration in weeks	Number of officers Trained	Man-weeks of training
1	Capacity Building (HRMI)	1-24 Apr 2015	4	33	132
2	Induction Training Program for newly promoted Assistant Directors / Assistant Executive Engineers of CWC	1 Apr - 05 Jun 2015	10	54	540
3	Capacity Building (HRMI)	27 Apr - 29 May 2015	5	33	165
4	Flood Warning (RoGB)	20-24 Apr 2015	1	12	12
5	E-water	11-15 May 2015	1	22	22
6	Water Resources of India	30-Jun 2015	0.2	37	7.4
7	Capacity Bulding Bihar (Dam Safety)	29 Jun - 3 Jul 2015	1	30	30
8	Management Development - Non Technical	06-10 Jul 2015	1	16	16
9	Preparation of DPR (NE Region)	06-17 Jul 2015	2	17	34
10	Capacity Building (Bihar-HM Equipment)	20-24 Jul 2015	1	30	30
11	World Bank Procurement Procedures	27-31 Jul 2015	1	64	64
12	PMKSY	24-28 Aug 2015	1	19	19

Sr. No	Details of the Programs	Dates	Duration in weeks	Number of officers Trained	Man-weeks of training
13	Orientation	31 Aug - 11 Sep 2015	2	42	84
14	Prepareation of DPR (Others)	21-25 Sep 2015	1	31	31
15	Water Law	29 Sep -1 Oct 2015	0.6	40	24
16	Module of Asst Secy MoWR	01-Oct 2015	0.2	5	1
17	Monitoring of Irrigation Projects using GIS (ISRO)	05-09 Oct 2015	1	28	28
18	Dam Break Analysis	12-16 Oct 2015	1	10	10
19	Coastal Protection	12-16 Oct 2015	1	25	25
20	Training-Workshop on CC	16-Oct 2015	0.2	40	8
21	Over view of WRS of NT officers	26-30 Oct 2015	1	24	24
22	Flood Management usig GIS (ISRO)	26-30 Oct 2015	1	21	21
23	International DL :Basic Hydrology	02 Nov - 18 Dec 2015	7	46	322
24	Environmental Aspects of WRP	16-20 Nov 2015	1	34	34
25	CAT - BPMO	16 Nov - 4 Dec 2015	3	18	54
26	28 ITP	07 Dec 2015 -03 Jun 2016	16	34	544
27	WQM &AA	14-18 Dec 2015	1	40	40

Sr. No	Details of the Programs	Dates	Duration in weeks	Number of officers Trained	Man-weeks of training
28	Advanced Design Techniques using Software	18-22 Jan 2016	1	35	35
29	Monitoring of Projects using Bhuvan Sofware	01-05 Feb 2016	1	33	33
30	MDP for Senior Officers	8-12 Feb 2016	1	18	18
31	Flood Management using RS-GIS for Officials of GFCC Patna	10-12 Feb 2016	0.8	9	7
32	Application of RS-GIS	22-26 Feb 2016	1	34	34
33	E-procurement	03-04 Mar 2016	0.4	32	12
34	International Adv DL	07 Mar - 15 April 2016	4	40	160
35	Digital Surface Modelling and Watershed Modelling using GIS (ISRO)	14-23 March 2016	1.8	10	18
36	Training-Workshop on Water Conservation and Management for Panchayat Raj Representatives and Farmers	31 Mar 2016	0.2	47	9
	Total		**76.4**	**1063**	**2648**

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Photo Gallery

Valedictory Function of 27th Induction Training Programme (ITP) for newly recruited CWES (Gr. A) Officers on 5thJune,2015 at NWA, Pune.

2nd National Dam Safety Conference during 12-13 January, 2016 at IISc., Bengaluru.

Launching of Jal Kranti Abhiyan at Shimla on 5th June, 2015

State Level Workshop cum Training Programme under Jal Kranti Ahbiyan held at Bhubaneswar on 12th January, 2016

State Level One Day Workshop on Jal Kranti Abhiyan held at Kurukshetra on 19th March, 2016

One Day Workshop on Management of Glacial Lake Outburst Flow at New Delhi on 28th July, 2015