सत्यमेव जयते

ABSTRACT ON WATER SECTOR-2020

सूचना प्रणाली संगठन
केन्द्रीय जल आयोग
जल संसाधन, नदी विकास एवं गंगा संरक्षण विभाग
जल शक्ति मंत्रालय
भारत सरकार

INFORMATION SYSTEM ORGANISATION
CENTRAL WATER COMMISSION
DEPARTMENT OF WATER RESOURCES, RD & GR
MINISTRY OF JAL SHAKTI
GOVERNMENT OF INDIA

दिसम्बर, 2020

DECEMBER, 2020

CWC/2020/109

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जल क्षेत्र सारांश-2020

ABSTRACT ON WATER SECTOR-2020

WATER RELATED STATISTICS DIRECTORATE
INFORMATION SYSTEM ORGANISATION
WATER PLANNING & PROJECTS WING
CENTRAL WATER COMMISSION
cwc.gov.in

दिसम्बर, 2020 **DECEMBER, 2020**

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CHAIRMAN
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to the Government of India

सत्यमेव जयते

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Central Water Commission

FOREWORD

Central Water Commission is the premier Technical Organisation of India in the field of water resources and is presently functioning as an attached office of the Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation, Government of India. The mandate of Central Water Commission is to promote integrated and sustainable development and management of India's water resources by using state-of-the-art technology, competency and by coordinating with all stakeholders.

In order to cater to the ever growing needs of data on water resources and related aspects, CWC brings out various publications at regular intervals. The present publication 'Abstract on Water Sector-2020' is a new initiative for providing a gist of water resources at all India level.

Excellent work has been done by Member (WP&P) as the Chairman of the Committee for improvement of this publication. The work of collection, compilation and finalization of data for the publication was accomplished by the officers/officials of Water Related Statistics Directorate of Information System Organisation (ISO), WP&P Wing of CWC under the supervision of Shri S. C. Malik, Advisor (ISO) and Smt. J. Kurian, Ex-Advisor (ISO). Comments/suggestions for further improvement of the publication would be welcome and will be highly appreciated.

I hope, this publication would be of great interest and use to users of Statistics of the water resource sector and concerned with balanced optimal water resources development.

(Rajendra Kumar Jain)

December, 2020

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सत्यमेव जयते

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जल संसाधन, नदी विकास
और गंगा संरक्षण विभाग
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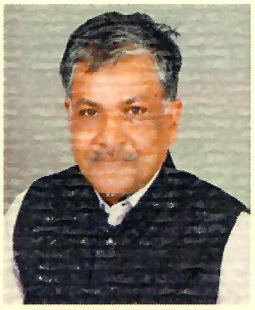
PREFACE



There are a number of water resources development projects which have been undertaken since independence in the country with the objective to ensure rational and balanced allocation of water. The planning, development, execution and management of these projects require a sound and broad database on water resources and related aspects. Central Water Commission being the lead nodal agency in the water resources sector with overall responsibility for its balanced development has been taking care of this aspect by documenting water and related data in the form of various publications.

In this endeavor, 'Abstract on Water Sector-2020' is the first edition of the publication intended to provide a gist of water resources at all India level.

I appreciate the work done by the officers/officials of Water Related Statistics Directorate of Information System Organization, WP&P wing, CWC, for giving a presentable shape to the publication. The data given in this publication is based on the information sourced from various Ministries/Departments/Organisations/Directorates of Central and State Governments. I also appreciate the efforts put in by all the data source agencies which contributed the data/information and supported our efforts to bring out this publication.

While due care has been taken to ensure the accuracy of data, the possibility of some errors and omissions in the publication can't altogether be ruled out. Suggestions/comments, if any, for further improvement of the publication will be highly appreciated.

(S. K. Haldar)

December, 2020

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MESSAGE

Water resource challenges faced by India are considerable and can only be addressed by adopting an integrated approach that considers all uses and sources of water (surface water, ground water, etc) from the river basin/hydrologic perspective. This requires sound information and knowledge on the water resource base and its uses, coupled with the availability of appropriate tools for collection, compilation, analysis and decision making. Hydro-meteorological observations and statistical analysis thereon are the basis for efficient and sustainable water management. Central Water Commission is the nodal agency in the water resources sector. It is mandated to promote integrated and sustainable development and management of India's water resources by using state-of-the-art technology and competency. To cater to the ever-growing needs of data on water resources and related aspects, ISO brings out various publications at regular intervals.

The present publication 'Abstract on Water Sector-2020' is a new initiative to provide a general picture of water resources at the national level. The statistics included in the publication inter-alia provide the information on National Water Policy, 2012 and its salient features. Attempts have been made to present water statistics both in tabular as-well-as in map/graphical formats for better and quick understanding by the stakeholders.

I would like to express my deep gratitude to Shri Rajendra Kumar Jain, Chairman, CWC and Shri S. K. Haldar, Member (WP&P), CWC for their continuous support, guidance and encouragement to bring out this publication in time. I am also very much thankful to all the Committee members and the data source agencies mainly various Directorates of CWC and D/o Water Resources, RD & GR, M/o Jal Shakti; Central Ground Water Board; Central Electricity Authority; India Meteorological Department; Directorate of Economics & Statistics; Forest Survey of India; M/o Fisheries, Animal Husbandry and Dairying and M/o Shipping etc. for their cooperation and support.

The publication has been prepared through the combined efforts of the officers and officials of the Information System Organisation (ISO). The efforts made by Shri Basant Kumar, Director; Shri G. R. Janghu, Ex-Joint Director, Smt. Suchitra Yadav, Deputy Director; Shri Ashwani Kumar, Senior Statistical Officer and Shri Raghuvir Singh, Junior Statistical Officer are commendable.

I hope the publication will prove to be a useful document to policymakers, planners, academicians and researchers. It shall be an endeavour on part of ISO to continuously improve the publication both in content and design with the help of users' feedback.

New Delhi
December, 2020

(Subash Chandra Malik)
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Acronyms and Abbreviations

AIBP	Accelerated Irrigation Benefits Programme
BCM	Billion Cubic Metret
BCM/yr	Billion Cubic Metre per year
BP	Basin Planning
BPMO	Basin Planning & Management Organization
CA	Central Assistance
CAD	Command Area Development
CAD&WM	Command Area Development & Water Management
CCA	Culturable Command Area
CCEA	Cabinet Committee on Economic Affairs
CEA	Central Electricity Authority
CFC	Consumption of Fixed Capital
CGWB	Central Ground Water Board
CIWTC	Central Inland Water Transport Corporation
Ckt.km	Circuit Kilometer
CLA	Central Loan Assistance
cm	Centimetre
Cr	Crore
CUI	Coverage Under Irrigation
cum	Cubic Metre
cumecs	Cubic Metre Per Second
CWC	Central Water Commission
CWPRS	Central Water and Power Research Station
DDP	Desert Development Programme
DHARMA	Dam Health and Rehabilitation Monitoring Application
DPAP	Drought Prone Areas Programme
DRIP	Dam Rehabilitation and Improvement Project
EFC	Expenditure Finance Committee
EMO	Environment Management Organisation
ERM	Extension, Renovation and Modernization
FBP	Farakka Barage Project
FMP	Flood Management Programme

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Acronyms and Abbreviations

GC/G	General Cargo
GD	Gauge and Discharge Site
GDP	Gross Domestic Product
GDQ	Gauge, Discharge and Water Quality Site
GDS	Gauge, Discharge and Sediment Site
GDSQ	Gauge, Discharge, Sediment and Water Quality Site
GFCC	Ganga Flood Control Commission
GIA	Gross Irrigated Area
GQ	Gauge and Water Quality Site
GSA	Gross Sown Area
GVA	Gross Value Added
GW	Giga Watt
G.W	Ground Water
Ha	Hectare
HDD	Hydrological Data Directorate
HEPR	Hydro Electric Potential Reassessment Division
HF	Harbor Freight
HFL	Highest Flood Level
HKKP	Har Khet Ko Pani
HP	Horse Power
HQ	Head Quarter
HSD	High Speed Diesel
IMF	International Monetary Fund
IOC	Indian Oil Corporation
IPC	Irrigation Potential Created
IPU	Irrigation Potential Utilised
ISBIG	Scheme for Bridging Irrigation Gap
ISO	Information System Organisation
IWAI	Inland Waterways Authority of India
IWDP	Integrated Watershed Development Project
IWRM	Integrated Water Resources Management

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Acronyms and Abbreviations

IWT	Inland Water Transport
km	Kilometer
km^2	Square Kilometer
km^3	Cubic Kilometer
KSINC	Kerala Shipping & Inland Navigation Corporation
KW	Kilo Watt
KW/h	Kilo Watt per hour
LAG	Liquified Amonnia Gas
Lakh Ha	Lakh Hectare
LCT	Loaded Carriage Tug
LDO	Light Diesel Oil
LTIF	Long Term Irrigation Fund
MCM	Million Cubic Metre
MCM/yr	Million Cubic Metre per year
Mha	Million Hectare
mm	Millimetre
MMI	Major and Medium Irrigation
MW	Mega Watt
NABARD	National Bank for Agriculture and Rural Development
NAPCC	National Action Plan on Climate Change
NCIWRD	National Commission on Integrated Water Resources Development
NDP	Net Domestic Product
NIA	Net Irrigated Area
NIH	National Institute of Hydrology
NIT	National Institute of Technology
NP	National Project
NRDWP	National Rural Drinking Water Programme
NRMD	Natural Resource Management Directorate
NRSC	National Remote Sensing Centre
NSA	Net Sown Area
NSO	National Statistical Office
NWP	National Water Policy

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Acronyms and Abbreviations

NWRC	National Water Resources Council
ODC	Over Dimensional Cargo
OECD	Organization for Economic Co-operation and Development
PDA	Pancheswar Development Authority
PIM	Participatory Irrigation Management
PL	Pond Level
PMKSY	Pradhan Mantri Krishi Sinchayee Yojana
PMO	Project Monitoring Organisation
POL	Petroleum Oil Lubricant
P&P	Planning & Progress
PSS	Power System Simulator
RDC	River Data Compilation
RGI	Registrar General of India
RRR	Repair, Renovation and Restoration
SG&Met	Snow Gauge & Meteorological Site
Sq.km	Square Kilometer
SVNIT	Sardar Vallabhbhai National Institute of Technology
SW	Surface Water
TCA	Total Cultivable Area
T&D	Transmission and Distribution Lines
Th.Ha	Thousand Hectare
Ton/Ha	Ton per Hectare
UID	Unique Identifier
UIP	Ultimate Irrigation Potential
UT	Union Territory
WM	Water Management
WP&P	Water Planning and Projects Wing
WQSS	Water Quality Sampling Station
WRIS	Water Resources Information System
WRS	Water Related Statistics
WUA	Water Users Association

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Section-I

National Water Policy, 2012

Section-I
National Water Policy, 2012

Water, which is a vital sustenance for life and economic development, is becoming an increasingly scarce resource in the country. The planning and execution of water resources development have by and large been carried out by individual State. As the major rivers in our country are inter-State in nature, it has not been possible for individual State to prepare master plans in respect of these rivers. It was felt that planning at the national level for utilization of water resources should be undertaken so that the greatest goal is achieved and optimum benefits derived from the available water resources.

The necessity for an apex body to evolve national policies for development and use of water resources in conformity with the highest national interests was emphasized by various authorities including the Irrigation Commission, National Commission on Agriculture and Rashtriya Barh Aayog. The National Development Council observed at its meeting held on 14th March, 1982 also discussed the matter and the Council that an environment should be created in which national water plans are prepared keeping in view the national perspective as well as State and regional needs. In that context, the Council welcomed the proposal of the Government of India for setting up of National Water Resources Council (NWRC).

Accordingly, NWRC was set up on 10th March, 1983 under the Chairpersonship of Prime Minister of India with Union Minister of Irrigation (now Water Resources) as Vice Chairman. Union Ministers of Finance, Agriculture, Planning, Energy, Shipping & Transport, Tourism, Science & Technology, Works & Housing and the Chief Ministers/ Chief Commissioners/ Administrators of the States and UTs were the other members of the NWRC.

The NWRC adopted the first National Water Policy in its 2nd meeting held in September, 1987. After adoption of NWP 1987, new challenges were emerged in the water resources sector, which necessitated review of the National Water Policy. Accordingly, the revised National Water Policy-2002 was adopted by the National Water Resources Council in its 5th meeting held on 1st April 2002. While there was a chord of similarity in essence and principles between the NWP-1987 and NWP-2002, yet the NWP-2002 was introduced for modification / addition/alteration pertaining to various issues namely Information system, Water resources planning, Institutional mechanism, Project planning, Private sector participation, Water quality, Monitoring of the projects, Water sharing/ distribution amongst the States, Performance improvement, Maintenance and modernization, Safety of structures, Land erosion by sea or river, Conservation of water in comparison to National Water Policy -1987.

India is faced with the challenge of sustaining its rapid economic growth while dealing with the global threat of climate change. While engaged with the international community to collectively and cooperatively deal with this threat, India needed a national strategy to firstly, adapt to climate change and secondly, to further enhance the ecological sustainability of

India's development path. With a view to address the related issues, the National Action Plan on Climate Change (NAPCC) was prepared by the Government of India and released by the Hon'ble Prime Minister in 2008. The NAPCC had laid down the principles and had identified the approach to be adopted to meet the challenges of impact of climate change through eight National Missions one of which was National Water Mission.

This Comprehensive Mission Document of "National Water Mission" identifies the strategies for achieving the goals of (a) Comprehensive water database in public domain and assessment of the impact of climate change on water resource, (b) Promotion of citizen and state actions for water conservation, augmentation and preservation, (c) Focused attention to vulnerable areas including over-exploited areas, (d) Increasing water use efficiency by 20%, and (e) Promotion of basin level integrated water resources management.

Under Goal 5 of the National Water Mission i.e 'Promotion of basin level integrated water resources management', Review of National Water Policy was one of the identified strategies. Accordingly, NWRC in its 6th meeting Chaired by the Hon'ble Prime Minister on 28th December, 2012, adopted the National Water Policy-2012 as per the deliberation at the Council Meeting. The adopted National Water Policy-2012 was released during India Water Week, 2013. The objective of the National Water Policy is to take cognizance of the existing situation, to propose a framework for creation of a system of laws and institutions and for a plan of action with a unified national perspective.

1.1 Salient features of National Water Policy, 2012

- Planning, development and management of water resources need to be governed by common integrated perspective considering local, regional, State and national context, having an environmentally sound basis, keeping in view the human, social and economic needs.

- Principle of equity and social justice must inform use and allocation of water.

- Water needs to be managed as a common pool community resource held, by the States under public trust doctrine to achieve food security, support livelihood, and ensure equitable and sustainable development for all

- Water is essential for sustenance of eco-system, and therefore, minimum ecological needs should be given due consideration.

- Safe Water for drinking and sanitation should be considered as pre-emptive needs, followed by high priority allocation for other basic domestic needs (including needs of animals), achieving food security, supporting subsistence agriculture and minimum eco-system needs. Available water, after meeting the above needs, should be allocated in a manner to promote its conservation and efficient use.

- Given the limits on enhancing the availability of utilizable water resources and increased variability in supplies due to climate change, meeting the future needs will depend more on demand management, and hence, this needs to be given priority, especially through (a) evolving an agricultural system which economizes on water use and maximizes value from water, and (b) bringing in maximum efficiency in use of water and avoiding wastages.

- Water quality and quantity are interlinked and need to be managed in an integrated manner, consistent with broader environmental management approaches inter-alia including the use of economic incentives and penalties to reduce pollution and wastage.

- The impact of climate change on water resources availability must be factored into water management related decisions. Water using activities need to be regulated keeping in mind the local geo-climatic and hydrological situation.

- There is a need to evolve a National Framework Law as an umbrella statement of general principles governing the exercise of legislative and/or executive (or devolved) powers by the Centre, the States and the local governing bodies. This should lead the way for essential legislation on water governance in every State of the Union and devolution of necessary authority to the lower tiers of government to deal with the local water situation.

- There is a need for comprehensive legislation for optimum development of inter-State rivers and river valleys to facilitate inter-State coordination ensuring scientific planning of land and water resources taking basin/sub-basin as unit with unified perspectives of water in all its forms (including precipitation, soil moisture, ground and surface water) and ensuring holistic and balanced development of both the catchment and the command areas. Such legislation needs, inter alia, to deal with and enable establishment of basin authorities, comprising party States, with appropriate powers to plan, manage and regulate utilization of water resource in the basins.

- The Centre, the States and the local bodies (governance institutions) must ensure access to a minimum quantity of potable water for essential health and hygiene to all its citizens, available within easily accessible to the households.

- Ecological needs of the river should be determined, through scientific study, recognizing that the natural river flows are characterized by low or no flows, small floods (freshets), large floods, etc., and should accommodate developmental needs. A portion of river flows should be kept aside to meet ecological needs ensuring that the low and high flow releases are proportional to the natural flow regime, including base flow contribution in the low flow season through regulated ground water use.

- The availability of water resources and its use by various sectors in various basin and States in the country need to be assessed scientifically and reviewed at periodic

intervals, say, every five years. The trends in water availability due to various factors including climate change must be assessed and accounted for during water resources planning.

- The anticipated increase in variability in availability of water because of climate change should be dealt with by increasing water storage in its various forms, namely, soil moisture, ponds, ground water, small and large reservoirs and their combination. States should be incentivized to increase water storage capacity, which inter-alia should include revival of traditional water harvesting structures and water bodies.

- There is a need to map the aquifers to know the quantum and quality of ground water resources (replenishable as well as non-replenishable) in the country. This process should be fully participatory involving local communities. This may be periodically updated.

- Declining ground water levels in over-exploited areas need to be arrested by introducing improved technologies of water use, incentivizing efficient water use and encouraging community based management of aquifers. In addition, where necessary, artificial recharging projects should be undertaken so that extraction is less than the recharge. This would allow the aquifers to provide base flows to the surface system, and maintain ecology.

- A system to evolve benchmarks for water uses for different purposes, i.e., water footprints, and water auditing should be developed to promote and incentivize efficient use of water. The 'project' and the 'basin' water use efficiencies need to be improved through continuous water balance and water accounting studies. An institutional arrangement for promotion, regulation and evolving mechanisms for efficient use of water at basin/sub-basin level will be established for this purpose at the national level.

- Recycle and reuse of water, including return flows, should be the general norm.

- Water saving in irrigation use is of paramount importance. Methods like aligning cropping pattern with natural resource endowments, micro irrigation (drip, sprinkler, etc.), automated irrigation operation, evaporation-transpiration reduction, etc., should be encouraged and incentivized. Recycling of canal seepage water through conjunctive ground water use may also be considered.

- Pricing of water should ensure its efficient use and reward conservation. Equitable access to water for all and its fair pricing, for drinking and other uses such as sanitation, agricultural and industrial, should be arrived at through independent statutory Water Regulatory Authority, set up by each State, after wide ranging consultation with all stakeholders.

- In order to meet equity, efficiency and economic principles, the water charges should preferably, as a rule, be determined on a volumetric basis. Such charges should be reviewed periodically.

- The principle of differential pricing may be retained for the pre-emptive uses of water for drinking & sanitation and high priority allocation for ensuring food security and supporting livelihood for the poor. Available water, after meeting the above needs, should increasingly be subjected to allocation and pricing on economic principles so that water is not wasted in unnecessary uses and could be utilized more gainfully.

- Encroachments and diversion of water bodies (like rivers, lakes, tanks, ponds, etc.) and drainage channels (irrigated area as well as urban area drainage) must not be allowed, and wherever it has taken place, it should be restored to the extent feasible and maintained properly.

- Sources of water and water bodies should not be allowed to get polluted. System of third party periodic inspection should be evolved and stringent punitive actions be taken against the persons responsible for pollution.

- Considering the heavy economic loss due to delay in implementation of projects, all clearances, including environmental and investment clearances, be made time bound.

- All components of water resources projects should be planned and executed in a pari-passu manner so that intended benefits start accruing immediately and there is no gap between potential created and potential utilized.

- Local governing bodies like Panchayats, Municipalities, Corporations, etc., and Water Users Associations, wherever applicable, should be involved in planning of the projects. The unique needs and aspirations of the Scheduled caste and Scheduled Tribes, women and other weaker sections of the society should be given due consideration.

- All water resources projects, including hydro power projects, should be planned to the extent feasible as multi-purpose projects with provision of storage to derive maximum benefit from available topology and water resources.

- While every effort should be made to avert water related disasters like floods and droughts, through structural and non-structural measures, emphasis should be on preparedness for flood/drought with coping mechanisms as an option. Greater emphasis should be placed on rehabilitation of natural drainage system.

- Urban and rural domestic water supply should preferably be from surface water in conjunction with groundwater and rainwater. Where alternate supplies are available, a source with better reliability and quality needs to be assigned to domestic water supply. Exchange of sources between uses, giving preference to domestic water supply should

be possible. Also, reuse of urban water effluents from kitchens and bathrooms, after primary treatment, in flush toilets should be encouraged, ensuring no human contact.

- In urban and industrial areas, rainwater harvesting and de-salinization, wherever techno-economically feasible, should be encouraged to increase availability of utilizable water. Implementation of rainwater harvesting should include scientific monitoring of parameters like hydrogeology, groundwater contamination, pollution and spring discharges.

- Urban water supply and sewage treatment schemes should be integrated and executed simultaneously. Water supply bills should include sewerage charges.

- A permanent Water Disputes Tribunal at the Centre should be established to resolve the disputes expeditiously in an equitable manner. Apart from using the “good offices” of the Union or the State Governments, as the case may be, the paths of arbitration and mediation may also to be tried in dispute resolution.

- Integrated Water Resources Management (IWRM) taking river basin / sub-basin as a unit should be the main principle for planning, development and management of water resources. The Departments/Organizations at Centre / State Governments levels should be restructured and made multi-disciplinary accordingly.

- All water related data, like rainfall, snowfall, geo-morphological, climatic, geological, surface water, ground water, water quality, ecological, water extraction and use, irrigated area, glaciers, etc., should be integrated with well defined procedures and formats to ensure online updation and transfer of data to facilitate development of database for informed decision making in the management of water.

- Continuing research and advancement in technology shall be promoted to address issues in the water sector in a scientific manner. Innovations in water resources sector should be encouraged, recognized and awarded.

- It needs to be recognized that the field practices in the water sector in advanced countries have been revolutionized by advances in information technology and analytical capabilities. A re-training and quality improvement programme for water planners and managers at all levels in India, both in private and public sectors, needs to be undertaken.

- An autonomous centre for research in water policy should also be established to evaluate impacts of policy decisions and to evolve policy directives for changing scenario of water resources.

1.2 States/UTs who have Formulated/Adopted/are in the process of National/State Water Policy

Sl. No.	States/UTs	Status of Water Policy			Remarks
		Formulated	Adopted	In Process	
1	2	3	4	5	6
States					
1	Andhra Pradesh	2009			
2	Arunachal Pradesh			In Process	Arunachal Pradesh Water Resources Regulatory Authority Act, 2006
3	Assam			In Process	Draft Water Policy 2007 prepared
4	Bihar			In Process	Draft Water Policy 2010 prepared
5	Chhattisgarh	2001			Draft Water Policy 2012 on website
6	Goa	2000			Draft Water Policy 2015 on website
7	Gujarat			In Process	Draft Water Policy 2015 prepared
8	Haryana			In Process	
9	Himachal Pradesh	2013			
10	Jharkhand	2011			
11	Karnataka	2002			
12	Kerala	2008			
13	Madhya Pradesh	2003			
14	Maharashtra	2003			
15	Manipur			In Process	
16	Meghalaya	2019			
17	Mizoram			In Process	
18	Nagaland			In Process	Water Policy 2016 (final version) prepared by Indian Environment Law Offices (IELO)
19	Odisha	2007			
20	Punjab			In Process	Draft Water Policy 2008 prepared
21	Rajasthan	2010			
22	Sikkim	2009			
23	Telangana				
24	Tamil Nadu	1994			Draft Water Policy 2007 prepared

Contd…

1.2 States/UTs who have Formulated/Adopted/are in the process of National/State Water Policy

Sl. No.	States/UTs	Status of Water Policy			Remarks
		Formulated	Adopted	In Process	
1	2	3	4	5	6
25	Tripura			In Process	
26	Uttar Pradesh	1999			Draft Water Policy 2014 prepared
27	Uttarakhand			In Process	Draft Water Policy 2015 prepared
28	West Bengal			In Process	Draft Water Policy 2011 prepared. Latest status not known
Union Territories					
1	Andaman & Nicobar Islands			In Process	
2	Chandigarh			In Process	
3	Dadar & Nagar Haveli		Adopted		
4	Daman & Diu		Adopted		
5	Jammu & Kashmir			In Process	Draft Water Policy & plan 2016 prepared
6	Lakshadweep			In Process	
7	Puducherry			In Process	Draft Water Policy 2012 prepared

Source: NWP Directorate, CWC

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Section-II

Water Resources at a Glance

Section-II
Water Resources at a Glance

Water resources are natural resources of water that are potentially useful. Uses of water include agricultural, industrial, household, recreational and environmental activities. All living things require water to grow and reproduce. About 97.5% of the water on the Earth is salt water and only about 2.5% is fresh water; slightly over two thirds of this is frozen in glaciers and polar ice caps. The remaining unfrozen fresh water is found mainly as groundwater, with only a small fraction present above ground or in the air.

Water resources include information on precipitation, surface and ground water storage and hydropower potential. Water resources (surface water and ground water) are renewed through the continuous cycle of evaporation, precipitation and run-off. The water cycle is driven by global and climatic forces that introduce variability in precipitation and evaporation, which in turn define run-off patterns and water availability over space and time (modulated by natural and artificial storage).

India has only about 4 per cent of the world's renewable water resources but is home to nearly 18 per cent of the world's population. India experiences an average annual precipitation of 3880 BCM where as average precipitation during monsoon is about 3000 BCM. The water resources potential of the country which occurs as natural run-off in the rivers is about 1999 BCM as per the estimates of Central Water Commission (CWC) taking both surface and ground water into account. Estimated utilizable water resources of the country is 1122 BCM per year, out of which, share of surface water and ground water is 690 BCM (as per Reassessment of Water Availability in India using Space Inputs-2019)and 432 BCM (as per Ground Water Resources Assessment -2017) per year respectively.

According to World Water Development Report, 2020 by UN; global water use has increased by a factor of six over the past 100 years and continues to grow steadily at a rate of about 1% per year as a result of increasing population, economic development and shifting consumption patterns. Combined with a more erratic and uncertain supply, climate change will aggravate the situation of currently water-stressed regions, and generate water stress in regions where water resources are still abundant today. Physical water scarcity is often a seasonal phenomenon, rather than a chronic one, and climate change is likely to cause shifts in seasonal water availability throughout the year in several places. Climate change manifests itself, amongst others, in the increasing frequency and magnitude of extreme events such as heat waves, unprecedented rainfalls, thunderstorms and storm surge events.

The National Commission for Integrated Water Resources Development (NCIWRD) had estimated total withdrawal/utilization for 2010 for all types of uses as 710 BCM for high projection scenario. Out of which irrigation accounted for nearly 78% followed by domestic use 6%, industries 5%, power development 3%, and other activities claimed about 8% including evaporation losses, environment and navigational requirements. Whereas, for the year 2050;

total 1180 BCM has been estimated for high projection scenario. Out of which irrigation will be accounted for nearly 68% followed by domestic use 9.5%, industries 7%, power development 6%, and other activities claimed about 9.5% including evaporation losses, environment and navigational requirements.

To meet the diverse types of water demands of the society, various facilities/systems comprising of reservoirs, diversion structures, canals, pump houses, overhead tanks, piped supply systems etc. have been created. Such systems have been conceived with a set design operating efficiency.

2.1 World- Land and Water Resources

A. General			
Geographical Area (2017)	13486 Mha		
Population (2018)	7631 Million		
B. Sources of Water (Approximate)			
Item	**Volume (in Billion km^3)**	**In Percentage**	
Water in Oceans	1.365	97.5	
Fresh Water	0.035	2.5	
Total	**1.4**	**100**	
C. Sources of Fresh Water (Approximate)			
Item	**Volume (in Million km^3)**	**% of Fresh Water**	**% of Total Water**
Polar Ice and Glaciers	24.000	68.9	1.77
Ground Water*	10.780	30.8	0.79
Lakes & Rivers	0.105	0.3	0.01
D. Land Resources			
Land Area (2017)	13003 Mha		
Arable Lands (2017)	1391 Mha		
Forest (2017)	3999 Mha		

Source: website of FAO - www.fao.org, http://www.unep.org

'*' Shallow and deep ground water basins up to 2000 metres, soil moisture, swamp water and permafrost.

2.2 India- Land and Water Resources

A. General	
Total Geographical Area (TGA)	328.74 Mha
Area as % of World Area	2.44%
Location	Latitude 8°4'N to 37°6'N Longitude 68°7'E to 97°25' E
Forest Cover (2019)	21.67% of TGA
Population (As Per Census Of India 2011)	1210.57 Million
Population(Estimated in 2018 as per FAO STAT)	1352.64 Million
Population as % of World Population(as in 2018)	17.73%
Annual Rainfall (2019)	1284.1 mm
B. Water Resources	
Average Annual Precipitation	3880 BCM
Average Annual Water Resources	1999.2 BCM
Estimated Utilizable Surface Water Resources	690 BCM
Total Annual Ground Water Recharge	432 BCM
Total Annual Utilizable Water Resources	1122 BCM
Per Capita Water Availability (2011 Census)	1651 m^3/year
Large Dams	5745 Nos.
Completed Dams	5334 Nos.
Under Construction	411 Nos.
Storage Capacity	257.812 BCM
C. Land Resources	
Total Cultivable Land (2015-16)	181.60 Mha
Gross Sown Area (2015-16)	197.05 Mha
Net Sown Area (2015-16)	139.51 Mha
Gross Irrigated Area (2015-16)	96.62 Mha
Net Irrigated Area (2015-16)	67.30 Mha
D. Hydropower (Capacity as on 30.09.2020)	
Identified Hydroelectric Potential (Total)	148701 MW
Identified Hydroelectric Potential (above 25 MW)	145320 MW
Capacity Under Operation (above 25 MW)	40913.6 MW
Capacity Under Construction (above 25 MW)	11393.5 MW

Source: BP-1 Directorate, CWC, RGI, IMD, Central Electricity Authority; 'India State of Forest Report 2019', Forest Survey of India, M/o Environment, Forests & Climate Change; 'Land Use Statistics at A Glance-2020', Directorate of Economics & Statistics, Department of Agriculture, Cooperation & Farmers Welfare (http://eands.dacnet.nic.in)

2.3 Tolerance and Classification

As per IS: 2296-1992, the tolerance limits of parameters are specified as per classified use of water depending on various uses of water. The following classifications have been adopted in India:

Designated Best Uses of Water

Designated Best Use	Class	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	1.Total Coliforms Organism MPN/100 ml shall be 50 or less 2. pH between 6.5 and 8.5 3. Dissolved Oxygen 6 mg/l or more 4. Biochemical Oxygen Demand 5 days 20°C, 2 mg/l or less
Outdoor Bathing (Organised)	B	1.Total Coliforms Organism MPN/100 ml shall be 500 or less 2. pH between 6.5 and 8.5 3. Dissolved Oxygen 5 mg/l or more 4. Biochemical Oxygen Demand 5 days 20°C, 3 mg/l or less
Drinking Water Source after Conventional Treatment and Disinfection	C	1. Total Coliforms Organism MPN/100 ml shall be 5000 or less 2. pH between 6 and 9 3. Dissolved Oxygen 4 mg/l or more 4. Biochemical Oxygen Demand 5 days 20°C, 3 mg/l or less
Propagation of Wild life and Fisheries	D	1. pH between 6.5 and 8.5 2. Dissolved Oxygen 4 mg/l or more 3. Free Ammonia (as N) mg/l, 1.2 or less 4. Biochemical Oxygen Demand 5 days 20°C, 2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	1. pH between 6.0 and 8.5 2. Electrical Conductivity at 25°C micro mhos/cm, maximum 2250 3. Sodium absorption Ratio Max. 26 4. Boron Max. 2 mg/l
	Below - E	Not meeting any of the A, B, C,D & E criteria

Source: CPCB/ 'Hydrological Data (Unclassified) Book-2020', HD Directorate, ISO, CWC

2.4 Water Quality Standards in India (Source IS 2296:1992)

Sl. No.	Characteristics	Designated Best Use				
		A	B	C	D	E
1	Dissolved Oxygen (DO) mg/l. min	6	5	4	4	-
2	Biochemical Oxygen demand (BOD) mg/l.max	2	3	3	-	-
3	Total Coliform organisms MPN /100 ml.max	50	500	5000	-	-
4	pH value	6.5-8.5	6.5-8.5	6.0-9.0	6.5-8.5	6.0-8.5
5	Colour. Hazen units. max	10	300	300	-	-
6	Odour	Un-objectionable			-	-
7	Taste	Tasteless	-	-	-	-
8	Total dissolved solids. mg/l. max	500	-	1500	-	2100
9	Total hardness (as $CaCO_3$),mg/l.max	200	-	-	-	-
10	Calcium hardness (as $CaCO_3$), mg/l.max	200	-	-	-	-
11	Magnesium hardness (as $CaCO_3$), mg/l.max.	200	-	-	-	-
12	Copper (as Cu).mg/l.max	1.5	-	1.5	-	-
13	Iron (as Fe). Mg/l max	0.3	-	0.5	-	-
14	Manganese (as Mn).mg/l. max	0.5	-	-	-	-
15	Chloride (as Cl). mg/l.max	250	-	600	-	600
16	Sulphates (as SO_4). mg/l. max	400	-	400	-	1
17	Nitrate (as NO_3). mg/l. max	20	-	50	-	-
18	Fluorides (as F). mg/l. max	1.5	1.5	1.5	-	-
19	Phenolic compounds (as C_2H_5OH). mg/l. max	0.002	0.005	0.005	-	-
20	Mercury (as Hg). mg/l. max	0.001	-	-	-	-
21	Cadmium (as Cd).mg/l. max	0.01	-	0.01	-	-
22	Selenium (as Se).mg/l.max	0.01	-	0.05	-	-
23	Arsenic (as As).mg/l.max	0.05	0.2	0.2	-	-
24	Cyanide (as Pb).mg/l. max	0.05	0.05	0.05	-	-
25	Lead (as Pb).mg/l. max	0.1	-	0.1	-	-
26	Zinc (as Zn).mg/l.max	15	-	15	-	-
27	Chromium (as Cr^{6+}).mg/l.max	0.05	-	0.05	-	-
28	Anionic detergents (sa MBAS). mg/l.max	0.2	1	1	-	-
29	Barium (as Ba).mg/l. max	1	-	-	-	-
30	Free Ammonia (as N)). Mg/l.max	-	-	-	1.2	-
31	Electrical Conductivity. Micromhos/cm. max.	-	-	-	-	2250
32	Sodium absorption ratio. max	-	-	-	-	26
33	Boron. Mg/l. max	-	-	-	-	2

Source: 'Hydrological Data (Unclassified) Book-2020', HD Directorate, ISO, CWC
Note: Basin-wise details of Water Quality Parameters are given in 'Hydrological Data (Unclassified) Book-2020'

2.5 Per Capita Water Availability in India

Water availability per person is dependent on population of the country and for India, per capita water availability in the country is reducing due to increase in population. India is now facing a water stressed situation as the per capita water availability in India is below 1700 cubic metres. The country has been facing a water crisis both for agriculture as well as for basic needs. The average annual per capita water availability in the years 2001 and 2011 was assessed as 1816 cubic metres and 1545 cubic metres respectively which may further reduce to 1486 cubic meters and 1367 cubic meters in the years 2021 and 2031 respectively.

Water demand is predicted to increase significantly over the coming decades. In addition to the agricultural sector, which is responsible for 70% of water abstractions nationwide, large increases in water demand are predicted for industry and energy production. Accelerated urbanization and the expansion of municipal water supply and sanitation systems also contribute to the rising localised demand. Climate change scenarios project an exacerbation of the spatial and temporal variations of water cycle dynamics, such that discrepancies between water supply and demand are becoming increasingly aggravated.

Per Capita Water Availability for India during different years

Year	Population (Million)	Per Capita Water Availability (m^3/year)	Remarks
1	2	3	4
1951	361	5178	
1955	395	4732	
1991	846	2210	
2001	1027	1820	
2011	1211	1651	water stressed#
2015	1326*	1508$	water stressed#
2021	1345a	1486$	water stressed#
2031	1463a	1367$	water stressed#
2041	1560a	1282$	water stressed#
2051	1628a	1228$	water stressed#

Source: Government of India, 2009 (NCIWRD Report, 1999), 'Reassessment of Water Availability in India using Space Inputs- 2019', BPMO Directorate, CWC

*projected from 2011 census, 'a': Population figures for 2021 to 2051 are taken from projected population by NITI Aayog, '$': The per capita availability from 2015 onwards has been calculated from 2017 WRA estimate, '#': According to the Falken mark Water Stress Indicator, a per capita availability of less than 1700 cubic metres (m^3) is termed as a water-stressed condition, while if per capita availability falls below 1000 m^3, it is termed as a water scarcity condition.

2.6 Renewable Internal Freshwater Resources Per Capita (cubic metres) of Top 10 and Bottom 10 countries with the position of India

Rank	Country	Renewable Internal Freshwater Resources Per Capita (cubic metres)	Year
1	2	3	4
Top 10 Countries			
1	Greenland	10,662,190.00	2007
2	Iceland	519,264.70	2014
3	Guyana	315,701.20	2014
4	Suriname	178,935.20	2014
5	Bhutan	108,475.60	2014
6	Papua New Guinea	100,796.20	2014
7	Gabon	87,058.07	2014
8	Canada	80,423.43	2014
9	Solomon Islands	76,139.66	2014
10	Norway	74,359.11	2014
Position of India			
128	India	1,116.08	2014
Bottom 10 Countries			
171	Israel	91.29	2014
172	Yemen	81.32	2014
173	Saudi Arabia	77.63	2014
174	Jordan	76.46	2014
175	Qatar	22.77	2014
176	Egypt	19.91	2014
177	United Arab Emirates	16.28	2014
178	Bahrain	2.99	2014
179	Sudan	0.00	2018
179	Kuwait	0.00	2014

Source: Food and Agriculture Organization, AQUASTAT data

2.7 River Basin Map of India

2.8 Water Resources Potential in River Basins of India

Sl. No.	River Basin	Catchment area (Sq.km)$	Average Water Resources Potential (BCM)$	Utilisable Surface Water Resources (BCM)
1	2	3	4	5
1	Indus (up to Border)	3,17,708	45.53	46
2	a) Ganga	8,38,803	509.52	250
	b) Brahmaputra	1,93,252	527.28	24
	c) Barak & Others	86,335	86.67	-
3	Godavari	3,12,150	117.74	76.3
4	Krishna	2,59,439	89.04	58
5	Cauvery	85,167	27.67	19
6	Subernarekha	26,804	15.05	6.8
7	Brahamani & Baitarni	53,902	35.65	18.3
8	Mahanadi	1,44,905	73	50
9	Pennar	54,905	11.02	6.9
10	Mahi	39,566	14.96	3.1
11	Sabarmati	31,901	12.96	1.9
12	Narmada	96,659.79	58.21	34.5
13	Tapi	65,805.80	26.24	14.5
14	West Flowing Rivers From Tapi to Tadri	58,360	118.35	11.9
15	West Flowing Rivers From Tadri to Kanyakumari	54,231	119.06	24.3
16	East Flowing Rivers between Mahanadi & Pennar	82,073	26.41	13.1
17	East Flowing Rivers between Pennar And Kanyakumari	1,01,657	26.74	16.5
18	West Flowing Rivers of Kutch and Saurashtra including Luni	1,92,112	26.93	15
19	Area of Inland drainage in Rajasthan	1,44,835.90	Negl.	N.A
20	Minor River Draining into Myanmar (Burma) and Bangladesh	31,382	31.17	N.A
Total		**32,71,953**	**1999.2**	**690.1**

Source: BP-I Directorate, Central Water Commission

'$' Based on 'Reassessment of Water Use Availability in India using Space Inputs', June, 2019

2.9 Inland Water Resources in India

Sl. No.	States/UTs	Rivers & Canals (Length in km)	Small, Medium & Large Reservoir		Tanks & Ponds (Ha)	Brackish Water (Ha)	Beels (Ha)	Oxbow Lakes (Ha)	Derelict Water (Ha)	Other than Rivers and Canals (Ha)	Total (Ha)
			Total Number	Area (Ha)							
1	2	3	4	5	6	7	8	9	10	11	12
1	Andhra Pradesh*	6960.49	119	170725.00	271167.00	60000.00				126000.00	627892.00
2	Arunachal Pradesh	30.00	1	160.00	3625.00			5.00	11864.00		15654.00
3	Assam	4820.00	1	2000.00	73065.00		100815.00		86204.00		262084.00
4	Bihar	3200.00	37	60000.00	93296.20			9000.00		133956.00	296252.20
5	Chhattisgarh	3573.00	0	84000.00	99400.00						183400.00
6	Goa	250.00	5	3448.00	180.00						3628.00
7	Gujarat	3865.00	1635	347659.00	22000.00	100000.00			12000.00		481659.00
8	Haryana	5000.00	0	0.00	20000.00	0.00	0.00	0.00	0.00	0.00	20000.00
9	Himachal Pradesh*	3000.00	5	43785.00	805.04	0.00	0.00	0.00	0.00	619.63	45209.67
10	Jammu & Kashmir	27781.00	8	11000.00	445.00			6000.00			17445.00
11	Jharkhand**	1800.00	401	121000.00	66348.00		0.00	0.00	0.00	14450.00	201798.00
12	Karnataka	5813.00	82	440000.00	292332.00	10000.00	0.00	0.00	0.00	0.00	742332.00
13	Kerala	3220.00	47	34205.00	27625.00	240000.00	74000.00	89000.00	80000.00		544830.00
14	Madhya Pradesh	17066.00	3131	339175.00	0.68						339175.68
15	Maharashtra	17725.00	2316	299000.00	148406.90	17125.15	0.00	0.00	0.00	0.00	464532.05
16	Manipur	3360.00	6	2142.00	11442.00	0.00	24433.00	0.00	4728.00	0.00	42745.00
17	Meghalaya	3904.12	5	8000.00	2000.00		220.93	61.45	53.94		10336.32
18	Mizoram	1100.00	4	8100.00	5468.34						13568.34
19	Nagaland	1600.00	1	2258.00	3425.50			1700.00			7383.50

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2.9 Inland Water Resources in India

Sl. No.	States/UTs	Rivers & Canals (Length in km)	Small, Medium & Large Reservoir		Tanks & Ponds (Ha)	Brackish Water (Ha)	Beels (Ha)	Oxbow Lakes (Ha)	Derelict Water (Ha)	Other than Rivers and Canals (Ha)	Total (Ha)
			Total Number	Area (Ha)							
1	2	3	4	5	6	7	8	9	10	11	12
20	Odisha	24878.33	611	256000.00	132832.00	430000.00	180000.00				998832.00
21	Punjab	868.00	13	4211.73	16220.00						20431.73
22	Rajasthan	5290.00	394	336871.00	93909.00						430780.00
23	Sikkim	900.00	3	850.00	15.70		3000.00				3865.70
24	Tamil Nadu	7420.00	61	570000.00	258035.00	60000.00	0.00	0.00	7000.00	0.00	895035.00
25	Telangana	1808.00	0	167900.00	404000.00						571900.00
26	Tripura	1266.71	2	5000.00	17552.07	0.00	0.00	0.00	361.44	0.00	22913.51
27	Uttarakhand***	2686.00	7	20587.00	861.15		300.00			347.89	22096.03
28	Uttar Pradesh	39542.00	94	147552.00	149933.76	0.00		12034.00	0.00	25351.00	334870.76
29	West Bengal	2526.00	52	28050.00	263372.00	210000.00	42082.00		26925.00		570429.00
30	Andaman & Nicobar Islands		7	367.00	160.00	33000.00					33527.00
31	Chandigarh	2.00	0	0.00							0.00
32	Dadra & Nagar Haveli	54.00	0	5000.00							5000.00
33	Daman & Diu	12.00	0	0.00							0.00
34	Delhi	150.00	0	4000.00							4000.00
35	Lakshadweep	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	Puducherry	25.00	10	1678.45	340.87	37.35			1000.00		3056.67
Total		**201495.65**	**9058**	**3524724.18**	**2478263.21**	**1160162.50**	**424850.93**	**117800.45**	**230136.38**	**300724.52**	**8236662.17**

Source: States/UTs, Handbook of Fisheries Statistics, 2018, Ministry of Fisheries, Animal Husbandry & Dairying

'*' Himachal Pradesh: Raceways-2.63 Ha, Cold water Lakes-617 Ha

'**' Jharkhand: 14450 Ha (Chek-dams, Ahar, Coalpits & mines) & 1.0 Lakh Dobha (Av size 10-15 decimal)

'***' Uttarakhand: Natural Lakes-297 Ha, Trout Raceway-0.888, Waterlogged area-50, '#' Data used for Handbook, 2014

2.10 Water Sheds in India

Name of Basin & River Length	Sl. No.	Name of Sub-Basin	Area (Sq.km)	Size Range of Watershed (Sq.km)	No. of Watersheds
1	2	3	4	5	6
Indus-1114 (2280) km	1	Beas	19002.47	389.00 – 999.00	30
	2	Chenab	29981.38	323.00 – 1127.00	48
	3	Ghaghar and others	26235.29	207.00 – 1158.00	45
	4	Gilgit	27088.70	340.00 – 1012.00	37
	5	Jhelum	29200.52	320.00 – 1322.00	44
	6	Lower Indus	23894.10	319.00 – 1270.00	31
	7	Ravi	13710.20	390.00 – 1303.00	20
	8	Shyok	38545.05	430.00 – 1374.00	53
	9	Satluj Lower	38442.79	329.00 – 1296.00	58
	10	Satluj Upper	21439.43	384.00 – 952.00	31
	11	Upper Indus	46450.13	383.00 – 974.00	70
Ganga-2525 km	12	Above Ramganga Confluence	39104.61	430.18 – 1301.20	51
	13	Banas	51651.51	330.66 – 1432.97	64
	14	Bhagirathi and others (Ganga Lower)	64038.97	308.24 – 1754.95	75
	15	Chambal Lower	10941.26	405.59 – 1135.93	14
	16	Chambal Upper	25546.57	405.14 – 1403.97	30

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2.10 Water Sheds in India

Name of Basin & River Length	Sl. No.	Name of Sub-Basin	Area (Sq.km)	Size Range of Watershed (Sq.km)	No. of Watersheds
1	2	3	4	5	6
Ganga-2525 km	17	Damodar	41965.49	326.16 – 1301.09	60
	18	Gandak and others	56260.43	334.87 – 1308.88	76
	19	Ghaghara Confluence to Gomti Confluence	58634.18	372.40 – 1761.77	36
	20	Ghaghara	26254.06	374.93 – 1300.49	76
	21	Gomti	29865.21	333.29 – 1330.50	41
	22	Kali Sindh and others up to Confluence with Parbati	48492.61	429.86 – 1275.01	64
	23	Kosi	18413.58	303.77- 1694.96	19
	24	Ramganga	30839.69	350.05 – 1442.76	40
	25	Sone	65110.05	380.66 – 1389.01	83
	26	Tons	16905.74	442.40 – 1173.36	23
	27	Upstream of Gomti Confluence to Muzaffarnagar	29061.37	364.16 – 1281.12	40
	28	Yamuna Lower	124867.19	735.54 – 1781.43	98

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2.10 Water Sheds in India

Name of Basin & River Length	Sl. No.	Name of Sub-Basin	Area (Sq.km)	Size Range of Watershed (Sq.km)	No. of Watersheds
1	2	3	4	5	6
Brahmapurta-916 (2900) km	29	Yamuna Middle	34586.39	410.43 – 1232.25	43
	30	Yamuna Upper	35798.19	321.77 – 1241.11	47
	31	Brahmaputra Lower	87392.22	429.01 – 1490.01	83
	32	Brahmaputra Upper	98972.87	488.58- 1473.03	97
Cauvery-800 km	33	Cauvery Lower	17386.45	320.70 -979.20	28
	34	Cauvery Middle	57280.98	377.45-934.52	86
	35	Cauvery Upper	10958.80	362.94-991.25	18
Godavari-1465 km	36	Wardha	46242.09	361.00 – 946.00	69
	37	Weinganga	49695.40	305.00 – 972.00	80
	38	Godavari Lower	44492.93	304.00 – 990.00	67
	39	Godavari Middle	36290.47	325.00 – 955.00	56
	40	Godavari Upper	21443.23	331.00 – 988.00	33
	41	Indravati	38306.10	343.00 – 993.00	60
	42	Manjra	29472.88	421.00 – 981.00	44
	43	Pranhita and others	36119.60	326.00 – 982.00	57
Subernarekha	44	Subernarekha	25792.16	387.02 – 962.40	45

Contd…

2.10 Water Sheds in India

Name of Basin & River Length	Sl. No.	Name of Sub-Basin	Area (Sq.km)	Size Range of Watershed (Sq.km)	No. of Watersheds
1	2	3	4	5	6
Barak and others	45	Barak	27658.98	365.66 – 844.23	47
	46	Kynchiang and other south flowing rivers	10267.39	308.78 – 790.32	17
	47	Naochchara and others	7695.81	383.79 – 856.71	13
Krishna-1401 km	48	Bhima Lower	23652.70	396.00 – 929.00	36
	49	Bhima Upper	44793.32	351.00 – 940.00	71
	50	Krishna Lower	39494.33	277.00 – 971.00	59
	51	Krishna Middle	22229.12	341.00 – 963.00	36
	52	Krishna Upper	54504.77	322.00 – 964.00	85
	53	Tungabhadra Lower	41556.48	357.00 – 976.00	59
	54	Tungabhadra Upper	28519.41	331.00 – 924.00	45
Brahmani and Baitarni-799 km	55	Baitarni	14351.23	472.27 – 974.99	21
	56	Brahmani	37545.83	332.75 – 964.48	58

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2.10 Water Sheds in India

Name of Basin & River Length	Sl. No.	Name of Sub-Basin	Area (Sq.km)	Size Range of Watershed (Sq.km)	No. of Watersheds
1	2	3	4	5	6
Pennar- 597 km	57	Pennar Lower	17979.85	357.62 – 850.70	29
	58	Pennar Upper	36263.58	310.23 – 926.97	61
Mahanadi-851 km	59	Mahanadi Lower	57958.88	320.05 – 1457.59	91
	60	Mahanadi Middle	51895.91	301.22 – 902.46	88
	61	Mahanadi Upper	29796.64	314.34 – 907.63	48
West Flowing Rivers from Tapi to Tadri	62	Vasishti and others	27473.95	335.12 – 979.25	47
	63	Bhatsol and others	29348.90	310.70 – 932.29	49
Mahi-583 km	64	Mahi Lower	13377.00	372.00 – 873.00	22
	65	Mahi Upper	24959.80	331.00 – 954.00	41
Tapi-724 km	66	Tapi Lower	4108.90	427.18 – 781.84	7
	67	Tapi Middle	31766.67	365.64 – 937.44	47
	68	Tapi Upper	28047.34	322.12-937.28	46

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2.10 Water Sheds in India

Name of Basin & River Length	Sl. No.	Name of Sub-Basin	Area (Sq.km)	Size Range of Watershed (Sq.km)	No. of Watersheds
1	2	3	4	5	6
East Flowing Rivers between Pennar and Kanyakumari	69	Vaippar and others	20356.69	318.37-887.70	33
	70	Palar and other	35392.34	321.81-957.25	56
	71	Pamba and others	18289.41	316.52-937.66	30
	72	Ponnaiyar and other	28249.49	356.72-900.11	46
Narmada-1312 km	73	Narmada Lower	8904.02	307.94 – 750.24	16
	74	Narmada Middle	40575.72	338.11- 957.42	63
	75	Narmada Upper	43192.68	327.06 – 986.00	71
West Flowing Rivers of Kutch and Saurashtra including Luni	76	Luni Upper	70202.58	381.48-1447.71	81
	77	Luni Lower	29180.12	315.95-1418.64	42
	78	Drainage of Rann	21229.90	310.82-968.30	40
	79	Saraswati	27260.84	308.99-1017.93	43
	80	Bhadar and other WFR	18489.70	331.14-964.84	30
	81	Shetrunji and other EFR	18221.67	300.06-855.86	32

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2.10 Water Sheds in India

Name of Basin & River Length	Sl. No.	Name of Sub-Basin	Area (Sq.km)	Size Range of Watershed (Sq.km)	No. of Watersheds
1	2	3	4	5	6
Sabarmati-371 km	82	Sabarmati Lower	8904.02	397.55 – 986.46	17
	83	Sabarmati Upper	40575.72	313.38 – 828.34	34
East Flowing Rivers between Mahanadi and Pennar	84	Vamsadhara & other	21870.63	392.23-930.46	34
	85	Nagvati & other	24372.24	357.79-928.45	41
	86	East Flowing Rivers between Godavari & Krishna	10342.29	472.32-902.04	16
	87	East Flowing Rivers between Krishna & Pennar	23334.63	204.66-1404.19	41
West Flowing Rivers from Tadri to Kanyakumari	88	Netravati and others	18762.09	317.42 -928.92	32
	89	Periyar and others	21895.21	340.11 – 933.86	37
	90	Varrar and others	14164.70	363.17- 978.16	23

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2.10 Water Sheds in India

Name of Basin & River Length	Sl. No.	Name of Sub-Basin	Area (Sq.km)	Size Range of Watershed (Sq.km)	No. of Watersheds
1	2	3	4	5	6
Minor Rivers Draining into Myanmar and Bangladesh	91	Imphal and others Sub Basin	16754.90	321.00 – 900.00	29
	92	Karnaphuli and Others Sub Basin	3776.84	312.00 – 882.00	6
	93	Mangpui Lui and others Sub Basin	7976.18	359.00 – 656.00	16
	94	Muhury and Others Sub Basin	1676.39	532.00 – 608.00	3

Source: Basin-wise Reports as downloaded from India WRIS, 2014
'-' Data not available.

2.11 Status of Monitored Glacial Lakes and Water Bodies

Month	No. of Glacial Lakes /Water Bodies Monitored	Water Spread Area (No.)		
		Increased	Decreased	No Change
1	2	3	4	5
June-Oct, 2011	391	218	35	138
June-Oct, 2012	391*	88	110	190
June-Oct, 2013	476**	165	115	195
June-Oct, 2014	438#	88	178	170
June-Oct, 2015	459$	119	144	195
June-Oct, 2016				
June, 2016	372	25	247	100
July, 2016	112	21	55	36
August, 2016	181	21	95	65
September, 2016	195	29	110	56
October, 2016	398	105	168	125
June-Oct, 2017				
June, 2017	192	58	90	44
July, 2017	176	47	87	42
August, 2017	165	37	86	42
September, 2017	273	80	116	77
October, 2017	326	97	122	107
June-Oct, 2018				
June, 2018	380	156	29	195
July, 2018	294	129	32	133
August, 2018	208	117	13	78
September, 2018	285	175	15	95
October, 2018	320	192	25	103
June-Oct, 2019				
June, 2019	249	150	15	82
July, 2019	259	161	34	62
August, 2019	254	178	23	51
September, 2019	276	203	14	58
October, 2019	314	228	25	60

Source: Monitoring of Glacier Lakes and water Bodies in Himalayan Region of Indian River Basin (Report of the respective months), Central Water Commission

Note: '*'Includes 3 new glacial lakes that were missed earlier; '**' Includes 1 Glacial lake that is dry; '#' Includes 2 Water bodies that are dry; '$' Includes 1 Glacial lake that is dry.

2.12 Glacial Lakes with Significant Change in Water Spread

(a) Lakes with increasing Water Spread

Sl. No.	UID	Lake_ID	Water Spread Area in Ha		% Difference in Water Spread Area					
			2009 (Inventory)	Sep-2019	2019	2018	2017	2016	2015	2014
1	2	3	4	5	6	7	8	9	10	11
1	HP_5	01_52H_004	46	156	239.13	243.48	157.89	202.17	178.26	173.91
2	CH_33	01_61C_005	139	466	235.25	176.63	-54.99	150.39	125.90	121.58
3	CH_207	02_71P_019	48	127	164.58	32.50	-29.88	-29.17	27.08	37.50
4	CH_217	02_71P_029	80	153	91.25	16.25	21.21	Cloud	13.75	-6.25
5	CH_423	03_71G_014	140	262	87.14	78.57	22.21	-18.73	16.43	20.71
6	CH_849	03_82J_019	45	82	82.22	80.19	Cloud	Cloud	33.33	-8.89
7	CH_206	02_71P_018	51	89	74.51	-3.92	-11.25	-17.49	156.86	-11.76
8	SK_19	03_78A_013	63	105	66.67	57.08	28.29	60.32	28.57	14.29
9	CH_55	01_61D_003	46	76	65.22	63.41	66.98	26.46	-4.35	0.00
10	CH_621	03_82A_002	319	526	64.89	21.94	8.37	14.86	10.97	6.90
11	HP_3	01_52H_002	62	102	64.52	74.58	44.58	29.27	2309.68	2222.58
12	CH_85	01_62E_010	156	252	61.54	6.41	-0.26	-13.18	-10.90	-3.80
13	CH_38	01_61C_010	88	142	61.36	35.23	27.78	Cloud	9.09	4.55
14	CH_101	01_62F_010	45	72	60.00	85.67	49.73	26.09	15802.22	15806.67
15	CH_590	03_77P_019	220	351	59.55	4.19	4.19	-2.86	1.36	2.27
16	CH_6	01_52O_003	148	235	58.78	40.54	48.13	54.95	22.30	42.57
17	CH_834	03_82J_004	378	595	57.41	48.05	45.70	Cloud	34.13	11.64
18	CH_1076	03_91C_025	97	150	54.64	32.99	7.46	7.35	3.09	4.12
19	CH_288	03_62J_016	44	68	54.55	43.18	9.75	11.91	3661.36	2518.18
20	CH_235	02_71P_047	71	109	53.52	35.21	20.65	Cloud	16.90	5.63
21	NP_12	02_62F_019	58	85	46.55	24.14	-6.45	Cloud	1.72	-13.79

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2.12 Glacial Lakes with Significant Change in Water Spread

(a) Lakes with increasing Water Spread

Sl. No.	UID	Lake_ID	Water Spread Area in Ha		% Difference in Water Spread Area					
			2009 (Inventory)	Sep-19	2019	2018	2017	2016	2015	2014
1	2	3	4	5	6	7	8	9	10	11
22	CH_725	03_82E_007	71	103	45.07	7.04	-21.53	-10.03	0.00	-7.04
23	NP_19	02_62J_003	49	71	44.90	34.69	Cloud	24.45	20.41	2.04
24	CH_545	03_77L_029	45	65	44.44	24.44	45.51	10.84	-4.44	-15.56
25	CH_971	03_82L_009	54	78	44.44	2.20	2.20	-11.21	-11.10	-29.60
26	SK_4	03_77D_004	106	152	43.40	31.13	22.23	Cloud	11.32	7.55
27	CH_369	03_62O_024	721	1030	42.86	19.97	9.45	3.23	3.61	5.27
28	CH_826	03_82G_065	59	84	42.37	22.57	7.94	Cloud	-6.78	-16.95
29	JK_205	01_52J_009	57	81	42.11	25.32	-6.53	Cloud	1.75	-1.75
30	JK_115	01_43K_014	112	159	41.96	41.07	23.57	14.65	16.07	13.39
31	CH_36	01_61C_008	151	214	41.72	18.54	15.32	19.38	93.38	92.72
32	CH_80	01_62E_005	189	267	41.27	21.17	4.74	Cloud	-2.65	-5.29
33	CH_261	02_77D_006	80	113	41.25	18.75	19.85	137.86	8.75	22.50
34	CH_630	03_82B_004	97	137	41.24	5.15	-1.56	-3.13	0.00	-3.10
35	CH_550	03_77L_041	56	79	41.07	0.11	-11.59	26.80	17.86	-16.07
36	CH_478	03_77H_003	208	293	40.87	-6.73	-85.01	-85.01	-9.13	-17.31
37	CH_39	01_61C_011	408	570	39.71	33.33	27.30	Cloud	12.50	0.49
38	JK_85	01_43J_007	95	132	38.95	1.05	0.35	-16.84	-3.20	-9.50
39	SK_16	03_78A_009	54	75	38.89	26.74	-62.56	-27.78	3.70	12.96
40	CH_298	03_62J_026	103	142	37.86	36.89	24.70	6.96	10.68	9.71
41	CH_420	03_71G_011	1192	1640	37.58	33.05	7.27	-6.14	-21.64	-22.23
42	AP_206	03_92E_001	45	61	35.56	-8.89	-8.46	Cloud	Cloud	Cloud

Contd…

2.12 Glacial Lakes with Significant Change in Water Spread

(a) Lakes with Increasing Water Spread

Sl. No.	UID	Lake_ID	Water Spread Area in Ha		% Difference in Water Spread Area					
			2009 (Inventory)	Sep-19	2019	2018	2017	2016	2015	2014
1	2	3	4	5	6	7	8	9	10	11
43	CH_303	03_62J_031	166	225	35.54	46.99	36.51	22.75	15.66	2.41
44	CH_262	02_77D_007	54	73	35.19	20.37	1.26	22.94	-1.85	0.00
45	CH_838	03_82J_008	156	210	34.62	40.40	Cloud	Cloud	14.74	12.82
46	CH_53	01_61D_001	70	94	34.29	30.14	28.93	-75.69	8.57	7.14
47	CH_263	02_77D_008	44	59	34.09	11.73	-59.18	-100.00	120.45	79.55
48	JK_187	01_52C_003	45	60	33.33	73.33	27.36	35.56	24.44	8.89
49	CH_647	03_82B_021	48	64	33.33	16.42	Cloud	0.65	-14.60	-6.30
50	CH_313	03_62K_009	250	333	33.20	29.20	22.25	20.02	17.60	14.40
51	CH_375	03_62O_030	97	129	32.99	23.71	-10.89	Cloud	8.25	3.09
52	CH_316	03_62K_012	73	97	32.88	24.66	12.34	18.77	37019.18	36846.58
53	SK_9	03_78A_001	156	207	32.69	40.78	Cloud	15.38	5.13	0.64
54	CH_1075	03_91C_024	239	316	32.22	40.68	31.50	Cloud	16.74	8.37
55	CH_592	03_77P_021	53	70	32.08	15.09	Cloud	2.58	9.40	-7.50
56	SK_3	03_77D_003	96	125	30.21	20.40	7.90	-21.05	-51.04	-54.17
57	CH_78	01_62E_003	136	177	30.15	22.79	14.17	-2.71	20.59	8.09
58	JK_195	01_52I_003	180	234	30.00	29.44	24.12	23.33	17.22	Cloud
59	JK_82	01_43J_004	65	84	29.23	24.62	4.48	16.03	3.08	-4.62
60	CH_636	03_82B_010	52	67	28.85	-3.85	-18.72	4.44	-5.80	-11.50
61	CH_304	03_62J_032	77	99	28.57	40.60	21.32	21.95	3.90	0.00

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2.12 Glacial Lakes with Significant Change in Water Spread

(a) Lakes with Increasing Water Spread

Sl. No.	UID	Lake_ID	Water Spread Area in Ha		% Difference in Water Spread Area					
			2009 (Inventory)	Sep-19	2019	2018	2017	2016	2015	2014
1	2	3	4	5	6	7	8	9	10	11
62	CH_215	02_71P_027	49	63	28.57	22.45	20.57	Cloud	0.00	-2.04
63	CH_623	03_82A_004	46	59	28.26	24.48	1.87	2.17	102.17	97.83
64	CH_213	02_71P_025	123	157	27.64	22.76	15.61	Cloud	0.00	-8.94
65	CH_40	01_61C_012	290	370	27.59	23.13	13.89	Cloud	8.28	6.21
66	CH_210	02_71P_022	80	102	27.50	11.24	6.20	Cloud	-6.25	-2.50
67	HP_1	01_52D_001	688	876	27.33	32.25	29.05	-4.60	8.58	9.45
68	CH_347	03_62O_002	52	66	26.92	5.77	-22.27	-12.52	71.15	84.62
69	CH_377	03_62O_032	49	62	26.53	20.41	-13.34	-12.96	0.00	8.16
70	CH_646	03_82B_020	49	62	26.53	2.98	-17.72	20.31	-18.40	-16.30
71	CH_641	03_82B_015	75	94	25.33	4.32	-8.45	6.53	0.00	-2.70
72	CH_30	01_61C_002	685	857	25.11	21.84	18.52	Cloud	12.55	11.82
73	CH_635	03_82B_009	156	195	25.00	14.10	5.72	1.15	3.20	3.80
74	CH_46	01_61C_018	1779	2219	24.73	15.06	13.30	0.97	15.51	1.80
75	CH_62	01_61G_001	85	106	24.71	13.40	11.51	-14.05	-17.60	0.00
76	CH_584	03_77P_013	53	66	24.53	31.90	-7.21	-4.64	3.77	-5.66
77	CH_66	01_61H_001	282	351	24.47	35.60	13.30	18.59	21.28	-15.25
78	CH_580	03_77P_009	94	117	24.47	22.33	18.50	11.20	3.19	0.00
79	CH_306	03_62K_002	45	56	24.44	31.11	7.27	0.18	2.22	8.89
80	CH_228	02_71P_040	135	168	24.44	10.37	-8.41	Cloud	0.00	-8.10
81	JK_23	01_43A_002	91	113	24.18	26.37	9.56	-1.57	0.00	-5.49
82	CH_631	03_82B_005	195	242	24.10	10.82	-0.92	12.31	7.70	4.10

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2.12 Glacial Lakes with Significant Change in Water Spread

(a) Lakes with Increasing Water Spread

Sl. No.	UID	Lake_ID	Water Spread Area in Ha		% Difference in Water Spread Area					
			2009 (Inventory)	Sep-19	2019	2018	2017	2016	2015	2014
1	2	3	4	5	6	7	8	9	10	11
83	CH_1205	03_91H_040	51	63	23.53	-0.18	-0.18	Cloud	-2.00	Cloud
84	CH_796	03_82G_035	81	100	23.46	10.06	9.84	-9.61	-2.50	Cloud
85	CH_383	03_62O_038	124	153	23.39	13.71	19.50	10.85	13.71	0.81
86	JK_47	01_43E_023	82	101	23.17	6.10	-6.19	48.78	0.00	-4.90
87	BH_12	03_77L_030	79	97	22.78	30.22	-89.67	Cloud	5.06	0.00
88	JK_111	01_43K_010	66	81	22.73	6.72	4.13	-0.84	-6.10	-3.00
89	CH_778	03_82G_017	53	65	22.64	4.15	-5.99	-3.25	-11.30	-7.50
90	JK_120	01_43M_003	208	255	22.60	9.28	23.92	11.54	21.20	-3.80
91	CH_564	03_77O_001	154	188	22.08	27.13	18.96	16.72	13.64	17.53
92	CH_59	01_61F_002	55	67	21.82	-5.70	8.80	19.99	-1.80	-3.60
93	CH_258	02_77D_003	88	107	21.59	7.95	12.52	631.22	15.90	-3.40
94	CH_43	01_61C_015	742	900	21.29	17.25	5.77	-5.62	-2.02	1.62
95	JK_5	01_42H_005	52	63	21.15	23.08	25.11	Cloud	-3.85	-7.69
96	CH_654	03_82B_028	48	58	20.83	0.00	-46.86	0.48	-2.10	-20.80
97	CH_1170	03_91H_005	58	70	20.69	Cloud	249.67	-8.90	0.00	Cloud
98	JK_201	01_52J_005	44	53	20.45	7.11	-5.18	-13.64	6.80	-4.50
99	CH_63	01_61G_002	1134	1363	20.19	17.11	11.67	10.85	12.10	9.50

Source: Monitoring of Glacier Lakes and Water Bodies in Himalayan Region of Indian River Basin for September, 2019, CWC

2.12 Glacial Lakes with Significant Change in Water Spread
(b) Lakes with Decreasing Water Spread

Sl. No.	UID	Lake_ID	Water Spread Area in Ha		% Difference in Water Spread Area					
			2009 (Inventory)	Sep-19	2019	2018	2017	2016	2015	2014
1	2	3	4	5	6	7	8	9	10	11
1	JK_99	01_43J_021	1238	933	-24.64	-11.15	-11.51	-15.06	-16.40	2.30
2	UK_8	02_53O_005	1510	1128	-25.30	26.09	21.17	Cloud	2.19	-1.13
3	JK_196	01_52I_004	124	87	-29.84	-6.82	-16.63	-25.81	-8.90	Dry
4	UK_10	02_53P_002	734	447	-39.10	-38.56	-40.59	Cloud	21.25	-41.96

Source: Monitoring of Glacier Lakes and Water Bodies in Himalayan Region of Indian River Basin for September 2019, CWC

UID - Unique identifier of the glacial lake with the letters denote the State (in case of India)/Country and the numbers the Sl. No. of the lake in the respective State/Country.

Lake_ID -Each glacial lake has a unique number in the digital database. The numbering is done sequentially within each 1:250,000 reference grid. The first two digits indicate the basin number (01 - Indus, 02 - Ganga and 03 - Brahmaputra). The next three characters depict the reference number of the 1:250,000 SOI toposheet. The last three digit number indicates lake number within a grid of 1:250,000 SOI toposheet.

2.13 State-wise Live Storage Capacity of Reservoirs

Sl. No.	States/UTs	Total Live Storage Capacity (BCM)
1	**2**	**3**
1	Andaman & Nicobar Islands	0.019
2	Arunachal Pradesh	0.000006
3	Andhra Pradesh (Erstwhile)	28.716
4	Assam	0.012
5	Bihar	2.613
6	Chhattisgarh	6.736
7	Goa	0.290
8	Gujarat	22.553
9	Himachal Pradesh	13.792
10	Jammu & Kashmir	0.029
11	Jharkhand	2.436
12	Karnataka	31.903
13	Kerala	9.768
14	Maharashtra	37.358
15	Madhya Pradesh	33.075
16	Manipur	0.532
17	Meghalaya	0.479
18	Nagaland	1.220
19	Odisha	24.032
20	Punjab	2.402
21	Rajasthan	9.708
22	Sikkim	0.007
23	Tamil Nadu	7.859
24	Tripura	0.312
25	Uttrakhand	5.670
26	Uttar Pradesh	14.263
27	West Bengal	2.027
28	Mizoram	0.000
Total		**257.812**

Source: WM Directorate, CWC

Note: Reconciliation of Live Storage Capacities of Reservoirs is under process. The above figures are furnished/ made available to CWC as on 01.12.2017.

2.14 Basin-wise Live Storage Capacity of Reservoirs

Sl. No.	Basin Name	Live Storage (in BCM)		
		Completed Projects	Under Construction Projects	Total
1	2	3	4	5
1	Indus	16.223	0.100	16.3232
2	Ganga	48.677	7.649	56.326
3	Brahmaputra	1.718	0.795	2.5131
4	Barak & others	0.719	9.172	9.891
5	Godavari	35.04	8.412	43.4515
6	Krishna	50.651	4.156	54.807
7	Cauvery	9.083	0.015	9.098
8	Subernrekha	0.309	2.150	2.459
9	Brahmani & Baitarni	5.55369	0.703	6.25669
10	Mahanadi	13.06564	1.461	14.52694
11	Pennar	2.938	2.141	5.079
12	Mahi	5.017	0.150	5.167
13	Sabarmati	1.577	0.109	1.686
14	Narmada	21.816	2.641	24.4567
15	Tapi	9.137	1.558	10.695
16	West Flowing Rivers from Tapi to Tadri	14.668	2.430	17.098
17	West Flowing Rivers from Tadri to Kanyakumari	11.023	1.416	12.439
18	East Flowing Rivers between Mahanadi and Pennar	2.676	1.181	3.857
19	East Flowing Rivers between Pennar and Kanyakumari	1.441	0.015	1.456
20	West Flowing Rivers of Saurashtra and Kutch including Luni	6.336	0.511	6.847
21	Area of Inland Drainage of Rajasthan	0.000	0.000	0.000
22	Minor Rivers Draining into Myanmar and Bangladesh	0.14358	0.000	0.14358
23	Area of North Ladakh not Draining into Indus	0.000	0.000	0.000
Total		**257.812**	**46.765**	**304.577**

Source: WM Directorate, CWC

Note: Reconciliation of Live Storage Capacities of Reservoirs is under process. The above figures are furnished/ made available to CWC as on 01.12.2017.

2.15 Abstract of Large Dams (State-wise)

Sl. No.	States	Total Completed Dams	Under Construction Dams	Total Dams
1	2	3	4	5
1	Andaman & Nicobar Islands*	2		2
2	Andhra Pradesh	149	17	166
3	Arunachal Pradesh	1	3	4
4	Assam	3	1	4
5	Bihar	24	2	26
6	Chhattisgarh	249	9	258
7	Goa	5		5
8	Gujarat	620	12	632
9	Himachal Pradesh	19	1	20
10	Haryana	1		1
11	Jammu & Kashmir	15	2	17
12	Jharkhand	55	24	79
13	Karnataka	230	2	232
14	Kerala	61		61
15	Madhya Pradesh	899	7	906
16	Maharashtra	2117	277	2394
17	Manipur	3	1	4
18	Meghalaya	8	2	10
19	Mizoram	1		1
20	Nagaland	1		1
21	Odisha	200	4	204
22	Punjab	14	2	16
23	Rajasthan	204	8	212
24	Sikkim	2		2
25	Tamil Nadu	118	0	118
26	Telangana	168	16	184
27	Tripura	1		1
28	Uttar Pradesh	117	13	130
29	Uttarakhand	17	8	25
30	West Bengal	30		30
Grand Total		**5334**	**411**	**5745**

Source: Dam Safety Monitoring Directorate, CWC/NRLD-2019 published on 27.06.2019
International Commission on Large Dams (ICOLD) Specification; '*' Union Territory
A large dam is classified as one with a maximum height of more than 15 m from its deepest foundation to the crest.
A dam between 10 & 15 m in height from its deepest foundation is also included in the classification of a large dam provided it complies with one of the following conditions:
a) length of crest of the dam is not less than 500 m or
b) capacity of the reservoir formed by the dam is not less than one MCM or
c) the maximum flood discharge dealt with by the dam is not less than one MCM or
d) the dam has specially difficult foundation problems, or
e) the dam is of unusual design

2.16 Pradhan Mantri Krishi Sinchayee Yojana Pradhan- 'Har Khet Ko Pani'-Ground Water

The scheme of PMKSY was approved in 2015-16, has inter-alia, a component of Ground Water and creating additional irrigation area of 2.5 Lakh Ha during 2015-20. Ground water component aims to utilize ground water for irrigation purpose in areas where ground water is sufficiently available. Further, to enhance small and marginal farmer's income in such areas by providing assured irrigation facility under the scheme. Operational guidelines for Ground Water component were issued by the Department of Water Resources, RD & GR, Ministry of Jal Shakti in July, 2016. However, keeping in view of various requirements to implement the scheme, guidelines have been revised on 8.11.2018 and 28.05.2019. As per the operational guidelines the eligible assessment units/ blocks for the implementation of the scheme have been selected based on the following criteria:

- Less than 60 per cent of the annual replenishable ground water resources have been developed i.e. there is sufficient scope for further ground water development without endangering groundwater sustainability with maximum permissible extraction level of 70% at any point of time.

- Average annual rainfall of 750 mm or more and

- Shallow groundwater levels (within 15 m below ground level in last 5 years).

The beneficiary under this scheme are Small and Marginal farmers only with priority to be given to SC/ST and Women farmers and are being identified by State Governments. The scheme expects to give a boost to assured irrigation in tribal and backward areas (with abundant replenishable ground water) of the country, which are deprived of benefits of irrigation projects.

A large part of the target areas particularly falls in North Eastern States, Chhattisgarh, Madhya Pradesh, Odisha and Jharkhand are occupied by tribal population. Better irrigation facilities are expected to result in improved socio-economic conditions of small and marginal farmers and may enhance food production by more than two-fold in target areas. Implementation of the scheme is also expected to generate employment for skilled/unskilled personnel including ground water professionals.

The scheme effectively launched in 2019-20 after revision of guidelines. Concurrently, provision of Rs. 319 Cr was made during FY 2019-20 and Rs. 400 Cr is earmarked for FY 2020-21 towards Central Assistance for proposals of States Government under PMKSY-HKKP-GW. So far, the Department of Water Resources, RD & GR, Ministry of Jal Shakti has issued Administrative Approvals amounting Rs. 1656.27 Cr to States of Assam, Arunachal Pradesh, Gujarat, Nagaland, Tripura, Mizoram, Manipur, Uttar Pradesh, Tamil Nadu, Telangana and West Bengal for providing assured irrigation in 1.46 Lakh Ha land benefitting around 1.90 Lakh small and marginal farmers. Since the release of funds has commenced only from August, 2019, projects are under various stages of execution. State-wise details of administrative approvals issued and funds released are as below:

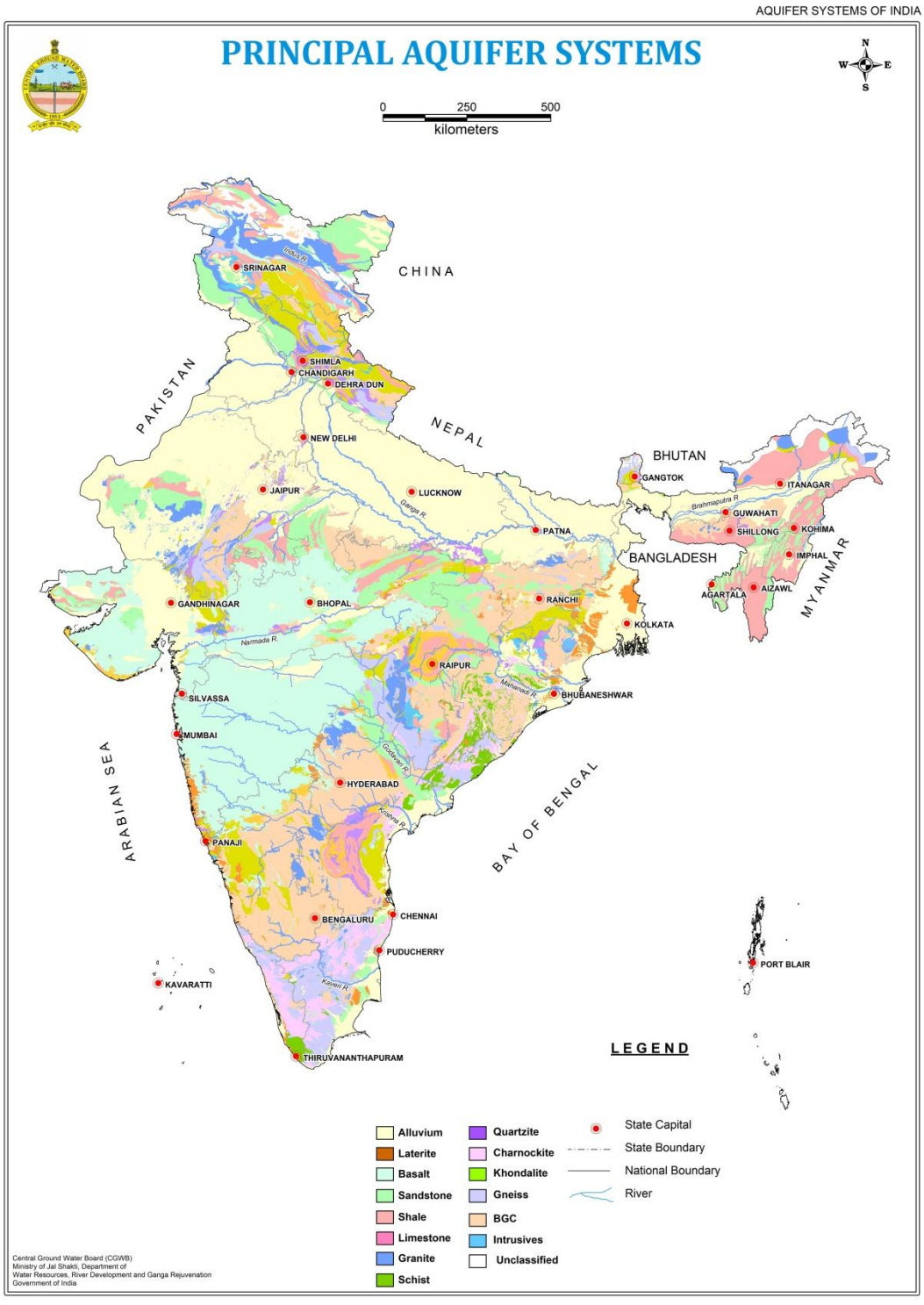
State-wise details of Administrative Approvals issued and Funds Released

Sl. No.	States	Total Project Command (Ha)	Beneficiaries	Cost of Proposal (Rs. Cr)	Central Assistance (Rs. Cr)	Funds Released during 2019-20 & 2020-21 (up to July, 2020) (Rs. Cr)
1	2	3	4	5	6	7
1	Assam-Phase-I	19116.00	19643	246.07	221.07	132.87
2	Arunachal Pradesh-Phase-I	1785.00	3350	45.30	40.77	24.46
3	Gujarat	3768.00	3655	163.29	98.13	6.00
4	Nagaland	666.75	264	18.15	16.25	9.75
5	Tripura	339.00	851	13.31	11.91	7.15
6	Uttar Pradesh	34659.00	14847	46.60	27.83	16.69
7	Arunachal Pradesh Phase-II	1957.00	519	44.95	40.25	24.15
8	Tamil Nadu	610.37	1233	10.19	6.11	3.67
9	Manipur	2057.00	550	61.68	55.51	33.306
10	Mizoram	553.00	411	16.04	14.46	8.66
11	Telangana	22925.00	24000	379.49	227.70	
12	West Bengal	37840.00	103596	318.24	191.38	
13	Assam-Phase-II	19680.00	17216	292.96	263.66	
Total		**145956.12**	**190135**	**1656.27**	**1215.03**	**266.706**

Source: Central Ground Water Board

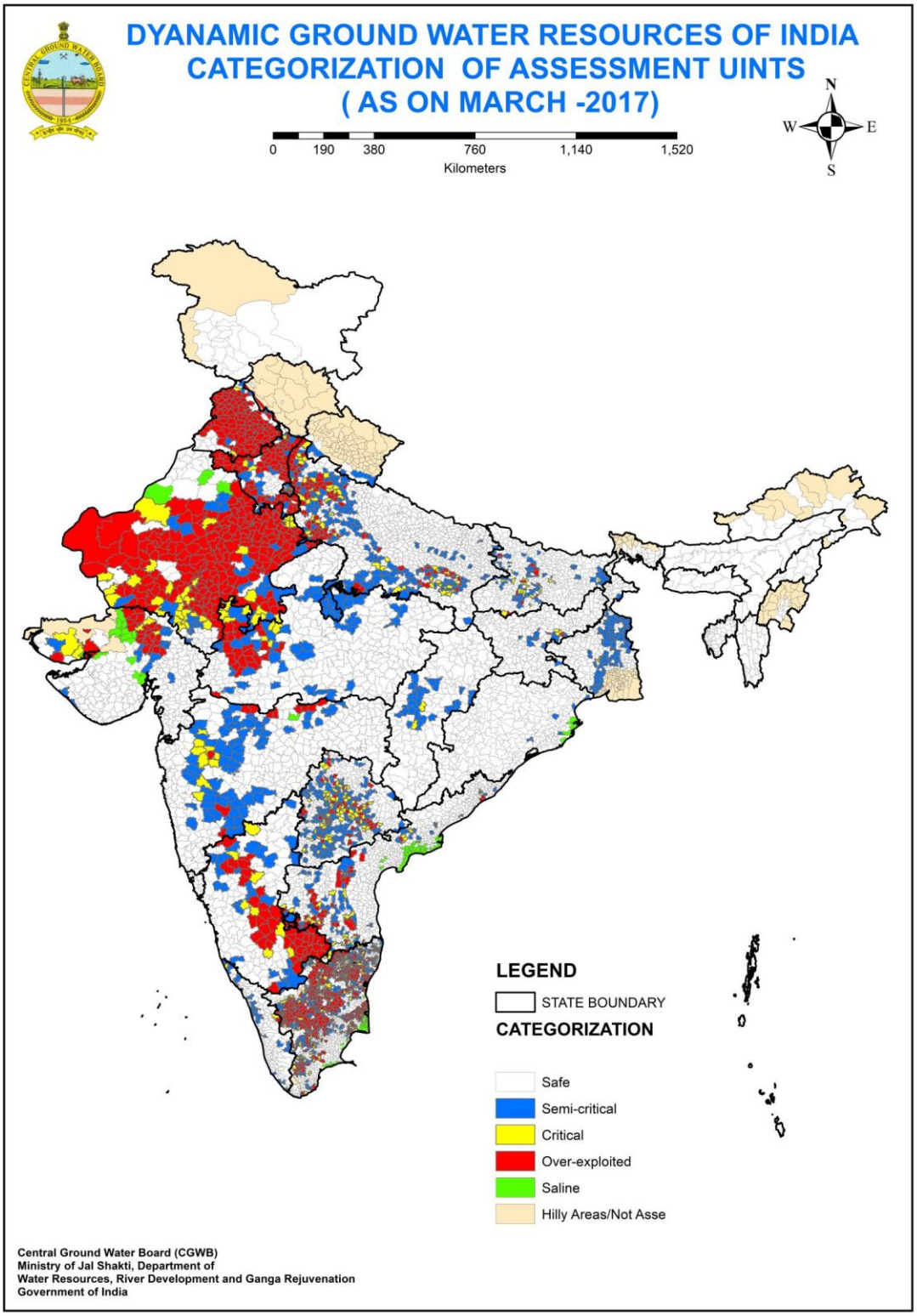
Ground water development for irrigation is planned in such a way that after implementation of the project, stage of Ground Water extraction should not exceed 70% at any time. Scheme includes measures to prevent over-exploitation and facilitate recharge to ground water. Suitable recharge measures are to be taken up under NRM component of MGNREGS or any other recharge scheme in the target area of the present scheme to provide sustainability to ground water. State/UT Government ensures that micro-irrigation practices are implemented in at least 30% of the proposed irrigated area in convergence with the relevant scheme(s) of Central/State/UT Governments.

2.17 Map of Principal Aquifer System of India



Source: Central Ground Water Board

2.18 Map of Categorization of Assessment Units in Dynamic GW Resources of India



Source: Central Ground Water Board

2.19 State/UT-wise Categorization of Assessment Units in India

Categorization Of Blocks/ Mandals/ Talukas in India (2017)

Sl. No.	States/ UTs	Total No. of Assessed Units	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
			Nos.	%	Nos.	%	Nos.	%	Nos.	%	Nos.	%
1	2	3	4	5	6	7	8	9	10	11	12	13
States												
1	Andhra Pradesh	670	501	75	60	9	24	4	45	7	40	6
2	Arunachal Pradesh	11	11	100	0	0	0	0	0	0	0	0
3	Assam	28	28	100	0	0	0	0	0	0	0	0
4	Bihar	534	432	81	72	13	18	3	12	2	0	0
5	Chhattisgarh	146	122	84	22	15	2	1	0	0	0	0
6	Delhi	34	3	9	7	21	2	6	22	65	0	0
7	Goa	12	12	100	0	0	0	0	0	0	0	0
8	Gujarat	248	194	78	11	4	5	2	25	10	13	5
9	Haryana	128	26	20	21	16	3	2	78	61	0	0
10	Himachal Pradesh	8	3	38	1	13	0	0	4	50	0	0
11	Jammu & Kashmir	22	22	100	0	0	0	0	0	0	0	0
12	Jharkhand	260	245	94	10	4	2	1	3	1	0	0
13	Karnataka	176	97	55	26	15	8	5	45	26	0	0
14	Kerala	152	119	78	30	20	2	1	1	1	0	0
15	Madhya Pradesh	313	240	77	44	14	7	2	22	7	0	0
16	Maharashtra	353	271	77	61	17	9	3	11	3	1	0
17	Manipur	9	9	100	0	0	0	0	0	0	0	0
18	Meghalaya	11	11	100	0	0	0	0	0	0	0	0
19	Mizoram	26	26	100	0	0	0	0	0	0	0	0
20	Nagaland	11	11	100	0	0	0	0	0	0	0	0
21	Odisha	314	303	96	5	2	0	0	0	0	6	2
22	Punjab	138	22	16	5	4	2	1	109	79	0	0
23	Rajasthan	295	45	15	29	10	33	11	185	63	3	1
24	Sikkim	4	4	100	0	0	0	0	0	0	0	0
25	Tamil Nadu	1166	427	37	163	14	79	7	462	40	35	3
26	Telangana	584	278	48	169	29	67	11	70	12	0	0
27	Tripura	59	59	100	0	0	0	0	0	0	0	0
28	Uttar Pradesh*	830	540	65	151	18	48	6	91	11	0	0
29	Uttarakhand	18	13	72	5	28	0	0	0	0	0	0

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2.19 State/UT-wise Categorization of Assessment Units in India

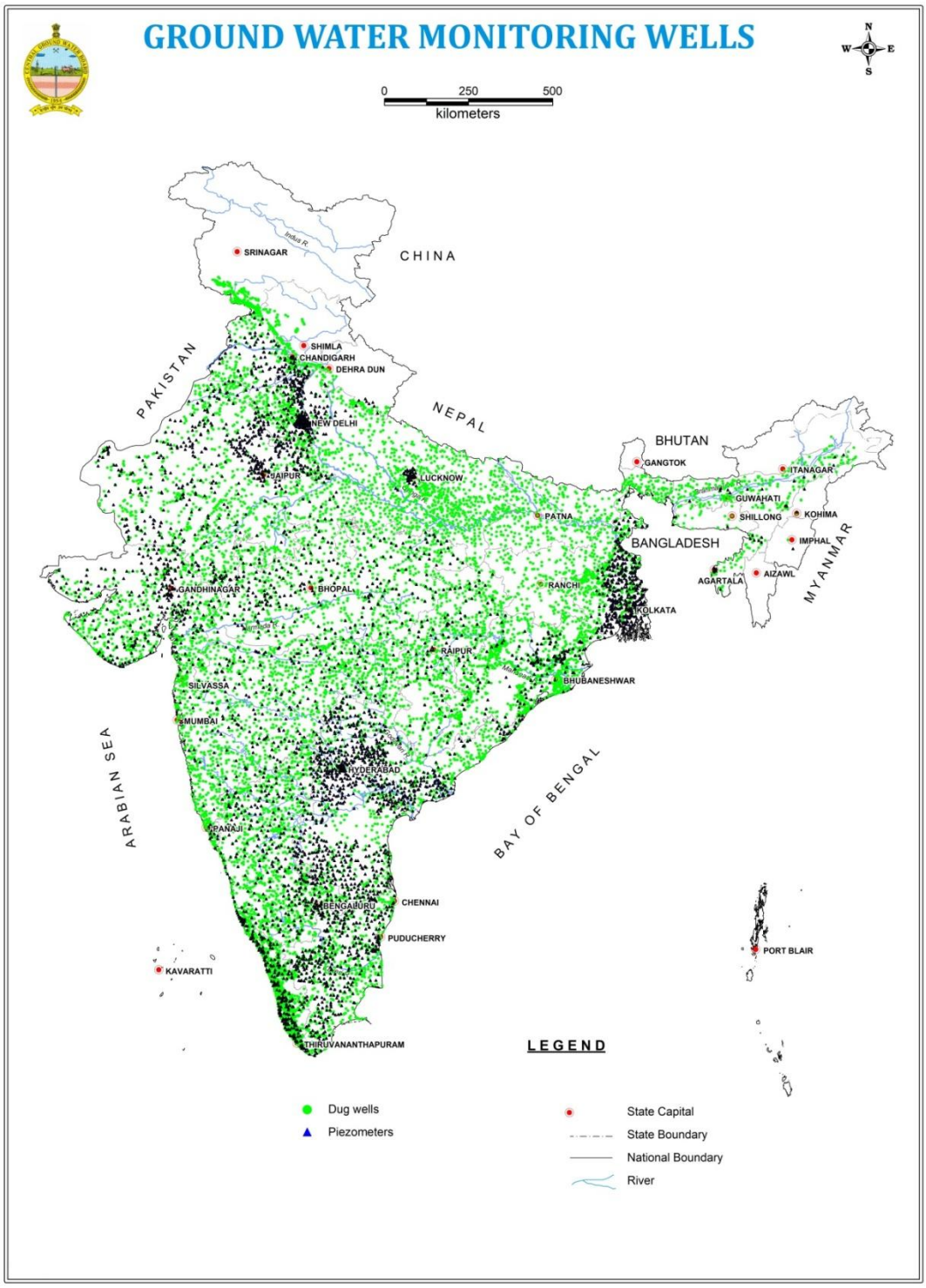
Categorization Of Blocks/ Mandals/ Talukas in India (2017)

Sl. No.	States/ UTs	Total No. of Assessed Units	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
			Nos.	%	Nos.	%	Nos.	%	Nos.	%	Nos.	%
1	2	3	4	5	6	7	8	9	10	11	12	13
30	West Bengal **	268	191	71	76	28	1	0	0	0	0	0
Total States		**6828**	**4265**	**62**	**968**	**14**	**312**	**5**	**1185**	**17**	**98**	**1**
Union Territories												
1	Andaman & Nicobar Islands	36	35	97	0	0	0	0	0	0	1	3
2	Chandigarh	1	0	0	1	100	0	0	0	0	0	0
3	Dadra & Nagar Haveli	1	1	100	0	0	0	0	0	0	0	0
4	Daman & Diu	2	1	50	0	0	1	50	0	0	0	0
5	Lakshadweep	9	6	67	3	33	0	0	0	0	0	0
6	Puducherry	4	2	50	0	0	0	0	1	25	1	25
Total UTs		**53**	**45**	**85**	**4**	**8**	**1**	**2**	**1**	**2**	**2**	**4**
Grand Total		**6881**	**4310**	**63**	**972**	**14**	**313**	**5**	**1186**	**17**	**100**	**1**

Source: Central Ground Water Board

Note: **Blocks-** Bihar, Chhattisgarh, Haryana, Jharkhand, Kerala, M.P., Manipur, Mizoram, Odisha, Punjab, Rajasthan, Tripura, Uttar Pradesh, Uttarakhand, West Bengal;
Talukas- Karnataka, Goa, Gujarat, Maharashtra;
Mandals- Andhra Pradesh, Telangana;
Districts/Valley- Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Mizoram, Nagaland;
Islands- Lakshadweep, Andaman & Nicobar Islands;
Firka- Tamil Nadu;
Region- Puducherry;
UT- Chandigarh, Dadar & Nagar Haveli, Daman & Diu;
Tehsil- NCT Delhi;
*Uttar Pradesh: There are total 820 Block and 10 Cities;
**The Ground Water Resources Assessment as on 2013 has been considered for the State of West Bengal.

2.20 Map of Ground Water Monitoring Stations in India



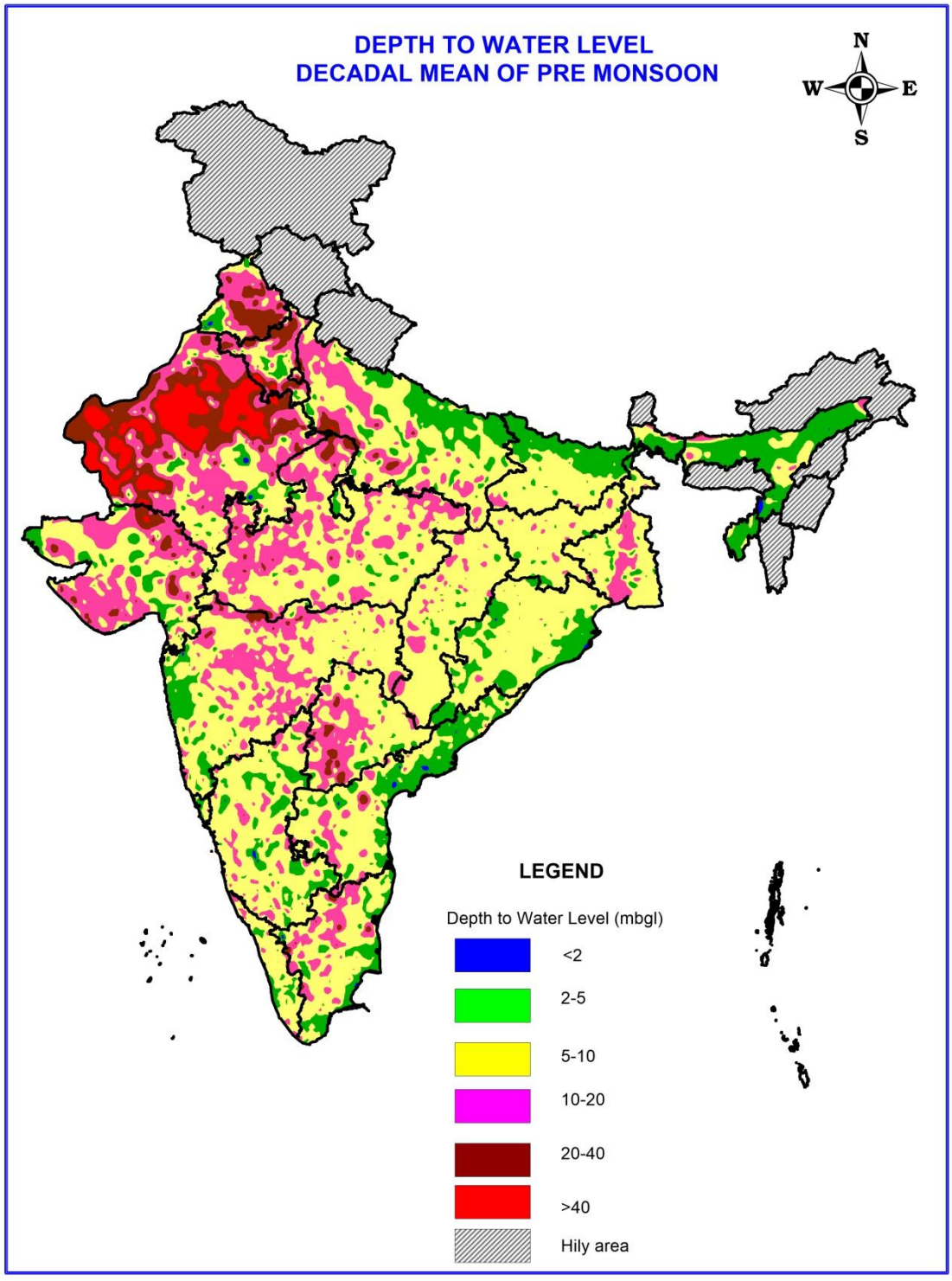
Source: Central Ground Water Board

2.21 State/UT-wise Ground Water Monitoring Wells in India

Sl. No.	Name of the States/UTs	Number of GW Monitoring Stations (March, 2020)
1	2	3
States		
1	Andhra Pradesh	838
2	Arunachal Pradesh	27
3	Assam	385
4	Bihar	757
5	Chhattisgarh	1425
6	Delhi	101
7	Goa	132
8	Gujarat	904
9	Haryana	1321
10	Himachal Pradesh	128
11	Jharkhand	467
12	Karnataka	1675
13	Kerala	1602
14	Madhya Pradesh	1519
15	Maharashtra	1919
16	Manipur	0
17	Meghalaya	67
18	Nagaland	30
19	Odisha	1602
20	Punjab	1055
21	Rajasthan	1265
22	Tamil Nadu	1286
23	Telangana	748
24	Tripura	115
25	Uttar Pradesh	1131
26	Uttarakhand	205
27	West Bengal	1531
Total		**22235**
Union Territories		
1	Andaman & Nicobar Islands	113
2	Chandigarh	37
3	Dadra & Nagar Haveli	17
4	Daman & Diu	14
5	Jammu & Kashmir	298
6	Puducherry	16
Total		**495**
Grand Total		**22730**

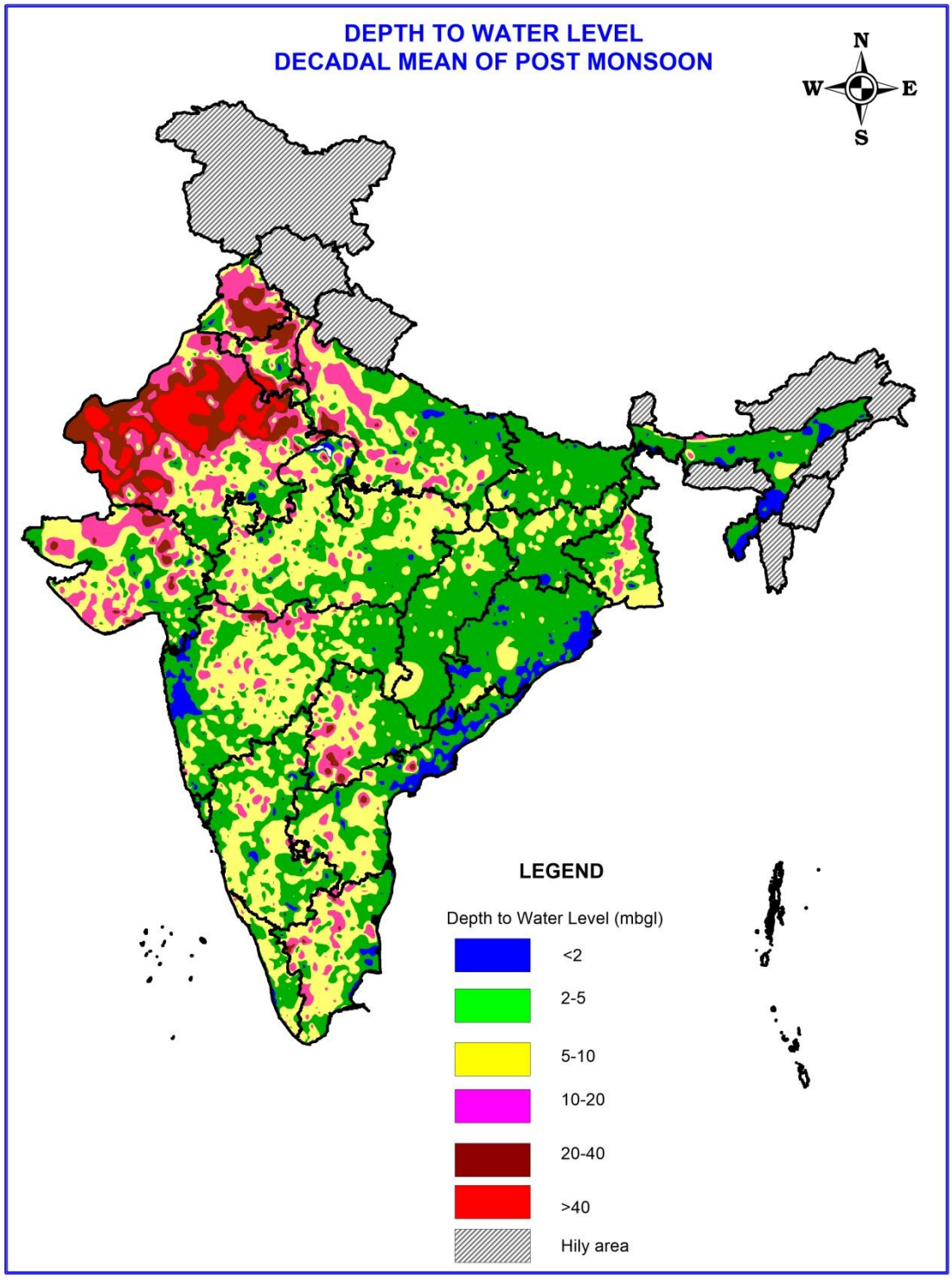
Source: Central Ground Water Board

2.22 Water Level Scenario in India-Depth to Water Level Map (Decadal Mean of Pre-Monsoon: 2010-2019)



Source: Central Ground Water Board

2.23 Water Level Scenario in India-Depth to Water Level Map (Decadal Mean of Post-Monsoon: 2010-2019)



Source: Central Ground Water Board

2.24 State-wise Ground Water Resources in India, 2017

(In BCM)

Sl. No.	States / Union Territories	Ground Water Recharge					Total Natural Discharges	Annual Extractable Ground Water Resource	Current Annual Ground Water Extraction				Annual GW Allocation for Domestic Use as on 2025	Net Ground Water Availability for Future use	Stage of Ground Water Extraction (%)
		Monsoon Season		Non-monsoon Season		Total Annual Ground Water Recharge			Irrigation	Industrial	Domestic	Total			
		Recharge from Rainfall	Recharge from other Sources	Recharge from Rainfall	Recharge from other Sources										
1	2	3	4	5	6	(7)=(3+4+5+6)	8	9	10	11	12	(13)=(10+11+12)	14	15	16
States															
1	Andhra Pradesh	9.96	5.62	1.21	4.42	21.22	1.07	20.15	7.85	0.14	0.9	8.9	1.48	12.31	44.15
2	Arunachal Pradesh	1.89	0.18	0.95	0.01	3.02	0.36	2.67	0	0	0.01	0.01	0.03	2.64	0.28
3	Assam	20.22	0.43	7.28	0.74	28.67	4.42	24.26	1.97	0.06	0.69	2.73	0.79	21.43	11.25
4	Bihar	19.83	3.95	3.14	4.5	31.41	2.43	28.99	10.78	0.66	1.83	13.26	1.83	15.78	45.76
5	Chhattisgarh	7.82	1.36	0.76	1.64	11.57	1	10.57	3.98	0.05	0.67	4.7	0.79	5.76	44.43
6	Delhi	0.13	0.06	0.03	0.11	0.32	0.02	0.3	0.09	0.02	0.24	0.36	0.29	0.02	119.61
7	Goa	0.19	0.03	0.01	0.05	0.27	0.11	0.16	0.02	*	0.03	0.05	0.04	0.07	33.5
8	Gujarat	15.95	3.4	0	3.02	22.37	1.12	21.25	12.84	0.11	0.63	13.58	0.9	7.98	63.89
9	Haryana	3.56	2.55	1.03	3	10.15	1.01	9.13	11.53	0.34	0.63	12.5	0.72	0.87	136.91
10	Himachal Pradesh	0.34	0.02	0.11	0.04	0.51	0.05	0.46	0.2	0	0.19	0.39	0.34	0.16	86.37
11	Jammu & Kashmir	1	0.5	0.88	0.51	2.89	0.29	2.6	0.2	0.07	0.5	0.76	0.5	1.84	29.47
12	Jharkhand	5.25	0.13	0.41	0.42	6.21	0.52	5.69	0.8	0.22	0.56	1.58	0.56	4.13	27.73
13	Karnataka	6.59	4.36	2.67	3.22	16.84	2.05	14.79	9.39	*	0.95	10.34	1.14	5.41	69.87
14	Kerala	3.91	0.04	0.68	1.13	5.77	0.56	5.21	1.22	0.01	1.44	2.67	1.57	2.41	51.27
15	Madhya Pradesh	27.1	1.51	0.82	6.99	36.42	1.95	34.47	17.43	0.22	1.24	18.88	1.72	15.84	54.76
16	Maharashtra	20.59	2.29	0.53	8.23	31.64	1.74	29.9	15.1	0.003	1.22	16.33	2.28	12.91	54.62
17	Manipur	0.23	0.01	0.17	0.02	0.43	0.04	0.39	0	0	0	0.01	0.04	0.34	1.44
18	Meghalaya	1.37	0.01	0.43	0.02	1.83	0.19	1.64	0.03	0	0.01	0.04	0.02	1.59	2.28
19	Mizoram	0.16	0	0.05	0	0.21	0.02	0.19	0	0	0.01	0.01	0.01	0.18	3.82
20	Nagaland	1.65	0.03	0.52	0	2.2	0.22	1.98	0	0	0.02	0.02	0.02	1.96	0.99
21	Odisha	10.53	2.34	1.5	2.37	16.74	1.17	15.57	5.28	0.14	1.15	6.57	1.3	8.85	42.18
22	Punjab	5.54	11.83	1.31	5.25	23.93	2.35	21.58	34.56	0.2	1.01	35.78	1.41	1.09	165.77

Contd...

2.24 State-wise Ground Water Resources in India, 2017

(In BCM)

Sl. No.	States / Union Territories	Ground Water Recharge					Total Natural Discharges	Annual Extractable Ground Water Resource	Current Annual Ground Water Extraction				Annual GW Allocation for Domestic Use as on 2025	Net Ground Water Availability for Future use	Stage of Ground Water Extraction (%)
		Monsoon Season		Non-monsoon Season		Total Annual Ground Water Recharge			Irrigation	Industrial	Domestic	Total			
		Recharge from Rainfall	Recharge from other Sources	Recharge from Rainfall	Recharge from other Sources										
1	2	3	4	5	6	(7)=(3+4+5+6)	8	9	10	11	12	(13)=(10+11+12)	14	15	16
23	Rajasthan	9.74	0.78	0.24	2.44	13.21	1.22	11.99	14.85	0	1.92	16.77	2.67	0.88	139.88
24	Sikkim	5.2	0	0.43	0	5.63	4.11	1.52	0	0	0	0	0.01	1.51	0.06
25	Tamil Nadu	6.67	9.41	1.89	2.26	20.22	2.02	18.2	13.06	0	1.67	14.73	1.85	5.66	80.94
26	Telangana	7.56	1.42	1.88	2.76	13.62	1.25	12.37	7.09	*	1	8.09	1.39	4.26	65.45
27	Tripura	0.8	0.06	0.4	0.26	1.53	0.29	1.24	0.02	0	0.08	0.1	0.11	1.11	7.88
28	Uttar Pradesh	37.73	11.67	1.59	18.93	69.92	4.6	65.32	40.89	*	4.95	45.84	5.96	20.36	70.18
29	Uttarakhand	1.15	0.93	0.09	0.87	3.04	0.15	2.89	1.3	0.13	0.22	1.64	0.22	1.25	56.83
30	West Bengal**	18.71	1.51	5.26	3.85	29.33	2.77	26.56	10.84	*	1	11.84	1.53	14.19	44.6
	Total States	**251.36**	**66.41**	**36.3**	**77.06**	**431.13**	**39.09**	**392.04**	**221.33**	**2.38**	**24.77**	**248.47**	**31.52**	**172.82**	**63.38**
Union Territories															
1	Andaman & Nicobar Island	0.35	0	0.02	0	0.37	0.04	0.33	0	0	0.01	0.01	0.01	0.32	2.74
2	Chandigarh	0.02	0.01	0	0.01	0.04	0	0.04	0	*	0.03	0.03	0.03	0	89
3	Dadra & Nagar Haveli	0.06	0	0	0.01	0.07	0	0.07	0.01	*	0.01	0.02	0.01	0.04	31.34
4	Daman & Diu	0.02	0	0	0	0.02	0	0.02	0.01	0	0	0.01	0	0	61.4
5	Lakshdweep	0.01	0	0	0	0.01	0.01	0.004	0	0	0.002	0.002	0	0	65.99
6	Puducherry	0.09	0.07	0.02	0.05	0.23	0.02	0.2	0.11	*	0.04	0.15	0.04	0.05	74.33
	Total UTs	**0.54**	**0.08**	**0.05**	**0.07**	**0.73**	**0.08**	**0.66**	**0.13**	**0**	**0.1**	**0.23**	**0.1**	**0.43**	**34.51**
Grand Total		**251.9**	**66.49**	**36.34**	**77.13**	**431.86**	**39.16**	**392.7**	**221.46**	**2.38**	**24.87**	**248.69**	**31.62**	**173.25**	**63.33**

Source: Central Ground Water Board, Dynamic Ground Water Resources of India (as on 31st March, 2017)

Note:

1. Industrial and domestic draft has not been estimated separately in Goa, Himachal Pradesh, Karnataka, Rajasthan, Tamil Nadu, Uttar Pradesh, Chandigarh, Dadra & Nagar Haveli and Puducherry.
2. The Ground Water Resources Assessment as on 2013 has been considered for the State of West Bengal.

2.25 Basin-wise Ground Water Resources in India, 2017

(in MCM)

Sl. No.	Basin/State/District	Recharge Due to Rainfall during Monsoon Season	Recharge Due to Other Sources during Monsoon Season	Recharge Due to Rainfall during non-Monsoon Season	Recharge Due to Other Sources during non-Monsoon Season	Total Annual Recharge	Annual Extractable Resources	Extraction due to Irrigation Needs	Extraction due to Domestic and Industrial Needs	Total Annual Extraction from all needs	Projected Demand for Domestic needs as on Year 2025	Allocation for Future Use	State of Extraction (%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)=(3+4+5+6)	(8)	(9)	(10)	(11)=(9+10)	(12)	(13)	(14)=(11/8)
1	Andaman & Nicobar Basin	327	13	20	13	379	334	24	30	54	333	1865	16%
2	Area of North Ladakh not Draining into Indus Basin	441	343	129	342	1393	1058	612	574	1201	8484	41110	114%
3	Barak & Other Basin	2485	88	1339	261	4169	3188	27	144	171	186	2965	5%
4	Brahmani & Baitarani Basin	4040	603	571	620	5834	5404	1713	370	2083	62	1046	39%
5	Brahmhaputra Basin	32184	705	9739	957	43576	34536	2490	799	3289	782	26658	10%
6	Cauvery Basin	3660	3725	1151	1376	9911	9001	6758	657	7415	722	2667	82%
7	Drainage Area of Lakshadweep Islands Basin	0	0	0	0	9	3	0	0	0	2	2	0%
8	East Flowing Rivers between Godavari and Krishna Basin	802	738	101	492	2133	2021	843	69	912	77	1179	45%
9	East Flowing Rivers between Krishna and Pennar Basin	826	536	557	588	2507	2382	733	144	877	242	1547	37%
10	East Flowing Rivers between Mahanadi and Godavari Basin	2689	1483	598	812	5582	5252	1265	361	1626	313	2807	31%
11	East Flowing Rivers between Pennar and Cauvery Basin	4051	4849	882	1391	11173	10216	7768	1296	9065	1448	2697	89%
12	East Flowing Rivers South of Cauvery Basin	2084	2715	551	864	6214	5593	2695	159	2854	188	2920	51%
13	Ganga Basin	100134	20276	9845	34391	164507	152662	87871	11662	99491	9032	31569	65%

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2.25 Basin-wise Ground Water Resources in India, 2017

(in MCM)

Sl. No.	Basin/State/District	Recharge Due to Rainfall during Monsoon Season	Recharge Due to Other Sources during Monsoon Season	Recharge Due to Rainfall during non-Monsoon Season	Recharge Due to Other Sources during non-Monsoon Season	Total Annual Recharge	Annual Extractable Resources	Extraction due to Irrigation Needs	Extraction due to Domestic and Industrial Needs	Total Annual Extraction from all needs	Projected Demand for Domestic needs as on Year 2025	Allocation for Future Use	State of Extraction (%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)=(3+4+5+6)	(8)	(9)	(10)	(11)=(9+10)	(12)	(13)	(14)=(11/8)
14	Godavari Basin	22369	2958	1880	6431	33638	31435	13201	1466	14668	2111	15343	47%
15	Indus (up to border) Basin	10276	14000	2970	7875	35121	31788	44036	2862	46897	1866	2852	148%
16	Krishna Basin	11592	4764	2808	6703	25866	23965	13933	1526	15458	2022	9625	65%
17	Mahanadi Basin	9249	2312	825	2507	14893	13726	5535	1171	6706	493	3081	49%
18	Mahi basin	2417	535	0	922	3875	3642	1999	225	2224	258	1437	61%
19	Minor Rivers Draining into Bangladesh Basin	205	10	75	41	332	279	4	12	16	16	263	6%
20	Minor Rivers Draining into Myanmar Basin	676	10	317	19	1022	920	3	6	9	45	832	1%
21	Narmada Basin	8688	622	217	3143	12671	11983	4528	416	4944	490	6938	41%
22	Pennar Basin	2929	1172	166	1240	5506	5216	3364	316	3680	438	2239	71%
23	Sabarmati Basin	3360	806	0	692	4858	4610	3286	184	3469	197	1279	75%
24	Subarnarekha Basin	2482	314	500	502	3798	3494	1130	232	1361	79	583	39%
25	Tapi Basin	4691	496	72	1701	6960	6570	3737	232	3969	487	2382	60%
26	West Flowing Rivers of Kutch and Saurashtra including Luni Basin	10592	1519	13	1295	13418	12650	10860	557	11414	750	2931	90%
27	West Flowing Rivers South of Tapi Basin	8657	898	1016	1949	12520	10778	3042	1778	4817	498	4433	45%
Grand Total		**251905**	**66490**	**36344**	**77125**	**431865**	**392703**	**221455**	**27248**	**248670**	**31620**	**173250**	**63%**

Source: Central Ground Water Board
Note: Totals may not tally.

2.26 Details of Plan-wise Position of Irrigation Potential Created and Utilized (in Mha)

Plan		Potential Created					Potential Utilized				
		Major & Medium	Minor			Total	Major & Medium	Minor			Total
			S.W	G.W	Total			S.W	G.W	Total	
1	2	3	4	5	6	7	8	9	10	11	12
Upto 1951 (Pre-Plan)	Cumulative	9.70	6.40	6.50	12.90	22.60	9.70	6.40	6.50	12.90	22.60
I Plan (1951-1956)	During	2.50	0.03	1.13	1.16	3.66	1.28	0.03	1.13	1.16	2.44
	Cumulative	12.20	6.43	7.63	14.06	26.26	10.98	6.43	7.63	14.06	25.04
II Plan (1956-1961)	During	2.13	0.02	0.67	0.69	2.82	2.07	0.02	0.67	0.69	2.76
	Cumulative	14.33	6.45	8.30	14.75	29.08	13.05	6.45	8.30	14.75	27.80
III Plan (1961-1966)	During	2.24	0.03	2.22	2.25	4.49	2.12	3.03	2.22	2.25	4.37
	Cumulative	16.57	6.48	10.52	17.00	33.57	15.17	6.48	10.52	17.00	32.17
Annual Plans (1966-1969)	During	1.53	0.02	1.98	2.00	3.53	1.58	0.02	1.98	2.00	3.58
	Cumulative	18.10	6.50	12.50	19.00	37.10	16.75	6.50	12.50	19.00	35.75
IV Plan (1969-1974)	During	2.60	0.50	4.00	4.50	7.10	1.64	0.50	4.00	4.50	6.14
	Cumulative	20.70	7.00	16.50	23.50	44.20	18.39	7.00	16.50	23.50	41.89
V Plan (1974-1978)	During	4.02	0.50	3.30	3.80	7.82	2.70	0.50	3.30	3.80	6.50
	Cumulative	24.72	7.50	19.80	27.30	52.02	21.09	7.50	19.80	27.30	48.39
Annual Plans (1978-1980)	During	1.89	0.50	2.20	2.70	4.59	1.48	0.50	2.20	2.70	4.18
	Cumulative	26.61	8.00	22.00	30.00	56.61	22.57	8.00	22.00	30.00	52.57
VI Plan (1980-1985)	During	1.09	1.70	5.82	7.52	8.61	0.93	1.01	4.24	5.25	6.18
	Cumulative	27.70	9.70	27.82	37.52	65.22	23.50	9.01	26.24	35.25	58.75
VII Plan (1985-1990)	During	2.22	1.29	7.80	9.09	11.31	1.90	0.96	6.91	7.87	9.77
	Cumulative	29.92	10.90	35.62	46.52	76.44	25.40	9.97	33.15	43.12	68.52
Annual Plans (1990-1992)	During	0.82	0.47	3.27	3.74	4.56	0.85	0.32	3.10	3.42	4.27
	Cumulative	30.74	11.46	38.89	50.35	81.09	26.25	10.29	36.25	46.54	72.79
VIII Plan (1992-1997)	During	2.21	1.05	1.91	2.96	5.17	2.13	0.78	1.45	2.23	4.36
	Cumulative	32.95	12.51	40.80	53.31	86.26	28.38	11.07	37.70	48.77	77.15
IX Plan (1997-2002)	During	4.10	1.09	2.50	3.59	7.69	2.57	0.37	0.85	1.22	3.79
	Cumulative	37.05	13.60	43.30	56.90	93.95	30.95	11.44	38.55	49.99	80.94
X Plan (2002-2007)	During	4.59	NA	NA	3.20	7.79	2.73	NA	NA	1.49	4.22
	Cumulative	41.64	NA	NA	60.10	101.74	33.68	NA	NA	51.48	85.16
XI Plan (2007-2012)	During	6.34	NA	NA	5.45	11.79	1.33	NA	NA	1.43	2.76
	Cumulative	47.97	NA	NA	65.56	113.53	35.01	NA	NA	52.91	87.92

Source: P&P Directorate, CWC

Note: IPC & IPU figures are under revision.
NA: Not Available; 'S.W': Surface Water; 'G.W': Ground Water

2.27 Irrigation Potential Created and Irrigation Potential Utilised in Major, Medium and Minor Irrigation Projects

Sl. No.	State	UIP of MMI Projects	UIP of Minor Projects	Total UIP	Up to XI Plan		
					MMI	Minor	Total
1	2	3	4	5	6	7	8 =6+7
1	Andhra Pradesh Telangana	5000	6260	11260	4803.73	3340.55	8144.28
2	Arunachal Pradesh	0	168	168	1.2	132.248	133.448
3	Assam	970	1900	2870	455.96	1016.82	1472.783
4	Bihar	5223.5	5663.5	10887	3054.46	5924.78	8979.24
5	Chhattisgarh	1146.93	571	1717.9	1269.32	842.295	2111.61
6	Goa	62	54	116	55.55	25.927	81.478
7	Gujarat	3000	3103	6103	3679.09	2071.97	5751.06
8	Haryana	3000	1512	4512	2206.29	1637.67	3843.96
9	Himachal Pradesh	50	303	353	30.45	186.217	216.667
10	Jammu & Kashmir	250	1183.5	1433.5	325.61	745.661	1071.27
11	Jharkhand	1276.5	1108	2384.5	530.71	534.2	1064.905
12	Karnataka	2500	3474	5974	2965.83	1704.17	4670
13	Kerala	1000	1679	2679	715.69	763.65	1479.34
14	Madhya Pradesh	4853.07	11361	16214	2506.43	2534.34	5040.772
15	Maharashtra	4100	4852	8952	4128.71	3185.6	7314.31
16	Manipur	135	469	604	158.5	120.69	279.19
17	Meghalaya	20	148	168	-	77.77	77.77
18	Mizoram	0	70	70	-	51.74	51.74
19	Nagaland	10	75	85	-	124.51	124.51
20	Odisha	3600	5203	8803	2147.36	1887.43	4034.79
21	Punjab	3000	2967	5967	2684.39	3497.71	6182.1
22	Rajasthan	2750	2378	5128	3167.13	2487.76	5654.89
23	Sikkim	20	50	70	-	42.74	42.74
24	Tamil Nadu	1500	4032	5532	1578.27	2331.99	3910.26
25	Tripura	100	181	281	29.25	161.863	191.113
26	Uttar Pradesh	12154	17481	29635	9288.09	25320.13	34608.22
27	Uttarakhand	346	518	864	288.98	585.347	874.327
28	West Bengal	2300	4618	6918	1901.41	4159.68	6061.09
29	Union Territories	98	46	144	0	61.935	61.935
All India Total		**58465**	**81428**	**139893**	**47972.4**	**65557.4**	**113529.8**

Source: Planning Commission/P&P Directorate, CWC

Note: Sum/Total may not match due to rounding off; 'UIP': Ultimate Irrigation Potential; 'MMI': Major & Medium Irrigation

2.28 List of Projects Accepted by the Advisory Committee of M/o Jal Shakti, D/o Water Resources, River Development & Ganga Rejuvenation during 1st November, 2018 to 31st December, 2019

Sl. No.	Name of the Project	Name of the State	Category	Estimated Cost (Rs. in Cr)	Irrigation Benefits in Ha/ Power (MW)
1	2	3	4	5	6
Irrigation Projects					
1	Ujh Multipurpose Project	Jammu & Kashmir	Major, Multipurpose, National Project	5850	31,380 & 196
2	Revised Cost Estimate of Polavaram Irrigation Project	Andhra Pradesh	Major Irrigation, National Project	55548.87	4,36,000 & 960
3	Revised Cost Estimate of Lakhwar Multipurpose Project	Uttarakhand	Multipurpose, National Project	5747.17	33,780 & 300
4	Revised Cost Estimate of Jamrani Dam Multipurpose Project	Uttarakhand	Major Multipurpose Irrigation	2584.1	2,95,382 & 14
5	7th Revised Cost Estimate of North Koel Reservoir Project	Jharkhand& Bihar	Major Irrigation	3042.16	1,14,201
6	2nd Revised Cost Estimate of Poorna Barrage-2 (Ner Dhamana) Medium Irrigation Project	Maharashtra	Medium Irrigation	888.43	7,024
7	Renukaji Dam Project	Himachal Pradesh	Multipurpose (National Project)	6946.99	Drinking Water Project& 40 MW Power Component
8	Seven Pneumatically Operated Gated Weirs in Series on Girna River	Maharashtra	Medium Irrigation	781.32	5,540
9	Shelgaon Barrage Medium Irrigation Project, Revised Cost Estimate (RCE)	Maharashtra	Medium Irrigation (REC)	961.11	9,589
10	Revised Cost Estimate of Bodwad Parisar Sinchan Yojana	Maharashtra	Major Irrigation	3763.6	53,025

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2.28 List of Projects Accepted by Advisory Committee of M/o JS, D/o WR, RD & GR during 1st November, 2018 to 31st December, 2019

Sl. No.	Name of the Project	Name of the State	Category	Estimated Cost (Rs. in Cr)	Irrigation Benefits (Ha)/ Power (MW)
1	2	3	4	5	6
Flood Control Project					
11	Construction of Basantpur-Khajuri marginal Embankment on right bank of River Ghaghara in Barabanki Distt.	Uttar Pradesh	Flood Control	68.6159	Benefitted area- 5,184 Ha Benefitted population- 15106
12	Revised project estimate for the construction of Khajuha Jhunjhuniya Andharpurwa marginal bund on left bank of Rapti River in Shrawasti Distt	Uttar Pradesh	Flood Control	46.3726	Benefitted area- 15,412 Ha Benefitted population- 98,350
13	Revised project estimate for the construction of Parsa Dehariya Tilakpur marginal bund on left bank of Rapti River in Shrawasti Distt.	Uttar Pradesh	Flood Control	37.8629	Benefitted area- 14,868.76 Ha Benefitted population- 83,900
14	Anti Erosion works on Left bank of River Ghaghara from confluence of river Rapti and Ghaghara up to village Kurah Parasia in District Deoria.	Uttar Pradesh	Flood Control	58.83	Benefitted area- 960 Ha Benefitted population- 26,415
15	Providing flood protection/stabilization work to NakerKhad and its tributaries from Rainta (RD 0) to Sour Kalan Bridge (RD 30000)	Himachal Pradesh	Flood Control	231.02	Benefitted area- 274 Ha Benefitted population- 3678
16	Providing Flood Protection Works/Anti erosion measures for Sakrain, Malthod, Thothu, Dol and SamourKhad in Dharampur Constituency, Distt.Mandi (HP)	Himachal Pradesh	Flood Control	145.73	Benefitted area- 300 Ha Benefitted population- 3,289

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2.28 List of Projects Accepted by Advisory Committee of M/o JS, D/o WR, RD & GR during 1st November, 2018 to 31st December, 2019

Sl. No.	Name of the Project	Name of the State	Category	Estimated Cost (Rs. in Cr)	Irrigation Benefits (Ha)/ Power (MW)
1	2	3	4	5	6
17	Revised DPR for protection work of left edge of River Ganga from Kewala village to Baghmara village in the length of 5200 m	Bihar	Flood Control	105.6	Benefitted area-55000 Ha Benefitted population- 60,000
18	Anti Erosion works before flood 2019 in between 0.00 km to 35.00 km of PP Embankment and at GH embankment	Bihar	Flood Control	44.53	Benefitted area-4,20,000 Ha Benefitted population-2,20,000
19	Comprehensive Plan for Flood Management works on River Jhelum and its tributaries short term measures phase-II, part-A	Jammu & Kashmir	Flood Control	1623.43	Benefitted area-2,80,000 Ha Benefitted population-9,06,091
Coastal protection Projects					
20	Implementation of coastal protection measures at Someswara, Mangalore taluk, Dakshina Kannada Distt, Karnataka.	Karnataka	Coastal Protection Externally funded project (ADB) under Sustainable Coastal Protection and Management Investment Program (SCPMIP) Tranche-II Karnataka	84.87	Length of protection-3 km

Source: PA (N) Directorate, CWC

2.29 Details of Hydrological Observations, Snow Gauge & Meteorological Sites and Water Quality Sampling Stations under CWC as on September, 2020

Sl. No.	Name of States/UTs	Type of Sites								
		G	GD	GDQ	GDS	GDSQ	GQ	SG&Met	WQSS	Total
1	2	3	4	5	6	7	8	9	10	11
1	Andhra Pradesh	11	16	4	0	14	1	8	0	54
2	Arunachal Pradesh	7	3	10	0	8	9	20	0	57
3	Assam	12	10	21	1	26	54	7	0	131
4	Bihar	61	29	5	2	22	2	0	0	121
5	Chhattisgarh	11	9	2	1	18	0	14	8	63
6	Dadar & Nagar Haveli	3	1	0	0	0	0	0	0	4
7	Delhi	0	1	0	0	2	0	0	0	3
8	Goa	0	2	0	0	0	0	0	0	2
9	Gujarat	20	16	4	0	9	0	6	1	56
10	Haryana	3	6	0	0	1	0	0	0	10
11	Himachal Pradesh	6	9	0	4	5	0	23	0	47
12	Jammu & Kashmir	15	7	3	7	6	0	17	0	55
13	Jharkhand	9	18	4	0	6	1	21	4	63
14	Karnataka	7	18	15	0	25	2	4	0	71
15	Kerala	0	15	3	0	22	0	0	0	40
16	Ladakh	4	0	0	0	0	0	0	0	4
17	Madhya Pradesh	58	51	8	0	26	1	10	0	154
18	Maharashtra	34	33	15	1	28	3	14	0	128
19	Manipur	0	1	0	0	0	1	0	0	2
20	Meghalaya	4	5	5	1	3	1	0	0	19
21	Mizoram	4	10	0	7	6	0	2	0	29
22	Nagaland	1	0	0	0	0	0	0	0	1
23	Odisha	49	7	2	0	22	1	5	15	101
24	Puducherry	0	0	3	0	0	0	0	0	3
25	Punjab	0	1	0	0	0	0	0	0	1
26	Rajasthan	15	12	3	0	8	0	4	0	42
27	Sikkim	0	0	9	0	1	7	8	0	25
28	Tamil Nadu	0	19	20	0	23	0	1	0	63
29	Telangana	11	12	4	0	8	1	12	0	48
30	Tripura	2	5	0	6	2	3	0	0	18
31	Uttar Pradesh	73	50	9	1	46	3	4	4	190
32	Uttarakhand	23	35	1	6	10	0	7	1	83
33	West Bengal	18	22	7	2	21	10	6	0	86
Grand Total		**461**	**423**	**157**	**39**	**368**	**100**	**193**	**33**	**1774**

Source: RDC-II Directorate, CWC

Note: 'G': Gauge; 'GD': Gauge & Discharge; 'GDQ': Gauge, Discharge & Water Quality; 'GDS': Gauge, Discharge & Sediment; 'GDSQ': Gauge, Discharge, Sediment & Water Quality; 'GQ': Gauge & Water Quality; 'SG&Met': Snow Gauge & Meteorological; 'WQSS': Water Quality Sampling Station.

2.30 Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)

2.30.1 PMKSY- AIBP

The Accelerated Irrigation Benefits Programme (AIBP) was launched by the Union Government in 1996-1997, to provide Central Assistance in the form of Loan to State Governments to complete those ongoing irrigation projects which were costing, Rs. 1000 Cr or above and were in advance stage of completion. Subsequently, the AIBP guidelines were changed from time to time so as to include all categories of projects i.e. Major, Medium and Surface Minor Irrigation projects to bring a regional balance. From 2005-06 onwards, Central Assistance is provided in the form of grant. Since inception, altogether 297 major and medium irrigation projects have been included under AIBP out of which 143 projects have been completed and five projects have been deferred, leaving 149 projects as ongoing as on 2015-16. A total sum of Rs. 55601.11 Cr was provided to State Governments in the form of Central Assistance till March, 2016 for Major and Medium Irrigation Projects under AIBP and an Irrigation Potential of 9231.00 Th.Ha has been created up to March, 2016.

Government of India has launched the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) during 2015-16 with the motto of providing 'Har Khet Ko Pani' ensuring access to some means of protective irrigation to all agricultural farms in the country, to produce 'per drop more crop', thus, bringing much desired rural prosperity. The programmes as being implemented by the Government of India, viz. Accelerated Irrigation Benefits Programme, Repair, Renovation and Restoration (RRR) of Water bodies and Command Area Development & Water Management (CAD&WM) have been subsumed in PMKSY. Under PMKSY-AIBP, 99 projects have been prioritized amongst the 149 ongoing projects under AIBP. Out of these priority projects, 44 projects have been reported as completed as on March, 2020.

Total Irrigation Potential targeted under 99 Priority Project is 75.87 Lakh Ha. During 2015-16, 2016-17, 2017-18, 2018-19 and 2019-20; a Central Assistance of Rs. 2327.81 Cr, Rs. 3310.22 Cr, Rs. 3578.40 Cr, Rs. 2816.69 Cr and Rs. 1738.78 Cr respectively has been released under PMKSY-AIBP. An Irrigation Potential of 4.6313 Lakh Ha, 4.9860 Lakh Ha, 3.858 Lakh Ha, 3.437 Lakh Ha and 3.2046 Lakh Ha have been created during 2015-16, 2016-17, 2017-18, 2018.-19 and 2019-20 respectively with a cumulative Irrigation Potential of 59.78 Lakh Ha till March, 2020. Under PMKSY-AIBP, a dedicated funding mechanism i.e. Long Term Irrigation Fund (LTIF) - a special window has been created in NABARD which could be utilized by the Central and State Governments to bridge the requirement of funds for completion of the 99 priority projects including CAD works for Central Assistance as well as State share component.

Out of these 99 projects (and 7 phases), physical works of AIBP component of 44 projects has been reported to be completed. On 28.01.2020, Ministry of Jal Shakti has conveyed the continuation of funding of the 99 prioritized projects under PMKSY-AIBP & CAD&WM for a period up to 31st March, 2021 or till the continuation of the scheme is approved, whichever is earlier within the scope, nature, coverage and size of the approved scheme.

2.30.2 Command Area Development (CAD) Works and Incentivisation Scheme for Bridging Irrigation Gap (ISBIG)

During the post-independence era, a large number of irrigation projects were constructed for increasing agricultural production in the country. However, during early seventies analysis of irrigation potential created and utilised revealed that there was a substantial gap between them. The Irrigation Commission made specific recommendations in its report in 1972 that systematic development of commands of irrigation projects should be taken up in order to fully utilise the irrigation potential created. Subsequently, a Committee of Ministers set up by the Ministry of Irrigation and Power analysed the issue and suggested in 1973 that a broad based Area Development Authority should be set up for every major irrigation project to undertake the work of comprehensive area development. Based on this recommendation, the Government of India initiated a Centrally Sponsored Command Area Development Programme (CADP) in December, 1974 to improve irrigation potential utilisation and optimise agricultural production from irrigated land through integrated and coordinated approach of efficient water management.

In tune with objectives of the programme a number of components such as construction of field channels and field drains, enforcement of warabandi, land levelling and shaping, realignment of field boundaries/ consolidation of holdings, introduction of suitable cropping patterns, strengthening of extension services etc. were included in the programme. Subsequently, in view of emergent needs a few more components like farmers' participation and reclamation of waterlogged areas were included in the programme with effect from 1st April, 1996 to make the programme more beneficial to the farmers.

Review of the Programme implementation during the VIII and IX Five Year Plan periods revealed that micro level distribution network for supply of water to individual holdings had been created in about 16 Mha and rotational supply of irrigation water had been enforced in about 11 Mha. A number of constraints such as unreliability of water supply at the outlet due to deficiencies in the irrigation system above the outlet, absence of link and intermediate drains to let out surplus water into main drains, non-inclusion of minor irrigation projects from non-hilly areas, low priority by the State Governments to extension and training activities, non-revision of cost norms for various activities since VIII Plan etc. were also noticed during the review. In view of these constraints the programme has been restructured for the remaining period of X Plan (2004-07) and renamed as 'Command Area Development & Water Management Programme (CAD&WM Programme)' to make it more comprehensive and beneficial to farmers. The scheme has been implemented as a State Sector Scheme during the XI Five Year Plan (2008-09 to 2011-12) and initial two years of XII Plan. During XII Plan, the CAD&WM programme has been implemented pari-passu with Accelerated Irrigation Benefits Programme (AIBP). The programme is being implemented under Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) -'Har Khet Ko Pani' from 2015-16. The ongoing CAD&WM programme has now been restricted to implementation of CAD works of 99 prioritized AIBP projects.

Initially, 60 major and medium irrigation projects were taken up under the CAD Programme, covering a Culturable Command Area (CCA) of about 15.00 Mha. At the end of FY 2015-16, there were 158 ongoing projects spread across the 29 States of the country with CCA of 16.3 Mha.

Completion of CAD works of 99 prioritised AIBP projects only are being targeted from 2016-17 onwards under Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) -'Har Khet Ko Pani'. The arrangement of funds for Central Share/ or Central Assistance (CA) has been made by taking loan from NABARD as per year-wise requirements. A dedicated Long Term Irrigation Fund (LTIF) in NABARD has been created. Accordingly, funding of Central Assistance and State share for above mentioned 99 projects along with CAD works is being made through NABARD.

Out of 99 prioritized CAD&WM projects, the State Governments have intimated that, CAD works are not required/deemed completed in 8 projects. Of the balance 91 projects, 1 Project of Rajasthan (Narmada Canal) included for Non- Structural intervention only for Central Assistance of Rs. 54.06 Cr; 87 projects in balance Culturable Command Area (CCA) of 45.08 Lakh Ha have been included under CAD&WM programme with Central Assistance (CA) of Rs. 8,300.833 Cr and targeted expenditure of Rs.18,736.476 Cr; 3 projects namely Punpun (Bihar), Karipuzha (Kerala) and Madhya Ganga (Uttar Pradesh) are yet to be included.

During 2016-17 to June, 2020 the Central Assistance amounting to Rs. 2652.912 Cr was released to 74 projects with the total reported progress of 14.18 Lakh Ha Culturable Command Area and an expenditure of Rs. 5,064.42 Cr (as reported by States).

2.30.3 Physical Achievements of Field Channels under CAD Programme

(In Th. Ha)

Sl. No.	Plan/Year	Achievements
1	**2**	**3**
1	Upto VIII Plan	13952.65
2	IX Plan	1801.99
3	X Plan	2314.09
4	XI Plan	2080.85
5	2012-13	361.04
6	2013-14	308.36
7	2014-15	178.62
8	2015-16	571.54
9	2016-17	498.50
10	XII Plan	1918.06
11	2017-18	439.61
12	2018-19	402.06
Cumulative Achievement up to 31.03.2019		**22909.31**

Source: CAD&WM Wing, D/o WR, RD & GR, M/o Jal Shakti

2.31 State-wise details of 297 Major and Medium Irrigation Projects under AIBP

Sl. No.	Name of States	No. of MMI Projects Benefitting under AIBP	No. of MMI Projects Completed under AIBP	No. of Ongoing MMI Projects under PMKSY- AIBP	Cumulative CLA/Grant Released as on 31.03.2020 (Rs. in Cr)	Ultimate Irrigation Potential Created till 31.03.2020 (Th.Ha)
1	2	3	4	5	6	7
1	Andhra Pradesh	16	8	8	1400.45	344.16
2	Assam	11	8	3	514.76	146.22
3	Bihar	9	5	2	857.02	478.87
4	Chhattisgarh	11	9	3	553.10	211.38
5	Goa	2	1	1	273.17	20.85
6	Gujarat	15	14	1	12786.71	1729.15
7	Haryana	3	2	0	90.54	115.22
8	Himachal Pradesh	4	1	0	378.89	37.51
9	Jammu & Kashmir	19	11	4	546.07	60.90
10	Jharkhand	10	3	1	2004.32	122.22
11	Karnataka	19	8	5	6942.79	849.65
12	Kerala	5	1	2	201.11	50.95
13	Madhya Pradesh	22 i/c phases of BDP, ISP & OSP total 33 Nos.	14 i/c phases of BDP, ISP & OSP total 19 Nos.	14 i/c phases of BDP, ISP & OSP total 14 Nos.	6099.43	985.08
14	Maharashtra	64	46	26	12145.01	883.80
15	Manipur	3	1	2	1572.33	37.36
16	Meghalaya	1	0	0	4.00	0.00
17	Odisha	18	12	8	5822.23	337.37
18	Punjab	7	5	2	724.45	206.25
19	Rajasthan	10	9	2	2538.53	1154.08
20	Tamil Nadu	1	1	0	20.00	0.00
21	Telengana	17	9	11	4852.61	549.33
22	Tripura	3	0	0	126.29	16.82
23	Uttra Pradesh	18	11	4	5595.91	1941.57
24	Uttrakhand	2	1	0	609.75	0.00
25	West Bengal	7	3	0	385.00	148.00
Total		**297***	**187****	**99**	**67044.48**	**10426.72**

Source: Monitoring (Central) Directorate, CWC

Note: '*' 5 projects have been deferred; '**'including 44 projects amongst 99 priority projects under PMKSY-AIBP reported completed by State Governments.

2.32 State-wise details of Ongoing 99 Priority Projects under PMKSY-AIBP

Sl. No.	Name of States	No. of Projects	CLA/Grant Released under PMKSY (Rs. in Cr)						Ultimate Irrigation Potential Created till 31.03.2020 (Th. Ha)
			2015-16	2016-17	2017-18	2018-19	2019-20	Total	
1	2	3	4	5	6	7	8	9	10
1	Andhra Pradesh	8	0.00	7.46	0.00	15.24	0.00	22.70	247.43
2	Assam	3	107.92	0.00	0.00	0.00	0.00	107.92	103.48
3	Bihar	2	41.51	0.00	46.32	37.82	11.98	137.63	18.47
4	Chhattisgarh	3	0.00	13.29	17.25	0.00	4.09	34.63	46.98
5	Goa	1	0.00	0.00	0.00	0.00	0.00	0.00	11.55
6	Gujarat	1	128.00	961.88	1410.49	1047.29	485.35	4033.01	1684.87
7	Jammu & Kashmir	4	34.31	0.00	9.57	16.92	5.88	66.68	22.04
8	Jharkhand	1	281.62	145.75	305.10	305.88	0	1038.35	107.93
9	Karnataka	5	208.16	135.47	459.52	197.00	163.42	1163.57	267.49
10	Kerala	2	0.00	0.00	0.00	0.00	0.00	0.00	29.46
11	Madhya Pradesh	14 (i/c phases of BDP, ISP & OSP total 21 Nos.)	188.21	300.15	181.28	34.34	26.45	730.43	877.18
12	Maharashtra	26	307.80	379.88	363.04	526.59	291.68	1868.99	521.47
13	Manipur	2	142.38	127.00	25.42	21.93	30.50	347.23	27.36
14	Odisha	8	173.80	457.74	464.71	119.38	90.65	1306.28	237.98
15	Punjab	2	1.05	52.42	0.00	0.00	0.00	53.47	88.25
16	Rajasthan	2	45.51	45.89	216.87	95.15	7.04	410.46	336.70
17	Telangana	11	112.50	547.62	13.24	1.99	214.04	889.39	315.67
18	Uttar Pradesh	4	555.04	135.64	65.60	397.16	407.68	1561.12	1033.81
Total		**99**	**2327.81**	**3310.19**	**3578.40**	**2816.69**	**1738.76**	**13771.85**	**5978.12**

Source: Monitoring (Central) Directorate, CWC

2.33 National Projects

Government of India approved a scheme of National Projects for implementation during XI Plan with a view to expedite completion of identified National projects for the benefit of the people. Such projects are provided Central Assistance (CA) of 90% of the cost of irrigation & drinking water component (as per original Guidelines) of the project by Government of India for their completion in a time bound manner. The proposal for continuation of Scheme of National Project in XII Plan was approved by CCEA on 12.09.2013. As per the approval, CA were 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 States and Special Category States, respectively. However, in the recently launched PMKSY, to which AIBP including National Projects has also been made a component, the proportion of CA from 2016-17 onwards has been reduced to 60% except in case of projects in Special Category States (eight North Eastern and three Himalayan States) which will continue to get 90% of the cost as Central grant.

The Government of India initially declared 14 projects as National Projects in February 2008. Later on, two projects namely Saryu Nahar Pariyojana and Polavaram Irrigation Project were included under the scheme of National Projects. Implementation of these projects is monitored by the High Powered Steering Committee constituted by Union Cabinet with Secretary, M/o Jal Shakti, D/o Water Resources, RD & GR as Chairman of the Committee.

The criteria for selection of National Projects are as under:

1. 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.

2. 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.

3. Intra State projects with additional potential of more than 2,00,000 Ha and with no dispute regarding sharing of water and where hydrology is established.

4. 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 certain conditions.

New Projects could be considered for inclusion under the scheme of National Projects on receipt of proposals in the prescribed format from the State Governments after investment clearance from Competent Authority, clearance from Expenditure Finance Committee/Project Investment Board on the recommendation there upon of the High Powered Steering Committee and approval by the Union Cabinet. 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.

2.34 List of Water Resources Projects declared as National Projects

Sl. No.	Name of the Project	State (River/Basin)	1) Irrigation Lakh (Ha) 2) Power (MW) 3) Storage (MCM)	CA Released under Scheme of National Projects (Rs. Cr)
1	2	3	4	5
1	Indira Sagar Polavaram Project	Andhra Pradesh (Godavari)	1) 4.36 Lakh Ha	12th Plan = 3364.70
			2) 960 MW	2017-18 = 2000.00
			3) 663.59 MCM of water to Vizag city for drinking and industrial purpose & diversion of 2264.80 MCM to Krishna Basin	2018-19 = 1400.00 Total = 6764.70
2	Gosikhurd Irrigation Project	Maharashtra (Wainganga/ Godavari)	1) 2.50 Lakh Ha	11th Plan = 2582.94
			2) 2.65 MW	12th Plan = 405.00
			3) 1147.14 MCM (Gross)	2017-18 = 166.59
				2018-19 = 195.81 Total = 3350.34
3	Shahpur kandi Dam Project	Punjab (Ravi)	1) 0.37 Lakh Ha	11th Plan = 26.04
			2) 206 MW	12th Plan = Nil
			3) 120.71 MCM (Gross)	2017-18 & 2018-19= Nil After 04/2019= 61.615 (sanctioned) Total = 87.655
4	Saryu Nahar Pariyojana	Uttar Pradesh (Diversion Scheme among Rivers Ghaghara, Saryu, Rapti & Bansagar/Ganga)	1) 14.04 (NP Component : 4.73)	11th Plan = Nil
			2) –	12th Plan = 1221.58
			3) Barrage	2017-8 = Nil 2018-19 = 305
				Total =1526.585
5	Teesta Barrage Project	West Bengal (Teesta)	1) 9.23 Lakh Ha (NP component: 5.27)	11th Plan = 178.20
			2) 1000 MW	12th Plan = Nil
			3) Barrage	Total = 178.20
6	Ujh Multipurpose project	J&K (Ujh/Ravi)	1) 0.32 Lakh Ha	Nil
			2) 196 MW	
			3) 925 MCM (Gross)	
7	Lakhwar Multipurpose Project	Uttarakhand (Yamuna)	1) 0.338 Lakh Ha	Nil
			2) 300 MW	
			3) 587.84 MCM (Gross)	
8	Noa-Dihing Dam Project	Arunachal Pradesh (Noa-Dihing)	1) 0.069 Lakh Ha	Nil
			2) 72 MW	
			3) 322.00 MCM (Gross)	

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2.34 List of Water Resources Projects declared as National Projects

Sl. No.	Name of the Project	State (River/Basin)	1) Irrigation Lakh (Ha) 2) Power (MW) 3) Storage (MCM)	CA Released under Scheme of National Projects (Rs. Cr)
1	2	3	4	5
9	Kulsi Dam Project	Assam (Kulsi) Tributary of Brahamputra	1) 0.395 Lakh Ha 2) 55 MW 3) 525.64 MCM (Gross)	Nil
10	Renuka Dam Project	HP (Giri/Yamuna)	1) Drinking water 2) 40 MW 3) 498.33 MCM (Live)	One time special assistance of Rs. 446.96 Cr was released in Oct, 2016
11	Kishau Multipurpose Project	HP/ Uttarakhand	1) 0.97 Lakh Ha 2) 660 MW 3) 1824 MCM (Gross)	Nil
12	Bursar HE Project	J&K (Marusudar/ Chenab/Indus)	1) 1.74 Lakh Ha 2) 800 MW 3) 616.74 MCM (Gross)	Nil
13	Ken Betwa Link Project	Madhya Pradesh & Uttar Pradesh (Ken & Betwa/ Yamuna Basin)	1) 10.62 Lakh Ha 2) 103 MW 3) 3711.55 MCM (Gross)	Nil
14	2nd Ravi Vyas Link Project	Punjab (Ravi Beas Link)	Harness water flowing across border (about 715.42 MCM in non-monsoon period)	Nil
15	Upper Siang Project	Arunachal Pradesh (Siang)	1) Indirect 2) 9750 MW 3) 1776.21 MCM (Gross) 4) Flood moderation	Nil
16	Gyspa HE Project	HP (Bhaga / Chenab/Indus)	1) 0.50 Lakh Ha 2) 300 MW 3) 912.78 MCM (Live)	Nil

Source: National Projects Directorate, CWC

2.35 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 such as World Bank, Japan International Cooperation Agency (JICA), Asian Development Bank (ADB), Asian Infrastructure Investment Bank (AIIB) etc. for the implementation of irrigation and multipurpose projects.

Department of Economic Affairs (DEA) functions as the Political and administrative focal point in India for all engagements (Loans, credits, grants, technical assistance etc.) with Multilateral Development Banks, Bilateral Agencies and International Financial Institutions and issues guidelines pertaining to project proposals for external assistance in order to streamline the processes involved and make the external funding more effective.

Being a line Ministry at Central Government level for water resources project, Ministry of Jal Shakti and its Departments/organizations assist the State Governments to fill up the resources gaps in terms of techno-economical update for rapid development of country's water resources.

External Assistance Directorate of Central Water Commission functions as a nodal Directorate for the techno-economical appraisal of such irrigation and multipurpose project proposals seeking external assistance, received from State Governments.

The important activities of Central Water Commission in Externally Aided Irrigation projects are:

1. Examining Concept Notes of proposed Externally Aided Projects (EAPs) for in-principle Consent for preparation of DPR.

2. Techno-economic Appraisal of DPR of proposed EAPs and preparation of TAC Note for putting the same before the Advisory Committee of the D/o Water Resources, RD & GR on Irrigation, Flood Control and Multipurpose Projects.

2.35.1 Status of Externally Aided Irrigation and Multipurpose Projects (EAPs) dealt in CWC during Financial Year 2019-2020

4 Concept Notes & 1 Feasibility Study Report (FSR) of externally aided irrigation and multipurpose project (having line Ministry as M/o Jal Shakti) have been appraised in CWC during 1st April, 2019 to 31st March, 2020 and the details of these 5 projects are given in the below table:

A. Concept Note/ PPR stage

A1. Concept Note/ PPR stage pertains to Ministry of Jal Shakti

Sl. No.	Name of Project	Status	Remarks
1.	Preliminary Project Report (PPR) regarding additional financing for the ongoing World Bank supported "West Bengal Accelerated Development of Minor Irrigation Project (WBADMIP)"- submitted by Government of West Bengal for World Bank Funding. Estimated Cost = Rs. 630 Cr	The revised Concept Note of the proposal has been received on 02.05.2019. The same has been examined / appraised and recommended to Ministry on 20.06.2019.	Recommended
2.	Project Proposal for "Extension Renovation and Modernization of Grand Anicut Canal System" submitted by Government of Tamil Nadu for AIIB external funding. (Estimated Cost: Rs. 2298.75 Cr)	A copy of Preliminary Project Proposal (PPR) in the format of DEA and the Detailed Project Report (DPR) for the proposal has been received on 02.09.2019.The same proposal (at price level 2014-15) was earlier accepted by the Advisory Committee during its 130th meeting held on 30.09.2019. Therefore, proposal has been recommended to submit DPR through an online platform of CWC.	PPR Recommended
3.	Project Proposal for "Jamrani Multipurpose Dam Project" submitted by Government of Uttarakhand for AIIB funding. (Estimated Cost: Rs. 2584.10 Cr)	The PPR of said project has been received for external funding on 13.09.2019. Since the DPR of the proposal has already been examined in CWC and accepted by the Advisory Committee of erstwhile M/o Water Resources, RD & GR during its 14th meeting held in Feb, 2019. Therefore, the proposal has been recommended for external funding.	PPR Recommended

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Sl. No.	Name of Project	Status	Remarks
4.	Project Proposal for "Water Security and Management Program in Meghalaya" submitted by the Government of Meghalaya for ADB funding. (Total financial of Rs. 1087 Cr)	The PPR in the format of DEA has been received from D/o Water Resources RD & GR on 21.10.2019.The same has been returned due to insufficient technical information on the proposal and requested to resubmit the proposal with requisite details as per D/o WR, RD & GR /CWC guidelines.	Returned

B. DPR/ Feasibility Study Report

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

2.36 Repair, Renovation and Restoration (RRR) of Water Bodies Scheme

In India, tanks/ponds and lakes have traditionally played an important role in conserving water for meeting various needs of the communities. Through the ages, Indian agriculture has been sustained by natural and man-made water bodies such as lakes, tanks, ponds and similar structures. A water body is a structure where rain water is accumulated or water is stored by diversion from a stream, nala or river. As per 5th Minor Irrigation Census 2013-14, there are 5.16 Lakh tanks and storages in the country as minor irrigation sources. Many of these water bodies have gone into disuse because of the development of ground water irrigation systems, inadequate maintenance, encroachments, etc.

The scheme of RRR of water bodies has multiple objectives such as reclamation of the lost irrigation potential, improvement of catchment area of the tanks, increase in storage capacity of water bodies and development of tourism and cultural activities.

A pilot scheme for "RRR of Water Bodies directly linked to Agriculture" was launched in January 2005 for implementation during the remaining period of X Plan with an outlay of Rs. 300 Cr. The scheme was sanctioned in respect of 1098 water bodies in 26 districts of 15 States. Out of these, 1085 water bodies were completed and 13 water bodies were dropped. An irrigation potential of 0.78 Lakh Ha was restored.

Keeping in view the success of the pilot scheme for RRR of water bodies and need to upscale the gains from water bodies, the Ministry of Jal Shakti (erstwhile Ministry of Water Resources, RD & GR) launched a State Sector Scheme for Repair, Renovation & Restoration (RRR) of water bodies with two components (i) one with external assistance and (ii) another with domestic support for implementation during XI Plan. Under the scheme, 3114 water bodies were completed with domestic support and 8054 water bodies were completed with external assistance. To increase the participation of all the States it was felt to frame a new scheme for RRR of Water Bodies during the XII plan as a State Sector Scheme with domestic budgetary support.

Government of India is committed to accord high priority to water conservation and its management. To this effect, Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) was launched in 2015-16 with an aim to enhance physical access of water on farm and expand cultivable area under assured irrigation, improve on farm water use efficiency, introduce sustainable water conservation practices etc. PMKSY-'Har Khet Ko Pani' (HKKP) is one of the component of PMKSY. The scheme of RRR of water bodies has become a part of PMKSY (HKKP).

Funding pattern under PMKSY:

Sl. No.	Category	Funding Pattern Central: State
1	2	3
1.	Seven North-Eastern States including Sikkim & three Hilly States (Himachal Pradesh, Jammu & Kashmir and Uttarakhand)	90 : 10

Contd…

Sl. No.	Category	Funding Pattern Central: State
2.	Project benefitting special areas i.e. undivided Koraput, Bolangir and Kalahandi (KBK) districts of Odisha, Bundelkhand region of UP and MP, Marathwada & Vidarbha region of Maharashtra, Naxal affected areas, DPAP areas, Tribal areas, Flood prone area, Desert Development Programme (DDP) area of General Category States / UTs.	60 : 40
3.	General Category States/UTs excluding the special areas.	25 : 75

There are 2219 water bodies (ongoing at start of XII plan/included thereafter) with an estimated cost of Rs. 1910.68 Cr. Under the programme, at present as reported by States so far (till June, 2020), restoration works of 1546 water bodies have been completed. Total Central Assistance released so far (till June, 2020) is Rs. 433.89 Cr.

2.37 National Water Mission and Climate Change Issue

The "National Water Mission" was formulated by the erstwhile Ministry of Water Resources, River Development and Ganga Rejuvenation (now Ministry of Jal Shakti) with main objective of "conservation of water, minimizing wastage and ensuring its more equitable distribution both across and within States through integrated water resources development and management". The Mission, duly approved by the Government, has set five goals to achieve the above objective, which are:

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

Climate Change cell was created in CWC in August, 2007 to deal with all the studies, works and reports on the subject regarding impact of climate change on water resources being referred to CWC. CWC provides inputs and assistance to NWM Secretariat in examining the research proposals related to climate change received in NWM Secretariat. M/o Jal Shakti, D/o WR has established six Chairs in Academic institutes- 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". Monitoring of Glacial lakes/Water bodies in the Himalayan Region of Indian river basin is being carried out on monthly basis from June to October. The main objective of the study is to monitor the changes in the spatial extent of the glacial lakes and water bodies greater than 50 Ha area with the area of base year 2009 using satellite data received from NRSC, Hyderabad. Monthly Monitoring Reports are sent to Central/State Government agencies and other stakeholders.

2.38 Annual and Monthly Rainfall in India

(In mm)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1901-10*	19.7	22.4	24.2	37.1	49.5	147.8	273.5	254.9	161.4	60.8	21.5	15.9	1088.7
1911-20*	20.2	25.4	32.6	36.2	64.8	186.7	268.4	247.1	165.6	78.6	36.5	12.5	1174.6
1921-30*	25.6	23.3	23.2	40.6	61.5	167.9	315.9	256.9	180.4	77.1	35.0	18.0	1225.3
1931-40*	17.8	31.8	28.3	40.6	66.4	190.5	308.1	263.4	176.9	79.3	33.1	14.4	1250.5
1941-50*	27.0	24.4	29.8	42.0	71.2	165.3	322.0	264.7	192.0	72.7	29.7	15.0	1255.7
1951-60*	23.6	16.0	28.9	33.6	66.9	162.9	307.9	271.7	183.9	98.9	24.0	11.4	1229.8
1961-70*	15.9	20.4	28.2	36.9	58.8	159.9	292.3	262.7	177.9	69.1	24.1	18.5	1164.4
1971-80*	15.3	21.9	24.1	36.6	59.2	172.3	279.6	263.2	156.5	76.9	36.4	14.2	1156.2
1981-90*	18.2	25.9	36.5	43.2	67.2	164.6	285.5	263.1	172.2	72.9	27.0	20.3	1196.5
1991-2000*	20.0	23.3	28.0	34.7	64.8	171.6	289.9	256.2	167.2	78.9	30.2	15.6	1180.1
2001	7.2	10.3	21.3	45.5	61.3	215.1	281.1	210.0	109.2	97.7	18.5	6.0	1083.3
2002	16.8	21.0	22.9	38.9	57.7	170.1	138.9	246.2	133.9	54.4	14.7	5.2	920.8
2003	7.2	42.1	33.7	35.5	38.6	164.5	305.6	247.8	179.9	92.7	10.2	16.6	1174.5
2004	26.2	10.7	11.9	50.6	74.5	167.8	241.7	252.5	123.6	88.8	16.9	6.1	1071.3
2005	40.3	46.0	42.6	38.5	50.3	146.9	340.3	192.0	200.7	96.2	27.2	11.5	1232.5
2006	17.4	11.5	34.4	30.4	80.7	151.4	298.5	302.6	175.4	52.3	32.1	12.7	1199.4
2007	2.7	35.7	34.4	33.6	50.4	201.4	295.8	259.2	215.1	55.3	15.2	16.7	1215.6
2008	22.4	19.2	37.7	32.6	45.2	208.8	250.0	264.3	165.7	50.5	25.1	10.8	1132.1
2009	11.8	13.2	15.2	26.0	56.6	86.5	283.7	191.9	140.3	70.1	53.2	10.8	959.3
2010	7.5	16.3	16.6	42.1	69.0	140.9	293.6	272.3	195.6	67.7	56.7	22.1	1200.5
2011	7.7	26.3	21.4	41.0	51.6	182.8	243.0	284.6	190.5	36.5	18.4	6.5	1110.1
2012	26.5	12.7	11.3	47.5	31.7	117.6	250.3	262.3	193.4	58.6	30.7	11.7	1054.3
2013	11.3	40.1	15.7	30.3	57.8	219.8	310.1	254.9	152.6	129.3	14.0	6.7	1242.6
2014	19.3	27.4	36.1	22.1	72.9	95.2	261.1	237.4	187.9	60.1	14.4	10.7	1044.7
2015	17.2	20.8	61.4	68.8	53.4	189.0	240.8	204.2	131.8	42.3	39.9	15.4	1085.0
2016	7.8	10.1	30.8	31.4	68.1	147.6	309.2	239.6	168.0	54.5	7.7	8.4	1083.2
2017	26.9	12.4	29.0	44.3	56.1	172.5	290.5	229.6	153.3	81.5	14.7	16.2	1127.0
2018	2.9	12.7	16.5	39.3	64.6	155.7	274.1	240.2	132.7	35.6	21.0	14.7	1020.8
2019	18.6	33.2	18.9	31.3	51.5	113.4	297.5	299.2	260.1	109.9	31.6	19.1	1284.1

Source: India Meteorological Department, Ministry of Earth Sciences

* Denotes average for the period.

2.39 Dam Rehabilitation and Improvement Project

In April 2012, Ministry of Jal Shakti initiated World Bank assisted ongoing Dam Rehabilitation and Improvement Project (DRIP) with an objective to improve safety and operational performance of selected dams, along with institutional strengthening with system wide management approach. The Scheme has provision to rehabilitate 223 dams, located in 7 States Jharkhand, Karnataka, Kerala, Madhya Pradesh, Odisha, Tamil Nadu and Uttarakhand with budget outlay of Rs.3466 Cr.

Scheme Outcome

- Physical rehabilitation of 223 dams to address various safety concerns of dams, safety of downstream people, property, environment and ecology of river
- Preparation of Emergency Action Plans (EAP) for all selected dams, 206 EAP prepared, 113 published and 42 nos. of Stakeholder Consultation Meetings conducted
- Operation and Maintenance Manuals for all DRIP dams, 127 manuals prepared
- 2 nos. of Inspection Manuals for Dam Field Engineers in post-seismic event for dams located in Uttarakhand and Jharkhand published
- De-siltation works for 3 dams (Tamil Nadu: 2, and Uttarakhand: 1) taken up

Upstream Reflective Coating at Idukki Dam

U/S Stone Pitching

Geomembrane Lining Works

Earth Slip Soil Erosion Protection Works

- Dam Health and Rehabilitation Monitoring Application (DHARMA), a web-based asset management tool developed to support the effective collection and management of dam data.

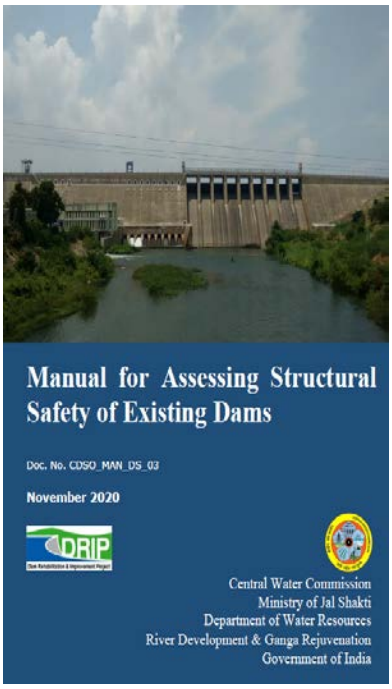
The licenses for this tool have been provided to 18 States and 3 Central Agencies. This tool has 1005 nos. of official users with stored data of 1470 nos. of large dams.

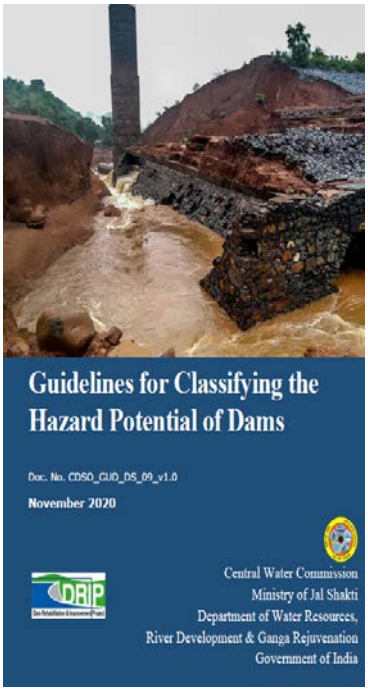
- 12 nos. of new Guidelines and Manuals published on various aspects of dam safety, 6 nos. of guidelines/manuals under finalization
- Provisions for capacity building of 9 Academic Institutions and 2 Central Agencies in addition to 10 Project Agencies
- Provision for Seismic Hazard Assessment Mapping of whole Country
- 170 nos. of training programs conducted so far, wherein about 5000 officials trained

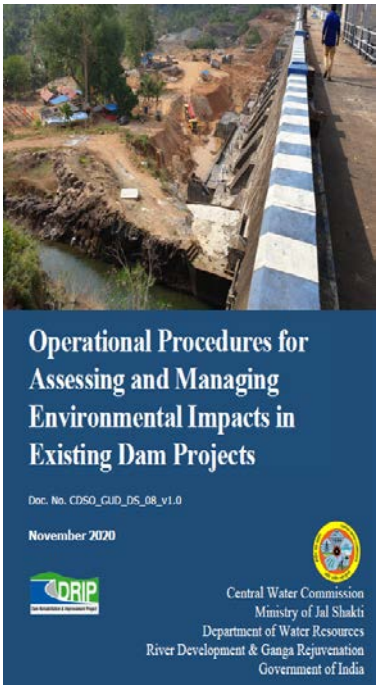
Stakeholder Consultation Meeting to disseminate Emergency Action Plan for Almatti and Narayanpur Dams of Karnataka WRD in December, 2020

International Dam Safety Conference, 2019

International and National Trainings under DRIP







Technical Publications Prepared under DRIP

Impacts

- All technical activities like safety inspections, investigations, rehabilitations, instrumentation, and risk assessment etc. and institutional set up envisaged under Dam Safety Bill; DRIP is preparing dam owners of India to achieve these objectives.

- The Scheme has been able to develop two most important technical documents (EAP, O&M manual) for all DRIP dams which will ensure safety and operational performance of selected dams; will mitigate the associated risks with dam failure through stakeholders sensitization about consequences, contribute in making more disaster resilience society.

- Capacity building of all partners will ensure availability of trained manpower to ensure safe dam operations.

- DRIP has given platform to all concerned States to take up need based de-siltation activities of reservoirs.

- DRIP will enable India to act as knowledge hub and strength in dam safety management especially for African and South East Asian Countries.

- First time in Country, academic institutions have been taken on board for long term capacity building to meet the future challenges of dam safety management.

New DRIP Phase II and Phase III

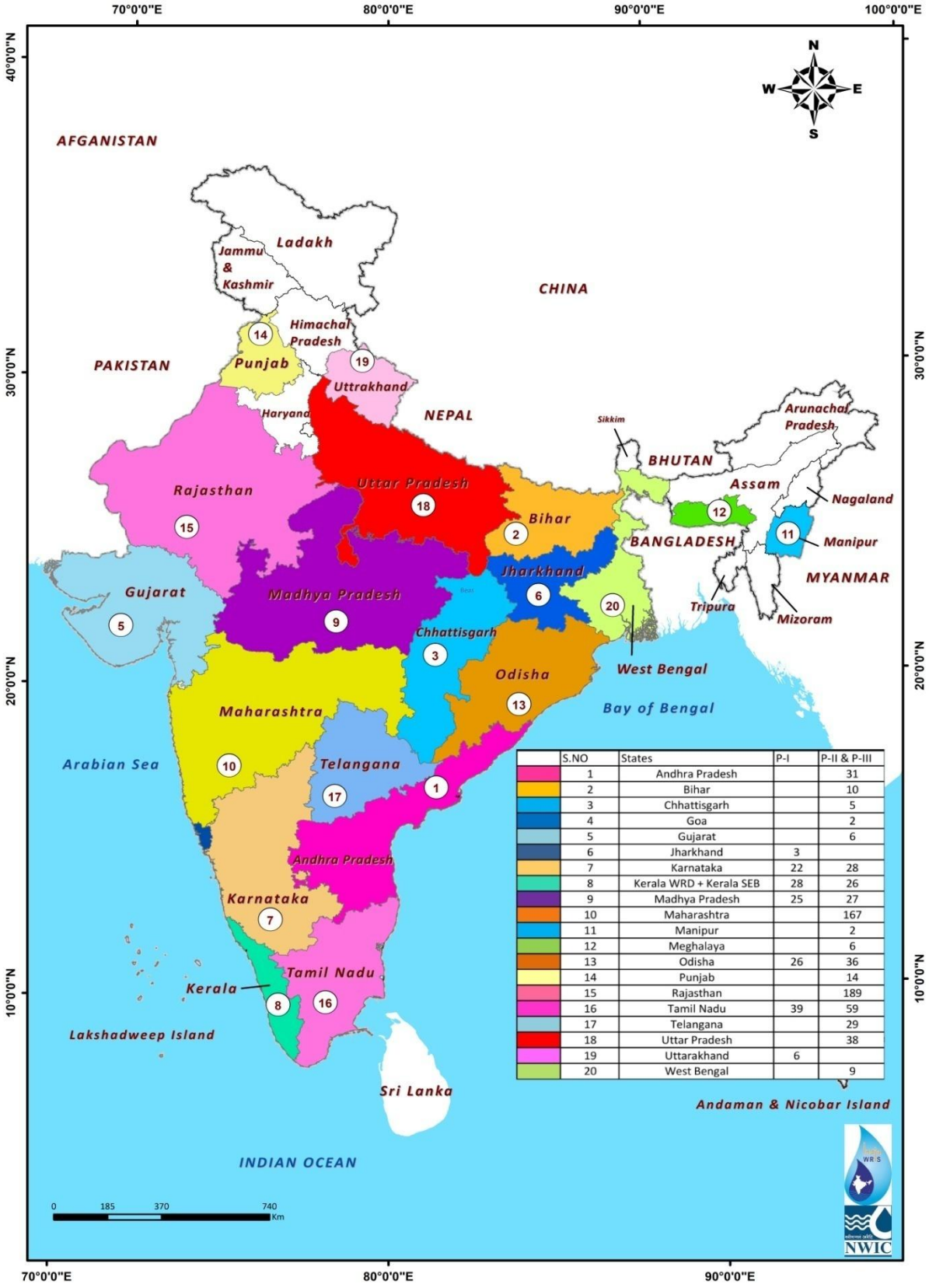
Based on the success of ongoing DRIP, the Ministry of Jal Shakti initiated activities for new DRIP by inviting proposals in year 2017 for inclusion of more number of States to include more dams facing serious health and dam safety challenges.

Proposals have been received from 19 States, and 3 Central Agencies. Scheme has provision for rehabilitation of 736 dams at an estimated cost of Rs. 10211 Cr (US$ 1.5 Billion). The Government of India and World Bank approved this Scheme in-principle.

The Scheme has four components; (i) to improve the safety and operational performance of selected existing dams and associated appurtenances in a sustainable manner, and (ii) to strengthen the dam safety institutional setup in participating States as well as at Central level, (iii) Exploration of alternative means at few of selected dams to generate the incidental revenue for sustainable operation and maintenance of dams, and (iv) Project Management.

It is a State Sector Scheme with duration of 10 years, to be implemented in two Phases i.e. Phase-II and Phase-III, each of six years duration with an overlap of two years. The Project is under Preparatory Stage, planned to be operationalized in early this year.

Map Depicting the Locations of DRIP Phase I, II and Phase III



	S.NO	States	P-I	P-II & P-III
	1	Andhra Pradesh		31
	2	Bihar		10
	3	Chhattisgarh		5
	4	Goa		2
	5	Gujarat		6
	6	Jharkhand	3	
	7	Karnataka	22	28
	8	Kerala WRD + Kerala SEB	28	26
	9	Madhya Pradesh	25	27
	10	Maharashtra		167
	11	Manipur		2
	12	Meghalaya		6
	13	Odisha	26	36
	14	Punjab		14
	15	Rajasthan		189
	16	Tamil Nadu	39	59
	17	Telangana		29
	18	Uttar Pradesh		38
	19	Uttarakhand	6	
	20	West Bengal		9

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Section-III

Navigation- Inland Water and Transport

Section-III

Navigation-Inland Water and Transport

India is endowed with a variety of navigable waterways comprising river systems, canals, back waters, creeks, and tidal inlets. However, navigation by mechanized crafts is possible only over a limited length covering about half of the reported navigable waterways. The navigable waterways are confined to a few States and location specific. The Inland Water Transport (IWT) is functionally important in regions covered by the Brahmaputra and the Ganges in the North East and Eastern parts of the country, Kerala, Goa and in the deltas of the rivers of Krishna and Godavari where IWT offers natural advantages. IWT has an important role to play in many parts of the country since it offers an economic, energy efficient, employment intensive and almost pollutant free mode of transport service. In spite of the merits of IWT, its operation is constrained by several factors like shallow water, narrow width during dry weather, siltation and bank erosion, inadequate vertical and horizontal clearances in a large number of overhead structures making navigation throughout the year a daunting task.

3.1 Waterways

Length of waterways along with its navigable length is an indicator of inland water potential of a State. Details of State-wise navigable waterways in India during 2018-19 are given in Table 3.2, which gives the total and Navigable length of Waterways reported across States. It is observed that the maximum length of waterways is in the State of Uttar Pradesh with 6,444 km followed by West Bengal with 4,741 km & Assam with 4,267 km. However, the ratio of the navigable length to the total length of the river/canal better reflects the potential for IWT. It is observed that the ratio of navigable length to the total length is about 96.88% in the State of West Bengal; by contrast, in case of Tamil Nadu the ratio of navigable length to total length is a mere 7.10%. Other States with good inland water transport prospects are Goa, Maharashtra and Kerala where waterways navigable length is 90.88%, 73.14% and 58.27% respectively of the total length of rivers/canals/lakes reported by these States. Twelve States have reported river length as well as navigable length for 166 rivers. Out of these, 118 rivers have total length of 21,477 km of which 42.7% is navigable length.

3.2 Total and Navigable Length of Waterways in different States during 2018-19

Sl. No.	States	Total Length of the Rivers/ Canals/ Lakes in State (km)	Navigable Length (km)	Percentage of Navigable Length to Total Length
1	2	3	4	5
1	Andhra Pradesh	3762.00	1160.00	30.83
2	Assam	4267.00	1938.00	45.42
3	Bihar **	3763.00	1391.00	36.97
4	Goa	274.00	249.00	90.88
5	Gujarat *	-	-	-
6	Karnataka	2902.00	1215.00	41.87

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3.2 Total and Navigable Length of Waterways in different States during 2018-19

Sl. No.	States	Total Length of the Rivers/ Canals/ Lakes in State (km)	Navigable Length (km)	Percentage of Navigable Length to Total Length
1	2	3	4	5
7	Kerala	3256.13	1897.49	58.27
8	Maharashtra	631.00	461.50	73.14
9	Odisha	1378.00	1555.00	-
10	Nagaland	-	276.00	-
11	Mizoram**	790.00	155.00	19.62
12	Tamil Nadu	197.00	14.00	7.10
13	Uttar Pradesh **	6444.00	425.00	6.60
14	West Bengal	4741.00	4593.00	96.88
Total		**32405.13**	**15329.99**	**47.31**

Source : State Governments/'Statistics of Inland Water Transport, 2018-19', Ministry of Shipping

Note: '*': Nil data reported for the year 2018-19.
'**': Pertains to 2016-17 as data was not received from these States for 2017-18 & 2018-19.

3.3 National Waterways

Criteria for declaration of National Waterways

- It should possess capability of navigation by mechanically propelled vessels of minimum 300 Tonnes (DWT) capacity (45 m x 8 m x1.2 m);
- It should have a fairway of minimum 40m wide channel with 1.4 m depth in case of rivers and minimum 30 m wide channel with 1.8 m depth in case of canals. Exception may be given in case of irrigation-cum-navigation canals based on request of the concerned State Government in order to safeguard the interest of irrigation;
- It should be a continuous stretch of minimum 50 km; the only exception to be made to waterway length is for urban conglomerations and intra-port traffic; and
- It should pass through and serve the interest of more than one States or connect a vast and prosperous hinterland and major port, or either pass through or connect a strategic region where development of navigations is considered necessary to provide logistic support for economic development or national security, or connect place not served by any other mode of transport.

To promote Inland Water Transport (IWT) in the country, the following five waterways had been declared as National Waterways till the enactment of National Waterways Act, 2016 (effective from 12.04.2016):

(a) Allahabad-Haldia stretch (1620 km) of Ganga-Bhagirathi-Hooghly River System was declared National Waterway-1 in 1982 and effective in October, 1986.

(b) Sadiya-Dhubri stretch (891 km) of the Brahmaputra River was declared National Waterways-2 in September, 1988.

(c) Kottapuram-Kollam stretch (168 km) of the West Coast Canal along with Champakara canal (14 km) and Udyogmandal canal (23 km) was declared National Waterways-3 in February, 1993 (Total 205 km).

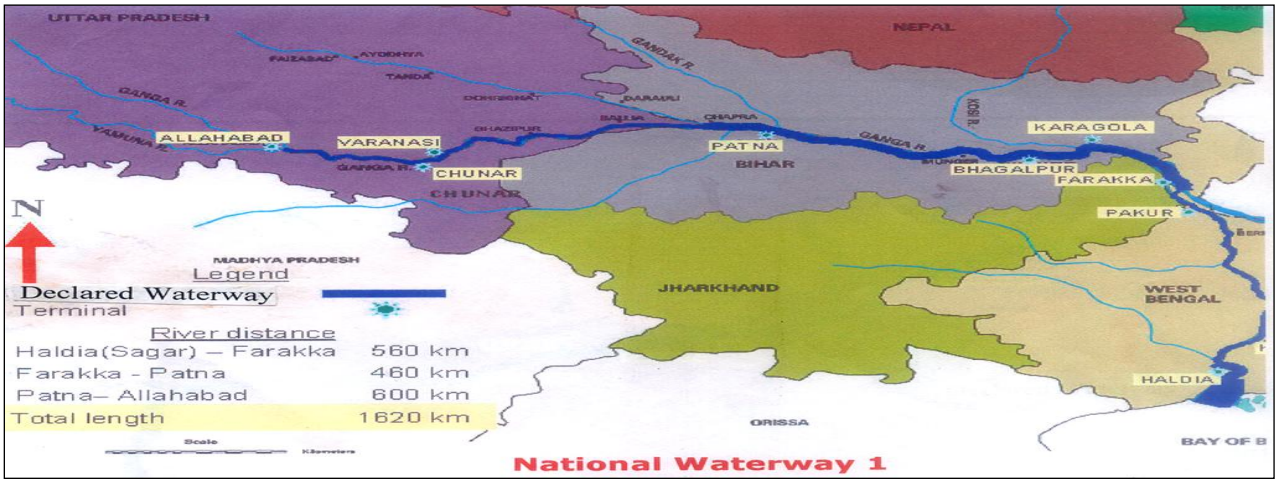
(d) Kakinada- Puducherry canals along with Godavari and Krishna Rivers (1078 km) as NW-4 in 2008 and

(e) East Coast Canal integrated with Brahmani River and Mahanadi Delta Rivers (588 km) as NW-5 in 2008.

3.3.1 National Waterways-1 (The Ganga-Bhagirathi-Hooghly)

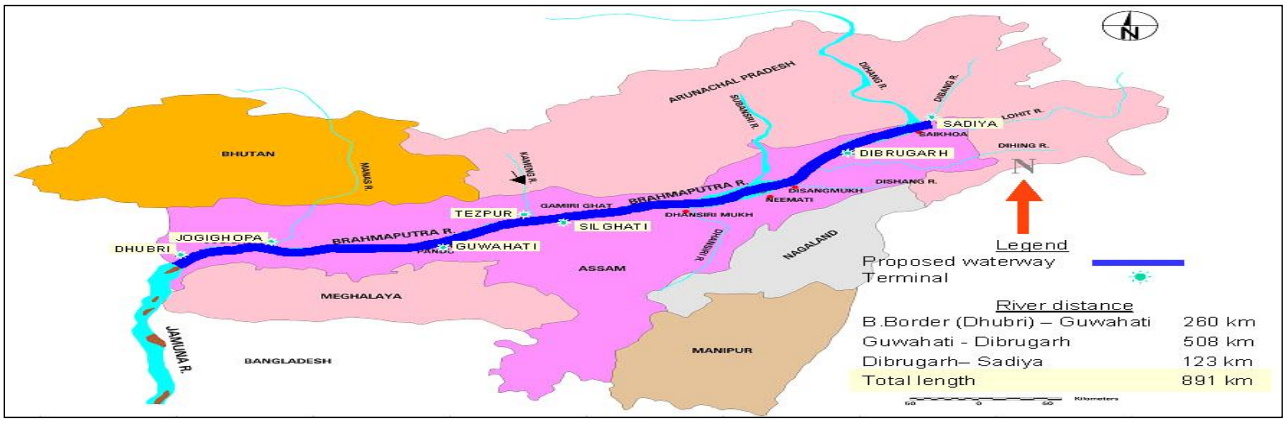
The Ganga - Bhagirathi - Hooghly River System between Haldia (Sagar) and Allahabad (1620 km) was declared as National Waterway-1 in 1986. Since then IWAI is carrying out various developmental works on the waterway for improvement of its navigability and also development and maintenance of other infrastructure such as navigation aids and terminal facilities as laid down in the IWAI Act, 1985 (82 of 1985). During 2018-19, the important works carried out for development and maintenance of fairway, navigational aids and terminal facilities on NW-1 for maintenance of the following Least Available Depth (LAD):

(a)	Haldia - Farakka stretch	(560 km)	–	2.6 m to 3.0 m
(b)	Farakka - Barh stretch	(400 km)	–	2.1 m to 2.5 m
(c)	Barh - Ghazipur stretch	(290 km)	–	1.6 m to 2.0 m
(d)	Ghazipur - Chunar/Allahabad	(370 km)	–	1.1 m to 1.5 m



3.3.2 National Waterways-2 (The Brahmaputra)

National Waterway-2 comprises of Dhubri to Sadiya of 891 km in the State of Assam. A navigable fairway of minimum 45 m width and 2.5 m Least Available Depth (LAD) was maintained in Dhubri-Pandu (255 km) and Pandu-Neamati (374 km) stretch. In Neamati-Dibrugarh stretch, 2.0 m LAD was maintained for 350 days. In Dibrugarh-Sadiya (Oriumghat) stretch, LAD of 1.5 m was maintained for 365 days.



Apart from the channel maintenance, the projects for construction of Ro-Ro terminals at Dhubri & Hatsingimari are being implemented. The floating terminals provided at 11 locations can also be shifted to any other place based on demand. Night navigation facilities provided between Dhubri and Silghat can be extended in a short period of time depending upon demand. DGPS station established at Dhubri, Jogighopa, Vishwanath Ghat and Dibrugarh providing DGPS connectivity in entire NW-2 and some portion of Protocol routes in Bangladesh.

3.3.3 National Waterway-3 (West Coast Canal)

West Coast Canal from Kottapuram to Kollam (168 km) together with Champakara canal (14 km) and Udyogmandal canal (23 km) was declared as NW-3 in 1993. The National Waterways Act, 2016 included stretch of West Coast Canal from Kottapuram to Kozhikode for a length of 160 km, thereby extending the total length of NW-3 to 365 km. IWAI is conducting channel developmental works that includes dredging for providing fairway of 2.20m LAD, channel width of 38 / 32 m, 24 hours navigational facilities and terminal facilities equipped with mechanical cargo handling equipment. IWAI has constructed eight permanent terminals at Kottapuram, Aluva, Maradu, Vaikkom, Thanneermukkom (Cherthala), Kayamkulam, Thrikkunnapuzha and Kollam. 9th terminal is under construction at Alappuzha. In addition, two terminals with Ro-Ro facilities have been constructed by IWAI at Bolghatty and Willingdon Island. NW-3 is provided with 24 hours navigational aids in the entire route. An average tonnage of 10 Lakh Tonnes of cargo moved on NW-3 per annum in the last five years. IWAI has sanctioned Rs. 38 Cr for reconstruction of lock gate at Trikkunnapzha across NW-3 for utilization of full capacity of NW-3. The NW-3 is fully navigable.

3.3.4 National Waterways - 4&5

These waterways were declared as National Waterways in November, 2008. Thereafter, Detailed Project Reports (DPRs) for development of both NWs were prepared. Subsequently, on the advice of erstwhile Planning Commission, development of commercially viable stretches through PPP mode was explored by appointing a transaction adviser (consultant) with the financial assistance of Department of Economic Affairs (DEA) and Asian Development Bank (ADB). However, both the waterways were not found to be viable for development in PPP Mode. Hence, it was decided to develop both the waterways through Gross Budgetary Support (GBS) and/or external aid through multilateral resources like ADB or World Bank.

National Waterway- 4

National Waterway 4was declared in 2008 for the length of 1,078 km comprising of the Kakinada-Puducherry stretch of canals and the Kaluvelly Tank, Bhadrachalam - Rajahmundry stretch of River Godavari and Wazirabad- Vijayawada stretch of River Krishna in Andhra Pradesh & Tamil Nadu. With the notification of the National Waterways Act 2016, the total length of NW-4 got extended to 2,890 km.

- Fairway development works in Vijayawada-Muktyala stretch of River Krishna (Part of NW-4) under Phase-I has commenced at a cost of Rs. 96 Cr including following main activities:
  - Dredging to develop and maintain fairway is in progress and to be completed in March, 2020.
  - Floating terminals (4 nos.) at Durga Ghat, Bhavani Island, Amaravati and Vedadri are at the final stage of completion.
  - Land acquisition for fixed terminals (3 nos.) at Ibrahimpatnam, Harischandrapuram and Muktryala is in progress.
  - Ro-Ro services from Ibrahimpatnam to Lingayapalem are under operation since April, 2018 by Private operators with a total cargo movement, primarily construction material, of approx. 0.45 Million Tonne till March, 2019.

National Waterway-5
(Brahmani- Kharsua- Kani River & Mahanadi Delta River System)

- NW-5, notified in 2008, consists of Brahmani, Kharsua, Kani, Dhamra, Matai & Mahanadi Delta & East Coast Canal spreading across the States of Odisha and West Bengal. (497 km in Odisha & 91 km in West Bengal).
- NW-5 will provide connectivity between Paradip/Dhamra Ports and Kalinganagar Industrial cluster (Pankapal) in Phase-I and Mahanadi Coal Field Ltd. (Talcher) in Phase-II.
- Development of NW-5 from Pankapal - Dhamra Port – Mangalgadi - Paradip Port covering 212 km with the following activities:

  a. Monthly Longitudinal Thalweg Survey for assessing depth and horizontal/vertical clearance for cross structures/bridges.

  b. Consultancy/Work has been awarded for:

  - Preparation of Detailed Project Report (DPR) followed by Front End Engineering Design (FEED) for hydrolic interventions, rectification of cross structures for navigational clearance,
  - Environmental clearance (EIA & EMP) including CRZ and Wildlife Clearance.
  - Navigational Clearance below existing power lines from Dhamra / Paradip to Pankapal on deposit basis through Government of Odisha

  Out of these five NWs, first three waterways have already been developed substantially with fairway of required depth & width, navigational aids & terminal facilities for loading/unloading of cargo & ingress/ egress of the passengers and cargo & passenger vessels are moving on these NWs.

3.3.5 Development of 106 new National Waterways

Government declared 111 (including 5 existing and 106 new) National Waterways (NWs) spread over 24 States under the National Waterways Act, 2016, which came into effect from 12th April, 2016 to promote Inland Water Transport (IWT) in the country. A list of all the NWs with their approx. length is given in table 3.3.6. Efforts initiated towards undertaking the developmental activities for providing safe fairway channel and creating infrastructures, in phased manner on the identified new National Waterways from 2016-17.

3.3.6 List of 111 National Waterways

(Government of India has declared 111 Waterways as National Waterways through National Waterways Act, 2016 enacted on 12.04.2016)

Sl. No.	National Waterway No.	Length (in km)	Details of Waterways	States
1	2	3	4	5
1	National Waterway1	1620	Ganga-Bhagirathi-Hooghly River System (Haldia - Allahabad)	Uttar Pradesh, Bihar, Jharkhand & West Bengal
2	National Waterway2	891	Brahmaputra River (Dhubri-Sadiya)	Assam
3	National Waterway3	205	West Coast Canal (Kottapuram- Kollam), Champakara and Udyog mandal Canals	Kerala
		170	West Coast Canal (Kottapuram-Kozhikode)	
4	National Waterway4	50	Kakinada Canal (Kakinada to Rajahmundry)	Andhra Pradesh, Telangana, Chhattisgarh, Karnataka, Tamil Nadu, Puducherry and Maharashtra
		171	Godavari River (Bhadrachalam to Rajahmundry)	
		139	Eluru Canal (Rajahmundry to Vijayawada)	
		157	Krishna River (Wazirabad to Vijayawada)	
		113	Commamur Canal (Vijayawada to Peddaganjam)	

Contd…

3.3.6 List of 111 National Waterways

(Government of India has declared 111 Waterways as National Waterways through National Waterways Act, 2016 enacted on 12.04.2016)

Sl. No.	National Waterway No.	Length (in km)	Details of Waterways	States
1	2	3	4	5
		316	North Buckingham Canal (Peddaganjam to Central Station of Chennai)	
		110	South Buckingham Canal (Central Station of Chennai to Marakanam)	
		22	Marakanam to Puducherry Through Kaluvelly Tank	
		1202	River Godavari (Bhadrachalam-Nashik)	
		636	River Krishna (Wazirabad - Galagali)	
5	National Waterway5	256	East Coast Canal and Matai River	Odisha and West Bengal
		265	Brahmani-Kharsua-Dhamra Rivers	
		67	Mahanadi Delta Rivers (Consisting of Hansua River, Nunanala, Gobrinala, Kharnasi River and Mahanadi River)	
6	National Waterway6	68	Aai River	Assam
7	National Waterway7	90	Ajoy (Ajay)River	West Bengal
8	National Waterway8	29	Alappuzha-Changanassery Canal	Kerala
9	National Waterway9	40	Alappuzha-Kottayam-Athirampuzha Canal	Kerala Alternate route:11.5 km
10	National Waterway10	45	Amba River	Maharashtra
11	National Waterway11	99	Arunawati - Aran River System	Maharashtra
12	National Waterway12	5.5	Asi River	Uttar Pradesh
13	National Waterway 13	11	Avm Canal	Kerala & Tamil Nadu
14	National Waterway14	48	Baitarni River	Odisha
15	National Waterway15	135	Bakreswar- Mayurakshi River System	West Bengal

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3.3.6 List of 111 National Waterways

(Government of India has declared 111 Waterways as National Waterways through National Waterways Act, 2016 enacted on 12.04.2016)

Sl. No.	National Waterway No.	Length (in km)	Details of Waterways	States
1	2	3	4	5
16	National Waterway16	121	Barak River	Assam
17	National Waterway17	189	Beas River	Himachal Pradesh & Punjab
18	National Waterway18	69	Beki River	Assam
19	National Waterway19	67	Betwa River	Uttar Pradesh
20	National Waterway20	95	Bhavani River	Tamil Nadu
21	National Waterway21	139	Bheema River	Karnataka & Telangana
22	National Waterway22	156	Birupa-Badi Genguti-Brahmani River System	Odisha
23	National Waterway23	56	Budha Balanga	Odisha
24	National Waterway24	61	Chambal River	Uttar Pradesh
25	National Waterway25	33	Chapora River	Goa
26	National Waterway26	51	Chenab River	Jammu & Kashmir
27	National Waterway27	17	Cumberjua River	Goa
28	National Waterway28	45	Dabhol Creek -Vashishti River System	Maharashtra
29	National Waterway29	132	Damodar River	West Bengal
30	National Waterway30	109	Dehing River	Assam
31	National Waterway31	114	Dhansiri/Chathe	Assam
32	National Waterway32	63	Dikhu River	Assam
33	National Waterway33	61	Doyans River	Assam
34	National Waterway34	137	Dvc Canal	West Bengal
35	National Waterway35	108	Dwarekeswar River	West Bengal
36	National Waterway36	119	Dwarka River	West Bengal
37	National Waterway37	296	Gandak River	Bihar & Uttar Pradesh
38	National Waterway38	62	Gangadhar River	Assam & West Bengal
39	National Waterway39	49	Ganol River	Meghalaya
40	National Waterway40	354	Ghaghra River	Bihar & Uttar Pradesh

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3.3.6 List of 111 National Waterways

(Government of India has declared 111 Waterways as National Waterways through National Waterways Act, 2016 enacted on 12.04.2016)

Sl. No.	National Waterway No.	Length (in km)	Details of Waterways	States
1	2	3	4	5
41	National Waterway41	112	Ghataprabha River	Karnataka
42	National Waterway42	514	Gomti River	Uttar Pradesh
43	National Waterway43	10	Gurupur River	Karnataka
44	National Waterway44	63	Ichamati River	West Bengal
45	National Waterway45	650	Indira Gandhi Canal	Punjab, Haryana &Rajasthan
46	National Waterway46	35	Indus River	Jammu & Kashmir
47	National Waterway47	131	Jalangi River	West Bengal
48	National Waterway48	590	Jawai-Luni-Rann of Kutch River System	Gujarat & Rajasthan
49	National Waterway49	110	Jhelum River	Jammu & Kashmir
50	National Waterway50	43	Jinjiram River	Assam & Meghalaya
51	National Waterway51	23	Kabini River	Karnataka
52	National Waterway52	53	Kali River	Karnataka
53	National Waterway53	145	Kalyan-Thane-Mumbai Waterway, Vasai Creek & Ulhas River System	Maharashtra
54	National Waterway54	86	Karamnasa River	Bihar & Uttar Pradesh
55	National Waterway55	311	Kaveri -Kollidam River System	Tamil Nadu
56	National Waterway56	22	Kherkai River	Jharkhand
57	National Waterway57	50	Kopili River	Assam
58	National Waterway58	236	Kosi River	Bihar
59	National Waterway59	19	Kottayam-Vaikom Canal	Kerala
60	National Waterway60	80	Kumari River	West Bengal
61	National Waterway61	28	Kynshi River	Meghalaya
62	National Waterway62	86	Lohit River	Assam & Arunachal Pradesh
63	National Waterway63	336	Luni River	Rajasthan
64	National Waterway64	426	Mahanadi River	Odisha
65	National Waterway65	80	Mahananda River	West Bengal

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3.3.6 List of 111 National Waterways

(Government of India has declared 111 Waterways as National Waterways through National Waterways Act, 2016 enacted on 12.04.2016)

Sl. No.	National Waterway No.	Length (in km)	Details of Waterways	States
1	2	3	4	5
66	National Waterway66	247	Mahi River	Gujarat
67	National Waterway67	94	Malaprabha River	Karnataka
68	National Waterway68	41	Mandovi River	Goa
69	National Waterway69	5	Manimutharu River	Tamil Nadu
70	National Waterway70	245	Manjara River	Maharashtra & Telangana
71	National Waterway71	27	Mapusa/Moide River	Goa
72	National Waterway72	59	Nag River	Maharashtra
73	National Waterway73	226	Narmada River	Maharashtra & Gujarat
74	National Waterway74	79	Netravathi River	Karnataka
75	National Waterway75	142	Palar River	Tamil Nadu
76	National Waterway76	23	Panchagangavali (Panchagangoli) River	Karnataka
77	National Waterway77	20	Pazhyar River	Tamil Nadu
78	National Waterway78	262	Penganaga-Wardha River System	Maharashtra & Telangana
79	National Waterway79	28	Pennar River	Andhra Pradesh
80	National Waterway80	126	Ponniyar River	Tamil Nadu
81	National Waterway81	35	Punpun River	Bihar
82	National Waterway82	58	Puthimari River	Assam
83	National Waterway83	31	Rajpuri Creek	Maharashtra
84	National Waterway84	44	Ravi River	Jammu & Kashmir, Himachal Pradesh & Punjab
85	National Waterway85	31	Revadanda Creek-Kundalika River System	Maharashtra
86	National Waterway86	72	Rupnarayan River	West Bengal
87	National Waterway87	210	Sabarmati River	Gujarat
88	National Waterway88	14	Sal River	Goa
89	National Waterway89	45	Savitri River (Bankot Creek)	Maharashtra
90	National Waterway90	29	Sharavati River	Karnataka

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3.3.6 List of 111 National Waterways

(Government of India has declared 111 Waterways as National Waterways through National Waterways Act, 2016 enacted on 12.04.2016)

Sl. No.	National Waterway No.	Length (in km)	Details of Waterways	States
1	2	3	4	5
91	National Waterway91	52	Shastri River- Jaigad Creek System	Maharashtra
92	National Waterway92	26	Silabati River	West Bengal
93	National Waterway93	63	Simsan River	Meghalaya
94	National Waterway94	141	Sone River	Bihar
95	National Waterway95	106	Subansiri River	Assam
96	National Waterway96	311	Subarnrekha River	Jharkhand, West Bengal & Odisha
97	National Waterway97	172	Sundarbans Waterway	West Bengal
		56	Bidya River	West Bengal
		15	Chhota Kalagachi (Chhoto Kalergachi) River	West Bengal
		7	Gomar River	West Bengal
		16	Haribhanga River	West Bengal
		37	Hogla (Hogal) - Pathankhali River	West Bengal
		9	Kalindi (Kalandi) River	West Bengal
		22	Katakhali River	West Bengal
		99	Matla River	West Bengal
		28	Muri Ganga (Baratala) River	West Bengal
		53	Raimangal River	West Bengal
		14	Sahibkhali (Sahebkhali) River	West Bengal
		37	Saptamukhi River	West Bengal
		64	Thakurran River	West Bengal
98	National Waterway98	377	Sutlej River	Himachal Pradesh & Punjab
99	National Waterway99	62	Tamaraparani River	Tamil Nadu
100	National Waterway100	436	Tapi River	Maharashtra & Gujarat
101	National Waterway101	42	Tizu-Zungki Rivers	Nagaland
102	National Waterway102	87	Tlwang (Dhaleswar River)	Assam & Mizoram

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3.3.6 List of 111 National Waterways

(Government of India has declared 111 Waterways as National Waterways through National Waterways Act, 2016 enacted on 12.04.2016)

Sl. No.	National Waterway No.	Length (in km)	Details of Waterways	States
1	2	3	4	5
103	National Waterway103	73	Tons River	Uttar Pradesh
104	National Waterway104	232	Tungabhadra River	Karnataka, Telangana & Andhra Pradesh
105	National Waterway105	15	Udayavara River	Karnataka
106	National Waterway106	20	Umngot (Dawki) River	Meghalaya
107	National Waterway107	46	Vaigai River	Tamil Nadu
108	National Waterway108	53	Varuna River	Uttar Pradesh
109	National Waterway109	166	Wainganga-Pranahita River System	Maharashtra & Telangana
110	National Waterway110	1080	Yamuna River	Delhi, Haryana & Uttar Pradesh
111	National Waterway111	50	Zuari River	Goa
Total Length		**20162.5**		

Source: 'Statistics of Inland Water Transport, 2018-19', Ministry of Shipping

3.3.7 Status of 106 new National Waterways

I. Based on the outcome of techno-economic feasibility and Detailed Project Reports (DPRs) prepared for 106 new NWs, technical interventions have been planned for safe navigation and shipping on technically viable NWs. As per the DPRs completed so far for the new NWs, 36 NWs have been found to be technically viable and development activities have been initiated on 10 most viable NWs as detailed below:

II. 10 Waterways which are considered the most viable and where development activities have been initiated in Phase I are:

1. River Barak (NW-16),
2. River Gandak (NW-37),
3. Sundarbans (Protocol Route) Waterways (NW-97),
4. Cumberjua River (NW-27),
5. Mandovi River (NW-68),
6. Zuari River (NW-111),
7. Alappuzha-Kottayam-Athirampuzha Canal (NW-9) and
8. Rupnarayan River (West Bengal) (NW-86)
9. River Ghagra (NW-40) and
10. River Koshi (NW-58)

3.4 Inland Water Transport (IWT)

Inland Water Transport (IWT): A Historical Perspective

The commercial history of India gives a glorious account of growth of navigation on inland waterways. The location of a large number of towns on waterways, which were also centers of trade and commerce, much before railways, indicate the value of this mode in the past.

The era of mechanical propulsion in India started in 1823 when the first propelled craft-Diana-weighing 89 Tonnes, sailed with passengers from Kulpi road to Calcutta, a distance of 80 km on the Hooghly. In 1834, a regular monthly steamer service was established between Calcutta and stations upstream on the Ganga for carrying the East India Company's officials and stores. In 1842, a regular fortnightly service grew up between Calcutta and Agra on the River Yamuna. By 1863, a regular steam service commenced between Calcutta and Assam. A network of steamer services soon developed extending as far as Garh-Mukteshwar on the River Ganga in Uttar Pradesh, about 645 km from Allahabad, and Ayodhya on the River Ghagra, about 325 km at its confluence with the Ganga.

In the 19th century navigation by power crafts and country boats played a dominant role in development of trade and commerce along river banks and catchment areas of the navigable river and canal system. Bulk of traffic was, however, carried in country boats plying from Delhi and Nepal border to Assam. At its peak in 1876-77 country boat traffic registered at Calcutta were about 180,000 cargo boats, at Hooghly 124,000 cargo boats, and at Patna about 62,000 cargo boats.

The advent of railways and extension of its network marked a turning point for water-transport in India. To start with, construction of main railway lines gave a spurt to river traffic as the two modes supplemented each other, with waterways providing feeder service to railways. This complementarily between IWT and railways was, however, short-lived. The decline of navigation started by about 1860. By that time extension of East Indian Railways had begun to make itself felt. With an increase in rail network new centers of economic activity away from waterways developed. Gradually, IWT lost its superiority.

3.4.1 Policy Initiatives and Milestones

Before 1950, there was no proper institutional set up for the development of IWT. A beginning was made during the First Plan when the Ganga-Brahmaputra Water Transport Board was set up as a Joint Venture of the Central Government and State Governments of Uttar Pradesh, Bihar, West Bengal and Assam. Its objective was to coordinate the efforts of the participating Governments in developing water transport on the Ganga and Brahmaputra Systems. Subsequently, the Government of India established the Inland Water Transport Directorate in the then Ministry of Shipping and Transport in 1965. In March, 1967, the Ganga-Brahmaputra Water Transport Board was merged with the IWT Directorate. Also, Central Inland Water Transport Corporation Ltd. (CIWTC) was set up at Kolkata in 1967 after taking over the assets and liabilities of the erstwhile River Steam Navigation Company Ltd.

In pursuance of the recommendations of the National Transport Policy Committee (NTPC), the Inland Waterways Authority of India (IWAI) was set up on October 27, 1986 by an Act of Parliament in 1985 for development, maintenance and regulation of National Waterways for

shipping and navigation in the country. Three basic IWT related infrastructure for development of waterways are:

(a) Fairway or navigational channel with desired width and depth
(b) Terminals for berthing of vessels, loading/unloading of cargo and for providing interface with road and rail; and
(c) Navigational aid for safe navigation.

The Ministry of Shipping is entrusted with the overall responsibility of development of inland water transport in the country. Besides, assistance is being provided to States by the Central Government under Centrally Sponsored Schemes to develop waterways, terminals, navigational aids and undertake survey and studies related to IWT. The assistance under this scheme used to be up to 50% by way of loan on reimbursement basis. However, the pattern of assistance was revised in 2002-03 to 100% in the form of grant under the scheme to the North Eastern States, (including Sikkim) and 90% grant to other States for the development of Inland Water Transport. An Inland Vessel Building Subsidy Scheme was also in place since April, 2002 up to 31st March 2007. Under this scheme, subsidy up to 30% cost of Inland Vessel built in India for operation on National Waterways (NWs), Sundarbans and Indo-Bangladesh protocol routes could be availed. With a view to attract private sector participation in IWT a number of promotional measures and fiscal incentives have been provided. IWAI Act was amended in September, 2001 to facilitate promotion of Joint Venture by IWAI; equity participation of Government/IWAI has been limited to a ceiling of 40% for BOT project; Tax exemptions similar to National Highways notified for IWT and customs duty concessions for specified IWT equipments were notified in 2002.

3.4.2 Inland Waterways Authority of India (IWAI)

The Inland Waterways Authority of India (IWAI), set up on 27th October 1986 under the Inland Waterways Authority of India Act, 1985, is entrusted with the regulation and development of Inland Waterways for the purpose of inland shipping and navigation. It's important functions are:

a) Carry out surveys and investigations for the development, maintenance and better utilization of the National Waterways (NWs) and the appurtenant land for shipping and navigation by:

- Providing infrastructural facilities, conservancy & river training works,
- Controlling activities of dumping / removal of bed material,
- Removing / altering any obstruction / impediment,
- Regulating traffic and structure across / under NWs,
- Disseminating navigational meteorological information,
- Coordinating with other modes of transport, providing pilotage and
- Entering into joint ventures concerning inland shipping by equity participation.

b) The Authority may also:

- Advises Central Government on IWT matters,
- Study the transport requirement in relation to other modes,
- Conduct Hydrographic Surveys & publish river charts,
- Assist State Governments for development of IWT,
- Develop & provide consultancy services,

- Conduct research for craft design, mechanization of country crafts, techniques of towage, landing & terminal facilities, port installations & survey techniques,
- Classification of Inland Waterways,
- Technical training of IWT personnel within & outside country.

c) The Authority will exercise the above functions with the prior approval of the Central Government.

3.4.3 Composition Cargo Movement on Major Waterways

The composition of cargo movement on National Waterways-1, 2 and 3 during 2016-17, 2017-18 and 2018-19 are given in the Table below. It is observed that Building Material (constituting Fly ash, stone chips etc.) constituted 61% trafficon NW-1 followed by Mix Commodities (38.8%).The total cargo traffic on NW-2 was 28.72 Lakh Tonnes during 2018-19 as against 31.62 Lakh Tonnes during 2017-18 showing a decrease of 9.17%. For NW-3, the cargo composition of freight traffic shows that Chemicals (92.1%) and Fertilizers (7.0%) were the major commodities moved through NW-3during 2018-19. These commodities are primarily raw materials of Fertilizers and Chemicals Travancore Limited (FACT) from Cochin port to FACT factory jetty on NW-3 traversing a distance of about 20 km.

Composition of Cargo Moved on Major Waterways

(In Tonnes)

Sl. No.	Name of the Commodity	National Waterways-1			National Waterways-2			National Waterways-3		
		2016-17	2017-18	2018-19	2016-17	2017-18$	2018-19	2016-17	2017-18	2018-19
1	2	3	4	5	6	7	8	9	10	11
1	Building Material	2704742 (60.0)	3568909 (65.1)	4478790 (61.0)	-	-	-	-	-	-
2	Chemicals	-	-	-	-	-	-	195809 (19.0)	323501 (75.6)	387002 (92.1)
3	Fertilizers	726260 (16.1)	0 (0.0)	0 (0.0)	-	-	-	224903 (21.8)	57998 (13.6)	29403 (7.0)
4	Food items	137730 (3.1)	38340 (0.7)	260 (Neg.)	-	-	-	-	-	-
5	Miscellaneous	59478 (1.3)	2816 (0.1)	5323 (0.1)	2590754 (100.0)	3162151 (100.0)	2871817 (100.0)	-	-	-
6	Mix	0 (0.0)	1694196 (30.9)	2854087 (38.8)	-	-	-	608670 (58.9)	42860 (10.0)	247 (0.1)
7	Ore/Minerals	16761 (0.4)	0 (0.0)	0 (0.0)	-	-	-	-	-	-

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Composition of Cargo Moved on Major Waterways

(In Tonnes)

Sl. No.	Name of the Commodity	National Waterways-1			National Waterways-2			National Waterways-3		
		2016-17	2017-18	2018-19	2016-17	2017-18$	2018-19	2016-17	2017-18	2018-19
1	2	3	4	5	6	7	8	9	10	11
8	POL/POL products	162520 (3.6)	0 (0.0)	0 (0.0)	-	-	-	3457 (0.3)	3630 (0.8)	3630 (0.9)
9	Coal	668740 (14.8)	160262 (2.9)	924 (Neg.)	-	-	-	-	-	-
10	Iron Steel	29146 (0.6)	14839 (0.3)	9946 (0.1)	-	-	-	-	-	-
Total		**4505377 (100.0)**	**5479362 (100.0)**	**7349330 (100.0)**	**2590754 (100.0)**	**3162151 (100.0)**	**2871817 (100.0)**	**1032839 (100.0)**	**427989 (100.0)**	**420312 (100.0)**

Source: Inland Waterways Authority of India for National Waterways/'Statistics of Inland Water Transport, 2018-19', Ministry of Shipping

Note: Figure within brackets indicate percentage to the total; NA- Not Applicable

Mix - Food Items, Iron Steel & Building Material (Flyash, FO, HF) etc.; Neg. - negligible;

Miscellaneous - Machinery, Steam Turbine, ODC Cargo, Harbour Crane and Turbine & Generator etc.;

$: Revised information has been furnished by IWAI in respect of unorganized sector operated on NW-II during 2017-18

3.4.4 Cargo Movement on National Waterways

Table given below, provides a snap view of cargo moved on the three National Waterways, Waterways of Goa, Maharashtra, Gujarat & Sundarbans which carry most of the cargo traffic on India's Inland Waterways. The total cargo movement on India's Waterways comprising the four National Waterways and Waterways in the State of Goa, Maharashtra, Gujarat & Sundarbans was 673.11 Lakh Tonnes in 2018-19 as against 500.88 Lakhs Tonnes in 2017-18, reflecting an increase of 34.4%. In terms of tonnage, Goa, Maharashtra, Gujarat & Sundarbans accounted for 5.6%, 30.3%, 42.8% and 4.8 % respectively of the total cargo volume in 2018-19 and 16.5% being accounted by the 4 National Waterways.

In terms of Tonne km (movement of one Tonne of cargo over a distance of one km) there was an increase of 14.8% in 2018-19 over 2017-18. On an average, cargo carried on Indian Waterways is 70 km (Tonne km/ Cargo moved). Goa, Maharashtra, Gujarat & Sundarbans Waterways, though accounted 83.5% of the total cargo movement on inland waterways across India, in terms of Tonne km their share was 37.4% only. In case of Goa and Maharashtra, high volume of cargo movement was carried over relatively short average distances of about 50 km and 29.27 km respectively leading to their intensive use. However, in the three National Waterways, although the volume of Cargo traffic was relatively much small (15.77%), the average distance is 278.66 km. In case of National Waterway-1 (Ganga- Bhagirathi-Hooghly) the average distance over which Cargo moved was relatively much longer at 394.66 km. In case of National Waterway-2 (The Brahmaputra) and National Waterway-3 (Champakara Canal, Udyogmandal Canal and West Coast Canal) the

distance traversed by Cargo was on an average of 19.53 km and 21.02 km respectively in 2018-19.

Cargo Movement on National Waterways

Sl. No.	Details of Waterway	Cargo Moved (Lakh Tonnes)			Tonne km (in Lakh)		
		2016-17	2017-18	2018-19	2016-17	2017-18	2018-19
1	2	3	4	5	6	7	8
1	National Waterway No. 1	45.05 (10.8)	54.79 (10.9)	73.49 (10.91)	24598 (64.2)	27773 (67.3)	29003.84 (61.2)
2	National Waterway No. 2	25.91 (6.2)	31.62$ (6.3)	28.72 (4.3)	503 (1.3)	614.69 (1.5)	561.00 (1.2)
3	National Waterway No. 3	10.33 (2.5)	4.28 (0.9)	4.20 (0.6)	109 (0.3)	81.14 (0.2)	88.30 (0.2)
4	National Waterway No. 4 (Kakinada-Puducherry stretch)*	-	-	4.50 (0.7)	-	-	10.00 (0.02)
Sub Total NWs		**81.29 (19.6)**	**90.69 (18.1)**	**110.91 (16.5)**	**25210 (65.8)**	**28468.83 (68.9)**	**29663.14 (62.6)**
5	Goa Waterways	157.68 (38.0)	111.62 (22.3)	37.72 (5.6)	7884 (20.6)	5581.06 (13.5)	1886.4 (4.0)
6	Maharashtra Waterways	176.43 (42.5)	183.37 (36.6)	203.98 (30.3)	5214 (13.6)	5520 (13.4)	5972 (12.6)
7	Gujarat Waterways (from October, 2017)	-	115.20 (23.0)	288.20 (42.8)	-	1728 (4.2)	4300 (9.1)
8	Sundarban Waterways#	-	-	32.3 (4.8)	-	-	5600 (11.8)
Grand Total		**415.40 (100.0)**	**500.88 (100.0)**	**673.11 (100.0)**	**38308 (100.0)**	**41297.89 (100.0)**	**47421.54 (100.0)**

Source: Inland Waterways Authority of India for National Waterways, Gujarat Waterways, Sundarban Waterways, Goa Waterways and Maharashtra Waterways/ Statistics of Inland Water Transport, 2018-19', Ministry of Shipping

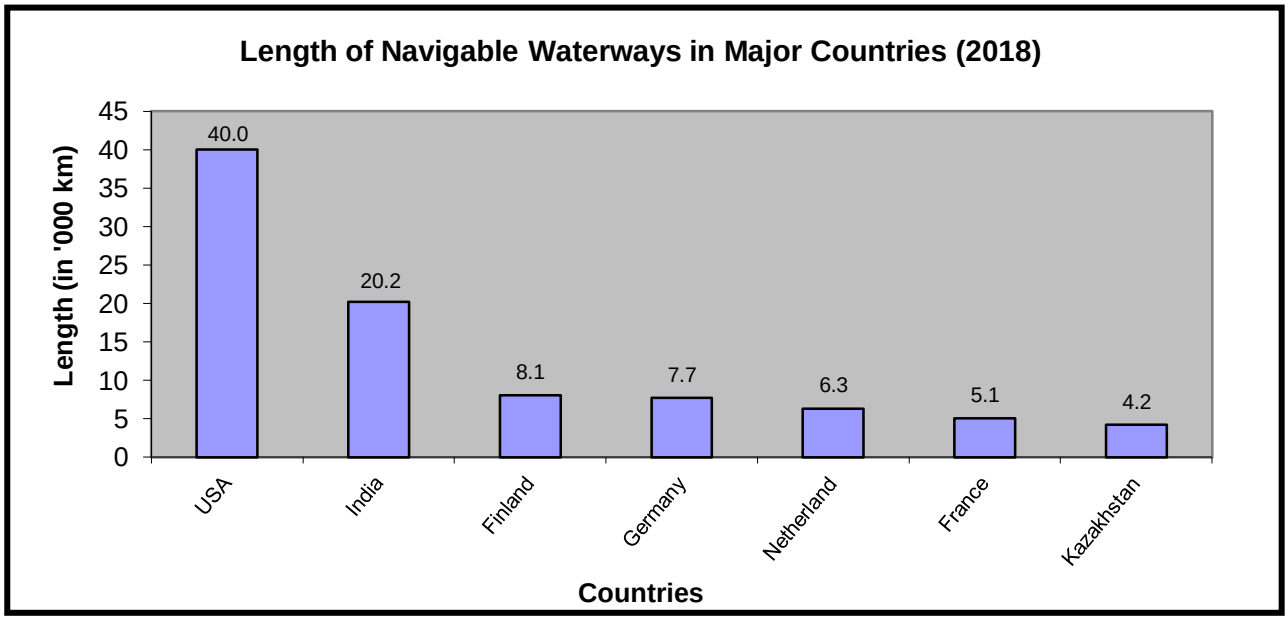
Note: Data for Goa Waterways include the data received from Ports Department, Government of Goa and the data received from the Mormugao Port Trust (MPT);

Data for Maharashtra Waterways received from Maharashtra Maritime Board (M.M.B). Revised information for 2016-17 to 2018-19 is provided by Maharashtra Maritime Board;

Cargo handled in Kolkata-Bangladesh-Kolkata route is included in the traffic on National Waterway No. 1. The route is a link between NW-1 & NW-2 through Bangladesh; Figure within brackets indicates percentage to the total; '$' Revised information has been furnished by IWAI in respect of unorganized sector operated on NW-2 during 2017-18; '*' NW-4 comprising of Kakinada-Puducherry stretch of canals Kaluvelly Tank, Bhadrachalam- Rajahmundry stretch of River Godavari and Wazirabad-Vijayawada stretch of Krishna in Andhra Pradesh and Tamil Nadu

3.5 Inland Waterways in Selected Countries

The maximum length of Navigable Inland Waterways in Europe and North America belongs to USA with 40,000 km followed by India with 20,163 km; Finland with 8,132 km; Germany with 7,675 km; Netherland with 6,256 km; France with 5,065 km and Kazakhstan with 4,151 km in the year 2018.



3.6 Infrastructure Facilities on National Waterways 1, 2 & 3

1. **National Waterway-1:** River Ganga-Bhagirathi-Hooghly River System from Haldia to Allahabad, 1620 km:

A. Fairway

- **Existing:** 2.5 to 3.0 m Least Available Depth (LAD) in Haldia – Farakka (560 km), 2.5 m in Farakka-Barh (396 km) & 2 m in Barh-Ghazipur (294 km), 1.5 m in Ghazipur-Varanasi (133 km) and 1.2 m in Varanasi-Allahabad (237 km), Departmental dredgers (11), Survey vessels (12).
- A World Bank assisted project (called Jal Marg Vikas- JMVP) is under implementation which is aimed to improve navigation infrastructure in Haldia-Varanasi (1390 km) of NW- 1.
- **Planned/ under implementation:** 3 m LAD in Haldia- Farakka (560 km), 2.5 m in Farakk-Patna (460 km), 2 m in Patna- Varanasi (363 km), 1.5 m LAD in Varanasi - Allahabad (237 km).

B. Terminals

(i) Fixed

- **Existing:** GR Jetty (Kolkata), Pakur, Farakka, Sahibganj, Patna (Low level and high level) and Varanasi.
- **Planned/ under implementation:** Under JMVP, Multimodal Terminal at Halida, 5 pairs of Ro-Ro terminals and intermodal terminals at Kalughat (Saran, Bihar) and Ghazipur (UP).

(ii) Floating (20 nos.)

- **Existing:** Haldia-1, Haldia-2, Kolkata (BISN, Botanical Garden),Shantipur, Swaroopganj,

Katwa, Hazardwari, Downstream Farakka, Upstream Farakka, Rajmahal, Sahibganj, Bateshwarsthan, Bhagalpur, Munger, Semaria, Buxar, Ghazipur, Varanasi & Allahabad.

C. Navigational Aids

(i) Existing

- Day navigation aids in entire waterway;
- 24 hrs Navigational aids between Diamond harbor and Ballia (1030 km);
- DGPS station setup at Swaroopganj, Bhagalpur and Patna providing DGPS connectivity between Sagar and Buxar (1195 km);
- River Information System (RIS) between Haldia-Farakka (Ph-I) and Farakka-Patna (Ph-II) completed and in operation.

(ii) Planned

- Night navigation facility can be extended beyond Ballia on demand.
- DGPS station at Varanasi.
- The 3rd Phase of RIS between Patna-Varanasi is in progress and will be commissioned shortly.

2. National Waterway-2: River Brahmaputra from Dhubri to Sadiya, 891 km:

A. Fairway: 2.5 m LAD in Dhubri-Neamati (630 km) 2.0 m LAD in Neamati-Dibrugarh (138 km), 1.5 m in Dibrugarh – Sadiya (123 km), Departmental dredgers (4) and survey launches (6).

B. Terminals

(i) Fixed

- **Existing:**

1. Low and high level jetties at Pandu with BG link.
2. IWT cum Ro – Ro terminal at Dhubri (Assam).

(ii) Floating

- **Existing (11 nos.):** Hatsingimari, Jogighopa, Pandu, Tezpur, Silghat, Vishwanath ghat, Neamati, Bogibeel, Sengajan, Dibrugarh and Orium ghat.
- Planned/ under implementation: Floating terminals can be provided at any location on demand.

C. Navigational Aids

- **Existing:** Day navigation aids in entire waterway,
- 24 hrs Navigational aids between Dhubri and Silghat (440 km),

3. National Waterway-3: West Coast Canal from Kottapuram to Kollam along with Champakara & Udyogmandal Canal was declared as NW-3, having total length of 205 km. IWAI is implementing the Waterway developmental activities such as, development of fairway channel, construction of cargo terminals and provision of 24 hours navigation aids in entire stretch of NW-3.

A. Fairway

- **Existing:** NW-3 is provided with channel of 2.00 m LAD and 32/38 m bottom width except 2.20 km sections spread over 2 locations, where LAD of 2.00 m has been achieved for single lane navigation channel. The channel dredging for 1.50 km requiring 0.75 Lakh cum dredging including widening near Chavara is under progress through a contract with scheduled completion in May, 2019.
- IWAI have owned 1 no. Cutter Suction Dredger (CSD) and 1 no. Amphibian dredger along with one Survey Launch in NW-3. In addition, one no. CSD and one backhoe dredger are also deployed for dredging/ widening work near Chavara by the Contractor.
- Departmental dredger CSD Champakara is mobilized to Ashtamudi Kayal for maintenance dredging.
- Planned / under implementation:
  - Dredging / widening of narrow section of waterway (1.50 km) along with the bank protection (0.75 km) is now in progress through a contract agency.
  - Construction of navigation lock at Trikkunnapuzha at a cost of Rs. 38 Cr has been sanctioned and work entrusted to irrigation department, Government of Kerala with the target of completion of 18 months.
  - Maintenance dredging at Kayamkulam for 45,000 cum is awarded to a contract agency and work is ongoing.

B. Terminals

- **Existing:** IWAI has already constructed 9 no. permanent terminals on NW.3 viz., Kottapuram, Aluva, Maradu, Vaikkom, Thanneermukkom, Alappuzha, Trikkunnapuzha, Kayamkulam and Kollam. In addition, there are 2 nos. terminals viz., Bolghatty & Willingdon island has also been developed in Cochin Port Trust limit for container traffic through Ro-Ro / Lo-Lo service.
- 8 nos. of Cranes and 8 nos. of Forklifts are available for cargo handling at terminals.
- **Planned/ under implementation:** One more terminal is under construction at Alappuzha through CPWD & same will be ready after completion of residual works.

C. Navigational Aids

- **Existing:** 24 hours navigational aid in entire stretch of NW-3 is provided for round the clock navigation. In addition, permanent Beacon post with lights also provided safe navigation in NW-3.

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Section-IV

Land Use Statistics

Section-IV
Land Use Statistics

In India, on the basis of nine-fold land-use classification, the land use statistics is available for roughly 306 Mha of land out of the 329 Mha of the total geographic area which accounts for 93% of the total land. Land is an environmental asset that outlines the space in which all the natural processes and human/economic activities are occurring. With growing population and changing industrial profile of economies and consequently, the country's socio-economic priorities drive changes in land use. Land-use change has broad lines of impact with a potential for influencing economic growth, quality of life, management of environmental resources, and national food supply.

Land is required for both agriculture and non-agricultural purposes, including establishment of industries, housing, roads, parks, railway lines etc. Further, due to the rapid industrialization and population growth, land resources are under pressure from physical, human and global causes such as soil erosion, desertification, pollution, food shortage, land conflict, water shortage and climate change. In addition, the urbanization of land has measurable impact on the quantity and quality of water resources.

4.1 Year-wise Net Sown Area, Net Irrigated Area and Net Un-Irrigated Area

(In Th. Ha)

Sl. No.	Year	Net Sown Area	Net Irrigated Area	Net Un-Irrigated Area
1	2	3	4	5
1	1950-51	118746	20853	97893
2	1960-61	133199	24661	108538
3	1970-71	140863	31103	109760
4	1980-81	140288	38720	101568
5	1990-91	142870	48024	94846
6	2000-01	141336	55205	86131
7	2010-11 (p)	141563	63665	77898
8	2011-12 (p)	140980	65707	75273
9	2012-13 (p)	139934	66287	73647
10	2013-14 (p)	141426	68117	73309
11	2014-15 (p)	140128	68384	71744
12	2015-16 (p)	139506	67300	72206

Source: 'Land Use Statistics at A Glance-2020', Directorate of Economics & Statistics, Department of Agriculture, Cooperation & Farmers Welfare
(p): Provisional

4.2 Year-wise Gross Sown Area, Gross Irrigated Area and Gross Un-Irrigated Area

(In Th. Ha)

Sl. No.	Year	Gross Sown Area	Gross Irrigated Area	Gross Un-Irrigated Area
1	2	3	4	5
1	1950-51	131893	22563	109330
2	1960-61	152772	27980	124792
3	1970-71	165791	38195	127596
4	1980-81	172630	49775	122855
5	1990-91	185742	63204	122538
6	2000-01	185340	76187	109153
7	2010-11 (p)	197683	88940	108743
8	2011-12 (p)	195796	91786	104010
9	2012-13 (p)	194219	92244	101975
10	2013-14 (p)	200951	95759	105192
11	2014-15 (p)	198378	96754	101624
12	2015-16 (p)	197054	96622	100432

Source: 'Land Use Statistics at A Glance-2020', Directorate of Economics & Statistics, Department of Agriculture, Cooperation & Farmers Welfare
(p): Provisional

4.3 Total Cultivable Area, Net Sown Area and Gross Sown Area

(In Th. Ha)

Sl. No.	Year	Total Cultivable Land	Net Sown Area	Irrigation Use (%)	Gross Sown Area	Cropping Intensity (%)
1	2	3	4	5=(4/3)*100	6	7=(6/4)*100
1	1950-51	129425	118746	92	131893	111
2	1960-61	144838	133199	92	152772	115
3	1970-71	151461	140863	93	165791	118
4	1980-81	155114	140288	90	172630	123
5	1990-91	156710	142870	91	185742	130
6	2000-01	156113	141336	91	185340	131
7	2010-11 (p)	182010	141563	78	197683	140
8	2011-12 (p)	181955	140980	77	195796	139
9	2012-13 (p)	182086	139934	77	194219	139
10	2013-14 (p)	181849	141426	78	200951	142
11	2014-15 (p)	181829	140128	77	198378	142
12	2015-16 (p)	181603	139506	77	197054	141

Source: 'Land Use Statistics at A Glance-2020', Directorate of Economics & Statistics, Department of Agriculture, Cooperation & Farmers Welfare
(p): Provisional

4.4 Agriculture Land by use in India

(In Mha)

Sl. No.	Classification	2010-11	2011-12	2012-13	2013-14	2014-15 (p)	2015-16 (p)
1	2	3	4	5	6	7	8
I	**Geographical Area for Land Utilisation Statistics**	**328.73**	**328.73**	**328.73**	**328.73**	**328.73**	**328.73**
II	**Reporting Area for Land Utilisation Statistics (1 to 5)**	**307.48**	**307.39**	**307.49**	**307.80**	**307.78**	**307.75**
1.	Forest	71.59	71.60	71.57	71.83	71.76	71.87
2.	Not available for Cultivation (A+B)	43.58	43.53	43.58	43.85	43.93	44.02
(A)	Area under non-agricultural uses	26.40	26.31	26.50	26.91	26.94	27.08
(B)	Barren & Un-culturable Land	17.18	17.22	17.07	16.94	16.99	16.94
3.	Other uncultivated land excluding fallow land (A+B+C)	26.15	26.11	26.08	25.84	25.78	25.64
(A)	Permanent Pasture & other Grazing Land	10.30	10.31	10.26	10.26	10.26	10.26
(B)	Land under misc. tree crops & groves (not included in net sown area)	3.20	3.16	3.18	3.19	3.10	3.09
(C)	Culturable Waste Land	12.65	12.64	12.64	12.39	12.42	12.29
4.	Fallow Lands (A+B)	24.60	25.18	26.33	24.85	26.18	26.72
(A)	Fallow Lands other than Current Fallows	10.32	10.67	11.04	10.69	11.09	11.31
(B)	Current Fallows	14.28	14.51	15.29	14.16	15.09	15.41
5.	Net Sown Area (6-7)	141.56	140.98	139.93	141.43	140.13	139.51
6.	Total Cropped Area (Gross Cropped Area)	197.68	195.80	194.22	200.95	198.38	197.05
7.	Area Sown more than once	56.12	54.82	54.29	59.53	58.25	57.55
8.	Cropping Intensity*	139.64	138.88	138.79	142.09	141.57	141.25
III	**Net Irrigated Area**	**63.67**	**65.71**	**66.29**	**68.12**	**68.38**	**67.30**
IV	**Gross Irrigated Area**	**88.94**	**91.79**	**92.24**	**95.76**	**96.75**	**96.62**

Source: 'Pocket Book of Agricultural Statistics-2019', Directorate of Economics & Statistics, Department of Agriculture, Cooperation & Farmers Welfare

'*': Cropping Intensity is percentage of the gross cropped area to the net sown area.

(p): Provisional

4.5 Productivity of Food Grain

Sl. No.	Year	Area (Mha)	Production (Million Tonne)	Yield (Tonne/Hectare)	Area Under Irrigation (%)
1	2	3	4	5	6
1	1950-51	97.32	50.82	0.52	18.10
2	1980-81	126.67	129.59	1.02	29.66
3	1990-91	127.84	176.39	1.38	35.07
4	2000-01	121.05	196.81	1.63	43.70
5	2006-07	123.71	217.28	1.76	47.18
6	2007-08	124.07	230.78	1.86	47.28
7	2008-09	122.83	234.47	1.91	48.47
8	2009-10	121.33	218.11	1.80	47.84
9	2010-11	126.67	244.49	1.93	48.06
10	2011-12	124.75	259.29	2.08	49.82
11	2012-13	120.78	257.13	2.13	51.30
12	2013-14	125.05	265.05	2.12	51.92
13	2014-15	124.30	252.03	2.03	53.06
14	2015-16	123.22	251.54	2.04	52.62
15	2016-17	129.23	275.11	2.13	-
16	2017-18	127.52	285.01	2.24	-
17	2018-19*	123.94	284.95	2.30	-

Source: 'Pocket Book of Agricultural Statistics-2019', Directorate of Economics & Statistics, Department of Agriculture, Cooperation & Farmers Welfare

'*' 4th Advanced Estimates

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Section-V

Hydro-Electric

Section-V
Hydro-Electric

Hydro-Electric forms an integral part of overall development of water resources of the river basin. The hydro schemes also form part of the complex integrated power generation system with diverse power generation resources. In the planning of hydro development and deciding on installed capacity etc, these two inter-connections viz. with the water resources developments of the river basin and with the power system are to be kept in view.

In the overall basin context, the impact of operation of upstream projects, constraints imposed by the downstream projects, irrigation diversions downstream, flood moderation etc. are to be considered. Further, with progressive development of consumptive water use and new water resources based development projects in the river basin; water availability would undergo considerable changes over the life of the plant. These are some of the important aspects which have to be considered while planning hydro electric/multipurpose projects.

India has total identified hydropower potential of about 1,48,701 MW out of which 1,45,320 MW of hydropower potential is in stations with installed capacity over 25 MW. During 2019-2020, the expected Hydel generation was 1,55,769.12 GWh which was about 11.26% of total electricity generation.

5.1 Electricity Generation & Consumption

Sl. No.	Year	Hydel Generation (GWh)	% of Hydel to Total Generation	Electricity Consumed in Agriculture (GWh)	% of Agriculture to Total Consumption
1	2	3	4	5	6
1	2012-13	113720.29	11.79	147461.92	20.80
2	2013-14	134847.53	13.13	152744.33	20.31
3	2014-15	129243.69	11.57	168913.46	20.75
4	2015-16	121376.65	10.40	173185.37	20.06
5	2016-17	122377.56	9.91	191150.89	20.91
6	2017-18	126122.70	9.68	199246.85	20.47
7	2018-19	134893.62	9.83	213409.18	20.57
8	2019-20 (p)	155769.12	11.26	Data under compilation	Data under compilation

Source: CEA, M/o Power
(p): Provisional

5.2 Plan-wise Growth of Electricity Sector in India- (Utilities)

Sl. No.	As on / during Financial Year ending with	Installed Capacity (MW)	No. of Villages Electrified	Length of T & D Lines (Ckt.kms.)(#)	Per Capita Consumption ($) (KWh)
1	2	3	4	5	6
1	31.12.1947	1362	N.A.	23238	16
2	31.12.1950	1713	3061	29271	18
3	31.03.1956 (End of the 1st Plan)	2886	7294	85427	31
4	31.03.1961 (End of the 2nd Plan)	4653	21754	157887	46
5	31.03.1966 (End of the 3rd Plan)	9027	45148	541704	74
6	31.03.1969 (End of the 3 Annual Plans)	12957	73739	886301	98
7	31.03.1974 (End of the 4th Plan)	16664	156729	1546097	126
8	31.03.1979 (End of the 5th Plan)	26680	232770	2145919	172
9	31.03.1980 (End of the 2 Annual Plans)	28448	249799	2351609	172
10	31.03.1985 (End of the 6th Plan)	42585	370332	3211956	229
11	31.03.1990 (End of the 7th Plan)	63636	470838	4407501	329
12	31.03.1992 (End of the 2 Annual Plans)	69065	487170	4574200	348
13	31.03.1997 (End of the 8th Plan)	85795	498836	5141413	465
14	31.03.2002 (End of the 9th Plan)	105046	512153	6030148	559
15	31.03.2007 (End of 10th Plan)	132329	482864	6939894	672
16	31.03.2012 (End of 11th Plan)	199877	556633	8726092	884
17	31.03.2017 (End of 12th Plan)	326833	592972	10686448	1122
18	31.03.2018	344002	597121	11958511	1149
19	31.03.2019	356100	597464	12436852@	1181

Source: CEA, M/o Power

'N.A.': Not Available; '@': Estimated; Rural electrification is based on revised definition of village electrification and 2011 Census.

'$': Per Capita Consumption = Gross Electrical Energy availability/Mid-year Population

'#': Includes 440 Volts Distribution Lines.

Ckt. kms: Circuit Kilometer

5.3 Status of Hydro-Electric Potential Development- Region and State-wise as on 30.09.2020 (In terms of Installed Capacity-above 25 MW)

Region/State	Identified Capacity as per Reassessment Study		Capacity in Operation		Capacity Under Construction		Capacity in Operation + Under Construction		Capacity yet to be taken up under Construction	
	Total (MW)	Above 25 MW	(MW)	%	(MW)	(%)	(MW)	(%)	(MW)	%
1	2	3	4	5	6	7	8	9	10	11
NORTHERN										
Jammu & Kashmir	11769	11497	3360.00	29.23	2559.50	22.26	5919.50	51.49	5577.50	48.51
Ladakh	2377	2046	89.00	4.35	0.00	0.00	89.00	4.35	1957.00	95.65
Himachal Pradesh	18820	18540	9809.00	52.91	2125.00	11.46	11934.00	64.37	6606.00	35.63
Punjab	971	971	1096.30	100.00	206.00	21.22	1302.30	100.00	0.00	0.00
Haryana[#]	64	64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rajasthan[##]	496	483	411.00	85.09	0.00	0.00	411.00	100.00	0.00	0.00
Uttarakhand	18175	17998	3756.40	20.87	1490.00	8.28	5246.40	29.15	12751.70	70.85
Uttar Pradesh*	723	664	501.60	75.54	0.00	0.00	501.60	75.54	162.40	24.46
Sub Total (NR)	**53395**	**52263**	**19023.30**	**36.40**	**6380.50**	**12.21**	**25403.80**	**48.61**	**26859.20**	**51.39**
WESTERN										
Madhya Pradesh	2243	1970	2235.00	100	400.00	20.30	2635.00	100	0.00	0.00
Chhattisgarh	2242	2202	120.00	5.45	0.00	0.00	120.00	5.45	2082.00	94.55
Gujarat[###]	619	590	550.00	100	0.00	0.00	550.00	100	0.00	0.00
Maharashtra	3769	3314	2647.00	79.87	0.00	0.00	2647.00	79.87	667.00	20.13
Goa	55	55	0.00	0.00	0.00	0.00	0.00	0.00	55.00	100.00
Sub Total (WR)	**8928**	**8131**	**5552.00**	**68.28**	**400.00**	**4.92**	**5952.00**	**73.20**	**2179.00**	**26.80**

Contd…

5.3 Status of Hydro-Electric Potential Development- Region and State-wise as on 30.09.2020 (In terms of Installed Capacity-above 25 MW)

Region/State	Identified Capacity as per Reassessment Study		Capacity in Operation		Capacity Under Construction		Capacity in Operation + Under Construction		Capacity yet to be taken up under Construction	
	Total (MW)	Above 25 MW	(MW)	%	(MW)	(%)	(MW)	(%)	(MW)	%
1	2	3	4	5	6	7	8	9	10	11
SOUTHERN										
Andhra Pradesh	2366	2341	1610.00	68.77	960.00	41.01	2570.00	100.00	0.00	0.00
Telangana	2058	2019	800.00	39.62	0.00	0.00	800.00	39.62	1219.00	60.38
Karnataka	6602	6459	3644.20	56.42	0.00	0.00	3644.20	56.42	2814.80	43.58
Kerala	3514	3378	1856.50	54.96	100.00	2.96	1956.50	57.92	1421.50	42.08
Tamil Nadu	1918	1693	1778.20	100.00	0.00	0.00	1778.20	100.00	0.00	0.00
Sub Total (SR)	**16458**	**15890**	**9688.90**	**60.97**	**1060.00**	**6.67**	**10748.90**	67.65	**5141.10**	**32.35**
EASTERN										
Jharkhand	753	582	170.00	29.21	0.00	0.00	170.00	29.21	412.00	70.79
Bihar####	70	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Odisha	2999	2981	2142.30	71.86	0.00	0.00	2142.30	71.86	838.80	28.14
West Bengal	2841	2829	441.20	15.60	120.00	4.24	561.20	19.84	2267.80	80.16
Sikkim	4286	4248	2169.00	51.06	1133.00	26.67	3302.00	77.73	946.00	22.27
Sub Total (ER)	**10949**	**10680**	**4922.50**	**46.09**	**1253.00**	**11.73**	**6175.50**	**57.82**	**4504.60**	**42.18**
NORTH EASTERN										
Meghalaya	2394	2298	322.00	14.01	0.00	0.00	322.00	14.01	1976.00	85.99
Tripura	15	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Manipur	1784	1761	105.00	5.96	0.00	0.00	105.00	5.96	1656.00	94.04
Assam	680	650	350.00	53.85	0.00	0.00	350.00	53.85	300.00	46.15
Nagaland	1574	1452	75.00	5.17	0.00	0.00	75.00	5.17	1377.00	94.83

Contd...

5.3 Status of Hydro-Electric Potential Development- Region and State-wise as on 30.09.2020 (In terms of Installed Capacity-above 25 MW)

Region/State	Identified Capacity as per Reassessment Study		Capacity in Operation		Capacity Under Construction		Capacity in Operation + Under Construction		Capacity yet to be taken up under Construction	
	Total (MW)	Above 25 MW	(MW)	%	(MW)	(%)	(MW)	(%)	(MW)	%
1	2	3	4	5	6	7	8	9	10	11
Arunachal Pradesh	50328	50064	815.00	1.63	2300.00	4.59	3115.00	6.22	46949.00	93.78
Mizoram	2196	2131	60.00	2.82	0.00	0.00	60.00	2.82	2071.00	97.18
Sub Total (NER)	**58971**	**58356**	**1727.00**	**2.96**	**2300.00**	**3.94**	**4027.00**	**6.90**	**54329.00**	**93.10**
ALL INDIA	**148701**	**145320**	**40913.60**	**28.15**	**11393.50**	**7.84**	**52307.10**	**35.99**	**93012.90**	**64.01**

Source: Hydro Electric Potential Reassessment Division, Central Electricity Authority, M/o Power

Note: 1. Does not include pumped storage projects.

2. In some States the total of the capacity developed and balance capacity is different from the potential assessed. This is due to change in capacity of the projects, addition/deletion of the projects and merger of two projects into one etc.

'*': Eastern Yamuna Canal Project (35 MW) has been developed in 2 stages each having Installed Capacity below 25 MW

'#': Western Yamuna Canal Project (64 MW) has been developed in 4 stages each having Installed Capacity below 25 MW

'##': Two projects namely Mahi Bajaj Sagar I & II were identified for I.C. of 97 MW has been developed with I.C of 140 MW. Gandhi Sagar (115 MW) Project was identified in Rajasthan but has been developed in Madhya Pradesh with same capacity.

'###': Two projects namely Ukai Dam and Sardar Sarovar were identified for an I.C. of 590 MW. However, as per actual, the I.C. is 550 MW.

'####': Identified Project namely East Gandak Canal has been developed with installed capacity below 25 MW.

3. In addition to above 9 PSS (4785.6 MW) are under operation, 3 PSS (1580 MW) are under construction and 1 PSS (1000 MW) is concurred by CEA, 1PSS (1200 MW) is under examination in CEA, 8 PSS (7530 MW) are under S&I and 1 PSS of I.C. 660 MW is under Held-up list.

5.4 Status of Hydro-Electric Potential Development-Basin-wise as on 30.09.2020 (In terms of Installed Capacity- above 25 MW)

Basin	Identified Capacity as per Reassessment Study		Capacity under Operation		Capacity under Construction		Capacity under operation + under Construction		Capacity yet to be taken up under Construction	
	Total	Above 25 MW	(MW)	(%)	(MW)	(%)	(MW)	(%)	(MW)	(%)
1	2	3	4	5	6	7	8	9	10	11
Indus	33832	33028	14294.30	43.28	4735.50	14.34	19029.80	57.62	13998.20	42.38
Ganga	20711	20252	5317.20	26.26	1645.00	8.12	6962.20	34.38	13289.60	65.62
Central Indian Rivers	4152	3868	3147.50	81.37	400.00	10.34	3547.50	91.71	320.50	8.29
West Flowing Rivers	9430	8997	5631.70	62.60	100.00	1.11	5731.70	63.71	3265.30	36.29
East Flowing Rivers	14511	13775	8249.00	59.88	960.00	6.97	9209.00	66.85	4566.10	33.15
Brahmaputra Basin	66065	65400	4274.00	6.54	3553.00	5.43	7827.00	11.97	57573.00	88.03
All India	**148701**	**145320**	**40913.60**	**28.15**	**11393.50**	**7.84**	**52307.10**	**35.99**	**93012.90**	**64.01**

Source: Hydro Electric Potential Reassessment Division, Central Electricity Authority, M/o Power

Note:

1. Does not include pumped storage projects.
2. In some States the total of the capacity developed and balance capacity is different from the potential assessed. This is due to change in capacity of the projects, addition/deletion of the projects and merger of two projects into one etc.
3. In addition to above 9 PSS (4785.6 MW) are under operation, 3 PSS (1580 MW) are under construction and 1 PSS (1000 MW) is Concurred by the CEA, 1 PSS (1200 MW) is under examination in CEA and 8 PSS (7530 MW) are under S&I and 1 PSS of I.C. 660 MW is under Held-up list.

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Section-VI

Flood Management

Section-VI
Flood Management

Floods are recurrent phenomena in India. Due to different climatic and rainfall patterns in different regions, it has been experienced that, while some parts are suffering from devastating floods, another part is suffering drought at the same time. With the increase in population and development activity, there has been a tendency to occupy the floodplains, which has resulted in damage of a more serious nature over the years. Often, because of the varying rainfall distribution, areas which are not traditionally prone to floods also experience severe inundation. Flooding is caused by the inadequate capacity within the banks of the rivers to contain the high flows brought down from the upper catchments due to heavy rainfall. Flood management refers to all the methods used to reduce or prevent the detrimental effects of flood waters.

6.1 Flood Management Programme (FMP)

'Flood Management Programme (FMP)' is a State sector scheme amounting to Rs. 8,000 Cr under Central Plan proposed by M/o Jal Shakti, D/o Water Resources, RD & GR was approved by the Government of India during XI Plan (November, 2007). The continuation of flood management programme has been approved by the Government of India during XII Plan with an outlay of Rs 10,000 Cr and revised guidelines issued during October, 2013.

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

6.1.1 River Management Activities & Works related to Border Areas (RMBA) Component:

This started as a Central Sector Scheme with an outlay of Rs. 820 Cr in XI plan for taking up non-structural measures such as Hydrological Observation and Flood Forecasting works on common border rivers, payment to neighbouring countries (China) for supplying HO data on common rivers, investigation of WR projects in neighbouring countries, activities of GFCC and Pancheswar Development Authority (PDA) was funded through this scheme. In addition to above activities, 100% Central Assistance was also provided for taking up structural measures such as Anti Erosion/Flood Management schemes on rivers on international borders and Union Territories. The scheme with an outlay of Rs. 740 Cr was also continued during XII Plan. A Central Assistance (as Grant-in-Aid) of Rs. 563.61 Cr was released during XI & XII Plan (XI plan-Rs. 340.41 Cr and XII Plan-Rs. 223.2 Cr).

6.1.2 Flood Management and Border Areas Programme (FMBAP)

A comprehensive scheme titled 'Flood Management and Border Areas Programme (FMBAP)' with an outlay of Rs. 3342.00 Cr (FMP-Rs. 2642 Cr & RMBA-Rs. 700 Cr) for period 2017-2020 with merged components from the existing Flood Management Programme (FMP) and River Management Activities & Works related to Border Areas (RMBA) schemes during XII Five Year Plan has been approved by the Union Cabinet on 7th March, 2019 and aims at completion of the on-going projects already approved under FMP.

A total 522 schemes costing Rs. 13238.37 Cr were approved during XI (420 projects costing Rs. 7857.08 Cr) Plan and XII (102 projects costing Rs. 5381.29 Cr) Plan. Out of these schemes, 414 schemes have been completed; 64 schemes foreclosed and shifted and 44 schemes are ongoing.

Releases under the FMP as well as RMBA is as under:

(Rs. In Cr)

Releases under FMP and RMBA since XI Plan									
Sl. No.	**Component**	**XI Plan**	**XII Plan**	**Total during (XI+XII)**	**FY: 2017-18**	**FY: 2018-19**	**FY: 2019-20**	**Total during 2017-20**	**Total Funds Released**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	FMP	3566.00	1307.07	4873.07	562.67	428.20	546.09	1536.96	6410.03
2	RMBA (Grant-in-Aid)	340.41	223.20	563.61	159.25	256.48	69.61	485.34	1048.94
Total		**3906.41**	**1530.27**	**5436.7**	**721.92**	**684.68**	**615.70**	**2022.30**	**7458.97**

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

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 nomination basis. The details and status of these studies are given below:

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

6.3 Physical Achievements of Flood Management Works till March, 2017

Sl. No	Name of States/UTs	Area Benefited (Mha)	Length of embank-ments (km)	Length of Drainage Channel (km)	Village raised/ Protected (Nos.)	Town/Vill. Protection Works (Nos.)	Raised Platforms (Nos.)
1	2	3	4	5	6	7	8
States							
1	Andhra Pradesh	1.31	2230	13569	23	72	0
2	Arunachal Pradesh	0.1	65.23	16.92	17	30	0
3	Assam	2.11	4473.82	874.97	1100	911	0
4	Bihar	3.692	3759.91	365	0	204	58
5	Chhattisgarh	0	0	0	0	0	0
6	Delhi	0.078	83	453	0	0	0
7	Goa	0.003	23.19	32.77	0	2	0
8	Gujarat	0.483	104.12	271	30	805	0
9	Haryana	2	1144	4385	98	448	7
10	Himachal Pradesh	0.018	159.16	11	82	0	0
11	Jammu & Kashmir	0.217	560.681	324	1301	22	0
12	Jharkhand	0.001	14	0	5	2	0
13	Karnataka	0.005	73.515	10	0	0	0
14	Kerala	0.346	205.744	82.19	6	4	0
15	Madhya Pradesh	0.004	26	0	0	37	0
16	Maharashtra	0.001	44.5	110	0	0	0
17	Manipur	0.132	577	166	512	38	0
18	Meghalaya	0.015	112	0	10	8	0
19	Mizoram	0	0	0	0	38	0
20	Nagaland	0.632	10.519	0	0	8	0
21	Odisha	0.63	7137.75	650	14	29	0
22	Punjab	3.19	1370	6622	0	3	0
23	Rajasthan	0.082	145	197	0	25	0
24	Sikkim	0.041	101.81	64.86	0	18	0
25	Tamil Nadu	0.122	87	19	4	46	0
26	Tripura	0.033	141.74	95.23	0	11	0
27	Uttar Pradesh	1.703	3813.97	3995	4511	65	0
28	Uttarakhand	0.002	9	0	0	6	0
29	West Bengal	3.584	10539	7392.76	0	74	0
Union Territories							
30	A & N Islands	0	0	0	0		0
31	Chandigarh	0	0	0	0		0
32	Dadra & Nagar Haveli	0	0	0	0		0
33	Daman & Diu	0	0	0	0		0
34	Lakshadweep	0	0	0	0		0
35	Puducherry	0.004	61	20	0		0
Total		**20.538**	**37073**	**39726.7**	**7713**	**2906**	**65**

Source: FMP Directorate, Central Water Commission

6.4 State-wise Flood Forecasting Stations as on 2019

Sl. No.	Name of States/UTs	FF Stations		
		Level	Inflow	Total
1	**2**	**3**	**4**	**5**
1	Andhra Pradesh	10	10	20
2	Arunachal Pradesh	3	0	3
3	Assam	30	0	30
4	Bihar	40	3	43
5	Chhattisgarh	1	2	3
6	Daman & Diu	1	0	1
7	Gujarat	6	7	13
8	Haryana	1	1	2
9	Himachal Pradesh	1	0	1
10	Jammu & Kashmir	3	0	3
11	Jharkhand	2	15	17
12	Karnataka	1	14	15
13	Madhya Pradesh	2	10	12
14	Kerala	3	2	5
15	Maharashtra	8	15	23
16	NCT, Delhi	2	0	2
17	Odisha	12	7	19
18	Rajasthan	3	11	14
19	Sikkim	3	5	8
20	Tamil Nadu	4	11	15
21	Telangana	5	8	13
22	Tripura	2	0	2
23	Uttar Pradesh	39	5	44
24	Uttarakhand	4	2	6
25	West Bengal	12	4	16
Total		**198**	**130**	**328**

Source: FFM Directorate, Central Water Commission

6.5 Basin-wise Flood Forecasting Stations as on 2019

Sl. No.	Major Inter-state River Systems	FF Stations		
		Level	Inflow	Total
1	**2**	**3**	**4**	**5**
1	Indus and its tributaries	3	0	3
2	Ganga & its tributaries	95	39	134
3	Brahmaputra & its tributaries	39	5	44
4	Barak System	6	0	6
5	Subarnarekha (i/c Burhabalang)	4	3	7
6	Brahmani & Baitarni	3	2	5
7	East Flowing (Mahanadi to Pennar)	4	4	8
8	Narmada	4	6	10
9	Tapi	1	2	3
10	Mahi	1	4	5
11	Sabarmati	1	1	2
12	Mahanadi	3	3	6
13	Godavari	18	24	42
14	Krishna	5	17	22
15	West Flowing Rivers (Kutch & Saurashtra)	1	1	2
16	West Flowing Rivers (Tapi to Tadri)	2	1	3
17	Cauvery and its tributaries	3	9	12
18	Pennar	1	1	2
19	East Flowing Rivers (Pennar to Kanyakumari)	1	6	7
20	West Flowing River (Tadri to Kanyakumari)	3	2	5
Total		**198**	**130**	**328**

Source: FFM Directorate, Central Water Commission

6.6 Flood Forecasting Performance from 2000 to 2019

Sl. No.	Year	No. of Level Forecasts Issued			No. of Inflow Forecasts Issued			Total No. of Forecasts Issued		
		Total	Within +/-15 cm of Deviation from Actual	Accuracy (%)	Total	Within +/- 20% cumecs of Deviation from Actual	Accuracy (%)	Total	Within +/- 15 cm or +/-20% cumecs of Deviation from Actual	Accuracy (%)
1	2	3	4	5	6	7	8	9	10	11
1	2000	5622	5504	97.90	821	747	90.99	6443	6251	97.02
2	2001	4606	4533	98.42	857	809	94.40	5463	5342	97.79
3	2002	3618	3549	98.09	623	602	96.63	4241	4151	97.88
4	2003	5989	5789	96.66	611	586	95.91	6600	6375	96.59
5	2004	4184	4042	96.61	705	654	92.77	4889	4696	96.05
6	2005	4323	4162	96.28	1295	1261	97.37	5618	5423	96.53
7	2006	5070	4827	95.21	1593	1550	97.30	6663	6377	95.71
8	2007	6516	6339	97.28	1707	1651	96.72	8223	7990	97.17
9	2008	5670	5551	97.90	1021	1003	98.24	6691	6554	97.95
10	2009	3343	3298	98.65	667	629	94.30	4010	3927	97.93
11	2010	6491	6390	98.44	1028	988	96.11	7519	7378	98.12
12	2011	4848	4795	98.91	1143	1109	97.03	5991	5904	98.55
13	2012	4200	4136	98.47	831	803	96.63	5031	4939	98.17
14	2013	5741	5471	95.30	1319	1289	97.73	7060	6760	95.75
15	2014	3884	3804	97.94	888	863	97.18	4772	4667	97.80
16	2015	3500	3429	97.97	572	562	98.25	4072	3991	98.01
17	2016	4969	4891	98.43	1270	1057	83.23	6239	5948	95.34
18	2017	5085	4975	97.84	1212	926	76.40	6297	5901	93.71
19	2018	4969	4871	98.03	1882	1624	86.29	6851	6495	94.80
20	2019	6004	5773	96.15	3750	2678	71.41	9754	8451	86.64
Average		**4870**	**4749**	**97.52**	**1009**	**949**	**94.05**	**5879**	**5699**	**96.94**

Source: FFM Directorate, Central Water Commission

6.7 Flood Damage during 1953 to 2018

Sl. No.	Year	Area Affected (in Mha)	Population Affected (in Million)	Damage to Crops		Damage to Houses		Cattle Lost No.	Human lives Lost No.	Damage to Public Utilities (in Rs. Cr)	Total Damages to Crops, Houses & Public Utilities (in Rs. Cr) (Col. 6+8+11)
				Area (in Mha)	Value in (Rs. Cr)	Nos.	Value (in Rs. Cr)				
1	2	3	4	5	6	7	8	9	10	11	12
1	1953	2.29	24.28	0.93	42.08	264924	7.42	47034	37	2.90	52.40
2	1954	7.49	12.92	2.61	40.52	199984	6.56	22552	279	10.15	57.23
3	1955	9.44	25.27	5.31	77.80	1666789	20.95	72010	865	3.98	102.73
4	1956	9.24	14.57	1.11	44.44	725776	8.05	16108	462	1.14	53.63
5	1957	4.86	6.76	0.45	14.12	318149	4.98	7433	352	4.27	23.37
6	1958	6.26	10.98	1.40	38.28	382251	3.90	18439	389	1.79	43.97
7	1959	5.77	14.52	1.54	56.76	648821	9.42	72691	619	20.02	86.20
8	1960	7.53	8.35	2.27	42.55	609884	14.31	13908	510	6.31	63.17
9	1961	6.56	9.26	1.97	24.04	533465	0.89	15916	1374	6.44	31.37
10	1962	6.12	15.46	3.39	83.18	513785	10.66	37633	348	1.05	94.89
11	1963	3.49	10.93	2.05	30.17	420554	3.70	4572	432	2.74	36.61
12	1964	4.90	13.78	2.49	56.87	255558	4.59	4956	690	5.15	66.61
13	1965	1.46	3.61	0.27	5.87	112957	0.20	7286	79	1.07	7.14
14	1966	4.74	14.40	2.16	80.15	217269	2.54	9071	180	5.74	88.43
15	1967	7.12	20.46	3.27	133.31	567995	14.26	5827	355	7.86	155.43
16	1968	7.15	21.17	2.62	144.61	682704	41.11	130305	3497	25.37	211.10
17	1969	6.20	33.22	2.91	281.90	1268660	54.42	270328	1408	68.11	404.44
18	1970	8.46	31.83	4.91	162.78	1434030	48.61	19198	1076	76.44	287.83
19	1971	13.25	59.74	6.24	423.13	2428031	80.24	12866	994	129.11	632.48
20	1972	4.10	26.69	2.45	98.56	897301	12.46	58231	544	47.17	158.19
21	1973	11.79	64.08	3.73	428.03	869797	52.48	261016	1349	88.49	569.00
22	1974	6.70	29.45	3.33	411.64	746709	72.43	16846	387	84.94	569.02
23	1975	6.17	31.36	3.85	271.49	803705	34.10	17345	686	166.05	471.64
24	1976	11.91	50.46	6.04	595.03	1745501	92.16	80062	1373	201.50	888.69

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6.7 Flood Damage during 1953 to 2018

Sl. No.	Year	Area Affected (in Mha)	Population Affected (in Million)	Damage to Crops		Damage to Houses		Cattle Lost No.	Human lives Lost No.	Damage to Public Utilities (in Rs. Cr)	Total Damages to Crops, Houses & Public Utilities (in Rs. Cr) (Col. 6+8+11)
				Area (in Mha)	Value in (Rs. Cr)	Nos.	Value (in Rs. Cr)				
1	2	3	4	5	6	7	8	9	10	11	12
25	1977	11.46	49.43	6.84	720.61	1661625	152.29	556326	11316	328.95	1201.85
26	1978	17.50	70.45	9.96	911.09	3507542	167.57	239174	3396	376.10	1454.76
27	1979	3.99	19.52	2.17	169.97	1328712	210.61	618248	3637	233.63	614.20
28	1980	11.46	54.12	5.55	366.37	2533142	170.85	59173	1913	303.28	840.50
29	1981	6.12	32.49	3.27	524.56	912557	159.63	82248	1376	512.31	1196.50
30	1982	8.87	56.01	5.00	589.40	2397365	383.87	246750	1573	671.61	1644.88
31	1983	9.02	61.03	3.29	1285.85	2393722	332.33	153095	2378	873.43	2491.61
32	1984	10.71	54.55	5.19	906.09	1763603	181.31	141314	1661	818.16	1905.56
33	1985	8.38	59.59	4.65	1425.37	2449878	583.86	43008	1804	2050.04	4059.27
34	1986	8.81	55.50	4.58	1231.58	2049277	534.41	60450	1200	1982.54	3748.53
35	1987	8.89	48.34	4.94	1154.64	2919380	464.49	128638	1835	950.59	2569.72
36	1988	16.29	59.55	10.15	2510.90	2276533	741.60	150996	4252	1377.80	4630.30
37	1989	8.06	34.15	3.01	956.74	782340	149.82	75176	1718	1298.77	2405.33
38	1990	9.30	40.26	3.18	695.61	1019930	213.73	134154	1855	455.27	1708.92
39	1991	6.36	33.89	2.70	579.02	1134410	180.42	41090	1187	728.89	1488.33
40	1992	2.65	19.26	1.75	1027.58	687489	306.28	78669	1533	2010.67	3344.53
41	1993	11.44	30.41	3.21	1308.63	1926049	528.32	211193	2864	1445.53	3282.49
42	1994	4.81	27.55	3.96	888.62	914664	165.21	52315	2078	740.76	1794.59
43	1995	5.25	35.93	3.25	1714.79	2001898	1307.89	62438	1814	679.63	3702.31
44	1996	8.05	44.73	3.83	1124.49	726799	176.59	73208	1803	861.39	3005.74
45	1997	4.57	29.66	2.26	692.74	505128	152.50	27754	1402	1985.93	2831.18
46	1998	10.85	47.44	7.50	2594.17	1932874	1108.78	107098	2889	5157.77	8860.72
47	1999	7.77	27.99	1.75	1850.87	1613260	1299.06	91289	745	462.83	3612.76
48	2000	5.38	45.01	3.58	4246.62	2628855	680.94	123252	2606	3936.98	8864.54

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6.7 Flood Damage during 1953 to 2018

Sl. No.	Year	Area Affected (in Mha)	Population Affected (in Million)	Damage to Crops		Damage to Houses		Cattle Lost No.	Human lives Lost No.	Damage to Public Utilities (in Rs. Cr)	Total Damages to Crops, Houses & Public Utilities (in Rs. Cr) (Col. 6+8+11)
				Area (in Mha)	Value in (Rs. Cr)	Nos.	Value (in Rs. Cr)				
1	2	3	4	5	6	7	8	9	10	11	12
49	2001	6.18	26.46	3.96	688.48	716187	816.47	32704	1444	5604.46	7109.42
50	2002	7.09	26.32	2.19	913.09	762492	599.37	21533	1001	1062.08	2574.54
51	2003	6.12	43.20	4.27	7307.23	775379	756.48	15161	2166	3262.15	11325.87
52	2004	5.31	43.73	2.89	778.69	1664388	879.60	134106	1813	1656.09	3314.38
53	2005	12.56	22.93	12.30	2370.92	715749	380.53	119674	1455	4688.22	7439.67
54	2006	1.10	25.22	1.82	2850.67	1497428	3636.85	266945	1431	13303.93	19790.92
55	2007	7.14	41.40	8.79	3121.53	3280233	2113.11	89337	3389	8049.04	13283.68
56	2008	3.43	29.91	3.19	3401.56	1566809	1141.89	101780	2876	5046.48	9589.94
57	2009	3.84	29.54	3.59	4232.61	1235628	10809.80	63383	1513	17509.35	32551.76
58	2010	2.62	18.30	4.99	5887.38	293830	875.95	39706	1582	12757.25	19520.59
59	2011	1.90	15.97	2.72	1393.85	1152518	410.48	35982	1761	6053.57	7857.89
60	2012	2.14	14.69	1.95	1534.11	174526	240.57	31558	933	9169.97	10944.65
61	2013	7.55	25.93	7.48	6378.08	699525	2032.83	163958	2180	38937.84	47348.75
62	2014	12.78	26.51	8.01	7255.15	311325	581.98	60196	1968	7710.95	15548.08
63	2015	4.48	33.20	3.37	17043.95	3959191	8046.97	45597	1420	32200.18	57291.10
64	2016	7.06	26.55	6.66	4052.72	278240	114.68	22367	1420	1507.93	5675.33
65	2017	6.08	47.34	4.97	8951.98	1252914	9384.02	26673	2063	12329.85	30665.85
66	2018	7.72	37.40	2.52	3708.19	913414	2508.66	60279	1839	12132.92	21849.97
Total		**474.05**	**2125.01**	**258.53**	**114933.81**	**81631407**	**56283.02**	**6109628**	**109374**	**224192.92**	**400097.02**
Avg.		**7.18**	**32.20**	**3.92**	**1741.42**	**1236840**	**852.77**	**92570**	**1657**	**3396.86**	**6062.08**
Max.		**17.50**	**70.45**	**12.30**	**17043.95**	**3959191**	**10809.80**	**618248**	**11316**	**38937.84**	**57291.10**
(Year)		**1978**	**1978**	**2005**	**2015**	**2015**	**2009**	**1979**	**1977**	**2013**	**2015**

Source: FFM Directorate, Central Water Commission

Section-VII

Financial Aspects

Section-VII
Financial Aspects

This section deals with the financial aspects of water and related sectors at the national level. It provides the financial status of irrigation projects under AIBP-PMKSY and CAD&WM Component for 99 Prioritized Projects. It also contains distribution of revenue and capital expenditure by sub-major head of accounts in the fields of flood control, anti-sea-erosion, drainage and general.

7.1 Financial Status of Irrigation Projects under AIBP-PMKSY

Sl. No.	Name of States	Cumulative CLA/Grant Released up to 31.03.2015 under AIBP	CLA/Grant Released under PMKSY (Rs. in Cr)					Cumulative CLA/Grant Released up to 31.03.2020 under AIBP-PMKSY
			2015-16	2016-17	2017-18	2018-19	2019-20	
1	2	3	4	5	6	7	8	9
1	Andhra Pradesh	1377.76	0.00	7.46	0.00	15.24	0.00	1400.46
2	Assam	406.84	107.92	0.00	0.00	0.00	0.00	514.76
3	Bihar	720.39	41.51	0.00	46.32	37.82	11.98	858.02
4	Chhattisgarh	518.47	0.00	13.29	17.25	0.00	4.09	553.10
5	Goa	273.17	0.00	0.00	0.00	0.00	0.00	273.17
6	Gujarat	8753.70	128.00	961.88	1410.49	1047.29	485.35	12786.71
7	Haryana	90.54	0.00	0.00	0.00	0.00	0.00	90.54
8	Himachal Pradesh	378.89	0.00	0.00	0.00	0.00	0.00	378.89
9	Jammu & Kashmir	479.39	34.31	0.00	9.57	16.92	5.88	546.07
10	Jharkhand	965.97	281.62	145.75	305.10	305.88	0.00	2004.32
11	Karnataka	5779.22	208.16	135.47	459.52	197.00	163.42	6942.79
12	Kerala	201.11	0.00	0.00	0.00	0.00	0.00	201.11
13	Madhya Pradesh	5369.00	188.21	300.15	181.28	34.34	26.45	6099.43
14	Maharashtra	10276.02	307.80	379.88	363.04	526.59	291.68	12145.01
15	Manipur	1225.10	142.38	127.00	25.42	21.93	30.50	1572.33

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7.1 Financial Status of Irrigation Projects under AIBP-PMKSY

Sl. No.	Name of States	Cumulative CLA/Grant Released up to 31.03.2015 under AIBP	CLA/Grant Released under PMKSY (Rs. in Cr)					Cumulative CLA/Grant Released up to 31.03.2020 under AIBP-PMKSY
			2015-16	2016-17	2017-18	2018-19	2019-20	
1	2	3	4	5	6	7	8	9
16	Meghalaya	4.00	0.00	0.00	0.00	0.00	0.00	4.00
17	Odisha	4515.95	173.80	457.74	464.71	119.38	90.65	5822.23
18	Punjab	670.99	1.05	52.42	0.00	0.00	0.00	724.46
19	Rajasthan	2128.07	45.51	45.89	216.87	95.15	7.04	2538.53
20	Tamil Nadu	20.00	0.00	0.00	0.00	0.00	0.00	20.00
21	Telangana	3963.22	112.50	547.62	13.24	1.99	214.04	4852.61
22	Tripura	126.29	0.00	0.00	0.00	0.00	0.00	126.29
23	Uttar Pradesh	4034.79	555.04	135.64	65.60	397.16	407.68	5595.91
24	Uttrakhand	609.75	0.00	0.00	0.00	0.00	0.00	609.75
25	West Bengal	384.99	0.00	0.00	0.00	0.00	0.00	384.99
Total		**53273.77**	**2327.81**	**3310.19**	**3578.40**	**2816.69**	**1738.76**	**67045.47**

Source: Monitoring (Central) Directorate, PMO, Central Water Commission

7.2 Financial Status of CAD&WM Component for 99 Prioritized Projects

Sl. No.	States	No. of Projects	Project Name	Targeted CCA (Th. Ha) Structural Interventions	Targeted Expenditure (Rs. Cr)	Targeted CA (Rs. Cr)	2016-17 to 2019-20 (up to January 2020)		
							CCA Covered (Th. Ha)	Expenditure Incurred (Rs. Cr)	CA Released (Rs. Cr)
1	2	3	4	5	6	7	8	9	10
1	Andhra Pradesh	1	Gundalakamma	32.400	102.798	47.150	0.000	Q0.000	3.640
2		2	Tadipudi LIS	54.346	277.290	109.340	0.000	0.000	16.400
3		3	Thotapally	29.138	265.840	58.533	0.000	0.000	6.370
4		4	Tarakaram Teertasagaram	4.351	25.917	10.145	0.000	0.000	0.610
5		5	Musurumilli	5.915	31.725	12.677	0.000	0.000	4.490
6		6	Pushkara LIS	46.546	240.870	99.656	0.000	0.000	35.850
7		7	Yerracalva	5.924	26.540	11.875	0.000	0.000	1.820
8		8	Maddigedda	0.000	0.000	0.000	0.000	0.000	0.000
		Total		**178.620**	**970.980**	**349.376**	**0.000**	**0.000**	**69.180**
9	Assam	1	Champamati	6.587	27.230	13.847	4.360	13.540	3.550
10		2	Dhansiri	34.183	151.990	66.267	9.900	8.430	0.000
11		3	Borolia	8.917	36.238	16.520	0.000	0.000	0.000
		Total		**49.687**	**215.458**	**96.634**	**14.260**	**21.970**	**3.550**
12	Bihar	1	Durgawati	30.510	142.395	50.664	14.410	45.580	35.823
13		2	Punpun	0.000	0.000	0.000	0.000	0.000	0.000
		Total		**30.510**	**142.395**	**50.664**	**14.410**	**45.580**	**35.823**
14	Chhattisgarh	1	Maniyari Tank	11.515	45.370	22.630	0.000	0.000	4.980
15		2	Kharung	8.300	33.180	16.430	0.000	0.000	4.950
16		3	Kelo	22.810	81.210	40.510	0.000	0.000	11.780
		Total		**42.625**	**159.760**	**79.570**	**0.000**	**0.000**	**21.710**
17	Goa	1	Tillari	11.777	137.920	68.960	0.770	21.000	0.000
		Total		**11.777**	**137.920**	**68.960**	**0.770**	**21.000**	**0.000**

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7.2 Financial Status of CAD&WM Component for 99 Prioritized Projects

Sl. No.	States	No. of Projects	Project Name	Targeted CCA (Th. Ha) Structural Interventions	Targeted Expenditure (Rs. Cr)	Targeted CA (Rs. Cr)	2016-17 to 2019-20 (up to January 2020)		
							CCA Covered (Th. Ha)	Expenditure Incurred (Rs. Cr)	CA Released (Rs. Cr)
1	2	3	4	5	6	7	8	9	10
18	Gujarat	1	Sardar Sarovar Project*	1363.859	5021.765	2510.883	1052.990	3522.315	1719.155
		Total		**1363.859**	**5021.765**	**2510.883**	**1052.990**	**3522.315**	**1719.155**
19	Jammu & Kashmir	1	Tral Lift	1.413	6.161	3.011	0.500	1.050	0.640
20		2	Prakachik Khows Canal (Kargil)	0.462	1.866	0.709	0.217	0.000	0.210
21		3	Rajpora Lift	0.585	3.613	1.521	0.563	0.690	0.850
22		4	Restoration & Mod. of Main Ravi Canal	0.000	0.000	0.000	0.000	0.000	0.000
		Total		**2.460**	**11.639**	**5.241**	**1.280**	**1.740**	**1.700**
23	Jharkhand	1	Subernrekha	66.645	747.530	133.320	0.000	0.000	0.000
		Total		**66.645**	**747.530**	**133.320**	**0.000**	**0.000**	**0.000**
24	Karnataka	1	Upper Tunga Irrigation Project	25.449	130.220	67.160	10.640	33.850	21.040
25		2	Sri Rameswar Irrigation	11.418	46.730	22.710	8.866	41.540	16.750
26		3	Bhima LIS	12.898	47.040	23.630	12.926	34.230	19.770
27		4	Karanja	5.588	42.600	11.230	2.288	3.400	6.380
28		5	NLBC	28.665	750.000	62.170	0.000	0.000	0.000
		Total		**84.018**	**1016.590**	**186.900**	**34.720**	**113.020**	**63.940**

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7.2 Financial Status of CAD&WM Component for 99 Prioritized Projects

Sl. No.	States	No. of Projects	Project Name	Targeted CCA (Th. Ha) Structural Interventions	Targeted Expenditure (Rs. Cr)	Targeted CA (Rs. Cr)	2016-17 to 2019-20 (up to January 2020)		
							CCA Covered (Th. Ha)	Expenditure Incurred (Rs. Cr)	CA Released (Rs. Cr)
1	2	3	4	5	6	7	8	9	10
29	Kerala	1	Muvattupuzha	18.476	107.300	48.720	0.000	1.540	0.000
30		2	Karapuzha	0.000	0.000	0.000	0.000	0.000	0.000
		Total		**18.476**	**107.300**	**48.720**	**0.000**	**1.540**	**0.000**
31	Madhya Pradesh	1	Sagad Project	9.478	35.370	17.680	8.430	21.720	6.487
32		2	Singhpur Project	5.840	21.390	10.370	5.120	12.830	4.924
33		3	Sanjay Sagar (Bah) Project	9.673	36.190	18.090	6.860	17.110	4.022
34		4	Mahuar Project	9.160	33.590	16.790	8.210	24.300	8.804
35		5	Sindh Project Phase II	90.564	361.530	180.760	66.750	263.770	74.790
36		6	Indira Sagar Project Canal Phase-I & II (0 to 142 km)	88.000	410.575	196.720	6.280	18.110	6.644
37		7	Mahi Project	28.127	128.340	64.280	11.780	29.840	17.106
38		8	Barriyarpur LBC	19.003	51.850	25.926	8.970	22.790	16.096
39		9	Bansagar Unit 2	97.036	448.600	224.300	45.490	115.480	56.555
40		10	Mahan Project	14.313	54.520	27.260	7.260	23.300	11.609
41		11	Pench Project	27.868	102.440	51.220	14.210	36.700	19.852
42		12	Indira Sagar Project Canal Phase-IV (206 to 243 km)	0.000	0.000	0.000	0.000	0.000	0.000
43		13	Bargi Diversion Project	53.093	204.503	102.052	0.000	0.000	14.940
44		14	Omkareshwar Project Canal Phase-III (RBC 65.50 to 142 km)	143.365	648.090	323.570	20.680	32.400	9.613
		Total		**595.520**	**2536.988**	**1259.018**	**210.040**	**618.350**	**251.442**

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7.2 Financial Status of CAD&WM Component for 99 Prioritized Projects

Sl. No.	States	No. of Projects	Project Name	Targeted CCA (Th. Ha) Structural Interventions	Targeted Expenditure (Rs. Cr)	Targeted CA (Rs. Cr)	2016-17 to 2019-20 (up to January 2020)		
							CCA Covered (Th. Ha)	Expenditure Incurred (Rs. Cr)	CA Released (Rs. Cr)
1	2	3	4	5	6	7	8	9	10
45	Maharashtra	1	Bawanthadi (IS)	2.500	15.630	8.239	1.340	2.150	0.520
46		2	Lower Panzara	6.785	29.020	15.740	5.211	6.500	6.120
47		3	Dhom Balkwadi	4.054	21.770	8.180	1.559	2.540	1.820
48		4	Upper Kundalika	2.800	14.629	5.600	2.300	6.760	0.520
49		5	Gadnadi	3.111	19.129	6.103	0.426	0.000	0.030
50		6	Waghur	17.972	77.950	39.130	10.368	31.710	1.570
51		7	Lower Dudhna	30.040	145.490	72.259	6.127	17.390	8.100
52		8	Tillari	6.570	32.428	13.143	0.000	2.590	1.810
53		9	Lower Wardha	61.203	198.630	98.850	24.980	48.790	20.634
54		10	Nandur Madhmeshwar Ph-II	23.116	98.500	49.330	0.842	1.610	0.000
55		11	Gosikhurd (NP)	176.107	743.725	354.095	0.000	0.000	9.380
56		12	Upper Pen Ganga	17.289	69.620	34.830	2.420	9.230	3.001
57		13	Bembla	29.779	164.440	64.490	7.202	24.250	9.500
58		14	Tarali	13.086	53.635	25.259	2.550	0.000	1.313
59		15	Arjuna	5.704	28.940	11.189	0.000	0.000	0.807
60		16	Krishna Koyana Lift	52.824	132.688	67.385	0.000	0.260	3.815
61		17	Sangola Branch Canal	6.883	32.449	13.830	0.149	1.140	1.920
62		18	Khadakpurna	15.720	79.421	31.300	2.761	1.190	2.650
63		19	Morna (Gureghar)	4.229	16.796	8.163	0.000	0.300	0.280
64		20	Kudali	5.327	26.758	10.703	0.000	0.000	0.000
65		21	Aruna	5.310	20.259	9.602	0.000	0.000	0.000
66		22	Lower Pedhi	10.192	43.882	20.505	0.000	0.000	0.000
67		23	Dongargaon	0.000	0.000	0.000	0.000	0.000	0.000
68		24	Wang	0.000	0.000	0.000	0.000	0.000	0.000
69		25	Nardave	0.000	0.000	0.000	0.000	0.000	0.000
70		26	Warna	0.000	0.000	0.000	0.000	0.000	0.000
		Total		**500.601**	**2065.789**	**967.925**	**68.235**	**156.410**	**73.790**

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7.2 Financial Status of CAD&WM Component for 99 Prioritized Projects

Sl. No.	States	No. of Projects	Project Name	Targeted CCA (Th. Ha) Structural Interventions	Targeted Expenditure (Rs. Cr)	Targeted CA (Rs. Cr)	2016-17 to 2019-20 (up to January 2020)		
							CCA Covered (Th. Ha)	Expenditure Incurred (Rs. Cr)	CA Released (Rs. Cr)
1	2	3	4	5	6	7	8	9	10
71	Manipur	1	Thoubal	9.839	65.850	32.932	3.716	14.290	0.000
72		2	Dolaithabi Barrage	3.223	21.704	11.426	1.314	5.050	0.000
		Total		**13.062**	**87.553**	**44.358**	**5.030**	**19.340**	**0.000**
73	Odisha	1	Lower Indra (KBK)	29.900	103.980	51.840	11.221	41.180	24.370
74		2	Telengiri	9.952	54.510	16.722	2.526	7.187	2.838
75		3	Subernarekha	68.883	389.580	126.030	4.555	32.780	16.283
76		4	Anandpur Barr. Ph.-I /Integrated Anandpur Barr.	60.000	334.370	101.570	1.802	4.170	1.820
77		5	Kanupur	29.578	164.850	53.444	0.000	2.733	5.542
78		6	Upper Indravati (KBK)	23.834	140.265	44.032	23.83	122.4	39.323
79		7	Rukura-Tribal	5.750	31.63	10.21	5.59	20.99	3.213
80		8	RET irrigation	8.500	46.87	16.552	8.5	37.43	4.105
		Total		**236.397**	**1266.055**	**420.399**	**58.024**	**268.870**	**97.494**
81	Punjab	1	Kandi Canal Stage II	0.000	0.000	0.000	0.000	0.000	0.000
82		2	1st Patiala feeder & Kotla Branch	142.658	477.190	228.860	0.000	0.000	0.000
		Total		**142.658**	**477.190**	**228.860**	**0.000**	**0.000**	**0.000**
83	Rajasthan	1	Mod. of Gang Canal	44.875	123.010	61.240	21.629	38.270	20.129
84		2	Narmada Canal Project	0.000	97.480	54.060	0.000	0.000	0.000
		Total		**44.875**	**220.490**	**115.300**	**21.629**	**38.270**	**20.129**

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7.2 Financial Status of CAD&WM Component for 99 Prioritized Projects

Sl. No.	States	No. of Projects	Project Name	Targeted CCA (Th. Ha) Structural Interventions	Targeted Expenditure (Rs. Cr)	Targeted CA (Rs. Cr)	2016-17 to 2019-20 (up to January 2020)		
							CCA Covered (Th. Ha)	Expenditure Incurred (Rs. Cr)	CA Released (Rs. Cr)
1	2	3	4	5	6	7	8	9	10
85	Telangana	1	J. Chokha Rao LIS	248.685	759.940	380.350	0.000	0.000	10.220
86		2	Gollavagu Project	3.845	20.400	7.186	0.000	0.000	1.030
87		3	Rallivagu Project	0.918	5.570	1.470	0.000	0.000	0.280
88		4	Mathadivagu Project	3.440	12.380	6.320	0.000	0.000	1.800
89		5	Rajiv Bheema	82.153	245.270	114.81	0.000	0.000	0.000
90		6	Peddavagu @ Jagannathpur	6.073	52.550	12.2	0.000	0.000	0.000
91		7	Sri Komaram Bheem Project	9.915	39.660	19.840	0.000	0.000	5.890
92		8	Peddavagu @ Neelwai Project	5.260	18.450	6.670	0.000	0.000	1.990
93		9	Palemvagu project	2.014	5.200	2.600	0.000	0.000	0.510
94		10	SRSP St.II	73.138	204.080	103.240	0.000	0.000	11.560
95		11	Indiramma Flood Flow Canal	93.587	97.230	48.260	0.000	0.000	3.060
		Total		**529.028**	**1460.730**	**702.946**	**0.000**	**0.000**	**36.340**
96	Uttar Pradesh	1	SaryuNahar (NP)	480.000	1672.696	837.058	0.000	0.000	150.000
97		2	Arjunsahayak	44.381	188.97	79.942	0.000	0.000	0.000
98		3	Madhya Ganga	0.000	0.000	0.000	0.000	0.000	0.000
99		4	Bansagar	0.000	0.000	0.000	0.000	0.000	0.000
		Total		**524.381**	**1861.666**	**917.000**	**0.000**	**0.000**	**150.000**
Grand Total				**4435.199**	**18507.798**	**8186.074**	**1481.388**	**4828.41**	**2544.252**

Source: CAD&WM Wing, M/o Jal Shakti, D/o Water Resources, RD & GR
Note: 'NP': National Projects; '*': May change with revision of MoUs;
'#': Subjected to reconciliation based on utilization certificates to be submitted by State Governments.

7.3 Plan-wise Expenditure of Major and Medium Irrigation in India

Sl. No.	Plan Period	Major & Medium Irrigation (Rs. in Cr)
1	2	3
1	First (1951-56)	376.2
2	Second (1956-61)	380
3	Third (1961-66)	576
4	Annual (1966-69)	429.8
5	Fourth (1969-74)	1242.3
6	Fifth (1974-78)	2516.2
7	Annual (1978-80)	2078.6
8	Sixth (1980-85)	7368.8
9	Seventh (1985-90)	11107.3
10	Annual (1990-92)	5459.2
11	Eight (1992-97)	21071.9
12	IX Plan (1997-02)	49289
13	X Plan (2002-07)	83647
14	XI Plan (2007-2012) Outlay /Expenditure	
(a)	Actual Expenditure (2007-2008)	29390.6
(b)	Actual Expenditure (2008-2009)	32341.8
(c)	Revised Approved Outlay (2009-2010)	34882.3
(d)	Revised Approved Outlay(2010-2011)	34310.1
(e)	Actual Expenditure (2011-2012)	35664.5
15	XII Plan Outlay (Projection)	
(a)	Approved Outlay (2012-13)	49920.6
(b)	Actual Expenditure (2012-2013)	27403.8
(c)	Approved Outlay (2013-14)	55587.7

Source: P&P Directorate, CWC

7.4 State-wise and Plan-wise Expenditure of Minor Irrigation in India

(Rs. in Cr)

Sl. No.	State/UT	IXth Plan	Xth Plan	XIth Plan	Year						
		(1997-02)	(2002-07)	(2007-2012)	(2012-13)	(2013-14)	(2014-15)	(2015-16)	(2016-17)	(2017-18)	(2018-19)
1	2	3	4	5	6	7	8	9	10	11	12
1	Andhra Pradesh	364.69	277.84	219.10	16.64	31.61	21.99	46.16	47.78	34.94	37.02
2	Arunachal Pradesh	0.00	0.30	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Assam	0.02	1.72	2.85	0.01	0.93	0.16	0.04	0.00	0.00	0.00
4	Bihar	12.92	283.58	85.68	46.57	17.89	25.55	43.44	34.99	80.84	0.09
5	Chhattisgarh	Included in M.P.	40.97	13.15	14.82	2.69	21.10	7.39	1.96	7.59	2.59
6	Goa	0.94	0.18	0.06	0.00	0.02	0.00	0.07	0.00	0.00	0.00
7	Gujarat	40.46	148.73	212.25	82.44	109.10	110.53	189.73	136.44	90.69	91.59
8	Haryana	183.90	168.88	638.08	67.37	26.95	49.21	72.52	57.33	71.43	19.71
9	Himachal Pradesh	113.10	21.25	19.80	0.00	4.03	6.01	0.00	0.00	0.00	10.81
10	Jammu & Kashmir	0.51	0.08	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
11	Jharkhand	Included in Bihar	1.82	4.47	1.90	0.00	0.32	1.06	1.67	0.00	0.02
12	Karnataka	127.43	235.73	417.66	85.62	62.80	297.93	12.08	5.03	339.03	256.34
13	Kerala	92.59	73.65	159.48	118.79	6.31	63.78	143.21	76.03	74.18	45.23
14	Madhya Pradesh	146.29	368.52	199.32	13.85	11.70	19.80	82.84	11.18	6.08	18.54
15	Maharashtra	102.16	277.57	97.08	206.48	118.35	183.96	262.72	317.75	486.33	302.27
16	Manipur	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	Meghalaya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	Mizoram	0.11	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	Nagaland	0.00	0.00	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	Odisha	1.24	21.64	7.34	8.39	0.05	5.61	9.33	2.41	0.01	0.03
21	Punjab	197.80	275.91	307.34	31.94	25.91	59.29	74.57	62.63	22.45	21.78
22	Rajasthan	363.74	252.79	175.87	10.21	66.84	95.16	81.64	20.94	74.54	9.67

Contd...

7.4 State-wise and Plan-wise Expenditure of Minor Irrigation in India

(Rs. in Cr)

Sl. No.	State/UT	IXth Plan	Xth Plan	XIth Plan	Year						
		(1997-02)	(2002-07)	(2007-2012)	(2012-13)	(2013-14)	(2014-15)	(2015-16)	(2016-17)	(2017-18)	(2018-19)
1	2	3	4	5	6	7	8	9	10	11	12
23	Sikkim	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	Tamil Nadu	15.72	54.49	102.43	32.45	25.30	148.51	109.47	168.81	188.58	180.03
25	Tripura	0.09	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	Uttarakhand	Included in U.P.	0.08	0.34	0.00	0.00	0.00	0.00	0.03	0.00	0.01
27	Uttar Pradesh	884.08	754.70	390.80	0.44	6.07	38.24	21.65	199.90	14.32	28.08
28	West Bengal	11.85	13.98	4.19	0.33	1.32	0.01	5.10	0.04	0.04	0.03
29	Telangana	**Included in Andhra Pradesh**								21.66	11.49
Total States		**2659.64**	**3255.09**	**3058.39**	**738.26**	**517.87**	**1147.17**	**1163.02**	**1144.91**	**1512.73**	**1035.33**
30	A & N Islands	-	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	Chandigarh	-	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	Dadar & N. Haveli	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	Daman & Diu	-	0.00	0.00	0.00	included in Goa	0.00	0.00			
34	Delhi	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
35	Puducherry	-	2.19	0.19	0.99	0.00	0.00	0.08	0.01	0.00	0.08
36	Lakshadweep	-	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total UTs.		**2.00**	**2.26**	**0.27**	**0.00**	**0.00**	**0.00**	**0.08**	**0.01**	**0.00**	**0.15**

Source: Minor Irrigation (Stat) Wing, M/o Jal Shakti, D/o Water Resources, RD & GR

Note: Total may not tally due to rounding off.

7.5 Capital Expenditure, Working Expenses and Gross Receipts for Major and Medium Irrigation Projects at All India Level

(Rs. In Cr)

Year	Annual Plan	Capital Expenditure		Working Expenses			Gross Receipts
		During the year	up to the end of the year	Direction and Administration	Expenses other than Direction and Administration	Total	
1	2	3	4	5	6	7	8
1992-93	VIII Plan	3416.32	37077.90	256.88	2905.25	3162.13	320.29
1993-94		3975.27	41080.38	295.55	3334.29	3629.85	477.58
1994-95		4806.07	45885.59	341.53	4010.91	4352.44	444.46
1995-96		5458.64	51346.89	424.76	4393.77	4818.53	495.43
1996-97		5494.42	56840.72	472.62	4973.02	5445.64	458.39
Sub Total		23150.72	-	1791.33	19617.25	21408.58	2196.15
1997-98	IX Plan	7137.93	63984.15	853.49	5404.43	6257.92	363.34
1998-99		7093.71	71077.86	929.64	6285.74	7215.38	441.80
1999-00		7874.72	78952.83	1167.66	6812.55	7980.22	456.94
2000-01		6821.63	78197.22	993.48	7768.94	8762.42	753.52
2001-02		7649.38	85846.70	1396.63	6842.56	8239.19	652.25
Sub Total		36577.36	-	5340.90	33114.22	38455.12	2667.85
2002-03	X Plan	10161.31	96007.86	1444.52	7401.38	8845.90	783.39
2003-04		14463.44	110472.71	1431.83	4861.78	6293.60	1047.60
2004-05		17652.23	128444.65	1556.67	5461.65	7018.31	1264.15
2005-06		21964.79	150409.65	2012.43	6203.62	8216.06	1194.70
2006-07		26542.23	168979.77	2442.34	7162.09	9604.43	1504.66
Sub Total		90784.00	-	8887.79	31090.52	39978.30	5794.50
2007-08	XI Plan	30879.23	199861.52	3101.12	8797.76	11898.88	2044.92
2008-09		36230.56	236092.07	3565.20	8631.66	12196.86	1903.97
2009-10		32074.86	268164.22	4654.78	10266.14	14920.92	2351.11
2010-11		32303.61	300464.06	5504.71	11858.86	17363.58	2597.52
2011-12		33895.28	334359.04	6110.55	12609.55	18720.10	3892.87
Sub Total		165383.53	-	22936.36	52163.97	75100.34	12790.40
2012-13	XII Plan	36097.64	370908.34	6497.26	14851.62	21348.87	3128.30
2013-14		36666.20	407574.54	6838.53	15288.23	22126.76	4348.74
2014-15		38535.84	449110.29	6978.80	15419.01	22097.82	4155.10
2015-16		42316.69	496704.51	7265.30	12480.75	19483.24	6218.30
2016-17		62015.20	557910.02	7376.53	11629.13	19005.66	4243.95
Sub Total		**215631.57**	**-**	**34956.41**	**69668.74**	**104062.35**	**22094.39**
2017-18		61782.18	619692.20	7907.85	11357.19	19265.04	7010.89
Sub Total		**61782.18**	**-**	**7907.85**	**11357.19**	**19265.04**	**7010.89**
Grand Total		**593309.36**	**-**	**81820.65**	**217011.88**	**298269.73**	**52554.18**

Source: Consolidated data from the publication 'Finance Accounts' published by States/UTs

7.6 Capital Expenditure, Working Expenses and Gross Receipts for Minor Irrigation Projects at All India Level

(Rs. In Cr)

Year	Annual Plan / 5-Year Plan	Capital Expenditure		Working Expenses			Gross Receipts
		During the year	up to the end of the year	Direction and Administration	Expenses other than Direction and Administration	Total	
1	2	3	4	5	6	7	8
1992-93	VIII Plan	559.84	6502.96	71.26	879.18	950.44	58.47
1993-94		635.33	7138.29	82.27	1377.25	1459.52	68.98
1994-95		732.40	7898.25	107.02	1510.47	1617.49	98.84
1995-96		756.33	8654.58	117.09	1638.68	1755.77	111.52
1996-97		889.95	9533.14	138.30	1775.35	1913.64	103.84
Sub Total		3573.85	-	515.94	7180.92	7696.87	441.67
1997-98	IX Plan	906.22	10439.36	169.65	1737.28	1906.93	115.92
1998-99		1006.68	11346.24	215.83	1912.91	2128.74	101.37
1999-00		1141.59	12604.02	261.62	1475.22	1736.83	95.26
2000-01		965.23	10396.79	271.08	1733.24	2004.33	80.14
2001-02		1038.38	11435.17	276.88	1829.79	2106.66	80.15
Sub Total		5058.10	-	1195.05	8688.44	9883.49	472.85
2002-03	X Plan	1065.81	12502.56	316.67	1741.33	2058.00	101.18
2003-04		1608.77	14111.33	357.75	1659.57	2017.33	127.91
2004-05		2469.54	16580.87	390.58	1960.33	2350.91	144.68
2005-06		2884.00	19464.88	426.00	2096.97	2522.97	169.78
2006-07		3020.37	20261.37	536.27	2396.44	2932.71	177.32
Sub Total		11048.49	-	2027.27	9854.64	11881.90	720.87
2007-08	XI Plan	4045.68	26706.02	657.02	3000.30	3657.32	209.10
2008-09		4622.89	31328.82	695.22	3633.08	4328.30	216.24
2009-10		5669.51	37100.29	854.31	3953.55	4805.09	579.81
2010-11		6952.23	44052.52	977.76	4190.99	5205.58	641.18
2011-12		8456.32	52509.31	1140.12	4738.88	5879.00	453.89
Sub Total		29746.62	-	4324.42	19516.81	23875.29	2100.23
2012-13	XII Plan	9323.12	61832.44	1308.04	5016.87	6324.91	911.89
2013-14		10197.89	72030.32	1390.38	5307.87	6698.25	917.66
2014-15		10095.68	82098.65	1477.96	5345.41	6823.37	733.90
2015-16		12316.53	94424.68	1574.04	5607.83	7481.71	736.20
2016-17		13971.51	108396.19	1616.18	5760.80	7376.98	831.27
Sub Total		**55904.73**	**-**	**7366.61**	**27038.78**	**34705.22**	**4130.92**
2017-18		14759.68	123155.87	1778.96	6475.00	8253.96	740.18
Sub Total		**14759.68**	**-**	**1778.96**	**6475.00**	**8253.96**	**740.18**
Grand Total		**120091.47**	**-**	**17208.25**	**78754.58**	**96296.72**	**8606.71**

Source: Consolidated data from the publication 'Finance Accounts' published by States/UTs

7.7 Capital Expenditure, Working Expenses and Gross Receipts for CAD Programme

(Rs. In Cr)

Year	Annual Plan	Capital Expenditure		Working Expenses			Gross Receipts
		During the year	up to the end of the year	Direction and Administration	Expenses other than Direction and Administration	Total	
1	2	3	4	5	6	7	8
1992-93	VIII Plan	83.04	606.04	0.60	210.11	210.70	0.00
1993-94		71.11	688.80	0.60	246.65	247.25	0.00
1994-95		83.38	772.19	0.73	267.27	268.00	0.00
1995-96		89.70	861.89	0.85	336.42	337.27	0.00
1996-97		135.02	996.91	0.82	297.34	298.16	0.00
Sub Total		462.25	-	3.60	1357.79	1361.38	0.00
1997-98	IX Plan	109.69	1106.60	1.04	316.67	317.71	0.00
1998-99		119.54	1226.14	1.39	334.26	335.65	0.00
1999-00		109.30	1335.44	1.67	354.71	356.39	0.00
2000-01		157.43	1476.16	1.20	393.20	394.40	0.00
2001-02		152.26	1628.39	1.18	354.16	355.34	0.00
Sub Total		648.22	-	6.47	1753.01	1759.48	0.00
2002-03	X Plan	97.01	1725.40	22.60	442.30	464.89	0.00
2003-04		77.47	1808.21	2.51	427.59	430.10	0.00
2004-05		139.50	1947.71	2.85	360.60	363.45	0.00
2005-06		165.59	2113.30	49.32	374.00	423.31	0.00
2006-07		172.95	2286.25	57.91	403.61	461.52	0.00
Sub Total		652.52	-	135.18	2008.09	2143.28	0.00
2007-08	XI Plan	233.84	2520.08	33.10	493.97	527.07	0.00
2008-09		255.11	2775.19	36.60	444.78	481.38	0.00
2009-10		319.04	3124.66	78.86	502.98	581.83	0.00
2010-11		551.42	3676.08	91.79	605.94	697.73	0.00
2011-12		332.46	4008.54	107.02	786.58	893.61	0.00
Sub Total		1691.86	-	347.37	2834.24	3181.61	0.00
2012-13	XII Plan	483.34	4491.88	69.52	793.52	868.43	0.00
2013-14		616.95	5108.83	112.99	785.87	898.86	0.00
2014-15		507.33	5616.17	133.21	758.14	890.95	0.00
2015-16		661.86	6277.40	112.67	1061.06	1173.72	0.00
2016-17		1086.47	7363.88	144.12	915.40	1059.54	0.00
Sub Total		3355.97	-	572.52	4313.98	4891.51	0.00
2017-18		633.09	7996.97	268.68	796.27	1064.94	0.00
Sub Total		633.09	-	268.68	796.27	1064.94	0.00
Grand Total		7443.91	-	1333.81	13063.39	14402.21	0.00

Source: Consolidated data from the publication 'Finance Accounts' published by States/UTs

7.8 Status of Works and Funds Released under Flood Management Programme (FMP) (since start of XI Plan and up to 4th November, 2019 (Rs. in Cr)

Sl. No.	State	XI Plan			XII Plan			Total (XI + XII Plan)						2017-18	2018-19	2019-20	Total Funds Released
		Works Approved		Funds Released (XI Plan)	Works Approved		Funds Released	Works Approved		Works Completed	Works shifted/ for Closed	Works ongoing as per EFC-FMBAP 2017-20	Funds Released (XI + XII Plan)	Funds Released	Funds Released	Funds Released	
		Nos.	Estimated Cost		Nos.	Estimated Cost	(XII Plan)	Nos.	Estimated Cost								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Arunachal Pradesh	21	224.69	81.69	0	0	87.91	21	224.69	21	0	0	169.6	21.18			190.78
2	Assam	100	996.14	748.86	41	1386.97	64.89	141	2383.11	105	30	6	813.75	245.49	142.118	85.03	1286.39
3	Bihar	43	1370.42	723.18	4	447.63	184.64	47	1818.05	42	1	4	907.82		16.583		924.41
4	Chhattisgarh	3	31.13	15.57	0	0	3.75	3	31.13	3	0	0	19.32				19.32
5	Goa	2	22.73	9.98	0	0	2	2	22.73	2	0	0	11.98				11.98
6	Gujarat	2	19.79	2	0	0	0	2	19.79	2	0	0	2				2
7	Haryana	1	173.75	46.91	0	0	0	1	173.75	1	0	0	46.91				46.91
8	Himachal Pradesh	3	225.32	165.98	4	1139.62	221.87	7	1364.94	5	1	1	387.85	87.5	162.6	176.41	814.36
9	Jammu & Kashmir	28	408.22	252.57	15	562.47	169.95	43	970.69	19	3	21	422.52	110.4	52.1984	92.81	677.93
10	Jharkhand	3	39.3	18.44	0	0	4.27	3	39.3	3		0	22.71				22.71
11	Karnataka	3	59.46	23.8	0	0	0	3	59.46	2	1	0	23.8				23.8
12	Kerala	4	279.74	63.68	0	0	55.22	4	279.74	2	2	0	118.9	19.05			137.95
13	Manipur	22	109.34	66.34	0	0	24.36	22	109.34	22		0	90.7				90.7
14	Meghalaya	0	0	3.81	0	0	0	0	0	0		0	3.81				3.81
15	Mizoram	2	9.13	14.48	0	0	1.93	2	9.13	1	1	0	16.41	0.47			16.88
16	Nagaland	11	49.35	28.96	6	74.52	54.17	17	123.87	14		3	83.12		10.841		93.96
17	Odisha	67	169	101.12	1	62.32	0	68	231.32	66	2	0	101.12				101.12
18	Puducherry*	1	139.67	7.5	0	0	0	1	139.67	0	1	0	7.5				7.5
19	Punjab	5	153.4	40.43	0	0	0	5	153.4	4	1	0	40.43				40.43
20	Sikkim	28	104.92	83.69	17	261.4	8.15	45	366.32	28	17	0	91.84				91.84
21	Tamil Nadu	5	635.54	59.82	0	0	0	5	635.54	5		0	59.82				59.82

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7.8 Status of Works and Funds Released under Flood Management Programme (FMP) (since start of XI Plan and up to 4th November, 2019 (Rs. in Cr)

Sl. No.	State	XI Plan			XII Plan			Total (XI + XII Plan)						2017-18	2018-19	2019-20	Total Funds Released
		Works Approved		Funds Released (XI Plan)	Works Approved		Funds Released	Works Approved		Works Completed	Works shifted/ for Closed	Works ongoing as per EFC-FMBAP 2017-20	Funds Released (XI + XII Plan)	Funds Released	Funds Released	Funds Released	
		Nos.	Estimated Cost		Nos.	Estimated Cost	(XII Plan)	Nos.	Estimated Cost								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
22	Tripura	11	26.57	23.62	0	0	0	11	26.57	11		0	23.62				23.62
23	Uttar Pradesh	26	667.57	290.69	3	291.7	111.22	29	959.27	24	2	3	401.91	13.55	15.575	39.15	470.18
24	Uttarakhand	12	119.82	49.63	10	715.72	153.98	22	835.54	16	2	4	203.61		4.634	35.58	243.82
25	West Bengal	17	1822.08	643.26	1	438.94	158.75	18	2261.02	16		2	802.01	65.03	23.652	117.12	1007.81
Total		**420**	**7857.08**	**3566**	**102**	**5381.28**	**1307.07**	**522**	**13238.36**	**414**	**64**	**44**	**4873.07**	**562.67**	**428.2**	**546.09**	**6410.03**

Source: FMP Directorate, CWC

'*': The scheme has been moved to be funded under RMBA component therefore this scheme has been excluded from sum of total no. of schemes.

7.9 Distribution of Revenue Expenditure by Sub-major Head of Accounts

(Rs. in Cr)

Sl. No.	Year/Plan Period	Flood Control	Anti-sea-Erosion	Drainage	General	Total
1	2	3	4	5	6	7
1	1998-99	331.15	15.13	176.86	4.62	527.76
2	1999-00	353.02	21.51	189.79	42.09	606.41
3	2000-01	395.08	12.25	186.32	126.75	720.41
4	2001-02	407.91	19.67	156.07	79.88	663.52
5	2002-03	322.94	9.87	166.36	13.71	512.88
6	2003-04	406.59	13.87	156.82	8.12	585.40
7	2004-05	389.53	12.26	157.28	2.01	561.07
8	2005-06	479.51	18.64	193.15	2.11	693.41
9	2006-07	535.66	11.98	196.38	3.05	747.06
10	2007-08	553.47	21.93	144.82	0.52	720.74
11	2008-09	781.67	66.50	215.37	0.41	1063.95
12	2009-10	841.14	28.89	292.06	0.00	1162.09
13	2010-11	790.76	31.46	309.16	0.37	1131.75
14	2011-12	1250.57	45.05	287.94	0.88	1584.44
15	2012-13	1338.74	83.05	368.72	0.60	1791.10
16	2013-14	1473.99	54.39	315.72	1.86	1845.97
17	2014-15	1552.82	54.50	369.57	0.78	1977.67
18	2015-16	1334.69	56.93	198.66	0.00	1590.29

Source: 'Comprehensive Flood Management in India-2018', HD Directorate, CWC. This publication is brought out on quinquennial basis.

7.10 Distribution of Capital Expenditure by Sub-major Head of Accounts

(Rs. in Cr)

Sl. No.	Year/Plan Period	Flood Control	Anti-sea-Erosion	Drainage	General	Total
1	2	3	4	5	6	7
1	1998-99	227.76	39.51	168.80	0.00	436.06
2	1999-00	308.93	26.71	150.55	0.00	486.20
3	2000-01	308.40	20.31	173.32	0.00	502.03
4	2001-02	355.50	29.62	177.42	0.00	562.54
5	2002-03	317.84	35.88	107.75	0.00	461.47
6	2003-04	307.91	54.37	102.08	0.00	464.36
7	2004-05	524.50	57.67	110.84	0.00	693.02
8	2005-06	727.52	62.87	288.38	0.00	1078.77
9	2006-07	976.33	71.80	247.62	0.00	1295.75
10	2007-08	1369.46	107.80	264.38	0.00	1741.63
11	2008-09	2007.18	188.99	313.27	0.00	2509.44
12	2009-10	2760.11	220.26	284.52	0.00	3264.89
13	2010-11	3161.57	160.97	234.41	0.00	3556.96
14	2011-12	3995.36	48.24	286.49	0.00	4330.09
15	2012-13	3623.44	114.92	431.91	0.00	4170.27
16	2013-14	3308.94	148.98	368.61	0.00	3826.53
17	2014-15	4800.48	131.35	518.61	0.00	5450.44
18	2015-16	3912.91	129.62	530.76	0.00	4573.29

Source: 'Comprehensive Flood Management in India-2018', HD Directorate, CWC. This publication is brought out on quinquennial basis.

7.11 States/UTs- wise Water Rates for Flow Irrigation

Sl. No.	States/UTs	For Irrigation Purposes Flow Irrigation	
		Rate (Rs./Ha)	Date since Applicable
1	2	3	4
1	Andhra Pradesh	148.20 to 864.50	07-01-1996
2	Arunachal Pradesh	No water rates	
3	Assam	150.00 to 751.00	30-03-2000
4	Bihar	74.10 to 370.50	Nov-2011
5	Chhattisgarh	123.50 to 741.00	15-06-1999
6	Delhi	34.03 to 148.20	2009
7	Goa	72.00 to 360.00	1/4/2013
8	Gujarat	160.00 to 300	01-01-2007
9	Haryana	24.70 to197.60	27/07/2000
10	Himachal Pradesh	49.92	04-01-2015
11	Jammu & Kashmir	121.03 to 298.87	04-01-2015
12	Jharkhand	74.10 to 370.50	26/11/2001
13	Karnataka	37.00 to 99.00	13/7/2000
14	Kerala	37.00 to 988.40	18/09/1974
15	Madhya Pradesh	50.00 to 960.00	31/12/2005
16	Maharashtra	119.00 to 6297.00	07-01-2003
17	Manipur	184.00 to 602.00	24/8/2013
18	Meghalaya	No water rates	
19	Mizoram	No water rates	
20	Nagaland	No water rates	
21	Odisha	60.00 to 930.00	04-05-2002
22	Punjab	123.50	12/11/2014
23	Rajasthan	29.64 to 286.52	24/5/1999
24	Sikkim	10.00 to 250.00	2002
25	Tamil Nadu	2.77 to 61.78	11-06-1987
26	Tripura	312.50	10-01-2003
27	Uttarakhand	30.00 to 474.00	18/9/1995
28	Uttar Pradesh	30.00 to 474.00	18/9/1995
29	West Bengal	37.06 to123.50	1/7/2003
30	A & N Islands	No water rates	
31	Chandigarh	Not Available	
32	Dadra & Nagar Haveli	110.00 to 830.00	29/1/1996
33	Daman & Diu	286	2007
34	Lakshadweep	No water rates	
35	Puducherry	Not Available	

Source: HD Directorate, ISO, Central Water Commission

7.12 States/UTs-wise Water Rates for Lift Irrigation

Sl. No.	States/UTs	For Irrigation Purposes	
		Lift Irrigation	
		Rate (Rs./Ha)	Date since Applicable
1	2	3	4
1	Andhra Pradesh	Not Available	
2	Arunachal Pradesh	No water rates	
3	Assam	150.00 to 751.00	30/03/2000
4	Bihar	Not Available	Nov-2011
5	Chhattisgarh	123.50 to 741.00	15/6/1999
6	Delhi	33.35 to 148.20	2009
7	Goa	144.00 to 720.00	04-01-2013
8	Gujarat	53.33 to 100.00	01-01-2007
9	Haryana	12.35 to 98.80	27/7/2000
10	Himachal Pradesh	99.81	04-01-2015
11	Jammu & Kashmir	298.87 to 2998.58	04-01-2015
12	Jharkhand	74.10 to 370.50	26/11/2001
13	Karnataka	74.00 to 1976.80	13/7/2000
14	Kerala	93.00 to 148.50	18/9/1974
15	Madhya Pradesh	50.00 to 960.00	31/12/2005
16	Maharashtra	20.00 to 5405.00	07-01-2003
17	Manipur	184.00 to 602.00	24/8/2013
18	Meghalaya	No water rates	
19	Mizoram	No water rates	
20	Nagaland	No water rates	
21	Odisha	Not Available	04-05-2002
22	Punjab	123.50	12/11/2014
23	Rajasthan	14.82 to 573.04	24/5/1999
24	Sikkim	Not Available	2002
25	Tamil Nadu	Not Available	6/11/1987
26	Tripura	312.50	10-01-2003
27	Uttarakhand	15.00 to 237.00	18/9/1995
28	Uttar Pradesh	15.00 to 237.00	18/9/1995
29	West Bengal	251.94 to 2015.52	07-01-2003
30	A & N Islands	No water rates	
31	Chandigarh*	Not Available	
32	Dadra & Nagar Haveli	75.00 to 275.00	29/1/1996
33	Daman & Diu	286	2007
34	Lakshadweep	No water rates	
35	Puducherry	Not Available	

Source: HD Directorate, ISO, Central Water Commission

'*' In Rural areas of Chandigarh the Water Rates for irrigation purpose is Rs. 23/-per hour w.e.f. 01.01.2010.

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Section-VIII

International Treaties and Cooperation

Section-VIII
International Treaties and Cooperation

8.1 International Water Agreement and Treaty

The International Water Treaty sets out a mechanism for cooperation and information exchange between one or more countries regarding their use of river water under the arbitration of Neutral Expert. It had fixed and delimited the rights and obligations on the use of the river water. The following Agreement and Treaty were signed:

Sl. No.	Country	MoU	Treaty	Cooperation	Remarks
1	2	3	4	5	6
1	India and Norway	MoU			Central Soil and Materials Research Station, New Delhi and Norwegian Geotechnical Institute, Oslo, Norway
2	India and the United Kingdom	MoU			
3	India and Scotland	MoU			
4	Indo-Bangladesh		Treaty		Treaty on Sharing of Ganga/ Ganges Waters at Farakka
5	India-Nepal		Treaty		Mahakali Treaty
6	India-China			Cooperation	Expert Level Mechanism (ELM) to discuss interaction and co-operation upon provision of hydrological data in flood season, emergency management and other issues regarding trans-border Rivers
7	India-Bhutan			Cooperation	Comprehensive Scheme for Establishment of Hydro-meteorological and Flood Forecasting Network on rivers Common to India and Bhutan
8	India-Pakistan		Treaty		Indus Waters Treaty, 1960

8.2 International Cooperation

8.2.1 Bilateral Cooperation

The Ministry of Jal Shakti has signed Memorandum of Understanding (MoU) with different countries on cooperation in the field of water resources management and development. Brief of the MoU's signed during 2018 and their implementation progress is given below:

8.2.1.1 MoU with Norwegian geotechnical Institute, Oslo, Norway: A Memorandum of Understanding (MoU) between Central Soil and Materials Research Station, New Delhi and Norwegian Geotechnical Institute, Oslo, Norway has been signed on 6th June, 2018 for a period of 5 years on cooperation in the field of Geo Technical Engineering and Material Sciences.

8.2.1.2 MoU between India and the United Kingdom on River Ganga Rejuvenation: On rejuvenation of River Ganga, a Memorandum of Understanding (MoU) has been signed between National Mission for Clean Ganga (NMCG) and Natural Environmental Research Council (NERC), UK on 18th April, 2018 during the visit of Prime Minister to London, United Kingdom. The MoU will enable United Kingdom to support Government of India for sustainable management of water resources in the Ganga Basin.

8.2.1.3 MoU between India and Scotland on River Ganga Rejuvenation: MoU has been signed between National Mission for Clean Ganga (NMCG) and Scottish Government: Water Industry Division has been signed on 17th April, 2018 to facilitate arrangements and understandings that lead to cooperation and coordination of all activities relating to pollution abatement & rejuvenation of River Ganga.

8.2.2 Foreign Visits/ Deputation

The Ministry of Jal Shakti has been regularly deputing Technical officers of Centre and State Governments for acquiring training in the various domains relating to water sector and during 2018, approx. 196 Officers from Central Government and State Government have been sent to different countries for acquiring expertise in the fields like Integrated water resources management, micro-irrigation, water use efficiency, irrigation management, enhancing crop production, flood disaster risk management, Dam safety and rehabilitation, waste water treatment, sewage treatment, Morphological modelling, Ecosystem conservation etc.

8.2.3 Indo-Bangladesh Joint Rivers Commission (JRC)

An Indo-Bangladesh Joint Rivers Commission is functioning since 1972 with a view to maintain liaison in order to ensure the most effective joint efforts in maximizing the benefits from common river systems. It is headed by Water Resources Ministers of both the countries. So far, 37 meetings of it have been held.

8.2.3.1 Treaty on Sharing of Ganga/ Ganges Waters at Farakka

A Treaty was signed by the Prime Ministers of India and Bangladesh on 12th December, 1996 for the sharing of Ganga/ Ganges waters at Farakka during the lean season. As per the Treaty, the Ganga/ Ganges waters is being shared at Farakka (which is the last control structure on river Ganga in India) during lean period, from 1st January to 31st May every year, on 10-daily basis as per the formula provided in the Treaty. The validity of Treaty is 30 years. The sharing of water as per the Treaty is being monitored by a Joint Committee headed by Members, Joint Rivers Commission (JRC) from both sides. The 69th & 70th meeting of Joint Committee were held at Kolkata (in May, 2018) and Dhaka (in September, 2018) respectively. The 'Ganga Water Treaty of

1996' with Bangladesh is being implemented to the satisfaction of both the countries since 1997.

Signing of Record of Discussion of 70th Joint Committee Meeting held in September, 2018 at Dhaka, Bangladesh

8.2.4 India-Nepal Cooperation

8.2.4.1 Pancheshwar Multipurpose Project

The Pancheshwar Multipurpose Project (PMP), a bi-national project of Government of India (GoI) and Government of Nepal (GoN), has been envisaged on Mahakali River (known as Sarada in India).

In February 1996, His Majesty's Government (HMG) of Nepal and Government of Indiahad signed a Treaty (known as "Mahakali Treaty") for integrated development of the Mahakali River. Under Article 3 of the Treaty, both sides agreed to build the Pancheshwar Project. The Pancheshwar Development Authority (PDA) was also set up with the approval of both the Governments in September, 2014 for development, execution and operation of the Pancheshwar Project. The Project would help in not only providing hydro energy to stabilize the power grid in the region which is of value, but also, more importantly could address water deficit by long distance water transfer in due course.

The draft final DPR of Pancheshwar Multipurpose Project is ready. On the direction of the Governing Body of PDA, a joint Team of Officials/ Experts (ToE) has been constituted by both the countries which is discussing to resolve the comments on the DPR towards its finalization.

8.2.4.2 Sapta Kosi High Dam Multipurpose Project and Sun Kosi Storage cum Diversion Scheme (including Kamala Diversion)

The India-Nepal Joint Project Office has started functioning in Biratnagar, Nepal since August, 2004 with the mandate of jointly carrying out field investigations and preparation of DPR for Sapta Kosi High Dam Multipurpose Project and Sun Kosi Storage cum Diversion Scheme (SSDS). Investigation of Kamla Multipurpose Project, which is now a component of SSDS, and preliminary study of the Bagmati Multipurpose Project were added to its mandate in October, 2004.

Signing of Minutes of 8th meeting of JCWR

8.2.4.3 Various India-Nepal Bilateral Meetings on Water Resources

a. Joint Ministerial Commission on Water Resources (JMCWR) headed by Ministers of Water Resources of India and Nepal, would address bilateral cooperation on water resources.

b. Joint Committee on Water Resources (JCWR) headed by Secretary (WR) of the two countries, to review the work of various technical/expert groups set up for planning and implementation of water resources project as well as the work of the Joint Standing Technical Committee. It would also ensure expeditious implementation of the decisions taken at the Ministerial Commission on Water Resources and appraise the respective governments on such matters. The 8th meeting of India-Nepal Joint Committee on Water Resources (JCWR) was held on 11th January, 2019 at New Delhi. The Indian side of JCWR was headed by Secretary (WR, RD & GR) and the Nepalese side was headed by Secretary, Ministry of Energy, Water Resources and Irrigation.

c. Joint Standing Technical Committee (JSTC) headed by Chairman, GFCC, and coordinates all

existing committees and subcommittees under the JCWR. The 6th India-Nepal Joint Standing Technical Committee (JSTC) was held on 9th-10th January, 2019 at New Delhi. The Indian side of JSTC was headed by Chairman, GFCC whereas the Nepalese side was headed by Joint Secretary, Ministry of Energy, Water Resources and Irrigation.

d. Joint Committee on Inundation of Flood Management (JCIFM) headed by Member (C), GFCC is an Umbrella Committee to implement the decisions of JSTC in inundation and flood management issues. The JCIFM addresses the issues related to flood management and inundation and canform task group(s), if required, and monitor the progress of works and provide guidance to task group(s) and report to JSTC. The 12th meeting was held during 16th-20th April, 2018 at Kathmandu, Nepal. Two meetings of Sub-Group of JCIFM have also carried out inspection of inundation area along India-Nepal borders on 26th-30th June, 2018 and 19th-23rd November, 2018.

Signing of Minutes of 6th meeting of JSTC

e. Joint Committee on Kosi Gandak Projects (JCKGP) headed by Principal Secretary, Water Resources Department, Government of Bihar held its ninth meeting on 28th-29th November, 2018 at Kathmandu, Nepal.

8.2.5 India-China Cooperation

During the visit of Hon'ble President of the People's Republic of China in November, 2006, it was mutually agreed upon to set up an Expert Level Mechanism (ELM) to discuss interaction and co-operation upon provision of hydrological data in flood season, emergency management and other issues regarding trans-border Rivers as agreed between them. The ELM meeting is held yearly alternatively in both the countries. The Last (11th) meeting of ELM was held during 26-27th March,

2018 at Hangzhou, China in which it was decided that Chinese side will provide hydrological information on the Yaluzangbu/Brahmaputra River in the flood season of 2018, irrespective of the date of signing of MoU and Implementation Plan. Next Meeting (12th) of ELM is proposed to be held in March, 2019 at Ahmadabad, Gujarat (India).

MoU on Hydrological information of Yaluzangbu/Brahmaputra River by China to India in Flood season was renewed and signed on 9th June 2018 during visit of Hon'ble Prime Minister of India to China. The timely information received from China as per the provisions of MoU helped to alert the concerned agencies in advance in Assam and Arunachal Pradesh in October, 2018 about the impending flood and sudden rise in water level in Brahmaputra/Siang due to heavy landslide in Tibet (China).

8.2.6 India-Bhutan Cooperation

A scheme titled 'Comprehensive Scheme for Establishment of Hydro-meteorological and Flood Forecasting Network on rivers Common to India and Bhutan' consists of hydro-meteorological/ meteorological stations network located in Bhutan and Operation & Maintenance (O&M) carried out by the Royal Government of Bhutan (RGoB) with funding from Government of India (GoI). The data received from these stations are utilised by the Central Water Commission (CWC) for formulating flood forecasts.

A Joint Group of Expert (JGE) on Flood Management 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 recommend to both Governments appropriate and mutually acceptable remedial measures. Total Eight meetings of JGE have been held so far. The latest (8th) meeting of JGE was held at Guwahati during 1st-2nd November, 2018.

A Joint Expert Team (JET) consisting of officials from the Government of India (GoI) and the Royal Government of Bhutan (RGoB) meets twice in a year to review the progress and other requirements of the scheme. The latest (34th) meeting of JET was held at Aizawl, Mizoram during 17th -18th, May, 2018 and 35th Meeting of JET was held at Thimphu on 6th-7th March, 2019.

A Joint Technical Team (JTT) was formed to carry out more detailed technical examination of flood related issues in southern foothills of Bhutan and adjoining plains in India. The last (5th) meeting of reconstituted JTT was held during 26th-27th April, 2018 at Phuentsholing, Bhutan.

8.2.7 Indus Waters Treaty, 1960

Under the Indus Waters Treaty 1960, India and Pakistan each have created a permanent post of Commissioner for Indus Waters. Each Commissioner is the representative of his Government and serves as a regular channel of communication on all matters relating to implementation of the Treaty. The two Commissioners together form the Permanent Indus Commission (PIC).

During the year 2018-19, the Commission held one (115th) meeting of Permanent Indus Commission (PIC) at Lahore, Pakistan in August, 2018. Commission also proposed to hold 119th Tour of PIC meeting in January, 2019 in India and 120th Tour of PIC in Pakistan in March, 2019.

In fulfilment of the requirement of Indus Waters Treaty, the daily G&D data of hydrological sites on six basins, The Indus, The Jhelum, The Chenab, The Ravi, The Beas and The Sutlej of Indus system was sent to Pakistan every month.

Irrigated Cropped Area Statistics for the crop year 2017-18 for the Indus, the Jhelum & the Chenab basin had been compiled and sent to Pakistan as per the provisions of Indus Waters Treaty during November, 2018.

Flood flow data for agreed sites on the rivers Ravi, Sutlej, Tawi and Chenab was also communicated by India to Pakistan as a gesture of goodwill and friendship for their benefit through telephone during 1st July to 10th October, 2018 to undertake advance flood relief measures.

Clearance of Projects from Indus Waters Treaty Angle issued/ to be issued for:

1. Sawalkot HEP (1856 MW) on Chenab River (J&K).
2. Baltikulan SHP (5 MW) on Baltikulan Nallahon sub-tributary of Jhelum River (J&K).
3. Tamasha SHP (12 MW) on Tamasha Nallah on sub-tributary of Indus River (J&K).
4. Kalaroos-IISHP (10.50 MW) on Kalaroos Nallah on sub-tributary of Jhelum River (J&K).
5. Kwar HEP (540 MW) on Chenab River (J&K) to be cleared soon.
6. LuhriHEP Stage-II (172 MW) on Sutlej River (HP).

Ujh Multipurpose Project

To fast track utilization of India's rights under Indus Waters Treaty, the detailed Project Report of Ujh Project has been cleared and now in next stage of implementation. This project will store around 0.65 MAF of waters of River Ujh (a tributary of River Ravi) to irrigate 30,000 Ha and produce 196 MW of hydropower. The project is a National project and eligible Central Assistance will be provided by the Ministry of Jal Shakti.

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Appendix Glossary

GLOSSARY OF TERMS

Anicut	An anicut is a masonry check dam that is constructed across a stream to impound water for maintaining and regulating irrigation. The water stored behind an anicut can be used for irrigation of crops or drinking water for humans and livestock. They also are used to increase the residence of water to recharge groundwater, especially wells located downstream. Anicuts are also used in wildlife sanctuaries to provide sufficient water hole for animals or to provide habitats for aquatic flora and fauna.
Area sown more than once	This represents the area on which crops are cultivated more than once during the agricultural year. This is obtained by deducting Net Sown Area from Total Cropped Area.
Barrage	A barrage is a type of low-head, diversion dam which consists of a number of large gates that can be opened or closed to control the amount of water passing through. This allows the structure to regulate and stabilize river water elevation upstream for use in irrigation and other systems.
Beel	A beel is a billabong or a lake-like wetland with static water (as opposed to moving water in rivers and canals.
Brackish water	Brackish water (less commonly brack water) is salt water and fresh water mixed together. It is saltier than fresh water, but not as salty as seawater. It may result from mixing of seawater with fresh water, as in estuaries, or it may occur in brackish fossil aquifers.
Canal	Canals are waterways channels, or artificial waterways, for water conveyance, or to service water transport vehicles. They may also help with irrigation. A canal is like a navigation when it parallels a river and shares part of its waters and drainage basin, and leverages its resources by building dams and locks to increase and lengthen its stretches of slack water levels while staying in its valley. In contrast, a canal cuts across a drainage divide atop a ridge, generally requiring an external water source above the highest elevation.
Carrying Capacity (also referred to as Dead Weight Capacity)	Maximum permissible weight of goods, expressed in tones, which a craft may carry according to ship's document.
Cropping Intensity	It is the ratio of gross (total) area sown to the net sown area expressed as a percentage.

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Culturable Command Area (CCA)	It is the area which can be physically irrigated from a scheme and is fit for cultivation.
Dam	Any artificial barrier which impounds or diverts water. A dam is generally considered hydrologically significant if it is 1.25 feet (0.4 m) or more in height from the natural bed of the stream and has storage of at least 15 acre-feet or it has an impounding capacity of 50 acre-feet or more and is at least six feet (2 m) above the natural bed of the stream.
Dumb Barge	IWT craft designed for being towed and not having its own means of mechanical propulsion. The fact that a dumb barge is fitted with an auxiliary engine does not change its nature.
Dumb Tanker	Dumb barge intended for the bulk transport of liquids or gases. Tankers for the transport in bulk of powdered products such as cement, flour, plaster, etc. are to be excluded, and to be counted among dumb barges.
Gender Development Index (GDI)	The Gender related Development Index (GDI) is an index designed to measure gender equality.
Gender Inequality Index (GII)	The GII is an inequality index. It measures gender inequalities in three important aspects of human development reproductive health, measured by maternal mortality ratio and adolescent birth rates; empowerment, measured by proportion of parliamentary seats occupied by females and proportion of adult females and males aged 25 years and older with at least some secondary education; and economic status, expressed as labour market participation and measured by labour force participation rate of female and male populations aged 15 years and older. The GII is built on the same framework as the IHDI to better expose differences in the distribution of achievements between women and men. It measures the human development costs of gender inequality.
Glacier	A glacier is a persistent body of dense ice that is constantly moving under its own weight. A glacier forms where the accumulation of snow exceeds its ablation (melting and sublimation) over many years, often centuries. Glaciers slowly deform and flow under stresses induced by their weight, creating crevasses, seracs, and other distinguishing features. They also abrade rock and debris from their substrate to create landforms such as cirques and moraines. Glaciers form only on land and are distinct from the much thinner sea ice and lake ice that form on the surface of bodies of water.

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Gross Sown Area	This is the sum total of the areas under all crops over the various seasons in an agriculture year (i.e. from the 1st July to 30th June next year).
Gross Irrigated Area	It is the total area irrigated under various crops in a year, counting the area irrigated under more than one crop during the same year as many times as the number of crops grown and irrigated.
Inland Water Transport (IWT) Craft	Craft having a minimum carrying capacity of 20 Tonnes designed for the carriage of goods by inland waterways.
Irrigation Potential Created (IPC)	The Irrigation potential created by a project at a given time during or after its construction is the aggregate gross area that can be irrigated annually by the quantity of water that could be made available by all the connected and completed works up to the end of the water courses or the last point in the water delivery system. It is the area that can be irrigated from a project in a design agriculture year that is from the 1st July to 30th June next year for the projected cropping pattern and accepted water allowance on its full development. Before an area is included under potential created, it has to be ensured that the water for the area to be reported upon is available and the conveyance system up to and including the irrigation outlet to serve an area up to 40 Ha in the area to be irrigated is completed.
Irrigation Potential Utilised	The Irrigation potential utilised is the total gross area actually irrigated by a project/scheme during the agricultural year under consideration.
Lake	A lake is an area filled with water, localized in a basin, surrounded by land, apart from any river or other outlet that serves to feed or drain the lake. Lakes lie on land and are not part of the ocean. Therefore, they are distinct from lagoons, and are also larger and deeper than ponds, though there are no official or scientific definitions.
Large Dam	A dam exceeding 15m in height above deepest river bed level and a dam between 10 and 15 m height provided volume of earthwork exceeds 0.75 MCM and storage exceeds 1 MCM or the maximum flood discharge exceeds 2000 cumecs.
Live Capacity	It is the total amount of storage capacity available in a reservoir for all purposes, from the dead storage level to the normal water or normal pool level/surface level. It does not include surcharge, or dead storage, but does include inactive storage, active conservation storage and exclusive flood control storage.

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Major Irrigation Scheme	A scheme having Culturable Command Area (CCA) more than 10,000 Ha is classified as major irrigation scheme.
Medium Irrigation Scheme	A scheme having CCA more than 2,000 Ha and up to 10,000 Ha individually is classified as medium irrigation scheme.
Minor Irrigation Scheme	A scheme having CCA up to 2,000 Ha individually is classified as minor irrigation scheme.
Multidimensional Poverty Index (MPI)	The Global Multidimensional Poverty Index (MPI) was developed in 2010 by the Oxford Poverty & Human Development Initiative (OPHI) and the United Nations Development Programme and uses health, education and standard of living indicators to determine the degree of poverty experienced by a population.
Navigable Inland Waterways	A stretch of water, not part of the sea, over which craft of a carrying capacity not less than 50 Tonnes can navigate when normally loaded. This term covers both navigable rivers and lakes (natural water-courses, whether or not they have been improved for navigation purposes) and canals (waterways constructed primarily for the purpose of navigation). The length of rivers and canals is measured in mid channel and length of lakes, as well as lagoons, is counted as the length between the most distant points between which the transport is performed. An inland waterway forming a common frontier between two countries is reported by both.
Net Sown Area	It is the total area sown with crops and orchards, counting areas sown more than once in the same agricultural year only once.
Net Irrigated Area	It is the total area which is irrigated counting area irrigated more than once on the same land in an agricultural year once only.
Oxbow Lake	An oxbow lake is a U-shaped lake that forms when a wide meander of a river is cut off, creating a free-standing body of water.
Reporting Area for Land Utilisation Statistics	The Reporting area stands for the area for which data on land use classification are available.
Power(KW)	Mechanical force developed by the motive power installation in craft. This power should be measured in effective kilowatts (power transmitted to the propeller).
Pushed Barge	IWT craft designed for being pushed and not having its own means of mechanical propulsion. The fact that a pushed barge is fitted with an auxiliary engine does not change its nature. Pushed barge intended for the bulk transport of liquids or gases. Tankers for the transport in bulk of powdered products such as cement, flour, plaster etc. are to be excluded and to be counted among pushed barges.

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Pusher Craft	Powdered craft developing not less than 37 KW and designed or fitted for the pushing of pushed or pushed- towed barges but not for the carriage of goods.
Pusher Tug	Powdered craft developing not less than 37 KW and designed or fitted for the towing of dumb barges, pushed-towed barges or rafts, and for the pushing pushed and pushed-towed barges but not for the carriage of goods.
River	River is a natural flowing water course, usually freshwater, flowing towards an ocean, sea, lake or another river.
River Basin	River Basin is the basic hydrological unit for water resources planning and management.
Run-off	Water which is not absorbed by the soil and flows to lower ground, eventually draining into a stream, river, or other body of water. It is that part of precipitation that flows toward the streams on the surface of the ground or within the ground. Run-off is composed of base flow and surface run-off.
Run-off/ Potential	Run-off/ potential of a river for a specified period at a site is the total volume of water flow/passed from/through the site during the specified period. It is the notional depth of water in mm over the catchment, equivalent to annual run-off (in cum)/Catchment Area (km^2)*1000 and calculated at the discharge measurement station.
Self-Propelled Barge	IWT craft having its own means of mechanical propulsion, dumb barges, pushed barges and pushed- towed barges with only an auxiliary engine should be regarded as dumb, pushed or pushed-towed barges as the case may be. The fact that a self-propelled barge can be used for towing does not change its nature.
Self-Propelled Craft for River- Sea Navigation	Craft having a Dead Weight capacity of at least 20 Tonnes, designed for the transport of goods by river and by Sea and equipped with their own means of propulsion developing at least 37 KW.
Self-Propelled Tanker	Self-propelled barge intended for the bulk transport of liquids or gases. Tankers for the transport in bulk of powdered products such as cement, flour, plaster etc. are to be excluded and to be counted among self-propelled barges.
Surface Water	Water that flows in streams and rivers and in natural lakes, in wetlands, and in reservoirs constructed by humans.

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Total Cultivable Area	This consists of net sown area, current fallows, fallow lands other than current fallows, culturable waste and land under miscellaneous tree crops.
Tug	Powdered craft developing not less than 37 KW and designed for the towing of dumb barges, pushed towed barges, rafts, but not for the carriage of goods.
Ultimate Irrigation Potential	The ultimate irrigation potential is the gross area that can be irrigated from a project in design year for the projected cropping pattern and assumed water allowance on its full development. The gross irrigated area will be the aggregate of the areas irrigated in the different crop seasons, the areas under two seasonal and perennial crops being counted only once in the year. The Ultimate Irrigation Potential of ground water may however, be taken as the total area that can be irrigated by utilizing the Annually Rechargeable Ground Water Resource Available for Irrigation considering the gross irrigation requirement of crops grown in an unit area.
Watershed	Watershed is a natural hydrologic entity governed by the terrain topography from where runoff is drained to a point. The term watershed is a general phenomenon thus its size and area depends on the scale of the base map used for delineation and codification.
Weir	A weir or low head dam is a barrier across the width of a river that alters the flow characteristics of water and usually results in a change in the height of the river level. They also are used to control of the flow of water for outlets of lakes, ponds, and reservoirs. There are many weir designs, but commonly water flows freely over the top of the weir crest before cascading down to a lower level.

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