सत्यमेव जयते

जल क्षेत्र की एक झलक-2024

WATER SECTOR AT A GLANCE-2024

भारत सरकार

GOVERNMENT OF INDIA

बेसिन आयोजन एवं प्रबंधन संगठन

BASIN PLANNING AND MANAGEMENT ORGANISATION

केन्द्रीय जल आयोग

CENTRAL WATER COMMISSION

जल संसाधन, नदी विकास एवं गंगा संरक्षण विभाग

DEPARTMENT OF WATER RESOURCES, RD & GR

जल शक्ति मंत्रालय

MINISTRY OF JAL SHAKTI

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जल सम्बंधित सांख्यिकी निदेशालय/Water Related Statistics Directorate

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केन्द्रीय जल आयोग/Central Water Commission

(cwc.gov.in)

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FOREWORD

Water remains an indispensable resource for the nation, and its judicious management is essential for sustainable growth. The Central Water Commission, recognized as the apex technical body in the field of water resources, continues to focus on promoting integrated and sustainable development through the application of advanced technology and collaboration with all relevant stakeholders.

The present publication, 'Water Sector at A Glance – 2024', marks the fifth annual edition aimed at providing a succinct yet comprehensive overview of the water resources sector at the national level. This publication is the result of meticulous efforts to compile and consolidate extensive data from multiple Ministries, Departments, and State Governments, thereby reflecting the status and trends in water availability and management across the country.

Reliable and updated data plays a pivotal role in shaping effective policies, and it is hoped that this publication will significantly contribute to informed decision-making in the water sector. The valuable inputs and leadership provided by Shri Yogesh Paithankar, Member (WP&P), and the dedicated work of the Water Related Statistics (WRS) Directorate and Basin Planning & Management Organisation (BPMO) team, led by Shri B. C. Vishwakarma, Chief Engineer (BPMO) are highly commendable.

It is anticipated that 'Water Sector at A Glance – 2024' will prove to be a useful and insightful resource for policymakers, researchers, and all stakeholders involved in the sustainable management of India's water resources.

New Delhi
September, 2025

(Atul Jain)
Chairman, CWC

ACKNOWLEDGEMENT

From sustaining agriculture to powering industries and shaping our cities, water defines the pace and pattern of India's development. Since Independence, the nation has undertaken ambitious water resources development projects to ensure equitable and efficient allocation of this vital resource across regions and sectors.

The planning, development, execution, and management of such projects demand a robust and comprehensive database on water resources and allied aspects. As the lead nodal agency in the water resources sector, the Central Water Commission (CWC) bears the overarching responsibility of promoting balanced and sustainable development of this critical resource. In this pursuit, CWC has consistently endeavoured to document and disseminate authentic water-related data through its various publications.

In continuation of this effort, *"Water Sector at a Glance – 2024"* presents a consolidated snapshot of water resources and related parameters at the all-India level. The data presented herein is sourced from various Ministries, Departments, Organisations, and Directorates of both Central and State Governments, and reflects the latest available information as of March 2024. This edition maintains the continuity and structure of previous publications while enhancing data presentation through graphs and tables for clarity, quick reference, and informed analysis.

The compilation and finalisation of this publication have been ably carried out by the officers and staff of the Water Related Statistics (WRS) Directorate, Basin Planning & Management Organisation (BPMO), WP&P Wing of CWC, under the guidance of Shri B C Vishwakarma, CE(BPMO), Shri Ajay Shivlal Banode, Director (RO Dte.) and Dr. Umesh P. Gupta, Director (BP-II Dte.). I commend their dedication and professionalism in giving the publication a comprehensive and reader-friendly form.

I trust that *"Water Sector at a Glance – 2024"* will serve as a useful reference for policymakers, planners, researchers, and all stakeholders in the water sector. Constructive suggestions and feedback for further improving the publication are most welcome.

New Delhi
September, 2025

(Yogesh Paithankar)
Member (WP&P), CWC

PREFACE

India's water resources challenges are complex and multifaceted — ranging from competing demands across agriculture, industry, and domestic use to the impacts of climate variability and environmental concerns. Addressing these challenges calls for an integrated approach that considers all sources of water — surface and groundwater alike — from a river basin and hydrological perspective. Such an approach must be anchored in accurate, comprehensive, and timely data, supported by advanced tools for collection, compilation, analysis, and informed decision-making. Hydro-meteorological observations and the statistical analysis derived from them form the foundation for efficient and sustainable water management.

The Central Water Commission (CWC), as the apex organisation in the water resources sector, is mandated to promote integrated and sustainable development of India's water resources through state-of-the-art technology and technical excellence. To meet the growing demand for credible and accessible water data, the Water Related Statistics (WRS) Directorate of the Basin Planning & Management Organisation (BPMO) regularly publishes a range of statistical and analytical reports.

The *"Water Sector at a Glance – 2024"* marks the fifth edition of this annual series, offering a concise yet comprehensive overview of water resources and related aspects at the national level. This edition includes key highlights of the National Water Policy, 2012, and presents data in both tabular and visual formats — maps, charts, and graphs — for clarity and ease of analysis by a wide spectrum of stakeholders.

This publication has been possible due to the vision and guidance of Shri Atul Jain, Chairman, CWC, and Shri Yogesh Paithankar, Member (WP&P), CWC, whose support and encouragement have been invaluable.

The compilation is the result of dedicated teamwork by the officers and staff of the Water Related Statistics (WRS) Directorate, BPMO. I extend my appreciation to Shri Ajay Shivlal Banode, Director; Dr. Umesh P. Gupta, Director; Ms. A. Kiruthika, Joint Director; Ms. Apeksha Agrawal Jain, Deputy Director; Ms. Lalita Bisht, Senior Statistical Officer; and Ms. Dipika Gupta, Junior Statistical Officer, for their committed efforts in bringing this edition to fruition.

I also express my sincere appreciation to all data-contributing agencies for their valuable inputs and continued support. Their cooperation remains central to the success of this endeavour.

I trust this publication will serve as a valuable reference for policymakers, planners, researchers, and academicians. We remain committed to continually enhancing both the content and design of future editions, and welcome constructive feedback from users to guide these improvements.

New Delhi
September, 2025

(B C Vishwakarma)
Chief Engineer (BPMO)

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(WRS DTE., BPMO, CWC)

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Acronyms and Abbreviations

AIBP	Accelerated Irrigation Benefits Programme
BCM	Billion Cubic Metre
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
CGWB	Central Ground Water Board
CIWTC	Central Inland Water Transport Corporation
CLA	Central Loan Assistance
cm	Centimetre
Cr	Crore
CUI	Coverage Under Irrigation
cum	Cubic Metre
cumec	Cubic Metre per Second
cusec	Cubic Feet 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 Barrage Project
FMP	Flood Management Programme
FRL	Full Reservoir Level
GD	Gauge and Discharge Site

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Acronyms and Abbreviations

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/ Ground Water
GWS	Ground Water Scheme
Ha	Hectare
HDD	Hydrological Data Directorate
HEPR	Hydro Electric Potential Reassessment Division
HFL	Highest Flood Level
HKKP	Har Khet Ko Pani
HP	Horse Power
HQ	Head Quarter
IPC	Irrigation Potential Created
IPU	Irrigation Potential Utilised
IWAI	Inland Waterways Authority of India
IWDP	Integrated Watershed Development Project
IWRM	Integrated Water Resources Management
IWT	Inland Water Transport
km	Kilometer
km^2	Square Kilometer
km^3	Cubic Kilometer
KW	Kilo Watt
KW/h	Kilo Watt per hour
LTIF	Long Term Irrigation Fund

Contd...

Acronyms and Abbreviations

MCM	Million Cubic Metre
MCM/Yr	Million Cubic Metre per year
Mha	Million Hectare
MLD	Million Litres per Day
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
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
NWP	National Water Policy
NWRC	National Water Resources Council
PDA	Pancheshwar Development Authority
PIM	Participatory Irrigation Management
PL	Price Level
PMKSY	Pradhan Mantri Krishi Sinchayee Yojana
PMO	Project Monitoring Organisation
RDC	River Data Compilation
RGI	Registrar General of India
RRR	Repair, Renovation and Restoration
SG & Met	Snow Gauge & Meteorological Site
Sq.km	Square Kilometer
STP	Sewage Treatment Plant
SW	Surface Water

Contd...

Acronyms and Abbreviations

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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Executive Summary

Water is an indispensable element in every sector of the economy, be it primary, secondary or tertiary sectors. These water demands are fulfilled by various sources of water supply; surface water bodies like river, lakes, glaciers and ponds; Ground water aquifers, wells, springs and other conventional sources. But these resources are under severe environmental stress due to the growing population and increased levels of developmental activities, industrialization and urbanization etc.

Water has cross sectoral linkages over various sectors such as food, energy, agriculture, industries and urban development and others, thus, cannot be considered in isolation, which makes it challenging for the policy makers for apportioning diminishing supplies between ever increasing demands. Factors such as demography and climate change further increase the stress on water resources and need for highlighting the water security. In many regions, the availability of water in both quantity and quality is being severely affected by climate change, with more or less precipitation in different regions and more extreme weather events. Thus, water resource management plays an important role.

The Water Related Statistics (WRS) Directorate, BPMO, CWC brings out various publications at regular intervals on statistics related to water resources development & management and related aspects. The present publication 'Water Sector At A Glance-2024' provides gist of water resources and related aspects at all India level. An attempt has been made to cover a wide range of data on water and related resources in the country in line with its previous publication, 2023. The information given in the publication is collected from various Directorates of CWC, various Ministries/Departments and other organizations with updated status as on 31st March, 2024.

It comprises 8 Sections. The water statistics are present both in tabular as-well-as in map/graphical formats for better and quick understanding by the stakeholders.
The structure of this publication is as follows:

- Section-I : 'National Water Policy, 2012'
- Section-II : 'Water Resources at a Glance'
- Section-III : 'Major & Medium Irrigation and other Projects'
- Section-IV : 'Flood Management'
- Section-V : 'Land-Use Statistics'
- Section-VI : 'Navigation-Inland Water and Transport'
- Section-VII : 'Hydro-Electric Potential'
- Section-VIII: 'International Treaties and Cooperation'

Section-I on 'National Water Policy, 2012' gives the information on the formation of National Water Policies-1987, 2002 and 2012. It gives the details of the States which are having State

Water Policies in pursuance of National water policy 1987, 2002 and 2012. It also provides the salient features of the National Water Policy, 2012.

Section-II on 'Water Resources at a Glance' presents a brief global water scenario, world land resources and a summary on India-land and water resources. It also provides per capita water availability in India and details on the total renewable internal fresh water resources of Top 10 and Bottom 10 countries. It deals with water resources potential in River Basins of India including catchment area of the River basins, Watersheds in India, annual and monthly rainfall in India, status of monitored glacial lakes and water bodies and Hydro-Meteorological network of CWC. It also provides information on designated best uses of water and water quality standards in India. It also gives the details on the water quality monitoring activities of CWC and State/Basin-wise Live Storage Capacity of Reservoirs. This Section also displays State/UT-wise Categorization of Assessment Units in India, 2024, State/UT-wise Ground Water Monitoring Wells in India and State-wise Ground Water Resources in India, 2024. In this Section, 6 Maps are provided covering the information on River Basins of India, Sub-Basin Boundary of India, Categorization of Assessment Units as per Dynamic Ground Water Resources Assessment of India-2024, Principal Aquifer System of India, Ground Water Monitoring Stations in India and Water Level Scenario in India.

Section-III on 'Major & Medium Irrigation and other Projects including Minor Irrigation' gives the information on state-wise and project-wise information on completed and ongoing schemes along with the updated details on Culturable Command Area (CCA), Irrigation Potential Created (IPC), project cost, and the time taken for completion. The section also deals with the technical and financial aspects of water and related sectors in the country such as details on Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) and its major components -Accelerated Irrigation Benefits Programme (AIBP) and Har Khet Ko Pani (HKKP). It gives the details on the sub-components-National Projects, Command Area Development & Water Management (CAD&WM) Programme, Surface Minor Irrigation Scheme, Repair, Renovation & Restoration (RRR) of Water Bodies Scheme and PMKSY-HKKP, Ground Water Scheme. It provides the details on special package for Maharashtra/Sirhind Feeder (SF) and Rajasthan Feeder (RF). This Section also consists of the data/information on External Assistance for development of water resources and provides the data/information on 6th Minor irrigation census conducted during 2017-18.

Section-IV on 'Flood Management' deals with State-wise and Basin-wise Flood Forecasting Stations, Flood Forecasting Performance, Flood Damage, Flood Management Programme (FMP), Flood Management and Border Areas Programme (FMBAP) and River Management Activities & works related to Border Areas (RMBA) Programme.

Section-V on 'Land-Use Statistics' deals with the data on selected Land-use & Irrigation Statistics, Irrigation area under principal crops, sources of irrigation along with area irrigated and productivity of food grains.

Section-VI on 'Navigation-Inland Water and Transport' provides the criteria for declaration of National Waterway, details of National Waterways (1-5) and development of 106 new National Waterways. It also provides the details of cargo movement on major waterways in the country.

Section-VII on ‘Hydro-Electric Potential’ provides the data/information on electricity generation & consumption. Hydro-Electric Potential 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. It also provides Region/State-wise and Basin-wise status of Large Hydro Electric Potential Development (in terms of installed capacity - above 25 MW).

Section-VIII on ‘International Treaties and Cooperation’ consists of the list of 14 Nos. of Memorandum of Understanding (MoU) and 2 Nos. of Memorandum of Cooperation (MoC) between India & other countries and brief note on the International Treaties and Transboundary Cooperation of India with five neighbouring countries on trans-boundary rivers in the field of Water Resources Management. Cooperation with other countries in water sector help water experts to set new standards for water resources management by sharing best practices, knowledge, latest technology and breakthroughs in theoretical and applied sciences.

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Section-I
National Water Policy, 2012

i. Water, which is a vital sustenance for life and economic development, is becoming an increasingly scarce resource in the country due to rising demand, population pressure, urbanization and the impacts of climate change.

ii. Since water is a State subject under the Constitution of India, the planning and execution of water resources development have by and large been carried out by the individual States. 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 are derived from the available water resources.

iii. This Section gives the information on the formulation of National Water Policies-1987, 2002 and 2012. It gives the details of the States which are having State Water Policies in pursuance of National Water Policy (NWP) 1987, 2002 and 2012. It also provides the salient features of the National Water Policy, 2012.

1.1 Formulation of National Water Policy (NWP)

i. The NWP is adopted by the National Water Resource Council (NWRC), which was established in March, 1983. The Hon'ble Prime Minister of India is the Chairman of the NWRC and the Minister of Water Resources is the Vice-Chairman. Members comprise Minister of State for Water Resources; the Union Ministers or Ministers of State from a few related Central Ministries; Chief Ministers of all the states; and Lieutenant Governors/Administrators of all the Union Territories. Secretary, M/o Water Resources is the Secretary of the NWRC.

ii. A National Water Board (NWB) also exists under the chairmanship of the Secretary, Ministry of Water Resources. Its members include Secretaries of the Union Ministries of Agriculture, Rural Development, Urban Development, Surface Transport, Environment and Forests, Planning, and Science and Technology; Chairman, Central Water Commission (CWC); and Chief Secretaries of all the States and Union Territories. The Member (Water Planning and Projects) of the CWC serves as the Member Secretary of the NWB. The NWB reports to the NWRC. The draft National Water Policy is first reviewed by the Board and revised based on inputs received. It is then finalized and forwarded to the Council for review and approval.

iii. The National Water Policy was first adopted by the NWRC during its 2nd meeting held on 9th September, 1987. It states that the policy may be reviewed and revised periodically as and when need arises. The National Water Policy was subsequently revised in year 2002 as new challenges emerged in water sector. The 1st revised National Water Policy, 2002 was adopted by the NWRC in its 5th meeting held on 1st April, 2002.

1.2 National Water Policy, 2012

1) India is faced with dual challenge of sustaining its rapid economic growth and 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 adapt and enhance the ecological sustainability of its development path.

2) To address these issues, the National Action Plan on Climate Change (NAPCC) was launched by the Government of India in 2008**,** outlining principles and approaches to mitigate the impact of climate change through eight National Missions, one of which is the National Water Mission.

3) This 'National Water Mission' document identifies the strategies for achieving the goals of (a) Comprehensive water data base in public domain (b) assessment of the impact of climate change on water resource, (c) Promotion of citizen and state actions for water conservation, augmentation and preservation and 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.

4) 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. In pursuance to this strategy as well as deliberations in National Water Board, Ministry of Water Resources initiated the process of review of National Water Policy, 2002.

5) A series of consultation meetings were held with Hon'ble Members of Parliamentary Standing Committee on Water Resources, Academia, Experts and Professionals, Non-Governmental Organizations and representatives of Panchayati Raj Institutions. A drafting committee was also constituted on 5th April, 2011 under the chairmanship of Dr. S. R. Hashim, (former Member Planning Commission and Chairman UPSC) for drafting the new National Water Policy. Considering the recommendations and feedback received during various consultation meetings, the Drafting Committee identified basic concerns in water resources sector and adopted basic principles which should be followed to address those concerns, and accordingly, evolved draft policy recommendations. The draft National Water Policy, 2012, recommended by the Drafting Committee was circulated in public domain as well as amongst all State Governments and related Union Ministries for comments. After incorporating the comments received, the Drafting Committee recommended Revised Draft National Water Policy, 2012.

6) The National Water Board under the Chairmanship of Secretary (WR) considered the Revised Draft National Water Policy, 2012 at its 14th meeting held on 7th June, 2012. The Draft National Water Policy arrived at as per deliberations of the National Water Board meeting was recirculated among all States/UTs and related Central Ministries. The draft policy was also discussed with the Consultative Committee of Parliament attached to the Ministry of Water Resources. The Draft National Water Policy (2012) was deliberated by the National Water Resources Council (NWRC) at its 6th meeting

on 28th December, 2012 under the Chairmanship of Hon'ble Prime Minister of India, wherein the National Water Policy, 2012 was adopted as per deliberations. Following adoption, it was forwarded to all the State Governments/UTs and the concerned Central Ministries/ Departments for implementation.

7) As per information available, 16 States in pursuance to NWP 1987, 2002 and 2012, have adopted their State Water Policies from time to time which are as under:

i. Tamil Nadu (1994)
ii. Uttar Pradesh (1999)
iii. Chhattisgarh (2001)
iv. Madhya Pradesh (2003)
v. Odisha (2007)
vi. Kerala (2008)
vii. Andhra Pradesh (2008)
viii. Sikkim (2009)
ix. Rajasthan (2010)
x. Jharkhand (2011)
xi. Himachal Pradesh (2013)
xii. Puducherry (2016)
xiii. Maharashtra (2019)
xiv. Meghalaya (2019)
xv. Goa (2021)
xvi. Karnataka (2022)

1.3 Salient Features of National Water Policy, 2012

i. Emphasis on the need for a national water framework law, comprehensive legislation for optimum development of inter-State rivers and river valleys.

ii. Water, after meeting the pre-emptive needs for safe drinking water and sanitation, achieving food security, supporting poor people dependent on agriculture for their livelihood and high priority allocation for minimum eco-system needs, be treated as economic good so as to promote its conservation and efficient use.

iii. Ecological needs of the river should be determined recognizing that river flows are characterized by low or no flows, small floods (freshets), large floods and flow variability and should accommodate development needs. A portion of river flows should be kept aside to meet ecological needs ensuring that the proportional low and high flow releases correspond in time closely to the natural flow regime.

iv. Adaptation strategies in view of climate change for designing and management of water resources structures and review of acceptability criteria has been emphasized.

v. A system to evolve benchmarks for water uses for different purposes, i.e., water footprints and water auditing be developed to ensure efficient use of water. Project financing has been suggested as a tool to incentivize efficient & economic use of water.

vi. Setting up of Water Regulatory Authority has been recommended. Incentivization of recycle and re-use has been recommended.

vii. Water Users Associations should be given statutory powers to collect and retain a portion of water charges, manage the volumetric quantum of water allotted to them and maintain the distribution system in their jurisdiction.

viii. Removal of large disparity in stipulations for water supply in urban areas and in rural areas has been recommended.

ix. Water resources projects and services should be managed with community participation. Wherever the State Governments or local governing bodies so decide, the private sector can be encouraged to become a service provider in public private partnership model to meet agreed terms of service delivery, including penalties for failure.

x. Adequate grants to the States to update technology, design practices, planning and management practices, preparation of annual water balances and accounts for the site and basin, preparation of hydrologic balances for water systems, and benchmarking and performance evaluation.

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Section-II
Water Resources at a Glance

1. This section begins with an overview of the global water scenario and a summary of India's land and water resources. It includes data on per capita water availability in India, as well as details on the total renewable internal freshwater resources of various countries. The section further covers the water resource potential of India's river basins, inland water bodies, watersheds, and rainfall patterns—both annual and monthly. It also provides information on the status of monitored glacial lakes and water bodies, along with the hydrological network maintained by the Central Water Commission (CWC). Additionally, it highlights designated best uses of water, national water quality standards, and the water quality monitoring activities carried out by the CWC. Important legislative and infrastructure details are also presented, including key provisions of the Dam Safety Act, 2021, the Dam Rehabilitation and Improvement Project, an abstract of large dams, and state/basin-wise live storage capacities of reservoirs. Lastly, it outlines the categorization of assessment units across States/UTs, the distribution of ground water monitoring wells, and state-wise ground water resource availability.

2. Water resources refer to the natural sources of water that can be used for various purposes, including agriculture, industry, domestic needs, recreation, and environmental conservation. Approximately 97.5% of Earth's water is saline, found primarily in oceans and seas, while only 2.5% is freshwater. Of this freshwater, over two-thirds is locked in glaciers and polar ice caps. The remaining unfrozen freshwater is mostly stored as ground water, with only a small fraction available in surface water bodies or as atmospheric moisture. The distribution of world water resources is given in the figures below:

Figure-1: World Water Distribution

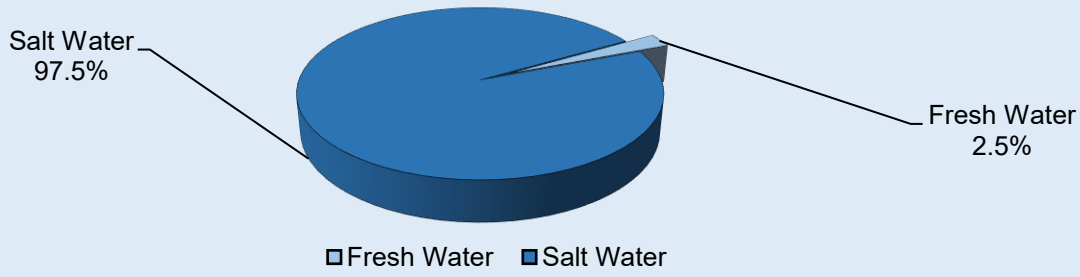
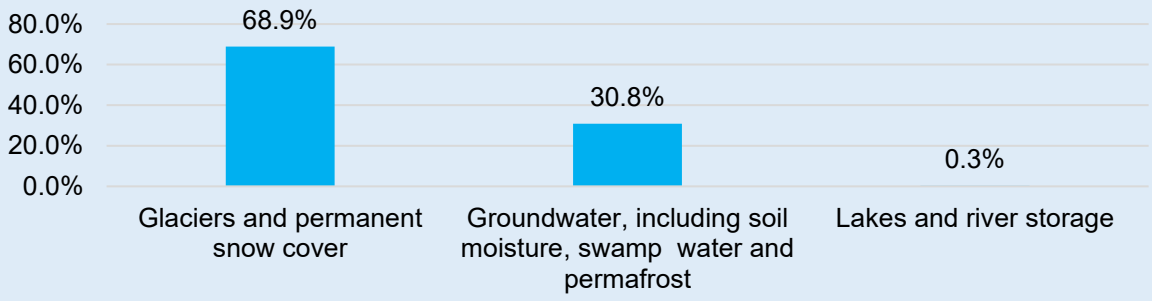


Figure-2: World Fresh Water Distribution



Source: Vital Water Graphics, UNEP
https://www.unep.org/resources/report/vital-water-graphics-overview-state-worlds-fresh-andn marine-waters

Table 2.1: India- Land and Water Resources

A. General	
Total Geographical Area (TGA) (2021-22)	328.75 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 (2023)	21.76 % of TGA
Population (as Per Census of India 2011)	1210.85 Million
Annual Rainfall (2024)	1206.6 mm
B. Water Resources	
Average Annual Precipitation	3729 BCM
Average Annual Water Resources (as per Assessment of Water Resources of India- 2024)	2116 BCM
Estimated Utilizable Surface Water Resources (as per NCIWRDM report-1999)	690 BCM
Total Annual Ground Water Recharge (as per Ground Water Reassessment-2024)	447 BCM
Total Annual Utilizable Water Resources	1137 BCM
Per Capita Water Availability (2011 Census)	1747 m^3/year
Large Dams	6281 Nos.
Completed Dams	6138 Nos.
Under Construction	143 Nos.
Storage Capacity	257.812 BCM
C. Land Resources	
Total cultivated Land [2023-24 (P)]	153.90 Mha
Gross Area Sown [2023-24 (P)]	217.88 Mha
Net Area Sown [2023-24 (P)]	138.99 Mha
Gross Irrigated Area [2023-24 (P)]	130.55 Mha
Net Irrigated Area [2023-24 (P)]	82.42 Mha
D. Hydropower (Capacity as on 31.03.2024)	
Identified Hydroelectric Potential (Total)	148701.00 MW
Identified Hydroelectric Potential (above 25 MW) as per Re-assessment Study (2017-23)	133410.03 MW
Capacity under Operation (above 25 MW)	42182.55 MW
Capacity Under Construction (above 25 MW)	14037.50 MW

Source: BP-1 & DSM Directorates, CWC; CGWB; RGI; 'India State of Forest Report 2023', Forest Survey of India; M/o Environment, Forest & Climate Change; 'Rainfall Statistics of India, 2024', IMD; Central Electricity Authority; 'Land Use Statistics at a Glance 2023-24', Economics Statistics & Evaluation Division, D/o Agriculture & Farmers Welfare, M/o Agriculture & Farmers Welfare

2.1 Per Capita Water Availability in India

1. 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 which may further reduce with increase of population in future.

2. 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.

3. The average annual per capita availability of water in the country taking into consideration, the population projections for the years 2021, 2031, 2041 and 2051 taken from the report of erstwhile Planning Commission (http://164.100.161.239/aboutus/committee/index.php?about=str_fmlywel.htm) is as under:

Year	Population (In Millions)	Per capita Average Annual Availability[$] ($m^3$/year)
2021	1345	1573
2031	1463	1446
2041	1560	1356
2051	1628	1300

*[$]Based on the study "**Assessment of Water Resources of India", CWC, 2024** with Average Annual Water Availability of India as **2115.95** BCM.*
Source: BPMO, CWC, M/o Jal Shakti

Map 1: River Basin Map of India

Source: NWIC, D/o Water Resources, RD &GR, M/o Jal Shakti.

Table 2.2: Per Capita Average Annual Availability of Water in India during 2025 & 2050

S. No.	River Basin	Average Annual Water Availability (BCM)$	Estimated Population (Million)#		Estimated per Capita Average Water Availability (M^3)	
			2025	2050	2025	2050
1	2	3	4	5	6	7
1	Barak & Others	93.65	10.24	12.05	9145.51	7771.78
2	Brahmani-Baitarani	31.27	16.18	19.04	1932.63	1642.33
3	Brahmaputra	592.32	48.06	56.54	12324.59	10476.12
4	Cauvery	26.53	48.39	56.93	548.25	466.01
5	EFR between Mahanadi & Pennar	23.33	38.97	45.85	598.67	508.83
6	EFR between Pennar & Kanyakumari	27.06	74.32	87.43	364.10	309.50
7	Ganga	581.75	593.04	697.69	980.96	833.82
8	Godavari	129.17	89.18	104.92	1448.42	1231.13
9	Indus (Eastern)#	47.3	69.2	81.41	683.53	581.01
10	Krishna	86.32	100.41	118.13	859.68	730.72
11	Mahanadi	72.82	43.93	51.68	1657.64	1409.06
12	Mahi	13.03	17.34	20.4	751.44	638.73
13	Minor rivers draining into Myanmar & Bangladesh	31.86	2.48	2.91	12846.77	10948.45
14	Narmada	49.95	24.28	28.56	2057.25	1748.95
15	Pennar	10.42	16.02	18.85	650.44	552.79
16	Sabarmati	9.87	17.34	20.4	569.20	483.82
17	Subernarekha	14.48	15.52	18.26	932.99	792.99
18	Tapi	20.98	24.44	28.75	858.43	729.74
19	WFR from Tadri to Kanyakumari	116.47	53.84	63.34	2163.26	1838.81
20	WFR from Tapi to Tadri	110.44	42.61	50.13	2591.88	2203.07
21	WFR of Kutch & Saurashtra including Luni	26.95	36.5	42.94	738.36	627.62
22	Area of inland drainage in Rajasthan	Negligible	11.73	13.79	-	-
23	Area of North Ladakh not draining into Indus	Negligible			-	-
Total		**2115.97**	**1394.02**	**1640**	**1517.89**	**1290.22**

Source: Basin Planning Directorate, CWC, M/o Jal Shakti

Note: '$': Assessment of Water Resources of India, 2024, CWC.
'#': Report of the Standing Sub-Committee for assessment of availability and requirement of water for diverse uses in the country, August, 2000.

2.2 Water Requirement

1. The requirement of fresh water both for irrigation and other uses is growing continuously. The requirement of water for various sectors has been assessed by the National Commission on Integrated Water Resources Development (NCIWRD) in the year 1999

2. As per NCIWRD 1999 report, the projected water demand in India (By Different Use) is given below:

Sector	Water Demand in km^3 or BCM			
	NCIWRD			
	2025		2050	
	Low	High	Low	High
Irrigation	561	611	628	807
Drinking Water	55	62	90	111
Industry	67	67	81	81
Energy	31	33	63	70
Other	70	70	111	111
Total	**784**	**843**	**973**	**1180**

Figure-3: Estimated Sector-wise High Demand in India during 2050 (As per NCIWRD)

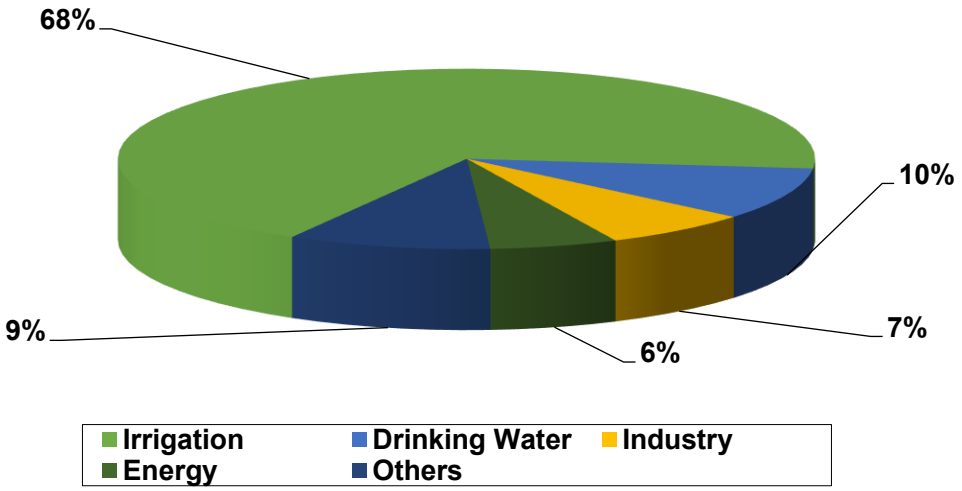


Figure-4: Projected Water Demand in India
(As per NCIWRD)

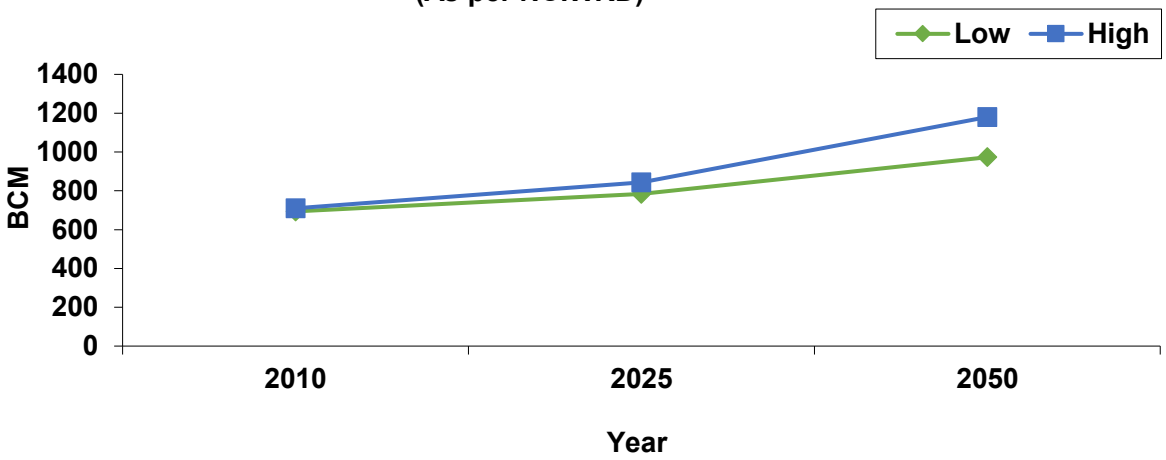


Table 2.3: Water Resources Potential in River Basins of India

S. No.	Basin	Catchment Area (sq.km)	Annual Average Water Resources Availability (BCM)	Utilizable Surface Water Resources (BCM)***
1	2	3	4	5
1	Barak & Others	86,335	93.65	-
2	Brahmani-Baitarani	53,902	31.27	18.3
3	Brahmaputra	1,93,252	592.32	24
4	Cauvery	85,167	26.53	19
5	EFR between Mahanadi & Pennar	82,073	23.33	13.1
6	EFR between Pennar & Kanyakumari	1,01,657	27.06	16.5
7	Ganga	8,38,803	581.75	250
8	Godavari	3,12,150	129.17	76.3
9	Indus (Eastern)*	1,25,067	47.3	46
10	Indus (Western)	1,49,660	-	-
11	Krishna	2,59,439	86.32	58
12	Mahanadi	1,44,905	72.82	50
13	Mahi	39,566	13.03	3.1
14	Minor rivers draining into Myanmar & Bangladesh	31,382	31.86	-
15	Narmada	96,660	49.95	34.5
16	Pennar	54,905	10.42	6.9
17	Sabarmati	31,901	9.87	1.9
18	Subernarekha	26,804	14.48	6.8
19	Tapi	65,806	20.98	14.5
20	WFR from Tadri to Kanyakumari	54,231	116.47	24.3
21	WFR from Tapi to Tadri	58,360	110.44	11.9
22	WFR of Kutch & Saurashtra including Luni	1,92,112	26.95	15
23	Area of inland drainage in Rajasthan	1,44,836	Negligible	-
24	Area of North Ladakh not draining into Indus	42,981	Negligible	-
	Total	**32,71,954****	**2115.95**	**690**

Source: Reassessment of Water Availability in India BPMO, Central Water Commission, M/o Jal Shakti

Note: '*': The average water resource of the Indus basin has been computed considering Ravi, Beas, Sutlej and Ghaggar rivers only.
'**': Excluding area of Indus above border, Lakshadweep Island and Andaman and Nicobar group of islands.
'***': As per NCIWRDM report-1999

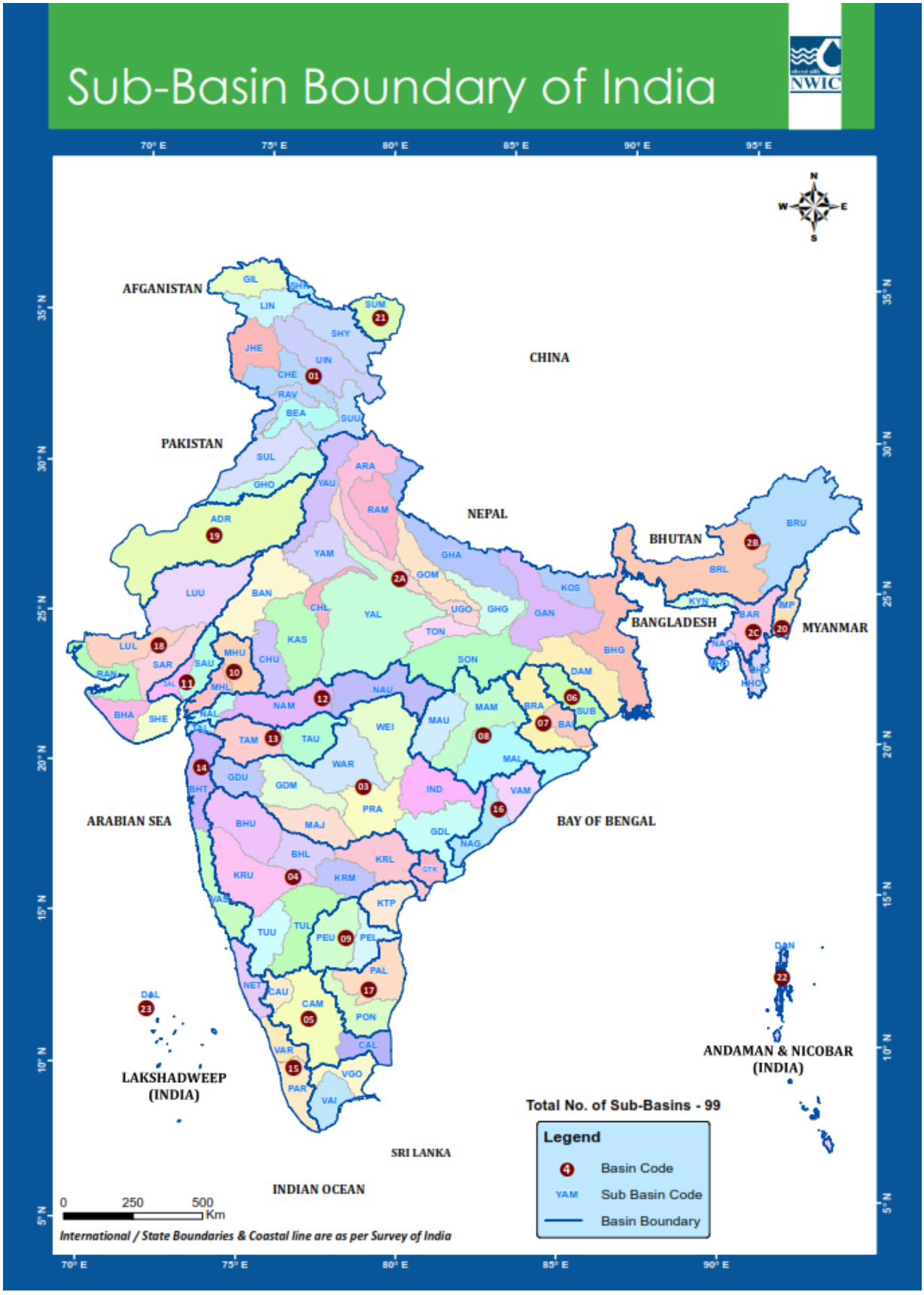
Table 2.4: Total Internal Renewable Fresh Water Resources (BCM/Year) of Top 10 and Bottom 10 countries

(Year:2022)

Rank	Country	Total Internal Renewable Water Resources (BCM/Year)
1	**2**	**3**
Top 10 Countries		
1	Brazil	5661.00
2	Russia	4312.00
3	Canada	2850.00
4	United States	2818.00
5	China	2812.90
6	Colombia	2145.00
7	Indonesia	2018.70
8	Peru	1641.00
9	**India**	**1446.00**
10	Myanmar	1002.80
Bottom 10 Countries		
1	Saint Vincent and the Grenadines	0.10
2	Barbados	0.08
3	Qatar	0.06
4	Antigua and Barbuda	0.05
5	Malta	0.05
6	Maldives	0.03
7	Saint Kitts and Nevis	0.02
8	Nauru	0.01
9	Bahrain	0.00
10	Kuwait	0.00

Source: Food and Agriculture Organization, AQUASTAT data. https://www.indexmundi.com/facts/indicators/ER.H2O.INTR.K3/rankings and FAO AQUASTAT Dissemination System

Map 2: Sub-Basin Boundary of India



Source: NWIC, D/o Water Resources, RD &GR, M/o Jal Shakti.

Table 2.5: Watersheds in India

Name of Basin & River Length	Basin Code	Sl. No.	Name of Sub-Basin	Sub Basin Code	No. of Watersheds	Area (Sq.km)	Size Range of Watershed (Sq.km)
1	2	3	4	5	6	7	8
Indus -1114 (2280) km	1	1	Gilgit	GIL	37	27383.51	339.63 - 1018.93
		2	Lower Indus	LIN	31	23980.48	319.30 - 1270.43
		3	Shyok	SHY	53	38574.41	430.05 - 1375.26
		4	Upper Indus	UIN	70	46434.87	383.02 - 973.92
		5	Jhelum	JHE	44	29119.96	315.90 - 1322.17
		6	Chenab	CHE	48	29914.09	319.76 - 1113.95
		7	Satluj Upper	SUU	31	21467.32	383.54 - 962.37
		8	Ravi	RAV	20	13600.91	390.23 - 1324.55
		9	Beas	BEA	30	19164.22	388.75 - 1143.90
		10	Satluj Lower	SUL	58	38468.82	329.08 - 1299.25
		11	Ghaghar and others	GHO	47	29429.88	317.44 - 1157.91
Ganga-2525 km	2A	12	Yamuna Upper	YAU	47	35919.24	324.97 - 1241.11
		13	Above Ramganga Confluence	ARA	51	39072.93	434.54 - 1301.20
		14	Ghaghara	GHA	76	58354.75	374.93 - 1300.81
		15	Ramganga	RAM	40	30828.33	350.05 - 1420.36
		16	Upstream of Gomti confluence to Muzaffarnagar	UGO	40	29545.43	315.03 - 1281.12
		17	Yamuna Middle	YAM	43	34497.06	410.43 - 1232.25
		18	Gomti	GOM	41	29765.26	333.29 - 1330.50
		19	Yamuna Lower	YAL	98	124509.11	735.54 - 1781.43
		20	Banas	BAN	64	51647.90	330.66 - 1432.97
		21	Gandak and others	GAN	76	57083.81	332.23 - 1697.39
		22	Chambal Lower	CHL	14	10936.96	405.59 - 1135.93
		23	Bhagirathi and others (Ganga Lower)	BHG	75	64015.15	308.24 - 1777.56
		24	Ghaghara Confluence to Gomti confluence	GHG	36	26434.92	372.40 - 1717.06
		25	Kosi	KOS	19	17599.26	303.77 - 2073.34

Table 2.5: Watersheds in India

Name of Basin & River Length	Basin Code	Sl. No.	Name of Sub-Basin	Sub Basin Code	No. of Watersheds	Area (Sq.km)	Size Range of Watershed (Sq.km)
1	2	3	4	5	6	7	8
		26	Kali Sindh and others up to Confluence with Parbati	KAS	64	48492.91	429.86 - 1275.01
		27	Tons	TON	23	16912.59	442.40 - 1173.36
		28	Chambal Upper	CHU	30	25546.57	405.14 - 1403.97
		29	Sone	SON	83	65104.54	380.66 - 1389.01
		30	Damodar	DAM	60	42346.50	326.16 - 1301.09
Brahmaputra-916 (2900) km	2B	31	Brahmaputra Upper	BRU	97	98840.64	476.11 - 1473.03
		32	Brahmaputra Lower	BRL	83	87585.75	429.01 - 1502.67
Barak and others	2C	33	Barak	BAR	47	27619.72	365.66 - 844.23
		34	Kynchiang and other South flowing rivers	KYN	17	10181.26	311.85 - 788.75
		35	Naoch chara and others	NAO	13	7713.58	392.34 - 857.52
Godavari - 1465 km	3	36	Weinganga	WEI	80	49635.39	305.64 - 971.62
		37	Wardha	WAR	69	46242.83	361.22 - 945.71
		38	Godavari Middle	GDM	55	35698.01	325.87 - 954.32
		39	Indravati	IND	60	39580.00	343.14 - 1100.38
		40	Godavari Upper	GDU	33	21443.23	331.11 - 987.06
		41	Pranhita and others	PRA	57	35864.91	326.11 - 981.77
		42	Godavari Lower	GDL	67	43531.89	304.77 - 989.28
		43	Manjra	MAJ	45	30067.53	421.07 - 980.21
Krishna - 1401 km	4	44	Bhima Upper	BHU	71	44793.32	351.72 - 939.84
		45	Krishna Upper	KRU	85	54505.99	322.33 - 963.80
		46	Bhima Lower	BHL	36	23653.24	396.71 - 928.25
		47	Krishna Lower	KRL	58	38670.68	277.58 - 970.03
		48	Krishna Middle	KRM	36	22111.72	341.29 - 861.31
		49	Tungabhadra Lower	TUL	59	41672.13	357.51 - 975.84
		50	Tungabhadra Upper	TUU	45	28519.41	331.6 - 923.94

Table 2.5: Watersheds in India

Name of Basin & River Length	Basin Code	Sl. No.	Name of Sub-Basin	Sub Basin Code	No. of Watersheds	Area (Sq.km)	Size Range of Watershed (Sq.km)
1	2	3	4	5	6	7	8
Cauvery-800 km	5	51	Cauvery Middle	CAM	86	57284.65	377.45 - 934.52
		52	Cauvery Upper	CAU	18	10861.61	362.94 - 991.25
		53	Cauvery Lower	CAL	28	17435.41	320.70 - 926.44
Subernarekha	6	54	Subarnarekha	SUB	45	25710.97	387.02 - 962.40
Brahmani and Baitarni-799 km	7	55	Brahmani	BRA	58	37419.14	332.75 - 971.23
		56	Baitarni	BAI	21	14476.76	472.27 - 1175.08
Mahanadi-851 km	8	57	Mahanadi Middle	MAM	88	51888.18	301.22 - 902.46
		58	Mahanadi Upper	MAU	48	29804.05	314.34 - 907.63
		59	Mahanadi Lower	MAL	91	57971.31	320.05 - 1456.61
Pennar - 597 km	9	60	Pennar Upper	PEU	61	36271.67	310.23 - 926.97
		61	Pennar Lower	PEL	29	18022.15	385.96 - 850.70
Mahi-583 km	10	62	Mahi Upper	MHU	41	24952.93	330.18 - 953.44
		63	Mahi Lower	MHL	22	13197.73	371.05 - 872.94
Sabarmati-371 km	11	64	Sabarmati Upper	SAU	34	19808.34	313.38 - 828.34
		65	Sabarmati Lower	SAL	17	11056.45	397.55 - 986.46
Narmada-1312 km	12	66	Narmada Upper	NAU	71	43192.68	327.06 - 986.00
		67	Narmada Middle	NAM	63	40575.64	338.11 - 957.42
		68	Narmada Lower	NAL	16	9780.19	385.73 - 943.31
Tapi-724 km	13	69	Tapi Upper	TAU	46	28047.22	322.12 - 937.28
		70	Tapi Lower	TAL	6	3655.25	502.50 - 781.84
		71	Tapi Middle	TAM	47	31766.60	365.64 - 937.44
West flowing rivers from Tapi to Tadri	14	72	Bhatsol and others	BHT	49	29039.28	300.92 - 897.89
		73	Vasishti and others	VAS	47	27740.03	335.12 - 1007.97
West flowing rivers from Tadri to Kanyakumari	15	74	Netravati and others	NET	32	18985.55	319.89 - 928.92
		75	Varrar and others	VAR	23	14239.35	363.17 - 978.16
		76	Periyar and others	PAR	37	21906.89	342.52 - 899.36

Table 2.5: Watersheds in India

Name of Basin & River Length	Basin Code	Sl. No.	Name of Sub-Basin	Sub Basin Code	No. of Watersheds	Area (Sq.km)	Size Range of Watershed (Sq.km)
1	2	3	4	5	6	7	8
East flowing rivers between Mahanadi and Pennar	16	77	East flowing rivers between Godavari and Krishna	GTK	17	11317.70	410.21 - 914.73
		78	East flowing rivers between krishna and Pennar	KTP	41	23360.58	204.66 - 1417.33
		79	Vamsadhara and other	VAM	34	21880.12	392.57 - 930.46
		80	Nagvati and other	NAG	41	24296.93	352.52 - 924.40
East flowing rivers between Pennar and Kanyakumari	17	81	Palar and other	PAL	56	35412.74	292.51 - 957.26
		82	Ponnaiyar and other	PON	46	28300.87	356.34 - 901.24
		83	Vaigai and others	VGO	30	18454.67	316.52 - 940.21
		84	Vaippar and others	VAI	33	20342.70	318.37 - 887.70
West flowing rivers of Kutch and Saurashtra including Luni	18	85	Luni Upper	LUU	81	70210.78	381.48 - 1447.71
		86	Saraswati	SAR	43	27151.49	308.99 - 1017.93
		87	Luni Lower	LUL	42	29171.45	315.95 - 1418.64
		88	Drainage of Rann	RAN	40	22850.24	327.17 - 968.30
		89	Bhadar and other West flowing rivers	BHA	30	18521.08	332.94 - 965.57
		90	Shetrunji and other East flowing rivers	SHE	32	18376.22	300.06 - 856.22
Area of Inland drainage in Rajasthan	19	91	Area of Inland drainage in Rajasthan	ADR	200	136768.48	326.27 - 1494.82

Table 2.5: Watersheds in India

Name of Basin & River Length	Basin Code	Sl. No.	Name of Sub-Basin	Sub Basin Code	No. of Watersheds	Area (Sq.km)	Size Range of Watershed (Sq.km)
1	2	3	4	5	6	7	8
Minor rivers draining into Myanmar and Bangladesh	20	92	Imphal and others	IMP	29	16692.62	314.40 - 899.22
		93	Chhimtuipui & Others	CHO	16	7879.11	359.61 - 655.10
		94	Khawthlangtuipui & others	KHO	6	3848.14	312.59 - 881.89
		95	Muhury and others	MHO	3	1682.35	519.82 - 607.58
Area of North Ladakh not draining into Indus Basin	21	96	Sulmar	SUM	33	22847.87	365.75 - 1081.27
		97	Shaksgam	SHK	9	6787.06	608.55 - 1033.48
Drainage area of Andaman & Nicobar Islands	22	98	Drainage Area of Andaman and Nicobar Islands	DAN	16	7577.36	207.47 - 783.11
Drainage area of Lakshadweep Islands	23	99	Drainage Area of Lakshadweep Islands	DAL	1	669.71	669.71 - 669.71

Source: NWIC, D/o Water Resources, RD &GR, M/o Jal Shakti

Note: 1.The length of the basins as per River Basin Atlas of India, 2012 publication (https://indiawris.gov.in/downloads/RiverBasinAtlas_Full.pdf).

2. Indus Basin: Total length 2,880 km, out of which 1,114 km flows through India.
3. Brahmaputra Basin: Total length 2,900 km, out of which 916 km flows through India.
4. Watershed at a glance information is as per the updated data as on December, 2023.

Table 2.6: 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	7.3	8.8	18.8	46.4	67.2	219.0	279.5	209.2	114.1	107.5	22.5	7.1	1107.3
2002	15.7	20.3	21.5	38.7	61.4	180.1	146.1	259.7	151.1	59.5	18.2	5.7	976.9
2003	7.6	45.6	33.2	35.4	39.1	184.5	316.6	254.9	191.3	100.5	15.5	18.6	1242.8
2004	25.7	8.8	11.3	59.0	88.9	162.9	243.4	248.9	124.5	92.2	15.8	4.6	1085.9
2005	28.1	41.7	42.5	37.7	46.1	143.1	334.2	190.3	206.8	99.2	27.2	11.2	1208.1
2006	17.7	11.9	35.6	32.6	74.9	141.8	287.6	281.3	178.7	51.8	34.6	13.1	1161.5
2007	1.7	36.7	35.2	30.6	46.7	194.2	286.4	257.4	206.6	55.6	14.4	15.3	1180.7
2008	18.4	19.3	41.2	29.5	43.7	201.9	244.8	265.6	165.0	51.6	25.5	11.0	1117.5
2009	12.0	12.0	14.2	25.1	56.0	85.7	280.5	192.4	139.5	71.4	53.7	11.1	953.7
2010	7.0	16.0	14.0	39.0	73.8	138.1	300.5	274.7	197.4	69.0	61.5	22.7	1213.3
2011	6.8	25.8	22.4	41.1	53.1	183.6	246.1	284.9	186.7	38.1	20.1	7.6	1116.0
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	1083.1
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	1127.1
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	18.5	33.1	18.7	31.5	51.3	113.5	298.8	299.9	259.5	110.1	31.6	19.2	1288.8
2020	28.3	12.1	44.7	42.7	71.8	195.6	257.1	327.8	178.0	78.3	29.2	17.0	1289.6
2021	20.2	7.6	16.7	31.1	107.8	182.4	266.2	196.3	229.6	100.8	56.5	20.5	1236.4
2022	39.5	19.1	8.9	38.2	83.2	152.2	327.2	264.0	181.4	111.8	18.6	13.6	1257.0
2023	14.8	7.5	37.6	42.3	67.9	152.9	316.5	162.9	189.9	50.6	34.7	25.5	1102.8
2024	7.2	19.7	28.6	32.1	66.4	147.3	304.6	293.5	187.7	75.9	13.4	27.6	1206.6

Source: India Meteorological Department, Ministry of Earth Sciences

* Denotes average for the period.

Table 2.7: Status of Monitored Glacial Lakes and Water Bodies

Month	No. of Glacial Lakes/Water Bodies Monitored during the Month (Total Nos. 477- until 2021) Total Nos. 902-since 2022	Details of GLs/WBs showing area Increased, Decreased, No Change (remains 0%) w.r.t. 2009 inventory area		
		Increased (Nos.)	Decreased (Nos.)	No Change (Nos.)
1	2	3	4	5
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
June-Oct, 2020				
June, 2020	218	147	26	45
July, 2020	173	104	28	41
August, 2020	267	118	70	79
September, 2020	222	69	79	74
October, 2020	372	136	115	121
June-Oct, 2021				
June, 2021	209	75	70	64
July, 2021	169	59	60	50
August, 2021	114	37	60	17
September, 2021	398	92	200	106
October, 2021	367	79	217	71
June-Oct, 2022				
June, 2022	457	339	103	15
July, 2022	818	231	312	275
August, 2022	829	305	419	105
September, 2022	882	363	458	61
October, 2022	875	322	508	45
June -Oct 2023				
June, 2023	521	258	460	33
July, 2023	836	312	469	55
August, 2023	852	376	421	55
September, 2023	870	359	458	53
October, 2023	870	429	376	65

Source: Morphology Directorate, Central Water Commission, M/o Jal Shakti

Note: less number of Glacial Lakes /Water Bodies Monitored during various months due to clouds.

Table 2.8: Change in Water Spread Area of Glacial lakes and Water Bodies Monitored by CWC
a) Glacial Lakes & Water Bodies with water spread area more than 50 Ha

Sl. No.	Lake ID	UID	State Name	Lake Type	Water Spread Area in Ha Inventory 2011	% Difference in Water Spread Area w.r.t Inventory Area					
						2023	2022	2021	2020	2019	2018
1	2	3	4	5	6	7	8	9	10	11	12
1	03_91C_064	AP_100	Arunachal Pradesh	WB	89	-17	-9	20	#	8	#
2	03_91C_069	AP_101	Arunachal Pradesh	WB	78	-9	-4	-8	#	9	#
3	03_91D_009	AP_108	Arunachal Pradesh	WB	47	2	4	-6	#	15	#
4	03_91D_010	AP_109	Arunachal Pradesh	WB	46	12	4	-2	#	26	#
5	03_91D_022	AP_118	Arunachal Pradesh	WB	44	-12	-22	-13	#	29	#
6	03_91D_041	AP_135	Arunachal Pradesh	WB	115	10	1	36	#	11	#
7	03_91D_107	AP_163	Arunachal Pradesh	WB	67	-5	12	2	-24	-1	#
8	03_91H_067	AP_185	Arunachal Pradesh	WB	56	-21	-19	-5	#	22	#
9	03_92A_005	AP_203	Arunachal Pradesh	WB	50	0	3	#	#	#	-18
10	03_92A_006	AP_204	Arunachal Pradesh	WB	83	-9	-9	-14	-15	6	6
11	03_92E_001	AP_206	Arunachal Pradesh	WB	45	6	3	63	#	34	-10
12	03_82O_042	AP_49	Arunachal Pradesh	WB	44	-25	-18	-35	-8	24	#
13	03_82O_061	AP_54	Arunachal Pradesh	WB	54	4	6	-5	#	6	-4
14	03_82O_062	AP_55	Arunachal Pradesh	WB	52	4	3	-10	#	#	#
15	03_82O_064	AP_57	Arunachal Pradesh	WB	44	-4	-1	10	#	18	0
16	03_82P_010	AP_67	Arunachal Pradesh	WB	99	-6	-11	-16	#	17	6
17	03_83A_012	AP_77	Arunachal Pradesh	WB	63	-13	-11	-20	5	25	#
18	03_91C_034	AP_84	Arunachal Pradesh	WB	134	4	4	20	#	#	#
19	03_91C_038	AP_85	Arunachal Pradesh	WB	113	-16	-10	-16	-28	#	#
20	03_91C_040	AP_87	Arunachal Pradesh	WB	94	-11	-16	-9	-6	#	#
21	03_91C_042	AP_89	Arunachal Pradesh	WB	50	-2	-2	1	#	#	#
22	03_91C_044	AP_90	Arunachal Pradesh	WB	63	4	2	1	#	18	#
23	03_91C_045	AP_91	Arunachal Pradesh	WB	113	-11	-8	-7	#	1	-6
24	03_91C_046	AP_92	Arunachal Pradesh	WB	61	-11	-12	-14	-14	-1	#

Sl. No.	Lake ID	UID	State Name	Lake Type	Water Spread Area in Ha Inventory 2011	% Difference in Water Spread Area w.r.t Inventory Area					
						2023	2022	2021	2020	2019	2018
1	2	3	4	5	6	7	8	9	10	11	12
25	03_91C_049	AP_95	Arunachal Pradesh	WB	80	-21	-13	-6	#	#	#
26	01_52D_001	HP_1	Himachal Pradesh	WB	725	-16	-13	3	11	17	25
27	01_53A_002	HP_10	Himachal Pradesh	WB	10256	17	#	-34	16	36	31
28	01_53E_001	HP_12	Himachal Pradesh	WB	72	49	1	18	42	76	80
29	01_52H_002	HP_3	Himachal Pradesh	GL	62	63	61	51	58	67	68
30	01_52H_004	HP_5	Himachal Pradesh	GL	46	242	242	202	223	232	228
31	01_52H_005	HP_6	Himachal Pradesh	WB	45	5	9	-18	-5	9	6
32	01_53A_001	HP_9	Himachal Pradesh	WB	16946	28	-3	-20	19	29	31
33	01_42H_001	JK_1	Ladakh (POK)	WB	276	-3	-3	-7	1	1	-2
34	01_43J_022	JK_100	Jammu & Kashmir	WB	60	2	-7	4	4	17	3
35	01_43K_010	JK_111	Jammu & Kashmir	WB	66	10	-1	-24	9	15	4
36	01_43K_014	JK_115	Jammu & Kashmir	WB	111	15	22	11	29	29	36
37	01_43M_003	JK_120	Ladakh (POK)	WB	187	18	-7	16	24	14	18
38	01_43N_001	JK_128	Ladakh (POK)	WB	127	0	2	-12	-3	5	0
39	01_43N_020	JK_147	Jammu & Kashmir (POK)	WB	61	0	4	-17	10	14	2
40	01_43N_022	JK_149	Jammu & Kashmir (POK)	WB	73	-5	-1	-16	4	2	-3
41	01_43N_027	JK_154	Jammu & Kashmir	WB	48	-5	-3	-12	0	-4	-3
42	01_43N_030	JK_157	Jammu & Kashmir	WB	86	3	2	-29	-10	-6	1
43	01_43N_032	JK_159	Jammu & Kashmir	WB	49	4	13	11	19	23	33
44	01_43P_002	JK_167	Jammu & Kashmir	WB	52	3	4	-5	9	16	22
45	01_52C_003	JK_187	Ladakh	GL	45	26	25	17	33	45	58
46	01_52E_001	JK_188	Ladakh	GL	51	#	-97	#	-81	#	#
47	01_52G_001	JK_189	Ladakh	WB	45	-12	-7	-21	-2	8	12
48	01_52G_003	JK_191	Ladakh	WB	1473	-9	-16	-51	-1	3	7
49	01_52I_003	JK_195	Ladakh	WB	180	0	-8	1	17	27	28

Sl. No.	Lake ID	UID	State Name	Lake Type	Water Spread Area in Ha Inventory 2011	% Difference in Water Spread Area w.r.t Inventory Area					
						2023	2022	2021	2020	2019	2018
1	2	3	4	5	6	7	8	9	10	11	12
50	01_52I_004	JK_196	Ladakh	WB	124	-29	#	#	-60	-34	-12
51	01_52J_001	JK_197	Ladakh	GL	65	51	50	35	53	57	51
52	01_52J_002	JK_198	Ladakh	WB	67	-10	-3	-27	-12	-1	2
53	01_52J_005	JK_201	Ladakh	WB	44	-8	2	-12	1	16	8
54	01_52J_006	JK_202	Ladakh	WB	110	-3	-5	-17	-2	-2	5
55	01_52J_009	JK_205	Ladakh	WB	57	16	2	-41	2	29	22
56	01_52K_004	JK_212	Ladakh	WB	5741	4	1	1	2	2	1
57	01_52K_009	JK_217	Ladakh	WB	204	0	-5	-16	-5	1	2
58	01_52K_010	JK_218	Ladakh	WB	152	-1	1	-19	-12	-1	4
59	01_52K_011	JK_219	Ladakh	WB	186	-3	-8	-12	-6	1	-3
60	01_43A_001	JK_22	Ladakh (POK)	WB	203	0	-1	0	11	4	5
61	01_52K_012	JK_220	Ladakh	WB	166	1	-1	-11	-5	0	-3
62	01_52K_014	JK_222	Ladakh	WB	405	10	13	-10	5	14	11
63	01_52K_016	JK_224	Ladakh	WB	507	2	3	-2	1	-14	6
64	01_52L_001	JK_225	Ladakh	WB	14139	-2	-2	-1	0	1	1
65	01_52L_002	JK_226	Ladakh	WB	442	-2	-2	-10	-4	1	1
66	01_52L_003	JK_227	Ladakh	WB	649	-24	-19	-21	-17	-8	-6
67	01_43A_002	JK_23	Ladakh (POK)	WB	91	8	2	5	15	21	25
68	01_42H_003	JK_3	Ladakh (POK)	WB	124	-14	-14	-16	-7	-4	-13
69	01_43E_006	JK_30	Ladakh (POK)	WB	71	-7	-5	-19	1	0	-4
70	01_43E_023	JK_47	Ladakh (POK)	WB	86	-8	-8	-12	6	9	0
71	01_42H_005	JK_5	Jammu & Kashmir	WB	73	-28	-26	-14	-23	-14	-18
72	01_43G_001	JK_67	Jammu & Kashmir (POK)	WB	14989	54	-2	2	81	61	79
73	01_43J_004	JK_82	Jammu & Kashmir (POK)	WB	59	9	5	4	13	24	29

Sl. No.	Lake ID	UID	State Name	Lake Type	Water Spread Area in Ha Inventory 2011	% Difference in Water Spread Area w.r.t Inventory Area					
						2023	2022	2021	2020	2019	2018
1	2	3	4	5	6	7	8	9	10	11	12
74	01_43J_007	JK_85	Jammu & Kashmir (POK)	WB	95	-4	-1	-6	72	22	1
75	01_43J_017	JK_95	Jammu & Kashmir	WB	164	-4	-4	-7	-5	1	-2
76	01_43J_020	JK_98	Jammu & Kashmir	WB	191	-10	-14	-14	-15	-7	-14
77	01_43J_021	JK_99	Jammu & Kashmir	WB	1238	-11	-23	-29	-31	-19	-12
78	03_78A_003	SK_11	Sikkim	GL	58	-8	-18	-24	9	33	223
79	03_78A_009	SK_16	Sikkim	GL	55	12	10	4	8	28	23
80	03_78A_013	SK_19	Sikkim	GL	67	20	16	14	14	40	40
81	03_77D_002	SK_2	Sikkim	GL	104	8	6	-12	-1	15	7
82	03_78A_014	SK_20	Sikkim	GL	123	21	29	21	21	27	22
83	03_78A_021	SK_26	Sikkim	GL	56	42	52	31	33	37	-39
84	03_77D_003	SK_3	Sikkim	WB	84	32	9	-8	19	45	30
85	03_77D_004	SK_4	Sikkim	GL	106	-1	14	10	9	34	29
86	03_77D_005	SK_5	Sikkim	GL	88	11	14	6	15	23	21
87	03_77D_008	SK_8	Sikkim	GL	46	-5	-6	-43	-11	5	11
88	03_78A_001	SK_9	Sikkim	GL	156	27	18	6	15	27	23
89	02_53K_001	UK_1	Uttarakhand	WB	3880	34	31	30	55	45	46
90	02_53P_003	UK_11	Uttarakhand	WB	1078	-15	-31	-44	-16	-8	0
91	02_53K_002	UK_2	Uttarakhand	WB	1597	-31	-53	-56	-41	-22	-12
92	02_53O_001	UK_4	Uttarakhand	WB	46		-17	-9	-10	21	-12
93	02_53O_005	UK_8	Uttarakhand	WB	1510	-26	-41	-39	-40	-14	24
94	02_53P_001	UK_9	Uttarakhand	WB	2054	-23	-37	-41	-15	-17	0

Source : Morphology & Climate Change Directorate, Central Water Commission, M/o Jal Shakti
Note 1: `UID' Unique identifier of the glacial lake with the letters denote the State (in case of India)
`Lake ID': Each glacial lake has a unique number in the digital database. The numbering is done sequentially within each 1:250,000 reference gride. 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.
Note 2 : #; indicates cloud covered, frozen/dried lakes; `GL', Glacial Lake; `WB' : Water Bodies.

Table No. 2.8: Change in Water Spread Area of Glacial Lakes and Water Bodies Monitored by CWC
b) Glacial Lakes with Water Spread Area between 10 Ha to 50 Ha

Sl. No.	State	Lake ID	Lake Type	Average 2023	Inventory 2011 (Ha)	% Difference of Annual Average Area of 2023 w.r.t Inventory Area 2011
1	2	3	4	5	6	7
1	Jammu & Kashmir	98	GL	5	-	#
2	Jammu & Kashmir	976	GL	16	-	#
3	Ladakh	173	GL	9	-	#
4	Jammu & Kashmir	963	GL	32	-	#
5	Jammu & Kashmir	1037	GL	37	-	#
6	Uttarakhand	2147	GL	#	-	#
7	Sikkim	260	GL	40	-	#
8	Sikkim	292	GL	3	-	#
9	Sikkim	312	GL	7	-	#
10	Sikkim	345	GL	16	-	#
11	Sikkim	515	GL	8	-	#
12	Sikkim	569	GL	31	-	#
13	Sikkim	256	GL	12	-	#
14	Jammu & Kashmir	27	GL	15	-	#
15	Ladakh	180	GL	9	-	#
16	Jammu & Kashmir	182	GL	8	-	#
17	Jammu & Kashmir	931	GL	19	-	#
18	Jammu & Kashmir	938	GL	19	-	#
19	Jammu & Kashmir	951	GL	18	-	#
20	Jammu & Kashmir	958	GL	8	-	#
21	Jammu & Kashmir	993	GL	5	-	#
22	Jammu & Kashmir	1014	GL	3	-	#
23	Jammu & Kashmir	1032	GL	1	-	#
24	Ladakh	1360	GL	10	-	#
25	Himachal Pradesh	1774	GL	7	-	#
26	Himachal Pradesh	1805	GL	6	-	#
27	Himachal Pradesh	1847	GL	14	-	#
28	Himachal Pradesh	1936	GL	3	-	#

Sl. No.	State	Lake ID	Lake Type	Average 2023	Inventory 2011 (Ha)	% Difference of Annual Average Area of 2023 w.r.t Inventory Area 2011
1	2	3	4	5	6	7
29	Himachal Pradesh	1998	GL	1	-	#
30	Himachal Pradesh	2031	GL	11	-	#
31	Uttarakhand	2108	GL	18	-	#
32	Uttarakhand	2207	GL	11	-	#
33	Uttarakhand	2299	GL	#	-	#
34	Sikkim	227	GL	63	-	#
35	Sikkim	293	GL	2	-	#
36	Sikkim	295	GL	7	-	#
37	Sikkim	298	GL	7	-	#
38	Sikkim	599	GL	8	-	#
39	Arunachal Pradesh	129	GL	10	-	#
40	Sikkim	237	GL	6	-	#
41	Uttarakhand	02_53N_001	GL	23	21	10
42	Uttarakhand	02_62B_004	GL	19	19	2
43	Uttarakhand	02_62B_005	GL	9	12	-24
44	Uttarakhand	02_62B_007	GL	#	19	#
45	Ladakh	01_42H_002	GL	16	13	25
46	Jammu & Kashmir	01_43J_003	GL	15	20	-27
47	Ladakh	01_52A_002	GL	18	23	-24
48	Ladakh	01_52A_003	GL	17	24	-28
49	Ladakh	01_52B_012	GL	14	17	-17
50	Ladakh	01_52C_001	GL	51	36	41
51	Jammu & Kashmir	01_52C_002	GL	42	26	61
52	Himachal Pradesh	01_52H_003	GL	159	28	471
53	Ladakh	01_52L_006	GL	11	12	-12
54	Ladakh	01_52L_007	GL	33	32	4
55	Uttarakhand	01_62B_003	GL	12	12	-4
56	Sikkim	03_78A_008	GL	14	44	-69
57	Ladakh	01_52A_004	GL	10	11	-7
58	Ladakh	01_52B_010	GL	16	18	-13
59	Himachal Pradesh	01_53I_002	GL	30	23	32
60	Arunachal Pradesh	03_82L_007	GL	14	16	-14
61	Arunachal Pradesh	03_91C_026	GL	28	28	0
62	Arunachal Pradesh	03_91D_075	GL	29	23	25
63	Arunachal Pradesh	03_91H_073	GL	26	25	4

Sl. No.	State	Lake ID	Lake Type	Average 2023	Inventory 2011 (Ha)	% Difference of Annual Average Area of 2023 w.r.t Inventory Area 2011
1	2	3	4	5	6	7
64	Sikkim	03_78A_005	GL	5	11	-54
65	Sikkim	03_78A_006	GL	10	11	-6
66	Sikkim	03_78A_023	GL	29	33	-11
67	Sikkim	03_78A_026	GL	12	11	10
68	Sikkim	03_78A_031	GL	12	14	-13
69	Sikkim	03_78A_035	GL	8	-	#
70	Sikkim	03_78A_010	GL	33	36	-7
71	Sikkim	03_78A_012	GL	23	26	-11
72	Sikkim	03_78A_016	GL	11	14	-21
73	Sikkim	03_78A_017	GL	24	19	27
74	Sikkim	03_78A_020	GL	13	14	-6
75	Arunachal Pradesh	03_83A_003	GL	83	24	245
76	Arunachal Pradesh	03_83A_004	GL	18	17	4
77	Arunachal Pradesh	03_83A_005	GL	12	13	-8
78	Arunachal Pradesh	03_83A_007	GL	13	14	-5
79	Sikkim	03_77D_006	GL	24	22	7
80	Sikkim	03_77D_007	GL	22	24	-6
81	Sikkim	03_78A_002	GL	36	22	61
82	Sikkim	03_78A_007	GL	17	17	-4
83	Sikkim	03_78A_027	GL	34	33	3
84	Sikkim	03_78A_015	GL	8	12	-36
85	Sikkim	03_78A_019	GL	13	15	-13

Source : Morphology & Climate Change Directorate, Central Water Commission, M/o Jal Shakti

Remarks : Monitoring of above 425 Glacial Lakes were initiated in the year 2022.

Note 1 : `UID' : Unique identifier of the glacial lake with the letters denotes the state (in case of India); `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 numbers indicate lake number within a grid of 1:250,000 SOI toposheet; GL': Glacial Lake; `WB': Water Bodies.
`-' : indicates Inventory data Not Available.
'#' : indicates cloud covered, frozen/dried lakes.

Table 2.9: State-wise Distribution of Hydro-Meteorological Observations Sites of CWC

(as on March, 2024)

Sl. No.	Name of States/UTs	Type of Site								
		G	GD	GDQ	GDS	GDSQ	GQ	SG&Met	WQSS	Total
1	2	3	4	5	6	7	8	9	10	11
1	Andhra Pradesh	8	17	4	-	14	1	-	2	46
2	Arunachal Pradesh	7	3	9	-	9	10	18	-	56
3	Assam	7	9	21		26	53	5	-	121
4	Bihar	61	27	6	2	22	1	-	-	119
5	Chhattisgarh	11	9	2	1	18	-	3	12	56
6	Dadar & Nagar Haveli	3	1	-	-		-	-	-	4
7	Delhi	-	-	1	-	2	-	-	3	6
8	Goa	-	2	-	-		-	-	-	2
9	Gujarat	20	16	4	-	9	-	1	2	52
10	Haryana	3	3	3	-	1	-		-	10
11	Himachal Pradesh	5	11		4	6	-	5	-	31
12	Jammu & Kashmir	10	4	3	5	6	-	1	-	29
13	Jharkhand	10	20	4	-	6	1	2	6	49
14	Karnataka	4	18	17	-	23	2	-	-	64
15	Kerala	-	14	2	-	24	-	-	-	40
16	Ladakh	8	2	-	-	-	-	-	-	10
17	Madhya Pradesh	55	44	20	-	24	4	4	12	163
18	Maharashtra	31	32	17	1	25	4	11	6	127
19	Manipur	-	1				1		-	2
20	Meghalaya	4	5	5	1	3	1		-	19
21	Mizoram	1	16		5	5	-	2	-	29
22	Odisha	49	7	2	-	22	1	4	25	110
23	Puducherry	-	-	3	-	-	-	-	-	3
24	Punjab	-	-	-	4	-	-	-	-	4
25	Rajasthan	15	6	8	-	8	-	1	2	40
26	Sikkim	-	-	-	-	11	6	2	5	24
27	Tamil Nadu	-	20	21	-	21	-	-	-	62
28	Telangana	10	11	4	-	8	1	1	-	35
29	Tripura	1	5	-	3	3	2	-	-	14
30	Uttar Pradesh	70	41	14	1	47	4	-	28	205
31	Uttarakhand	26	27	5	6	9		18	15	106
32	West Bengal	18	22	7	2	21	10	3	7	90
Grand Total		**437**	**393**	**182**	**35**	**373**	**102**	**81**	**125**	**1728**

Source: RDC-II Directorate, Central Water Commission, M/o Jal Shakti

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.

Table 2.10: Basin-wise Distribution of Hydro-Meteorological Sites of CWC

(as on March, 2024)

Sl. No	Basin Name	G	GD	GDQ	GDS	GDSQ	GQ	Excl. Met	WQSS	Grand Total
1	2	3	4	5	6	7	8	9	10	11
1.	Barak and other Basins	6	24	6	6	18	7	2		69
2.	Brahmani & Baitarni Basin	12				11	1	1	15	40
3.	Brahmaputra Basin	12	7	33		44	76	25	9	206
4.	Cauvery Basin		13	17		24		0		54
5.	East Flowing Rivers between Pennar and Cauvery		17	8		4		0		29
6.	East Flowing Rivers between Krishna and Pennar		1			1		0		2
7.	East Flowing Rivers between Mahanadi and Godavari	13	1			4		0	5	23
8.	East Flowing Rivers between South of Cauvery		2	2		4		0		8
9.	Ganga Basin	226	151	49	12	115	6	25	54	638
10.	Godavari Basin	46	42	19		26	4	9	6	152
11.	Indus Basin	21	15	3	12	8		4		63
12.	Krishna Basin	7	14	14		27	3	0		65
13.	Mahanadi Basin	30	2	1		22		6	15	76
14.	Mahi Basin	8	4	2		3		2		19
15.	Narmada Basin	15	33	8		11	4	2	11	84
16.	Pennar Basin		4	4		4		0		12
17.	Rivers draining into Bangladesh Basin	1	4			1		0		6
18.	Rivers draining into Myanmar Basin	1	4		3	2		0		10
19.	Sabarmati Basin	7	4	1		1		0	1	14
20.	Subarnarekha Basin	6	2	1		6		0	8	23
21.	Tapi Basin	16	18	1	1	3		2		41
22.	West Flowing Rivers of Kutch & Saurashtra including Luni Basin	3	10	2		3		0		18
23.	West Flowing Rivers from South of Tapi	7	22	11		31	1	3	1	76
Grand Total		**437**	**393**	**182**	**35**	**373**	**102**	**81**	**125**	**1728**

Source: RDC-II Directorate, CWC, M/o Jal Shakti

Note: 'G': Gauge Site; 'GQ': Gauge and Water Quality Site; 'GD': Gauge and Discharge Site; 'GDS': Gauge, Discharge & Sediment Site; 'GDQ': Gauge, Discharge & Water Quality Site; 'GDSQ': Gauge, Discharge, Sediment and Water Quality Site; 'Exl. Met': Exclusive Met Sites; 'WQSS': Water Quality Sampling Station.

Table 2.11: Tolerance and Classification of Water

As per CPCB, 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/100ml shall be 50 or less 2. pH between 6.5 and 8.5 3. Dissolved Oxygen 6mg/l or more 4. Biochemical Oxygen Demand 5 days 20°C, 2mg/l or less
Outdoor bathing (Organised)	B	1.Total Coliforms Organism MPN/100ml shall be 500 or less 2. pH between 6.5 and 8.5 3. Dissolved Oxygen 5mg/l or more 4. Biochemical Oxygen Demand 5 days 20 °C, 3mg/l or less
Drinking Water Source after conventional treatment and disinfection	C	1. Total Coliforms Organism MPN/100ml shall be 5000 or less 2. pH between 6 and 9 3. Dissolved Oxygen 4mg/l or more 4. Biochemical Oxygen Demand 5 days 20 °C, 3mg/l or less
Propagation of Wild life and Fisheries	D	1. pH between 6.5 and 8.5 2. Dissolved Oxygen 4mg/l or more 3. Free Ammonia (as N) 1.2 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. 2mg/l

Source: CPCB, M/o Environment, Forest & Climate Change (as per the latest data available on the site) (https://cpcb.nic.in/wqm/Designated_Best_Use_Water_Quality_Criteria.pdf

Table 2.12: Water Quality Standards in India

Sl. No.	Characteristics	Designated Best Use				
		A	B	C	D	E
1	2	3	4	5	6	7
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 SO4). mg/l. max	400	-	400	-	1
17	Nitrate (as NO3). 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 Cr6+).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 (Un-classified) Book-2021', HD Directorate, CWC, M/o Jal Shakti (as per the latest availability of data)

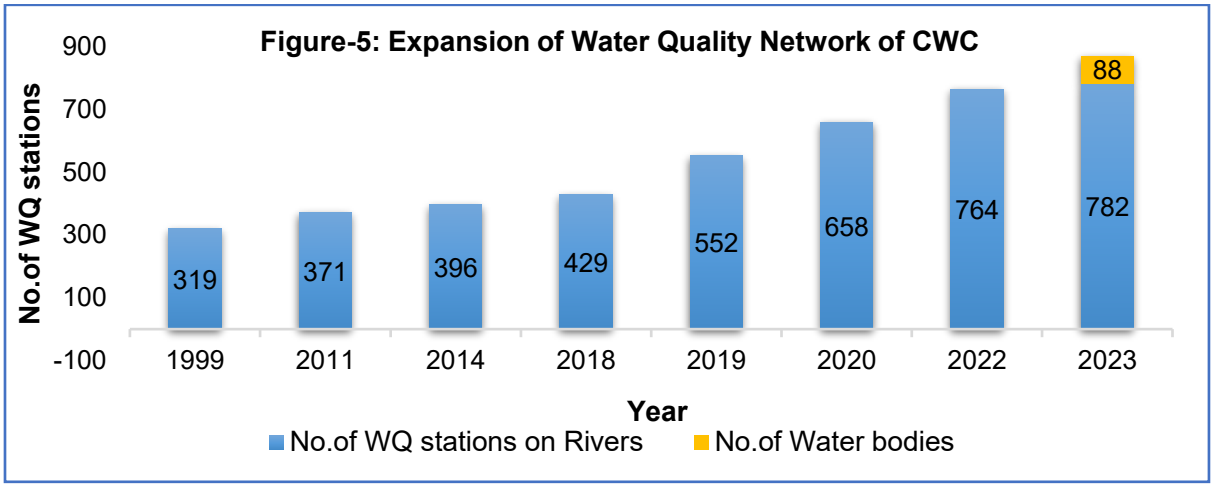
Note: Basin-wise details of Water Quality Parameters are given in 'Hydrological Data (Un-classified) Book-2021.'

2.3 Water Quality Monitoring Activities of CWC during 2024

1. Being the apex national body for development of water resources in the country, water quality monitoring activities of CWC in the year 2024 focused upon:
   (i) Establishment of baseline water quality
   (ii) Assessment of suitability of water for various uses
   (iii) Detection of trends in water quality changes.
   (iv) Dissemination of water quality information upon request

2. In the year 2024, Central Water Commission is observing water quality at 782 key locations covering important river basins of India following 'Guidelines of Water Quality Monitoring, 2017' published by Water Quality Assessment Authority. In addition, CWC has started monitoring of water quality of water bodies across India since 01.03.2023. 88 water bodies have been identified for water quality monitoring purpose across various states of the country.

3. From the 764 key locations in the year 2022, 18 more water quality monitoring locations on rivers were added as per expansion plan in the area of WQ network given in Figure-5 below:



4. CWC follows a three-tier laboratory system which consists of Level I, II and III types of laboratories

Level-I	•427 labs at field WQ monitoring stations •06 in-situ parameters (Colour, Odour, Temperature pH, Electrical Conductivity and Dissolved Oxygen)
Level-II	•18 labs located at division offices •NABL Accreditation for 17 labs •25 physico-chemical and bacteriological parameters
Level-III	•5 regional labs (All NABL Accredited) •25 physico-chemical and bacteriological parameters and 16 heavy metals and pesticides parameters

Note: Samples have been collected thrice in a month from all sites for water quality analysis since June, 2021.

5. In 2023, one (01) WQ laboratories of CWC located at Haridwar (Uttarakhand) received NABL accreditation bringing 20 out of 23 laboratories (Level-II/III) of CWC accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) in the field of testing in accordance with ISO/IEC 17025:2017.

6. The list of parameters being analysed in CWC labs during 2022 are given below:

Level I – 378 labs	**Level II – 18 labs**	**Level III – 5 labs**
• Temperature • Colour • Odour • pH • Dissolved Oxygen • Electrical Conductivity **Total= 06 Nos**.	• Temperature • Electrical Conductivity • Total Dissolved Solids • pH • Dissolved Oxygen (DO) • Biochemical Oxygen Demand • Chemical Oxygen Demand • Turbidity • Ammonia • Sodium • Calcium • Magnesium • Potassium • Boron • Carbonate • Bicarbonate • Fluoride • Chloride • Sulphate • Nitrate • Nitrite • Silicate • Phosphate • Total Coliform • Fecal Coliform **Total= 25 Nos**.	*Level-II Parameters (25 nos.)* *Trace & Toxic metals (9 nos.)* • Arsenic • Cadmium • Chromium • Copper • Lead • Iron • Mercury • Nickel • Zinc • *Pesticides (7 nos.)* • Alpha, Beta or Gamma BHC • O,P' and P,P' DDT • Aldrin, Dieldrin • Alpha and Beta Endosulfan • Carbaryl (Carbamate) • Malathion, 2-4 D, Methyl Parathion • Anilophos, Chlorpyrifos **Total= 25+16= 41 Nos.**

Source: RDC-II Directorate, CWC, M/o Jal Shakti

Table 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	0.000
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	Uttarakhand	5.670
26	Uttar Pradesh	14.263
27	West Bengal	2.027
28	Mizoram	0.000
Total		**257.812**

Source: Water Management Directorate, Central Water Commission, M/o Jal Shakti.

Note: Reconciliation of Live Storage Capacities of Reservoirs is under process.
The above figures are as furnished/made available to CWC as on 01.12.2017 (as per the latest availability of data).

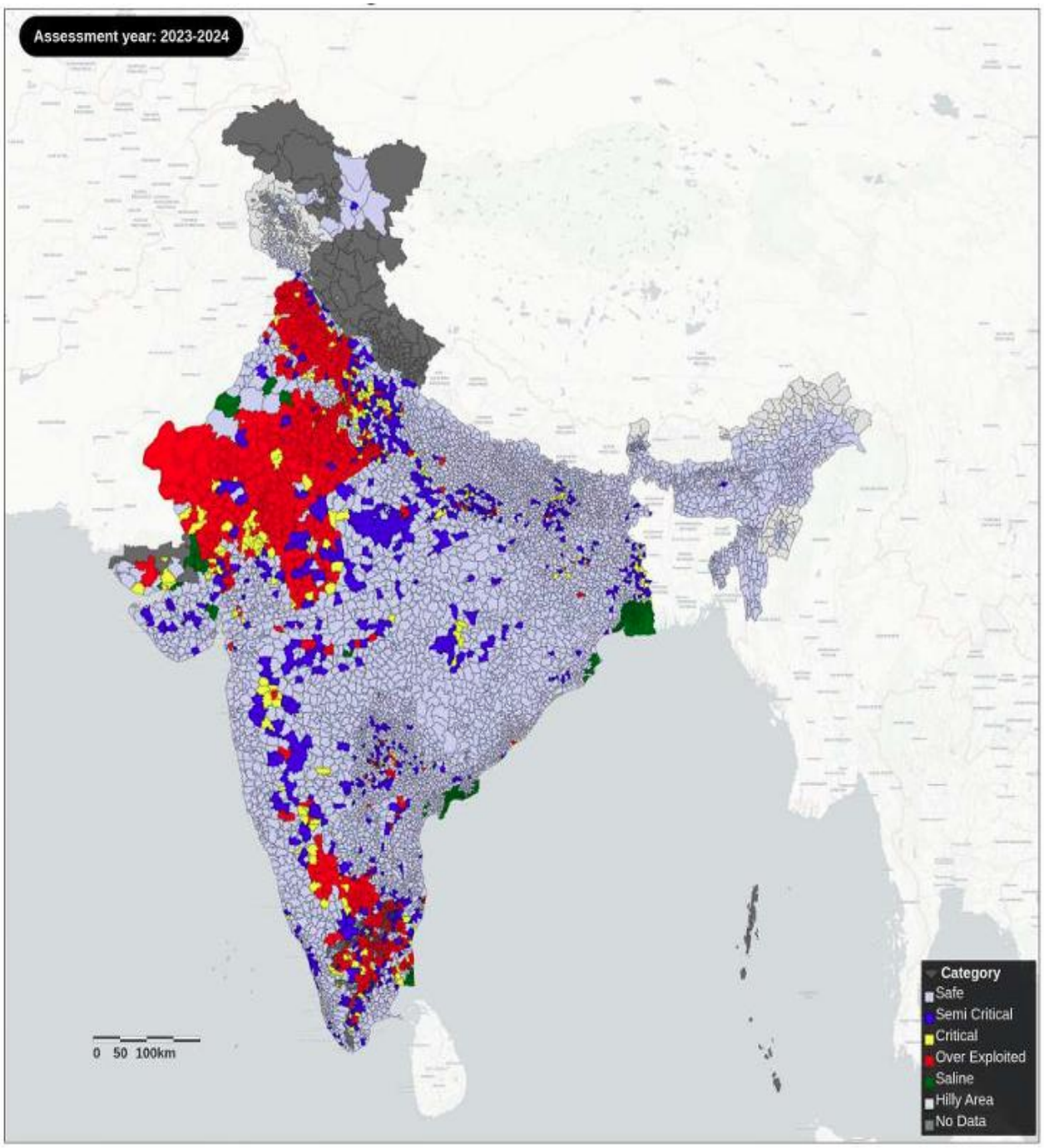
Table 2.14: Basin-wise Live Storage Capacity of Reservoirs

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	Subernarekha	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 (WFR) from Tapi to Tadri	14.668	2.430	17.098
17	West Flowing Rivers (WFR) from Tadri to Kanyakumari	11.023	1.416	12.439
18	East Flowing Rivers (EFR) between Mahanadi and Pennar	2.676	1.181	3.857
19	East Flowing Rivers (EFR) between Pennar and Kanyakumari	1.441	0.015	1.456
20	West Flowing Rivers (WFR) 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, Central Water Commission, M/o Jal Shakti.

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 (as per the latest availability of data).

Map 3: Categorization of States as per Ground Water Resources Assessment (2024)



Source: Central Ground Water Board, D/o Water Resources, RD & GR, M/o Jal Shakti (https://cgwb.gov.in/cgwbpnm/public/uploads/documents/17056512151889452705file.pdf)

Note:
1. Based on the stage of extraction, the assessment units are categorized as Safe (<= 70%); Semi-Critical (>70 % and <=90 %); Critical (>90% and <=100%) and Over-Exploited (>100 %).
2. The percentage of Over-exploited and Critical administrative units more than 25% of the total units are in Delhi, Haryana, Punjab, Rajasthan, Tamil Nadu, Dadra & Nagar Haveli and Daman & Diu.
3. The overall stage of ground water extraction in the country is 59.26%. The stage of ground water extraction is very high in the States/UTs of Haryana, Punjab, Rajasthan, Dadra & Nagar Haveli and Daman & Diu where it is more than 100%, which implies that in these States the annual ground water consumption is more than annual extractable ground water resources. In the States of Delhi, Tamil Nadu, Uttar Pradesh, Karnataka and UTs of Chandigarh, Lakshadweep and Puducherry, the stage of ground water extraction is between 60-100%. In rest of the States/UTs, the stage of ground water extraction is below 60%.

Table 2.15: State/UT -wise Categorization of Assessment Units in India, 2024

S. No.	State/Union Territories	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
1	Andhra Pradesh	679	591	87.0	38	5.6	2	0.3	9	1.3	39	5.74
2	Arunachal Pradesh	42	42	100	-	-	-	-	-	-	-	-
3	Assam	245	244	99.59	1	0.41	-	-	-	-	-	-
4	Bihar	535	473	88.41	49	9.16	9	1.68	4	0.75	-	-
5	Chhattisgarh	146	120	82.19	21	14.38	5	3.42	-	-	-	-
6	Goa	12	12	100	-	-	-	-	-	-	-	-
7	Gujarat	252	184	73.02	24	9.52	10	3.97	22	8.73	12	4.76
8	Haryana	143	36	25.17	8	5.59	11	7.69	88	61.54	-	-
9	Himachal Pradesh	10	10	100	-	-	-	-	-	-	-	-
10	Jharkhand	263	240	91.25	12	4.56	6	2.28	5	1.9	-	-
11	Karnataka	237	144	60.76	33	13.92	15	6.33	45	18.99	-	-
12	Kerala	152	120	78.95	29	19.08	3	1.97			-	-
13	Madhya Pradesh	317	225	70.98	61	19.24	5	1.58	26	8.2	-	-
14	Maharashtra	359	302	84.12	41	11.42	7	1.95	8	2.23	1	0.28
15	Manipur	9	9	100	-	-	-	-	-	-	-	-
16	Meghalaya	40	40	100	-	-	-	-	-	-	-	-
17	Mizoram	26	26	100	-	-	-	-	-	-	-	-
18	Nagaland	52	52	100	-	-	-	-	-	-	-	-
19	Odisha	314	299	95.22	9	2.87	-	-	-	-	6	1.91
20	Punjab	153	22	14.38	12	7.84	4	2.61	115	75.16	-	-
21	Rajasthan	302	37	12.25	21	6.95	27	8.94	214	70.86	3	0.99
22	Sikkim	38	38	100	-	-	-	-	-	-	-	-
23	Tamil Nadu	313	127	40.58	55	17.57	20	6.39	106	33.87	5	1.60
24	Telangana	620	490	79.03	85	13.71	13	2.10	32	5.16	-	-
25	Tripura	59	59	100	-	-	-	-	-	-	-	-
26	Uttar Pradesh	836	566	67.7	165	19.74	46	5.5	59	7.06	-	-
27	Uttarakhand	20	16	80	4	20	-	-	-	-	-	-
28	West Bengal	345	239	69.28	36	10.43	10	2.9	-	-	60	17.39
29	Andaman And Nicobar	9	9	100	-	-	-	-	-	-	-	-
30	Chandigarh	1	1	100	-	-	-	-	-	-	-	-
31	Dadra and Nagar Haveli and Daman and Diu	3	-	-	-	-	-	-	3	100	-	-
32	Delhi	34	5	14.71	2	5.88	13	38.24	14	41.18	-	-
33	Jammu And Kashmir	149	149	100	-	-	-	-	-	-	-	-
34	Ladakh	18	17	94.44	1	5.56	-	-	-	-	-	-

Contd....

S. No.	State/Union Territories	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
35	Lakshadweep	5	4	80	1	20	-	-	-	-	-	-
36	Puducherry	8	3	37.50	3	37.50	-	-	1	12.50	1	12.50
Grand Total		**6746**	**4951**	**73.39**	**711**	**10.54**	**206**	**3.05**	**751**	**11.13**	**127**	**1.88**

Source: Central Ground Water Board, D/o Water Resources, RD & GR, M/o Jal Shakti

Note 1:

'Blocks': Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Haryana, Jharkhand, Kerala, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Rajasthan, Tripura, Uttar Pradesh, Uttarakhand, West Bengal, Andaman & Nicobar Island, Ladakh, Lakshadweep

'Taluks': Goa, Gujarat, Karnataka, Maharashtra, Tamil Nadu, Puducherry;

'**Mandals**': Andhra Pradesh, Telangana;

'District': Sikkim, Dadra & Nagar Haveli, Daman & Diu, Jammu & Kashmir;

'**Valley**': Himachal Pradesh;

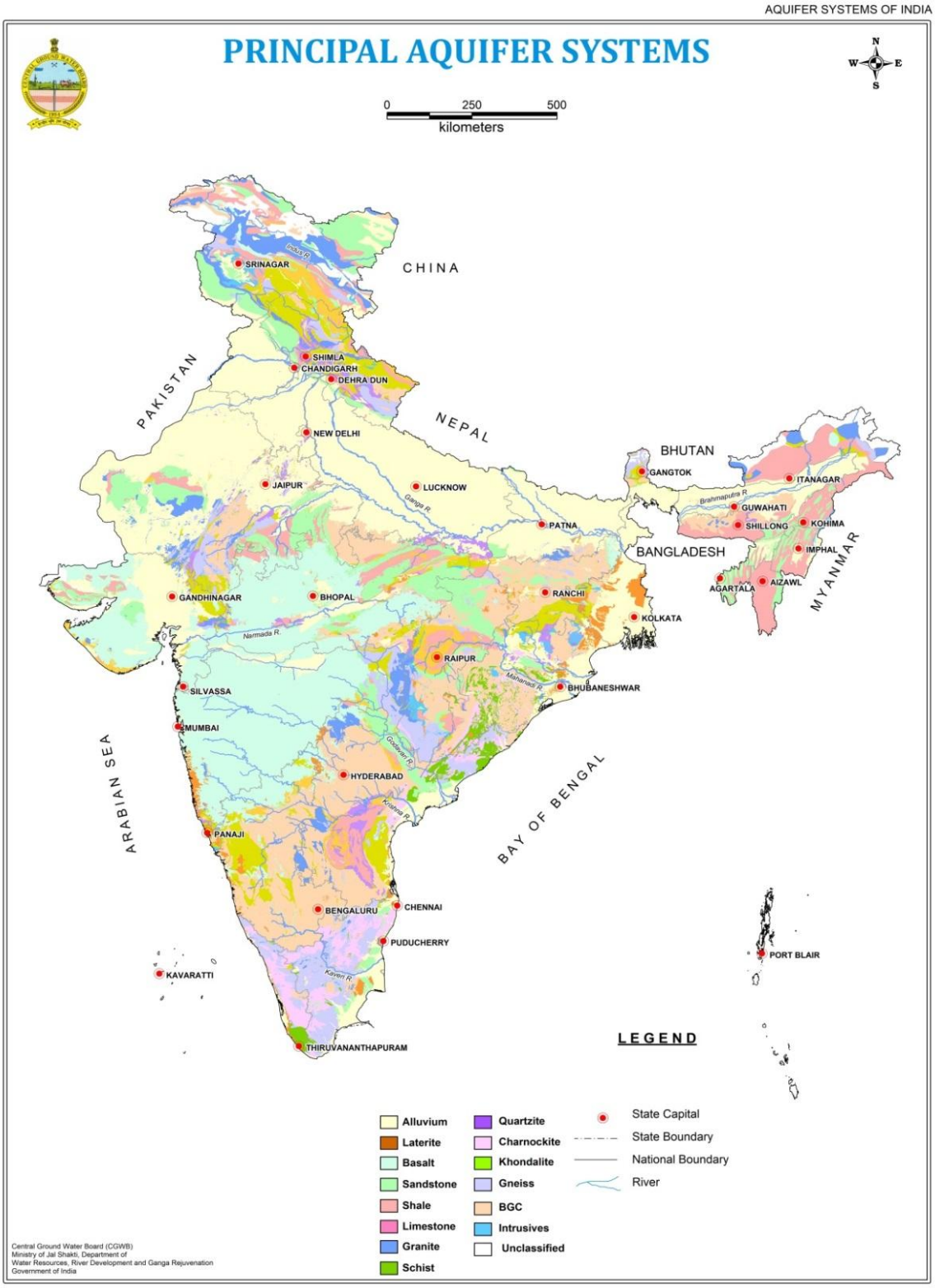
'UT': Chandigarh;

'**Tehsil**': Delhi.

Note 2:

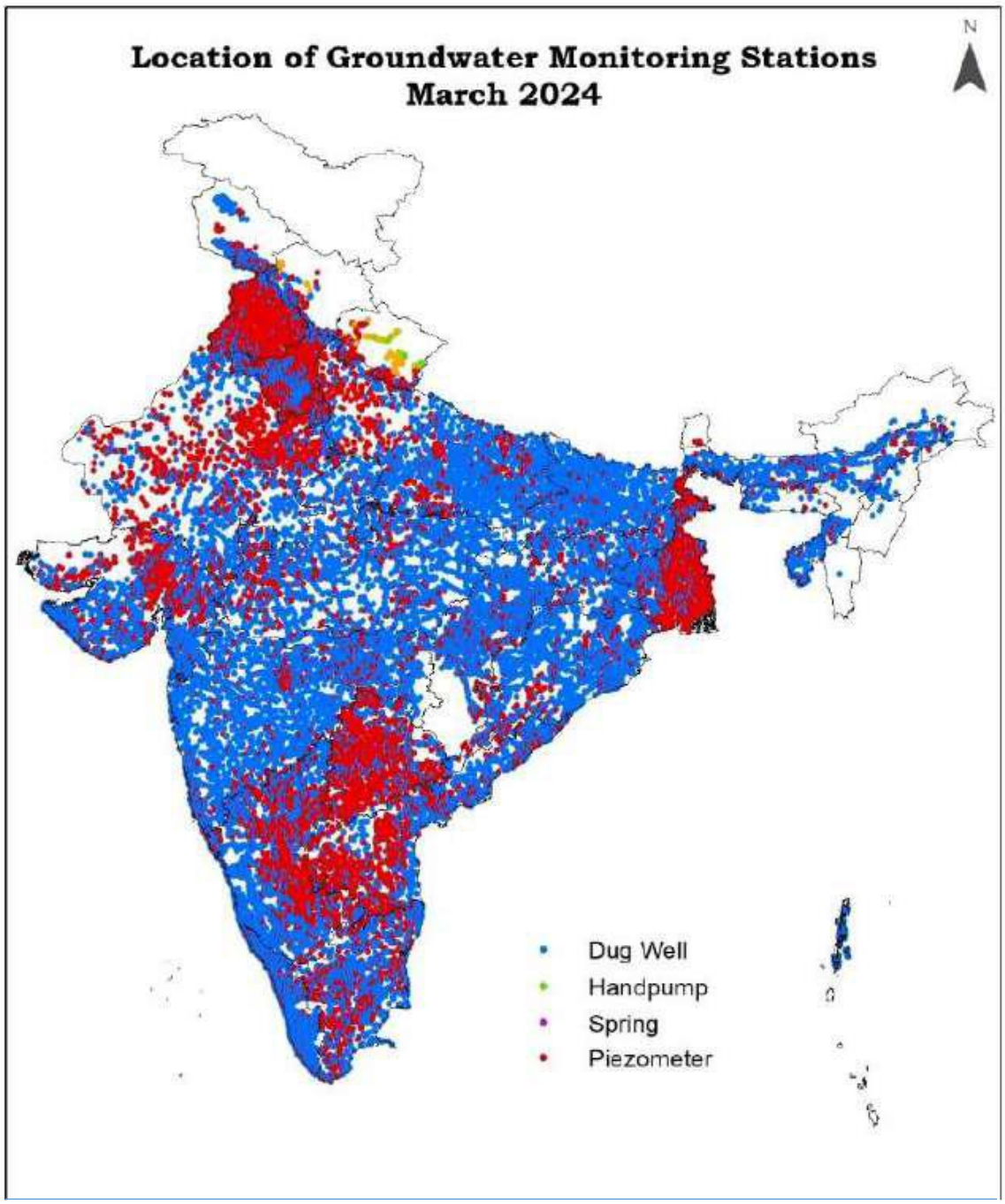
Based on the stage of extraction, the assessment units are categorized as Safe (<= 70%);
Semi Critical (>70 % and <=90 %); Critical (>90% and <=100%) and Over-Exploited (>100 %).

Map 4: Principal Aquifer System of India



Source: CGWB, D/o Water Resources, RD&GR, M/o Jal Shakti

Map 5: Map of Ground Water Monitoring Stations in India



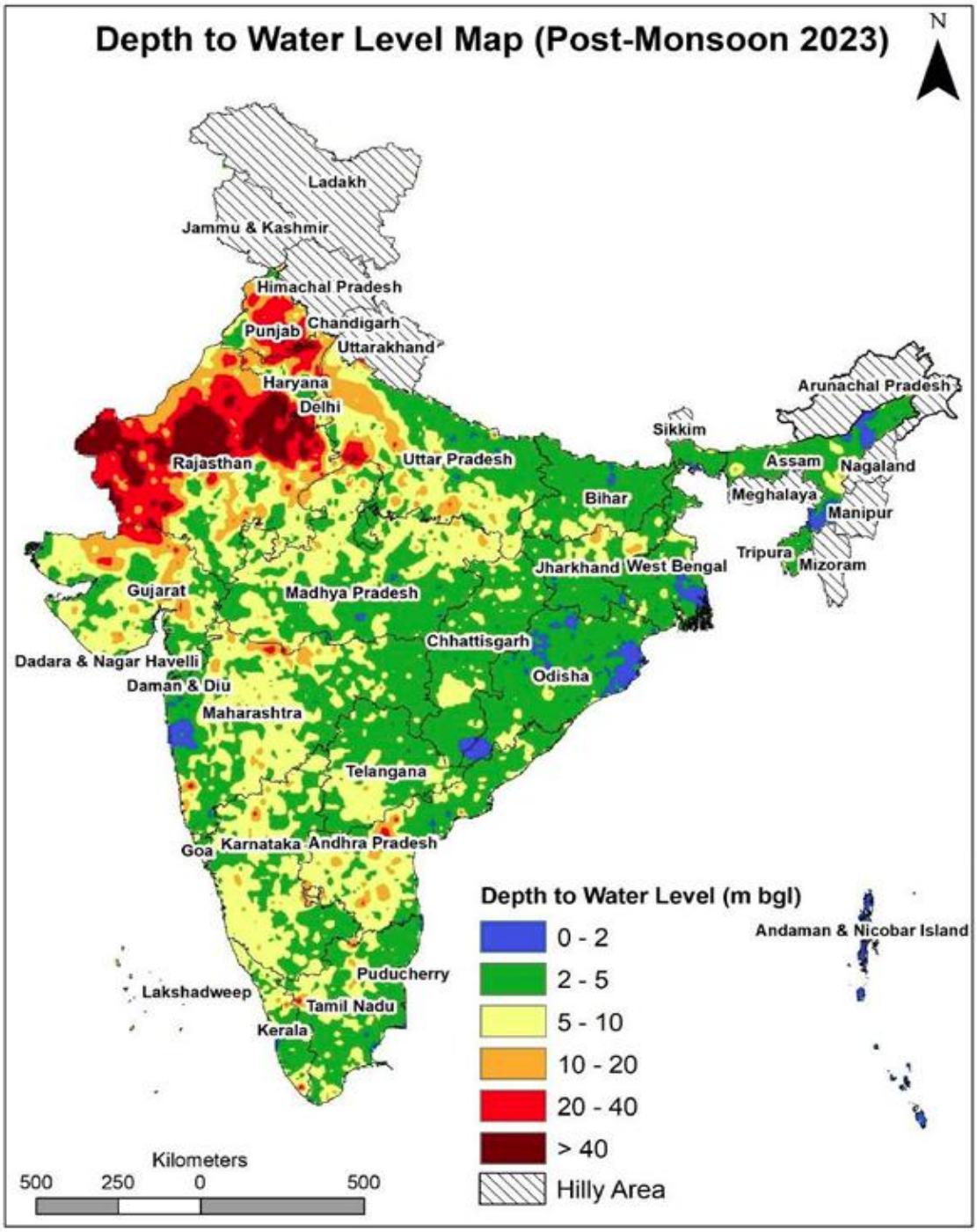
Source: Central Ground Water Board, D/o Water Resources, RD & GR, M/o Jal Shakti

Table 2.16: State/UT-wise Ground Water Monitoring Wells in India

S. No.	Name of the States/UTs	Total Number of Monitoring Stations (March, 2024)
1	2	3
States		
1	Andhra Pradesh	1473
2	Arunachal Pradesh	32
3	Assam	443
4	Bihar	916
5	Chhattisgarh	1318
6	Delhi	135
7	Goa	135
8	Gujarat	1293
9	Haryana	1297
10	Himachal Pradesh	217
11	Jammu & Kashmir	425
12	Jharkhand	582
13	Karnataka	2291
14	Kerala	1650
15	Madhya Pradesh	1871
16	Maharashtra	2075
17	Manipur	6
18	Meghalaya	99
19	Mizoram	3
20	Nagaland	128
21	Odisha	1784
22	Punjab	1170
23	Rajasthan	1302
24	Sikkim	4
25	Tamil Nadu	1437
26	Telangana	1281
27	Tripura	115
28	Uttar Pradesh	1464
29	Uttarakhand	279
30	West Bengal	1732
Union Territories		
1	Andaman & Nicobar Islands	113
2	Chandigarh	23
3	Dadra & Nagar Haveli	43
4	Daman & Diu	
5	Puducherry	27
Total		**27163**

Source: Central Ground Water Board, D/o Water Resources, RD & GR, M/o Jal Shakti

Map 6: Water Level Scenario in India



Source: CGWB, D/o Water Resources, RD&GR, M/o Jal Shakti

Table 2.17: STATE-WISE GROUND WATER RESOURCES OF INDIA, 2024

S. 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	8	9	10	11	12	13	14	15	16
1	Andhra Pradesh	9	10.79	0.82	7.18	27.8	1.39	26.41	6.75	0.13	1	7.88	1.24	18.83	29.83
2	Arunachal Pradesh	2.16	0.27	1.11	0.34	3.88	0.42	3.46	0.01	0	0.01	0.01	0.01	3.44	0.39
3	Assam	19.45	0.67	6.53	0.56	27.21	6.32	20.89	2.06	0.01	0.56	2.64	0.58	18.23	12.61
4	Bihar	19.54	8.05	1.14	5.42	34.15	3.19	30.95	10.21	0.4	3.48	14.1	3.76	16.7	45.54
5	Chhattisgarh	8.57	3.43	0.15	2.03	14.18	1.26	12.93	5.21	0.14	0.77	6.12	0.84	6.82	47.32
6	Goa	0.35	0.01	0	0.03	0.38	0.08	0.31	0.03	0	0.04	0.07	0.04	0.24	22.91
7	Gujarat	19.58	2.79	0	5.21	27.58	2	25.58	12.81	0.21	0.85	13.86	0.92	12.38	54.21
8	Haryana	3.26	3.51	0.67	2.86	10.32	0.96	9.36	11.47	0.58	0.67	12.72	0.68	1.1	135.96
9	Himachal Pradesh	0.61	0.18	0.13	0.2	1.11	0.1	1.01	0.19	0.06	0.12	0.36	0.12	0.65	35.48
10	Jharkhand	4.98	0.46	0.47	0.37	6.28	0.52	5.76	0.94	0.22	0.65	1.81	0.65	3.96	31.43
11	Karnataka	8.79	5.01	1.23	3.7	18.74	1.86	16.88	10.15	0.19	1.22	11.55	1.28	7.1	68.44

S. 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	8	9	10	11	12	13	14	15	16
12	Kerala	4.19	0.13	0.49	0.85	5.67	0.54	5.13	1.12	0.01	1.63	2.76	2.14	2.12	53.78
13	Madhya Pradesh	27	1.68	0.17	7.04	35.9	1.91	33.99	17.9	0.2	1.76	19.85	1.88	15.02	58.4
14	Maharashtra	20.69	2.76	0.73	8.85	33.03	1.89	31.15	15.07	0.03	1.4	16.5	1.46	15.09	52.99
15	Manipur	0.4	0.001	0.11	0.006	0.52	0.05	0.47	0.017	0.00 02	0.02	0.04	0.02	0.43	8
16	Meghalaya	1.35	0.06	0.42	0.04	1.86	0.33	1.53	0.02	0	0.05	0.07	0.05	1.48	4.6
17	Mizoram	0.18	0	0.03	0	0.21	0.02	0.19	0	0	0.01	0.01	0.01	0.18	3.95
18	Nagaland	0.41	0.12	0.08	0.01	0.62	0.05	0.56	0.01	0	0.02	0.03	0.02	0.53	4.72
19	Odisha	10.18	2.94	1.51	2.84	17.46	1.42	16.04	6.28	0.19	1.26	7.74	1.37	8.26	48.23
20	Punjab	4.79	9.01	0.72	4.37	19.19	1.87	17.63	26.24	0.25	1.18	27.66	1.19	2.07	156.87
21	Rajasthan	9.08	0.65	0.22	2.62	12.58	1.2	11.37	14.51	0.13	2.41	17.05	2.41	0.88	149.86
22	Sikkim	0.18	0	0.06	0	0.24	0.02	0.22	0.01	0	0	0.01	0	0.2	5.85
23	Tamil Nadu	7.42	10.18	1.2	2.71	21.51	2.07	19.46	13.51	0.14	0.8	14.45	1.45	6.76	74.26

S. 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	8	9	10	11	12	13	14	15	16
24	Telangana	6.88	6.63	0.94	5.96	20.4	1.96	18.44	7.59	0.37	0.51	8.47	0.74	9.95	45.91
25	Tripura	1.03	0.16	0.2	0.07	1.45	0.27	1.18	0.03	0	0.08	0.11	0.09	1.07	9.48
26	Uttar Pradesh	36.43	14.12	0.81	21.47	72.84	6.46	66.38	41.15	0.53	5.08	46.76	5.38	20.52	70.45
27	Uttarakhand	1.53	0.21	0.14	0.26	2.14	0.17	1.96	0.74	0.13	0.18	1.05	0.26	0.83	53.54
28	West Bengal	16.65	1.71	3.4	4.13	25.89	2.33	23.56	8.99	0.17	1.59	10.75	1.77	12.72	45.63
29	Andaman And Nicobar	0.2	0	0.17	0	0.38	0.04	0.34	0	0	0.01	0.01	0.01	0.33	2.08
30	Chandigarh	0.01	0.01	0	0.03	0.06	0.01	0.05	0.01	0	0.03	0.03	0.03	0.02	66.13
	Dadra and Nagar Haveli and Daman														
31	and Diu	0.09	0.01	0	0.02	0.12	0.01	0.12	0.01	0.14	0.01	0.16	0.03	0.01	142.17
32	Delhi	0.12	0.09	0	0.17	0.38	0.04	0.34	0.08	0	0.26	0.34	0.28	0.02	100.77

S. 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	8	9	10	11	12	13	14	15	16
33	Jammu And Kashmir	1.19	0.35	0.85	0.15	2.55	0.25	2.3	0.13	0.02	0.37	0.51	0.37	1.79	22.28
34	Ladakh	0	0.05	0.01	0	0.07	0.01	0.06	0	0	0.02	0.02	0.02	0.04	30.93
35	Lakshadweep	0.01	0	0	0	0.01	0.01	0.01	0	0	0	0	0	0	61.32
36	Puducherry	0.05	0.09	0.01	0.03	0.19	0.02	0.17	0.07	0.01	0.05	0.13	0.05	0.04	75.91
Grand Total		**246.37**	**86.14**	**24.54**	**89.54**	**446.908**	**41.05**	**406.194**	**213.29**	**4.28**	**28.07**	**245.646**	**31.12**	**189.83**	**60.475**

Source: Central Ground Water Board, D/o Water Resources, RD & GR, M/o Jal Shakti

Note 1: For National compilation, Evapotranspiration loss of Arunachal Pradesh, Assam, Meghalaya, Tripura and Lakshadweep has been added in Total Natural Discharges.
Note 2: Minor discrepancies in numbers may arise due to rounding at various levels.
Note 3: Totals may not tally due to rounding off.

Section-III

Major & Medium Irrigation and other Projects including Minor Irrigation

Major and Medium Irrigation (MMI) projects form the backbone of India's irrigation infrastructure, playing a pivotal role in sustaining agricultural production and rural livelihoods. By supplying water to extensive command areas, these projects not only enhance crop productivity and improve farmers' incomes but also contribute to strengthening the rural economy as a whole. Typically comprising large dams, canals, and reservoirs, MMI projects ensure reliable distribution of water, backed by substantial storage capacity that provides resilience even during drought conditions. Their objectives extend beyond irrigation, encompassing flood control, hydropower generation, and drinking water supply.

2. A detailed account of Major and Medium Irrigation projects was first compiled in 2008 under the title *"Major and Medium Irrigation Projects in India"*, which presented state-wise and project-wise information on completed and ongoing schemes. The "*National Register of Major and Medium Irrigation Projects"* builds further on that framework, providing updated details on Culturable Command Area (CCA), Irrigation Potential Created (IPC), project cost, and the time taken for completion.

3. As per the National Register of Major and Medium Irrigation Projects-2024, a total of 1720 MMI projects have been reported at the national level, of which 656 are major and 1064 are medium projects. Out of these, 1323 projects have been completed (449 major and 874 medium), while 397 projects are ongoing (207 major and 190 medium). State wise no. of completed and ongoing major & medium irrigation projects are given in Table 3.1 below:

TABLE 3.1: NO. OF COMPLETED AND ONGOING MAJOR & MEDIUM IRRIGATION PROJECTS

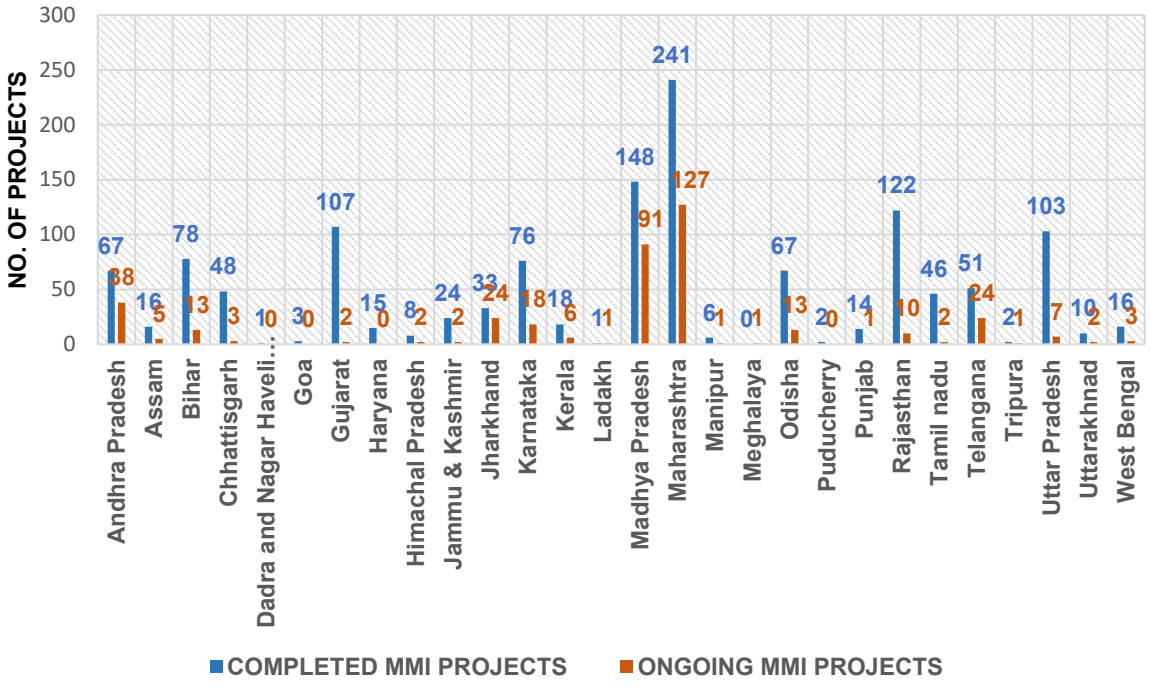
S. No.	Name of State/ UT	Completed									Ongoing			Grand Total (Completed & Ongoing)		
		Major				Medium				Total Major & Medium (6+10)						
		Pre-Plan	During Plan up to End of XII Plan (2017)	After XII Plan	Total (3+4+5)	Pre-Plan	During Plan up to End of XII Plan (2017)	After XII Plan	Total (7+8+9)		Major	Medium	Total Major & Medium (12+13)	Major (6+12)	Medium (10+13)	Grand Total Major & Medium (15+16)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1	Andhra Pradesh	9	7	2	18	6	42	1	49	67	27	11	38	45	60	105
2	Assam	0	4	2	6	0	10	0	10	16	2	3	5	8	13	21
3	Bihar	2	22	2	26	2	45	5	52	78	8	5	13	34	57	91
4	Chhattisgarh	4	8	1	13	3	30	2	35	48	2	1	3	15	36	51
5	Dadra & Nagar Haveli and Daman & Diu (UT)	0	1	0	1	0	0	0	0	1	0	0	0	1	0	1
6	Goa	0	1	1	2	0	1	0	1	3	0	0	0	2	1	3
7	Gujarat	2	19	1	22	0	83	2	85	107	1	1	2	23	86	109
8	Haryana	2	10	3	15	0	0	0	0	15	0	0	0	15	0	15
9	Himachal Pradesh	0	1	0	1	0	7	0	7	8	0	2	2	1	9	10
10	Jammu & Kashmir (UT)	1	3	0	4	8	9	3	20	24	0	2	2	4	22	26
11	Jharkhand	0	2	0	2	0	31	0	31	33	8	16	24	10	47	57
12	Karnataka	4	20	3	27	7	37	5	49	76	13	5	18	40	54	94
13	Kerala	0	11	0	11	0	6	1	7	18	2	4	6	13	11	24
14	Ladakh (UT)	0	0	0	0	0	1	0	1	1	0	1	1	0	2	2
15	Madhya Pradesh	2	22	20	44	11	73	20	104	148	55	36	91	99	140	239
16	Maharashtra	12	42	8	62	6	142	31	179	241	47	80	127	109	259	368
17	Manipur	0	1	0	1	0	4	1	5	6	1	0	1	2	5	7
18	Meghalaya	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1
19	Odisha	3	13	2	18	4	42	3	49	67	7	6	13	25	55	80
20	Puducherry (UT)	1	0	0	1	0	1	0	1	2	0	0	0	1	1	2
21	Punjab	3	9	0	12	0	2	0	2	14	1	0	1	13	2	15

TABLE 3.1: NO. OF COMPLETED AND ONGOING MAJOR & MEDIUM IRRIGATION PROJECTS

S. No.	Name of State /UT	Completed									Ongoing			Grand Total (Completed & Ongoing)		
		Major				Medium				Total Major & Medium (6+10)						
		Pre-Plan	During Plan up to End of XII Plan (2017)	After XII Plan	Total (3+4+5)	Pre-Plan	During Plan up to End of XII Plan (2017)	After XII Plan	Total (7+8+9)		Major	Medium	Total Major & Medium (12+13)	Major (6+12)	Medium (10+13)	Grand Total Major & Medium (15+16)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
22	Rajasthan	9	20	1	30	35	56	1	92	122	3	7	10	33	99	132
23	Tamil Nadu	11	8	0	19	9	16	2	27	46	0	2	2	19	29	48
24	Telangana	1	11	3	15	13	15	8	36	51	19	5	24	34	41	75
25	Tripura	0	0	0	0	0	2	0	2	2	0	1	1	0	3	3
26	Uttar Pradesh	12	70	3	85	1	17	0	18	103	7	0	7	92	18	110
27	Uttarakhand	2	5	0	7	1	2	0	3	10	2	0	2	9	3	12
28	West Bengal	3	4	0	7	0	9	0	9	16	2	1	3	9	10	19
	Total	83	314	52	449	106	683	85	874	1323	207	190	397	656	1064	1720

Source: *National Register of Major and Medium Irrigation Projects in India-2024*

Figure 6: State-wise Status Of MMI Projects In India



This Section also deals with the technical and financial aspects of water and related sectors in the country such as details on Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) and its major components -Accelerated Irrigation Benefits Programme (AIBP) and Har Khet Ko Pani (HKKP). It also gives the details on the sub-components-National Projects, Command Area Development & Water Management (CAD&WM) Programme, Surface Minor Irrigation Scheme, Repair, Renovation & Restoration (RRR) of Water Bodies Scheme and PMKSY-HKKP, Ground Water Scheme. It provides the details on special package for Maharashtra/Sirhind Feeder (SF) and Rajasthan Feeder (RF). This Section also consists of the data/information on External Assistance for development of water resources, National Water Mission & Climate Change Issue and Namami Gange Programme. It also provides the data/information on Minor irrigation census and state wise details of No. of schemes, their CCA, IPC and IPU under Ground Water and Surface Water schemes.

3.1 Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)

1. Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) was launched during the year 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.

2. PMKSY is an umbrella scheme, consisting of two major components being implemented by the Ministry of Jal Shakti, namely; Accelerated Irrigation Benefits Programme (AIBP) and Har Khet Ko Pani (HKKP). HKKP, in turn, consists of four sub-components; Command Area Development & Water Management (CAD&WM), Surface Minor Irrigation (SMI), Repair, Renovation and Restoration (RRR) of Water Bodies, and Ground Water (GW) Development component.

3. In addition, PMKSY also consists of two components being implemented by other Ministries. Per Drop More Crop (PDMC) component is being implemented by

Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture & Farmers Welfare. Watershed Development component (WDC) of PMKSY is being implemented by Department of Land Resources, Ministry of Rural Development.

3.1.1 PMKSY-AIBP

1. Under PMKSY-AIBP, 99 (106 including phases) projects have been prioritized amongst the 149 on-going projects under AIBP. Out of these priority projects, 58 (including phases) projects have been reported as completed as on March, 2024. Total Irrigation Potential targeted under 99 Priority Project is 76.03 Lakh Ha out of which 41.45 Lakh Ha was created up to March, 2016. A cumulative Irrigation Potential of 67.25 Lakh Ha out of 76.03 Lakh Ha (88.5%) has been created till March, 2024. Further, in December, 2021, implementation of PMKSY for the period of 2021-22 to 2025-26 has been approved by the Government of India with an outlay of Rs. 93,068.0 Cr including Rs. 37,454 Cr Central Assistance (CA) to States.

2. Under the continuing scheme of PMKSY-AIBP, it is planned to provide financial assistance for completion of 60 ongoing Major/Medium Irrigation projects under PMKSY-AIBP, 85 ongoing CAD&WM projects and financial assistance to new Major/Medium irrigation projects including ERM projects. Since 2021-22, 08 newly MMI/ERM projects, one each from Rajasthan, Himachal Pradesh, Assam, Manipur,Tamil Nadu and Uttrakhand and two projects from Maharashtra have been included in PMKSY-AIBP upto March, 2024. During 2016-17 to 2023-24, Rs.14743.56 Cr. Central Assistance was released including the new projects included under the extended PMKSY-AIBP scheme.

3.1.2 National Projects

1. The Government of India initially declared 14 projects as National Projects (NP) in February, 2008. Later, Cabinet Committee on Infrastructure approved inclusion of Saryu Nahar Pariyojana in the scheme of National Project on 3rd August, 2012. Polavaram Irrigation Project was included under the scheme of National Projects vide Gazette notification dated 01.03.2014. Implementation of these projects is monitored by the High Powered Steering Committee constituted by Union Cabinet with Secretary, M/o Jal Shakti, D/o WR, RD & GR as Chairman of the Committee. The proportion of Central share from 2016-17 onwards has been reduced to 60% from 75% except in case of projects in eight North Eastern States and three Himalayan States which will continue to get 90% of the cost as Central Grant.

2. D/o WR, RD & GR, M/o Jal Shakti vide letter dated 07.02.2022 issued guidelines for Pradhan Mantri Krishi Sinchayee Yojana-Accelerated Irrigation Benefits Programme and National Projects (PMKSY-AIBP and NP), wherein the criteria for selection of the NP are as under:

   (i) International projects where usage of water in India is required by a treaty or where planning and early completion of the project is necessary for the interest of the country.

   or

(ii) 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.

or

(iii) Intra State projects with additional potential of more than 2 Lakh Ha and with no dispute regarding sharing of water and where hydrology is established.

or

(iv) Extension, Renovation and Modernization (ERM) projects envisaging extension/restoration of irrigation potential of 2 Lakh Ha, subject to:

a. CAD&WM works shall be ensured in the entire command area of the ERM project.
b. CAD&WM works shall be taken up simultaneously with the ERM works so as to facilitate achievement of the benchmark efficiency for water use.
c. The management of command area system by Water Users' Association (WUAs) after the ERM works will be necessary.

3. Independent evaluation of the project will be carried out after project implementation and the project should achieve the benchmark water use efficiency in practice, as prescribed by Central Water Commission.

3.1.3 PMKSY- HKKP, Command Area Development & Water Management (CAD&WM)

1. 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.

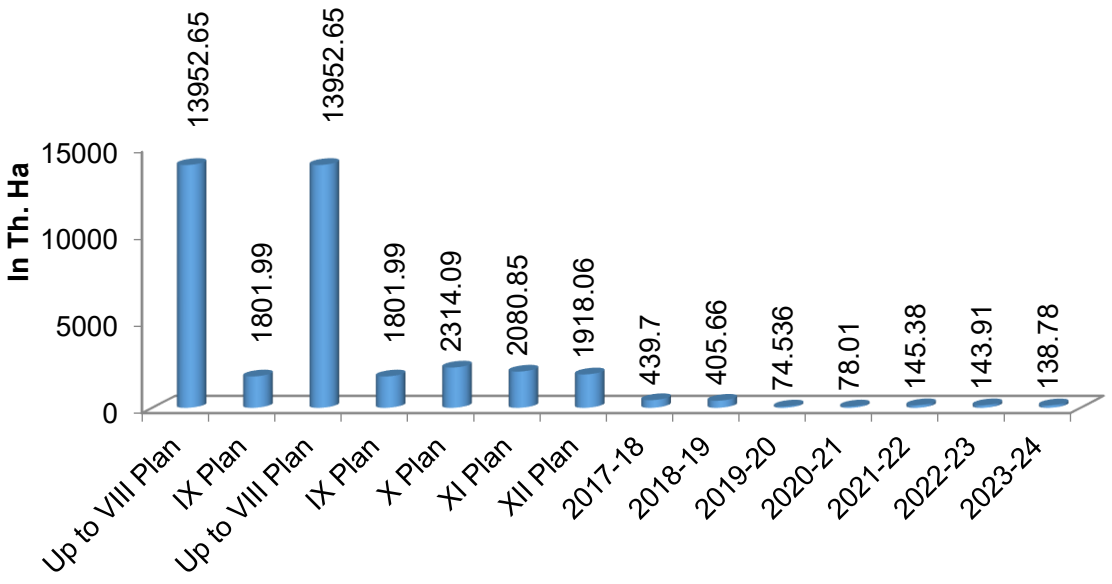
2. Completion of CAD works of 99 prioritised AIBP projects only, are being targeted from 2016-17 onwards under PMKSY-HKKP. The arrangement of funds for Central Share/ or Central Assistance (CA) has been made by taking loan from NABARD as per year-wise requirements. A dedicated Long Term Irrigation Fund (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.

3. 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. 8,235.69 Cr and targeted expenditure of Rs. 18,736.476 Cr; 3 projects namely Punpun (Bihar), Karipuzha (Kerala) & Madhya Ganga (Uttar Pradesh) are yet to be included. The physical achievements of field channels under CAD programme (in Th. Ha) are given in below:

Sl. No.	Plan/Year	Achievements
1	2	3
1	Up to VIII Plan	13952.65
2	IX Plan	1801.99
3	X Plan	2314.09
4	XI Plan	2080.85
5	XII Plan	1918.06
6	2017-18	439.70
7	2018-19	405.66
8	2019-20	74.536
9	2020-21	78.01
10	2021-22	145.38
11	2022-23	143.91
12	2023-24	138.78
Cumulative Achievement up to 31.03.2024		**23493.65**

Source: CAD Wing, D/o Water Resources, RD&GR, M/o Jal Shakti

Figure-7: Physical Achievements of Field Channels under CAD Programme



3.1.4 PMKSY-HKKP, Surface Minor Irrigation (SMI)

1. The scheme 'Surface Minor Irrigation (SMI)' is a part of PMKSY-HKKP. The main objective of SMI schemes is to expand cultivable areas under assured irrigation. The eligibility criteria, funding pattern and release of funds in this scheme are as per the guidelines of the D/o Water Resources, RD&GR of January, 2022.

2. Since XII Plan, 7869 SMI schemes have been reportedly included under the programme (till 31.03.2024). Out of this, 4436 schemes have been reported to be completed (37 schemes completed during 2023-24). So far, Central Assistance amounting to Rs. 9684.4 Cr has been released for completion of these schemes till

31.3.2024. Out of this, an amount of Rs. 675.2 Cr was released during 2023-24. No new SMI projects included for funding under the scheme SMI during 2023-24.

3. The Surface Minor Irrigation (SMI) component was included under Accelerated Irrigation Benefits Programme (AIBP) since 1999-2000 for special category States. Subsequently the scheme was extended to cover other special areas, namely; drought prone area programme (DPAP), tribal area (TA), desert development programme (DDP), flood prone, left wing extremism affected and Koraput, Bolangir and Kalahandi (KBK) region of Odisha.

3.1.5 PMKSY-HKKP, Repair, Renovation & Restoration (RRR) of Water Bodies Scheme

1. To revive, restore and rehabilitate the traditional water bodies, Ministry of Jal Shakti, Government of India launched a pilot scheme for 'Repair, Renovation and Restoration (RRR) of Water Bodies directly linked to Agriculture' in January, 2005 for implementation during the remaining period of X Plan. The pilot scheme envisaged a Plan outlay of Rs. 300 Cr to be shared by Centre and State in the ratio of 3:1. The scheme was sanctioned in respect of 1,098 water bodies in 26 districts of 15 States, with a target to create 0.78 Lakh Ha of additional irrigation potential. Keeping in view the success of the pilot scheme for RRR of Water Bodies, the then Ministry of Water Resources, during XI plan, launched a State Sector Scheme for Repair, Renovation & Restoration (RRR) of Water Bodies with two components (i) one with external assistance with an outlay of Rs. 1,500 Cr and (ii) the other with domestic support with an outlay of Rs. 1,250 Cr. Under the scheme of external assistance, 10,887 water bodies have been taken up while under scheme of RRR of water bodies with domestic support, 3341 water bodies taken up.

2. The scheme of RRR of Water Bodies has become a part of PMKSY-HKKP from 2015-16. Recently, Government of India has approved the scheme implementation during 2021-26 with enhanced scope. Now, in addition to water bodies directly linked to irrigation, other water bodies such as percolation tanks and the water bodies used for providing drinking water and for other community purposes which fulfil the eligibility criteria, are now proposed to be included under the scheme. During 2021-26, the scheme aims to create 0.9 Lakh Ha of irrigation potential in addition to improve availability of drinking water & conservation schemes for multifarious use. The scheme also aims to provide protection works to avoid encroachment, environmental benefits etc. Funding pattern under the scheme, for projects to be included as per the latest guidelines, is as below:

Sl. No.	Category	Funding Pattern
1	2	3
1	All Union Territories (UTs)	100% Central funding for UTs without legislature; 90% (Centre): 10% (State) for UTs with legislature.
2	Seven North-Eastern States including Sikkim & Hilly States (Himachal Pradesh, Uttarakhand)	90% (Central): 10% (State)
3	All others	60% (Central) : 40% (State)

Source: National Projects Directorate, Central Water Commission, M/o Jal Shakti

3. As per the information available, during FY 2023-24, an amount of Rs. 135.97 Cr Central Assistance has been released for RRR of Water Bodies under PMKSY-HKKP. Also, 14.49 MCM storage has been restored and 212 water bodies have been physically completed.

3.1.6 PMKSY-HKKP, Ground Water

1. PMKSY-HKKP, Ground Water scheme, launched by the Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti, envisages providing irrigation facility for small and marginal farmers in areas having sufficient potential for future development of ground water. The scheme is being implemented with an objective to support goal of Hon'ble Prime Minister of India, for doubling the farmers' incomes. Though the scheme was approved for 2015-20, keeping in view the various requirements to implement the scheme, guidelines were revised and scheme was effectively launched in July, 2019.

2. Beneficiaries under this scheme are small and marginal farmers only identified by State Governments. Priority is to be given to SC/ST and Women farmers. 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. The scheme is applicable only in areas having stage of ground water extraction less than 60%, average rainfall more than 750 mm rainfall and having shallow ground water levels (less than 15 m below ground level).

3. 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.

4. Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti has sanctioned 13 projects under PMKSY-HKKP-GW scheme since 2019 in 10 States namely Assam, Arunachal Pradesh, Gujarat, Nagaland, Manipur, Mizoram, Tripura, Tamil Nadu, Uttar Pradesh and Uttarakhand. The total cost of these 13 ongoing projects is Rs. 978.00 Cr and Central Assistance is Rs.827.15 Cr out of which 764.89 Cr has already been released as on 31st March, 2023 by the Ministry of Jal Shakti. No fund has been released during the year 2023-24. The cumulative financial progress status of PMKSY-HKKP-GW as on 31st March, 2023, is given below:

Sl. No.	State	Projects	Project Cost (Rs.in Cr)	CA Released (As on 31st March, 2023)	CA Released in 2022-23
1	2	3	4	5	6
1	Assam	Assam Phase-I	246.69	439.65	3.69
2		Assam Phase-II	292.96		0.00
3	Arunachal Pradesh	Arunachal Pradesh Phase-I	45.30	79.90	0.00
4		Arunachal Pradesh Phase-II	44.95		0.00
5	Gujarat	Gujarat	119.19	71.44	36.94
6	Nagaland	Nagaland	18.15	16.25	0.65
7	Manipur	Manipur	61.68	54.40	0.00
8	Mizoram	Mizoram	16.04	13.86	5.20
9	Tamil Nadu	Tamil Nadu	9.13	5.36	0.08
10	Tripura	Tripura Phase-I	13.31	43.63	0.26
11		Tripura Phase-II	48.34		7.74
12	Uttarakhand	Uttarakhand	15.89	13.72	0.00
13	Uttar Pradesh	Uttar Pradesh	46.37	26.69	10.00
Total			**978.00**	**764.89**	**64.55**

Source: CGWB, D/o Water Resources, RD&GR, M/o Jal Shakti

5. During the year 2023-24, total 84 wells have been constructed, 10583 Ha command area have been created and 624 number of small & marginal farmers have been benefited under the scheme. All the 13 projects have been completed with the help of combined effort of CGWB, DOWR, RD & GR, Ministry of Jal Shakti and concerned state implementing Agency.
6. As on March, 2024; total 29779 wells have been constructed, 88547 Ha command area have been created and 67909 number of small & marginal farmers have been taken the benefit of PMKSY-HKKP-GW scheme so far. The cumulative physical progress status of PMKSY-HKKP-GW, as on 31st March, 2024, is given below:

Sl. No.	Projects	Wells to be Constructed Target/ Achievement (Nos.)	Project Command Target/ Achievement (Ha)	Beneficiaries Target/ Achievement (Nos.)
1	2	3	4	5
1	Assam Phase-I	4779 / 4779	19116 / 19116	19643 / 19643
2	Assam Phase-II	4916/ 4916	19664/ 19532	17216/ 17200
3	Arunachal Pradesh Phase-I	473 / 473	1785/ 1785	3350/ 3350
4	Arunachal Pradesh Phase-II	519/ 519	1957/ 1957	3633/ 3633
5	Nagaland	262/ 262	667/ 667	264/ 264
6	Tripura Phase-I	231/ 231	339/ 339	851/ 851
7	Tripura Phase-II	890/ 890	2670/ 2670	1639/ 1639
8	Manipur	550/ 550	2057/ 2057	1445/ 1445
9	Mizoram	209/ 209	553/553	411/ 411
10	Uttar Pradesh	14752/ 14752	36365/ 36365	15252/ 15252
11	Uttarakhand	206/ 206	1030/ 1030	1085/ 1085
12	Gujarat	1826/ 1826	1866/ 1866	1908/ 1908
13	Tamil Nadu	166/ 166	610/ 610	1233/ 1228
Total		**29779/ 29779**	**88679/ 88547**	**67930/ 67909**

Source: CGWB, D/o Water Resources, RD&GR, M/o Jal Shakti

7. 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. The scheme includes measures to prevent over-exploitation and facilitate recharge to ground water. Suitable recharge measures are to be taken up under NRM (National Resource Management) 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.

Table 3.2: State/UT-wise Details of Major and Medium Irrigation Projects under PMKSY-AIBP

Sl. No.	Name of States	No. of MMI Projects Benefitting under AIBP	No. of MMI Projects Completed under AIBP upto 2015-16	No. of MMI Projects under PMKSY- AIBP (including new projects) as on 31.03.2024	No. of completed MMI Projects under PMKSY-AIBP as on 31.03.2024	CLA/Grant Released under PMKSY (Rs. in Cr) (2016-2024)	Cumulative CLA/Grant Released under AIBP as on 31.03.2024 (Rs. in Cr)
1	2	3	4	5	6	7	8
1	Andhra Pradesh	16	7	8	1	22.64	1400.40
2	Assam	11	7	4	2	41.98	556.75
3	Bihar	9	5	2	0	110.24	872.14
4	Chhattisgarh	11	7	3	2	49.62	568.04
5	Goa	2	1	1	1	0.00	273.17
6	Gujarat	15	14	1	0	4533.79	13415.49
7	Haryana	3	2	0	-	-	90.54
8	Himachal Pradesh	4	1	1	-	2.25	381.15
9	Jharkhand	10	3	1	0	756.73	2004.32
10	Karnataka	19	5	5	4	1190.05	7177.41
11	Kerala	5	1	2	0	0.00	201.11
12	Madhya Pradesh	22 i/c phases of BDP, ISP & OSP total 33 Nos.	5	14 (21 i/c phases of BDP, ISP & OSP)	17 projects (i/c phases of BDP, ISP & OSP)	796.77	6204.56
13	Maharashtra	64	37	28	12	2571.74	12937.50
14	Manipur	3	0	3	1	270.89	1638.37
15	Meghalaya	1	0	0	-	-	4.00
16	Odisha	18	7	8	5	1208.86	5898.62
17	Punjab	7	3	2	2	52.42	724.46
18	Rajasthan	10	7	3	2	654.87	2828.93
19	Tamil Nadu	1	1	1	-	34.79	54.79
20	Telangana	17	6	11	4	981.49	5057.21
21	Tripura	3	0	0	-	-	126.29
22	UT of Jammu & Kashmir	18	10	3	3	39.71	520.49
23	UT of Ladakh	1	0	1	0	2.98	34.63
24	Uttar Pradesh	18	10	4	2	1421.82	6011.44
25	Uttarakhand	2	1	1	-	-	609.75
26	West Bengal	7	3	0	-	-	385.00
Total		**297***	**143**	**107(114 including phases)**	**58****	**14743.59**	**69976.56**

Source: Monitoring (Central) Directorate, Central Water Commission, M/o Jal Shakti
Note '*' 5 projects have been deferred; '**':- including phases projects under PMKSY-AIBP reported completed by State Governments; 'MMI': Major and Medium Irrigation.

Table 3.3: Financial Status of Irrigation Projects under AIBP-PMKSY

Sl. No.	Name of States	Cumulative CLA/Grant Released up to 31.03.2016 under AIBP (Rs. in Cr)	CLA/Grant Released under PMKSY (Rs. in Cr)								CLA/ Grant Released under PMKSY-AIBP (Rs. in Cr) (2016-2024)
			2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	
1	2	3	4	5	6	7	8	9	10	11	12
1	Andhra Pradesh	1377.76	7.40	15.24	0.00	0.00	0.00	0.00	0.00	0.00	22.64
2	Assam	514.77	0.00	0.00	0.00	0.00	0.00	0.00	41.90	0.00	41.90
3	Bihar	761.90	0.00	46.32	37.82	11.98	14.12	0.00	0.00	0.00	110.24
4	Chhattisgarh	518.44	13.29	17.26	0.00	4.09	6.45	3.12	1.85	3.57	46.06
5	Goa	273.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	Gujarat	8881.70	961.88	1410.49	1047.29	485.35	177.96	357.28	61.15	32.40	4501.40
7	Haryana	90.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Himachal Pradesh	378.89	0.00	0.00	0.00	0.00	0.00	2.25	0.00	0.00	2.25
9	Jharkhand	1247.59	145.75	305.10	305.88	0.00	0.00	0.00	0.00	0.00	756.73
10	Karnataka	5987.36	135.47	459.52	197.00	163.42	231.22	0.00	3.42	0.00	1190.05
11	Kerala	201.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	Madhya Pradesh	5407.76	300.15	181.27	81.01	26.45	19.96	59.47	87.86	40.62	756.19
13	Maharashtra	10363.89	379.88	363.05	527.54	291.68	301.85	285.55	155.28	266.96	2304.79
14	Manipur	1367.48	126.99	25.42	21.93	30.50	23.51	11.75	24.88	5.91	264.98
15	Meghalaya	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	Odisha	4689.74	457.74	464.71	119.38	90.65	76.39	0.00	0.00	0.00	1208.87
17	Punjab	672.03	52.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.42
18	Rajasthan	2174.07	45.89	216.87	95.15	7.04	93.61	41.43	0.00	154.88	499.99
19	Tamil Nadu	20.00	0.00	0.00	0.00	0.00	0.00	9.04	25.70	0.00	34.74
20	Telangana	4075.72	545.44	13.24	1.99	214.05	162.82	43.95	0.00	0.00	981.49
21	Tripura	126.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	UT of Jammu & Kashmir	480.78	0.00	8.22	16.92	5.07	9.50	0.00	0.00	0.00	39.71
23	UT of Ladakh	31.66	0.00	1.36	0.00	0.81	0.81	0.00	0.00	0.00	2.98
24	Uttar Pradesh	4589.63	135.63	65.60	397.16	407.68	391.84	0.00	23.91	0.00	1421.81
25	Uttarakhand	609.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	West Bengal	385.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		**55231.04**	**3307.93**	**3593.63**	**2849.08**	**1738.77**	**1510.04**	**813.84**	**426.03**	**504.34**	**14743.56**

Source: Monitoring (Central) Directorate, Central Water Commission, M/o Jal Shakti

Table 3.4: List of Water Resources Projects declared as National Projects

(As on 31.03.2024)

Sl. No.	Name of the Project	State (River/Basin)	Benefits: 1) Irrigation Potential (Ha) 2) Power (MW) 3) Storage (MCM)	Latest Estimated Cost (Rs. in Cr)	Central Assistance Released so far (Rs. in Cr)	Date of Completion/ Remarks
1	2	3	4	5	6	7
National Projects under Implementation/Execution						
1	Gosikhurd Irrigation Project	Maharashtra (Wainganga/ Godavari)	1) 2.50 lakh 2) 26.5 MW 3)1147.14 MCM (Gross)	18494.57 (PL 2012-13)	3881.2825	December, 2024
2	Saryu Nahar Pariyojana	Uttar Pradesh (Diversion Scheme among Rivers Ghaghara, Saryu, Rapti & Bansagar/ Ganga)	1) 14.04 (NP Component:4.73) 2) – 3) Barrage	9802.67 (PL 2016)	2257.692	The project was inaugurated by Hon'ble PM on 11.12.2021
3	Polavaram Irrigation Project	Andhra Pradesh (Godavari)	1) 4.36 Lakh 2) 960 MW 3) 5511 MCM (Gross)	47725.74 (P.L. 2017-18)	15146.270	March,2026
4	Shahpurkandi Dam Project	Punjab (Ravi)	1) 0.37 Lakh 2) 206 MW 3) 120.71 MCM (Gross)	3394.49 (PL-Oct, 2022)	390.8058	June, 2024
5	Teesta Barrage Project	West Bengal (Teesta)	1) 9.23 Lakh (NP component: 5.27 Lakh) 2) 1000 MW 3) Barrage	2988.61	178.20	Project is at standstill since 2014-15 due to land acquisition issues.
6	Renukaji Dam Project	Himachal Pradesh (Giri/Yamuna)	1) Drinking water 2) 40 MW 3) 498 MCM Drinking (Live)	6946.99 (PL Oct, 2018)	1909.9569	30th April, 2029
7	Lakhwar Multipurpose Project	Uttarakhand (Yamuna)	1) 0.3378 Lakh 2) 300 MW 3) 587.84 MCM (Gross)/39.415 MCM (Drinking)/39.415 MCM (Industrial)	5747.17 (PL July, 2018)	204.14	Oct, 2028
8	Ken-Betwa Link Project	Madhya Pradesh & Uttar Pradesh (Ken & Betwa/ Yamuna Basin)	1) 9.08 Lakh (CCA) 2) 130 MW 3) 3495 MCM (Live)	Rs 44605 Cr (PL 2020-21)	6659.01	March, 2030

Table 3.4: List of Water Resources Projects declared as National Projects

(As on 31.03.2024)

Sl. No.	Name of the Project	State (River/Basin)	Benefits: 1) Irrigation Potential (Ha) 2) Power (MW) 3) Storage (MCM)	Latest Estimated Cost (Rs. in Cr)	Central Assistance Released so far (Rs. in Cr)	Date of Completion/ Remarks
9	Ujh Multipurpose Project	Jammu & Kashmir (Ujh/Ravi)	1) 0.91 Lakh 2) 89.5 MW 3) 925 MCM (Gross)/ 20 MCM (Drinking)/ 20 MCM (Industrial)	11907.77 (PL Dec, 2019)	----	Accepted by Advisory Committee of D/o WR, RD & GR on 148th meeting on 17.01.2022. The project was not accepted by the Public Investment Board (PIB), meeting held on 12th October, 2022.
National Projects under Appraisal:						
10	Kulsi Dam Project	Assam (Kulsi - Tributary of Brahmaputra)	1) 0.395 Lakh (GIA) 2) 55 MW 3) 525.64 MCM (Gross)	Unit-I= 1073.05 Unit-II= 290.12 E&M Cost = 91.78 (PL June 2017)	----	----
11	Noa Dihing Dam Project	Arunachal Pradesh (Noa-Dihing)	1) 0.036 Lakh (CCA) 2) 72 MW 3) 322.00 MCM (Gross)	1291.93 (PL May, 2017)	----	-----
12	Bursar HE Project	Jammu & Kashmir (Marusudar/ Chenab/Indus)	1) 1.74 Lakh (Indirect) 2) 800 MW 3) 616.74 MCM (Gross)	16839.90 (PL Oct 2016)	----	----
13	Kishau Multipurpose Project	Himachal Pradesh & Uttarakhand (Tons/Yamuna)	1) 0.97 Lakh Ha 2) 660 MW 3) 1824 MCM (Gross)/ 617 MCM (Drinking)	7193.23 (PL 2010)	----	Revised DPR under preparation
14	Gyspa HE Project	Himachal Pradesh (Bhaga /Chenab/ Indus)	1) 0.50 Lakh Ha 2) 300 MW 3) 912.78 MCM (Live)	----	----	----

Table 3.4: List of Water Resources Projects declared as National Projects

(As on 31.03.2024)

Sl. No.	Name of the Project	State (River/Basin)	Benefits: 1) Irrigation Potential (Ha) 2) Power (MW) 3) Storage (MCM)	Latest Estimated Cost (Rs. in Cr)	Central Assistance Released so far (Rs. in Cr)	Date of Completion/ Remarks
15	2nd Ravi Beas Link Project	Punjab (Ravi Beas Link)	Harness water flowing 0.58 MAF across border (about 719.30 MCM in non-monsoon period)	----	----	----
16	Upper Siang Project	Arunachal Pradesh (Siang)	1) Indirect 2) 9750 MW 3) 9.2 BCM (Live) 4) Flood moderation	----	----	----

Source: National Projects Directorate, Central Water Commission, M/o Jal Shakti (as per the latest availability of data)

Table 3.5: Status of CAD&WM Component for 99 Prioritized Projects under PMKSY-HKKP

(CCA in Th. Ha; CA and Total Cost in Rs. Cr)

Sl. No.	Name of the State/UT	As per DPR/MoU			Expenditure Progress		Financial Progress		Physical Progress	
		CCA Target	CA Target	Total Cost Target	Total Expenditure 2016-24	%	Total CA Released 2016-24	%	Total CCA 2016-24	%
1	2	3	4	5	6	7	8	9	10	11
1	Andhra Pradesh	178.62	339.72	687.86	3.66	0.53	69.18	20.36	0.93	0.52
2	Assam	46.62	96.64	215.46	47.98	22.27	7.55	7.81	25.40	54.48
3	Bihar	30.51	50.66	142.40	75.64	53.12	35.82	70.71	19.13	62.71
4	Chhattisgarh	42.63	79.57	159.76	32.87	20.57	28.58	35.92	8.78	20.61
5	Goa	8.67	18.77	137.92	45.83	33.23	3.84	20.46	6.70	77.27
6	Gujarat	1363.86	2510.88	5021.76	5583.06	111.18	1719.15	68.47	1030.54	75.56
7	Jammu & Kashmir	2.46	5.24	11.64	54.15	465.27	3.57	68.12	2.28	92.60
8	Jharkhand	66.65	133.32	747.53	0.00	0.00	0.00	0.00	0.00	0.00
9	Karnataka	83.48	163.85	989.24	171.09	17.30	78.25	47.76	42.08	50.41
10	Kerala	18.48	48.72	107.30	4.77	4.45	2.69	5.52	1.50	8.10
11	Madhya Pradesh	595.52	1259.04	2536.99	882.46	34.78	328.90	26.12	289.11	48.55
12	Maharashtra	500.71	967.51	2078.20	890.33	42.84	279.50	28.89	218.78	43.69
13	Manipur	22.04	60.42	120.65	58.94	48.85	9.822	16.26	8.67	39.34
14	Odisha	236.40	420.40	1266.06	1344.88	106.23	131.96	31.39	85.49	36.16
15	Punjab	142.66	228.87	475.48	149.79	31.50	82.08	35.86	73.53	51.54
16	Rajasthan	117.98	224.82	439.01	346.06	78.83	155.55	69.19	82.47	69.91
17	Telangana	529.03	702.21	1467.40	5.22	0.36	36.34	5.18	10.68	2.02
18	Uttar Pradesh	524.38	914.93	1861.67	14.88	0.00	156.00	17.05	21.71	4.14
Total		4510.56	8225.56	18466.31	9711.62	52.59	3128.79	38.04	1927.77	42.74

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

Note: 'CCA': Culturable Command Area; 'CA': Central Assistance

3.2 Special Package for Maharashtra/Sirhind Feeder (SF)/Rajasthan Feeder (RF)

1. Government of India has sanctioned a special package for completion of Irrigation Projects to address agrarian distress in Vidarbha and Marathwada and other chronically drought prone areas of rest of Maharashtra during July, 2018. The package consists of 8 Major and Medium Irrigation (MMI) Projects approved by TAC of M/o Water Resources, RD & GR and 83 Surface Minor Irrigation (SMI) Projects. The balance estimated cost of projects of Maharashtra to be completed under this package is Rs.13651.61 Cr as on 01.04.2018, with Rs.3831.41 Cr being the Central Assistance (CA) by the Government of India. On completion of the balance works of these projects, additional Irrigation Potential of 3.77 Lakh Ha would be created. Project-wise details of these 8 Major & Medium Irrigation projects indicating Central Assistance released are given in Table 3.5.

2. In addition, Government of India has sanctioned a Special Package for Relining of Sirhind Feeder for 99.80 km and Relining of Rajasthan Feeder for 96.62 km for the States of Punjab and Rajasthan during the year 2016 for Rs.1305.267 Cr and Rs. 671.478 Cr respectively at 2015 price level. A Central Assistance of Rs. 205.758 Cr and Rs. 620.41 Cr for Sirhind Feeder (SF) and Rajasthan Feeder (RF) were approved respectively. In addition, Rs. 50.00 Cr for Sirhind Feeder & Rs. 105.84 Cr for Rajasthan Feeder (RF) have already been released. 0.93 Lakh Ha irrigation potential has been stabilized by RF & SF of Punjab up to June, 2022. The details of both Feeder canals are as given below:

Sl. No.	Name of the Project	Project Cost for works (Rs. Cr)	Eligible CA as per Cabinet Note (Rs. Cr)	CCA to be Created (in Th. Ha)	Expenditure Incurred till date (in Rs. Cr)	CA Released till date (in Rs. Cr)	Completion Date
1	2	3	4	5	6	7	8
1	Relining of Sirhind Feeder from RD 119700 to 447927	623.08	255.758	621	552.35	203.651	March 2025
2	Relining of Rajasthan Feeder from RD 179000 to 496000	1210.417	726.25	1963	1104.71	559.524	March 2025

Source: Monitoring (Central) Directorate, PMO, Central Water Commission, M/o Jal Shakti

Table 3.6 (1/3): Details of Special Package Projects of Maharashtra (Cost, CA & Expenditure- Rs.in Cr and IP in Ha)

Sl. No.	Project Name	Districts Benefitted	Cost of the Project in Cabinet Note	Latest Cost - Works	Approved Cost - Works	Balance Cost (Works) as on 01.04.2018 based on Latest Cost	Balance Eligible CA based on latest balance cost as on 01.04.2018	Expenditure Incurred in 2018-19	Expenditure Incurred in 2019-20	Expenditure Incurred in 2020-21	Expenditure Incurred in 2021-22	Expenditure Incurred in 2022-23	Expenditure Incurred in 2023-24
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Tembhu LIS Dist. Satara	Satara, Sangli, Solapur	3108.54	2993.50	2993.50	1088.62	272.16	260.10	374.34	308.25	121.81	24.12	0.00
2	Urmodi Dist. Satara	Satara	1566.39	895.81	580.79	414.93	103.73	42.50	43.28	26.19	25.93	75.25	62.11
3	Sulwade Jamphal Kanoli L.I. Scheme Dist. Dhule	Dhule	2183.25	2098.60	2098.60	2071.54	517.89	1.70	382.19	327.90	217.99	642.57	522.89
4	Shelgaon Barrage Medium Project, Dist.Jalgaon	Jalgaon	620.58	879.49	879.49	535.45	133.86	55.94	188.59	66.19	168.83	0.00	92.35
5	Ghungshi Barrage LIS Akola	Akola (V)	462.25	479.65	479.65	163.78	40.95	10.21	15.36	15.66	36.94	21.32	31.72
6	Purna Barrage No.2 (Nerdhamana) Dist. Akola	Akola (V)	667.66	848.07	848.07	302.19	75.55	24.80	12.46	2.96	5.41	0.55	2.953
7	Jigaon Dist. Buldhana	Buldhana (V), Akola (V)	7764.39	7222.95	7222.95	4266.74	1066.69	561.39	425.63	688.50	524.28	1153.55	1494.58
8	Warkhed Londhe Dist. Jalgaon	Jalgaon	465.86	465.86	465.86	363.62	90.91	77.38	104.13	80.26	14.49	23.20	3.00
Total MMI			**16838.92**	**15883.93**	**15568.91**	**9206.87**	**2301.72**	**1034.02**	**1545.98**	**1515.91**	**1115.69**	**1940.56**	**2209.60**
Total SMI (83 Projects)			**8364.84**	**8155.36**	**7407.37**	**3965.12**	**991.28**	**633.10**	**479.14**	**292.03**	**180.13**	**220.59**	**393.50**
Grand Total			**25203.76**	**24039.29**	**22976.28**	**13171.99**	**3292.99**	**1667.12**	**2025.12**	**1807.94**	**1295.82**	**2161.15**	**2603.10**

Table 3.6 (2/3): Details of Special Package Projects of Maharashtra (Cost, CA & Expenditure- Rs. in Cr and IP in Ha)

Sl. No.	Project Name	Districts Benefitted	CA Released during 2018-19	CA Released during 2019-20	CA Released during 2020-21	CA Released during 2021-22	CA Released during 2022-23	CA Released during 2023-24	Total CA Released so far
1	2	3	15	16	17	18	19	20	21
1	Tembhu LIS Dist. Satara	Satara, Sangli, Solapur	25.00	69.79	77.56	108.01	10.77	6.03	297.16
2	Urmodi Dist. Satara	Satara	13.27	10.63	0.00	14.35	0.00	0.00	38.25
3	Sulwade Jamphal Kanoli L.I. Scheme Dist. Dhule	Dhule	0.23	0.00	95.97	108.55	103.47	126.92	435.14
4	Shelgaon Barrage Medium Project, Dist. Jalgaon	Jalgaon	15.22	13.99	47.15	43.59	15.32	0.00	135.27
5	Ghungshi Barrage LIS Akola	Akola (V)	3.27	2.55	3.84	10.43	2.71	5.33	28.13
6	Purna Barrage No.2 (Nerdhamana) Dist. Akola	Akola (V)	0.00	0.00	12.43	0.74	1.35	0.14	14.66
7	Jigaon Dist. Buldhana	Buldhana (V), Akola (V)	262.03	17.01	39.53	336.42	33.66	487.41	1176.06
8	Warkhed Londhe Dist. Jalgaon	Jalgaon	10.41	19.35	26.03	23.68	2.78	5.80	88.05
Total MMI			**329.43**	**133.31**	**302.52**	**645.77**	**170.04**	**631.62**	**2212.68**
Total SMI			**170.58**	**166.69**	**97.49**	**79.24**	**42.97**	**68.37**	**625.33**
Grand Total			**500.00**	**300.00**	**400.00**	**725.01**	**213.01**	**699.99**	**2838.01**

Table 3.6 (3/3): Details of Special Package Projects of Maharashtra (Cost, CA & Expenditure- Rs. in Cr and IP in Ha)

Sl. No.	Project Name	Districts Benefitted	Ultimate Irrigation Potential (UIP)	IP Created up to March, 2017	IP Created during 2017-18	Balance IP as on 01.04.2018	IP Created during 2018-19	IP Created during 2019-20	IP Created during 2020-21	IP Created during 2021-22	IP Created during 2022-23	IP Created during 2023-24
1	2	3	22	23	24	25	26	27	28	29	30	31
1	Tembhu LIS Dist. Satara	Satara, Sangli, Solapur	111856.00	10258.00	5279.00	96319.00	37698.00	34000.00	11000.00	11374.00	2247.00	0.00
2	Urmodi Dist. Satara	Satara	32000.00	6497.00	1131.00	24372.00	1323.00	4509.00	820.00	2120.00	8492.00	715.00
3	Sulwade Jamphal Kanoli L.I. Scheme Dist. Dhule	Dhule	52720.00	0.00	0.00	52720.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Shelgaon Barrage Medium Project, Dist.Jalgaon	Jalgaon	11318.00	0.00	0.00	11318.00	0.00	0.00	0.00	0.00	80.00	0.00
5	Ghungshi Barrage LIS Akola	Akola (V)	6660.00	0.00	0.00	6660.00	0.00	0.00	0.00	0.00	3000.00	2102.00
6	Purna Barrage No.2 (Nerdhamana) Dist. Akola	Akola (V)	6954.00	0.00	0.00	6954.00	0.00	0.00	0.00	0.00	0.00	0.00
7	Jigaon Dist. Buldhana	Buldhana (V), Akola (V)	101088.00	0.00	0.00	101088.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Varkhede Londhe Dist. Jalgaon	Jalgaon	7919.00	0.00	0.00	7919.00	0.00	0.00	0.00	0.00	0.00	0.00
Total MMI			**330515.00**	**16755.00**	**6410.00**	**307350.00**	**39021.00**	**38509.00**	**11820.00**	**13494.00**	**13819.00**	**2817.00**
Total SMI			**76334.00**	**8766.00**	**1571.00**	**65997.00**	**4712.00**	**7101.00**	**3128.00**	**10420.00**	**19106.00**	**2585.00**
Grand Total			**406849.00**	**25521.00**	**7981.00**	**373347.00**	**43733.00**	**45610.00**	**14948.00**	**23914.00**	**32925.00**	**5402.00**

Source: Monitoring (Central) Directorate, PMO, Central Water Commission, M/o Jal Shakti

Note: 'MMI': Major & Medium Irrigation; 'SMI': Surface Minor Irrigation; 'IP': Irrigation Potential; 'CA': Central Assistance

3.3 External Assistance for Development of Water Resources

1. 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.

2. 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:

   (i) Examining Concept Notes/Preliminary Project Report (PPR) of proposed Externally Aided Projects (EAPs) for in-principle consent for preparation of DPR.
   (ii) 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 WR, RD&GR on Irrigation, Flood Control and Multipurpose Projects.

3. Details of the Preliminary Project Report (PPR) for which In-Principle consent were provided to D/o WR, RD&GR for the year 2023-24:

Sl. No.	State (PPR ID)	Name of Project	Funding Agency	Cost in Cr	Screening Committee of CWC detail
1	Bihar (12153)	Bihar Integrated Water Resources Management Project	World Bank	Rs. 4415 Crore	Vide CWC letter dated 24.01.2024.
2	Karnataka (12218)	Karnataka Multisector Disaster and Climate Resilience Project	World Bank	Rs. 5000 Crore	Vide CWC letter dated 20.02.2024

Source: Project Appraisal (Central) Directorate, CWC, New Delhi.

4. Details of the Detailed Project Report (DPR) accepted by the Advisory Committee of D/o WR, RD&GR for the year 2023-24:

Sl. No.	State	Name of Project	Funding Agency	Cost in Cr	Advisory Committee Meeting Number and Date of meeting
1	Assam	Climate Resilient Brahmaputra Integrated Flood and Riverbank Erosion Risk Management Project in Assam-Dibrugarh and Tinsukia Sub Project (Zone-A)	Asian Development Bank (ADB)	Rs. 778.7849 Crores (@ PL March, 2023)	154 held on 08.12.2023
2	Assam	Climate Resilient Brahmaputra Integrated Flood and Riverbank Erosion Risk Management Project in Assam-Morigaon, Nagaon, Tezpur Sub Project (Zone-B)	ADB	Rs.676.5080 Crores (@ PL March, 2023)	
3	Assam	Climate Resilient Brahmaputra Integrated Flood and Riverbank Erosion Risk Management Project in Assam-Guwahati West, P.G.P Sub Project (Zone-C)	ADB	Rs. 269.5371 Crores (@ PL March, 2023)	
4	Assam	Climate Resilient Brahmaputra Integrated Flood and Riverbank Erosion Risk Management Project Dhubri Sub Project (Zone-D)	ADB	Rs. 542.4982 Crores (@ PL March, 2023)	

Source: Project Appraisal (Central) Directorate, CWC, New Delhi.

3.4 Minor Irrigation (MI) Census

1. All ground water schemes and surface water schemes (both flow and lift) having Culturable Command Area (CCA) up to 2,000 Ha individually, are classified as Minor Irrigation schemes. A major share of irrigation is contributed by minor irrigation schemes across the country and the share of different type of minor irrigation schemes has also been changing over time. To study the composition of the minor irrigation sector and other related aspects, there was a need for a sound and reliable database on the minor irrigation sector, which could provide a strong foundation for planning and policy formulation. To meet this objective, Minor Irrigation Censuses are being conducted under the 'Rationalisation of Minor Irrigation Statistics (RMIS)' scheme till date.

2. The Centrally Sponsored Plan Scheme RMIS was launched in 1987-88 with 100% Central assistance to the States/UTs. Currently, Irrigation Census (parent component of 'RMIS') is a standalone component under Umbrella Scheme- 'Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)' and other Schemes.

3. So far, six Censuses have been conducted with reference years 1986-87, 1993-94, 2000-01, 2006-07, 2013-14 & 2017-18 respectively. The All India and State wise reports of 6th MI Census with reference year 2017-18 were released in August, 2023 and is available on the website of the D/o Water Resources, RD & GR, M/o Jal Shakti. The Census throws light on important aspects like Irrigation Potential Created and Utilized through minor irrigation structures- both ground and surface water, water distribution practices employed by owners of these schemes and also sources used for energisation of these schemes.

4. Based on the 6th MI census, a total of 23.14 million minor irrigation schemes were reported at national level. Of these, 21.93 million schemes (≈95%) were ground water-based and 1.21 million schemes (≈5%) were surface water-based. States with the largest number of schemes include Uttar Pradesh, Maharashtra, Madhya Pradesh and Tamil Nadu, which together account for 52% of the total MI schemes in the country.

5. In terms of irrigation potential, the census reveals that under all MI schemes, the reported Culturable Command Area (CCA) is about 69.46 million hectares (Mha), the Irrigation Potential Created (IPC) stands at 88.84 Mha, while the Irrigation Potential Utilized (IPU) is about 75.64 Mha.

6. Ground water schemes contribute the largest share, with 62.74 Mha CCA, 80.45 Mha IPC, and 69.59 Mha IPU, compared to 6.72 Mha CCA, 8.39 Mha IPC, and 6.05 Mha IPU under surface water schemes.

7. The state-wise number of schemes under Ground water, Surface water, and their totals are presented in Table 3.8 (a). Correspondingly, the state-wise details of Culturable Command Area (CCA), Irrigation Potential Created (IPC), and Irrigation Potential Utilized (IPU) under Ground water and Surface water are provided in Table 3.8 (b).

TABLE 3.7 (a): MINOR IRRIGATION SCHEMES AT A GLANCE (2017-18)

S. No.	State	No. of Districts	No. of Blocks	No. of Villages	Total Number of Schemes								Grand Total (10+13)
					Ground Water					Surface Water			
					Dugwell	Shallow Tubewell	Medium Tubewell	Deep Tubewell	Total (6+7+8+9)	S. Flow Scheme	S. Lift Scheme	Total (11+12)	
1	ANDAMAN & NICOBAR ISLANDS	3	9	362	2429	40	0	0	2469	68	3429	3497	5966
2	ANDHRA PRADESH	13	666	17397	171301	198162	237713	525593	1132769	47590	10605	58195	1190964
3	ARUNACHAL PRADESH	20	78	4936	25	18	2	5	50	3374	2	3376	3426
4	ASSAM	33	246	26397	38	151095	369	674	152176	2083	7570	9653	161829
5	BIHAR	38	534	45078	15926	183878	455650	35777	691231	4545	4859	9404	700635
6	CHANDIGARH	1	1	13	0	0	0	30	30	0	0	0	30
7	CHHATISGARH	27	150	20292	31414	27875	156944	117354	333587	425	12900	16335	349922
8	GOA	2	12	418	3932	71	7	1	4011	1030	1072	2102	6133
9	GUJARAT	33	247	18490	382286	303245	390256	279040	1354827	24117	17141	41258	1396085
10	HARYANA	22	93	7041	1005	20892	49495	148073	219465	98	637	735	220200
11	HIMACHAL PRADESH	12	169	21194	431	5255	4769	661	10640	2541	101	2642	13211
12	JAMMU & KASHMIR	22	218	7071	4725	1526	318	661	10470	2541	101	2642	13112
13	JHARKHAND	24	260	32689	160077	1611	1209	520	163417	71961	17285	89246	252663
14	KARNATAKA	30	176	29700	134603	115123	696702	330824	1277252	75073	52890	127725	1405215
15	KERALA	14	245	1034	52135	3146	5301	1871	62453	8269	21852	30121	92574
16	MADHYA PRADESH	52	737	56806	1336682	419640	243781	232720	2232643	19557	33093	52650	2285293
17	MAHARASHTRA	36	353	43945	2749088	131100	174194	179583	3233965	99621	239278	338899	3572864
18	MANIPUR	9	38	2675	0	0	0	0	0	774	197	971	971
19	MEGHALAYA	11	46	6703	149	803	0	0	952	4493	3	4496	5448
20	MIZORAM	8	29	830	34	4	23	0	61	2419	0	2419	2480
21	NAGALAND	11	74	1114	12	10	3	10	35	13974	46	19420	19455
22	ODISHA	30	314	50065	265554	42443	46550	61434	415981	30701	63899	94600	510581
23	PUDUCHERRY	3	14	123	37	625	14	381	1057	705	0	705	1762

S. No.	State	No. of Districts	No. of Blocks	No. of Villages	Total Number of Schemes								Grand Total (10+13)
					Ground Water					Surface Water			
					Dugwell	Shallow Tubewell	Medium Tubewell	Deep Tubewell	Total (6+7+8+9)	S. Flow Scheme	S. Lift Scheme	Total (11+12)	
24	PUNJAB	22	139	12940	0	181189	418938	573630	1173757	32	1408	1732	1175489
25	RAJASTHAN	33	323	46246	834841	21417	140380	478286	1474924	2674	13475	16149	1491073
26	SIKKIM	4	414	1037	0	0	0	0	0	0	0	0	0
27	TAMIL NADU	32	385	17440	1577198	89026	110660	293934	2070818	39711	4380	44091	2114909
28	TELENGANA	31	568	10805	457784	76790	677156	367519	1579249	62753	37866	100619	1679868
29	TRIPURA	8	58	1178	4	109	146	266	2747	2316	210	2526	5273
30	UTTARAKHAND	13	95	16082	411	44838	5003	1739	51991	397	616	1013	53004
31	UTTAR PRADESH	75	821	106402	85224	333679	418163	106883	394194	25777	32215	57992	397674
32	WEST BENGAL	23	342	40891	11080	227536	82266	11063	330945	611059	59581	120740	370941
Total		695	7854	647394	8278425	5585106	4318146	3750247	21931924	611059	595981	1207040	23138964

Source: 6th Census of Minor Irrigation Schemes Report

TABLE 3.7 (b): MINOR IRRIGATION SCHEMES, CCA AND IRRIGATION POTENTIAL IN ALL SCHEMES

S. No.	State	Ground Water (Nos)	Ground Water (CCA)	Ground Water (IPC)	Ground Water (IPU)	Surface Water (Nos)	Surface Water (CCA)	Surface Water (IPC)	Surface Water (IPU)	Total (Nos)	Total (CCA)	Total (IPC)	Total (IPU)
1	ANDAMAN & NICOBAR ISLANDS	2469	2403.58	2676.69	1192.4	3497	4268.08	4951.89	2532.52	5966	6671.66	7628.58	3724.92
2	ANDHRA PRADESH	1132769	1313196.32	1691470.19	1354787.05	58195	905385.14	1084772.43	636712.79	1190964	2218581.46	2766242.62	1991499.84
3	ARUNACHAL PRADESH	50	1496.0	1779.5	626.0	3376	39274.21	40838.11	20682.67	3426	40770.21	42617.61	21308.67
4	ASSAM	152176	211934.41	269069.16	197605.6	9653	302448.49	387164.18	137744.74	161829	514382.9	656773.34	335350.34
5	BIHAR	691231	4399150.5	5698670.5	4485177.63	9404	115900.02	152532.05	107722.95	700635	4515050.52	5840943.05	4592896.58
6	CHANDIGARH	30	1400.11	1771.94	768.94	0	0	0	0	30	1400.11	1771.94	768.94
7	CHHATISGARH	333587	714717.04	959398.97	872945.45	6400	134846.42	170928.66	144522.42	339987	849563.46	1130327.63	1017467.87
8	GOA	4031	3165.38	3180.14	3037.37	2102	4429.57	4340.0	4028.66	6133	7594.95	7520.14	7066.03
9	GUJARAT	1354827	2609518.27	4038453.12	3549133.1	279040	5473627.07	9339149.73	8077967.47	1633867	8083145.34	13377592.85	116270100.57
10	HARYANA	219465	963433.25	1853306.56	1818283.73	735	2395.69	4678.58	4604.18	220200	965828.94	1857985.14	1822887.91
11	HIMACHAL PRADESH	10691	37860.43	63363.55	57011.61	2166	23862.52	34723.91	24118.04	32677	61722.95	98087.46	81129.65
12	JAMMU & KASHMIR	10470	10388.6	20621.61	19536.56	2642	161824.53	212523.43	202192.74	13112	172213.23	233145.05	221729.3
13	JHARKHAND	163417	253299.29	281184.88	219630.0	89246	312123.15	339845.35	268800.07	252663	565422.44	621030.23	466510.07
14	KARNATAKA	1277252	20028493.01	24812391.29	23436672.2	1277252	20028493.01	24812391.29	23436672.2	1405215	22633261.86	28534738.05	25641337.27
15	KERALA	62453	3883.37	6500.44	3444.57	30121	23939.78	41264.57	25104.37	92574	27823.15	47765.01	28548.94
16	MADHYA PRADESH	2232643	6549982.4	10613471.37	7202256.36	52650	339478.29	785954.6	452149.77	2285293	6889460.69	11399425.97	7654406.13
17	MAHARASHTRA	3233965	6094421.17	6539443.42	6056686.47	338899	948426.86	1085862.19	914103.25	3572864	7042847.73	7671305.61	6975722.02
18	MANIPUR	0	0	0	0	971	1559.65	1559.65	1559.65	971	1559.65	1559.65	1559.65
19	MEGHALAYA	957	1399.1	2322.0	2033.5	4496	17505.54	26607.87	25516.02	5453	18904.65	28929.87	27549.52
20	MIZORAM	61	90.75	232.0	220.0	2419	17055.42	6686.62	11591.36	2480	17146.17	6918.62	11811.36
21	NAGALAND	35	111.9	180.0	83.0	19420	62590.25	76067.97	67559.62	19455	62702.15	76247.97	67642.62
22	ODISHA	415981	6685307.92	9632447.77	6172134.01	94600	733245.69	1049874.92	548381.86	510581	7418553.62	10682322.69	6720515.87
23	PUDUCHERRY	3831	4789.75	6159.84	3749.67	705	1430.65	1781.55	1401.78	4536	6219.1	7941.39	5151.45
24	PUNJAB	117357	3310074.7	5557754.87	5691320.93	32	1463.96	14241.27	11077.4	117489	3311538.65	5571996.14	5702398.33
25	RAJASTHAN	1474924	6791044.95	9755777.89	6906566.1	16149	773118.89	948799.24	748541.85	1491073	7564163.84	10744684.13	7655107.95
26	SIKKIM	0	0	0	0	0	0	0	0	0	0	0	0
27	TAMIL NADU	2070818	5484641.67	6905168.57	5341380.46	44091	474578.52	501575.67	383765.16	2114909	5959219.19	7406744.24	5725145.62
28	TELENGANA	1579249	5987235.92	7318140.21	6867939.58	100619	825683.09	950456.28	768336.77	1679868	6812919.01	8268596.49	7636276.35
29	TRIPURA	2747	9487.53	16718.76	13324.04	2526	6364.98	10426.48	8392.68	5273	15852.51	27145.24	21716.72
30	UTTARAKHAND	51991	197373.78	342846.4	318407.29	1013	3296.49	4258.87	3690.09	53004	200670.27	347105.27	322097.38

S. No.	State	Ground Water (Nos)	Ground Water (CCA)	Ground Water (IPC)	Ground Water (IPU)	Surface Water (Nos)	Surface Water (CCA)	Surface Water (IPC)	Surface Water (IPU)	Total (Nos)	Total (CCA)	Total (IPC)	Total (IPU)
31	UTTAR PRADESH	394144	2837677.78	4800462.86	3811930.0	57992	1838323.85	2783098.03	2371523.0	397674	4676001.63	7583560.89	6183453.0
32	WEST BENGAL	1331425	1299740.65	6224013.52	1859329.42	38996	289651.2	454100.51	316163.31	1370941	1589391.85	6678114.03	2175492.73
Total		21931924	62737195.91	80453730.6	69592707.9	1207040	6721897.13	8387640.0	6045144.62	23138964	69459093.04	88841370.6	75637852.52

Source: 6th Census of Minor Irrigation Schemes Report

Section-IV
Flood Management

1. Floods are a recurrent natural phenomenon in India. Due to diverse climatic conditions and rainfall patterns across regions, it is often observed that while some areas experience severe flooding, others may simultaneously face drought-like conditions. With rising population and increasing developmental activities, there has been a growing tendency to encroach upon floodplains, leading to progressively severe flood-related damages. Moreover, irregular rainfall distribution has resulted in inundation even in regions not traditionally prone to flooding. Flooding primarily occurs when riverbanks are unable to contain the high discharge volumes from upper catchments during intense rainfall events. Flood management encompasses all strategies and interventions aimed at mitigating or preventing the adverse impacts of floodwaters.

2. This section covers key aspects such as State-wise and Basin-wise Flood Forecasting Stations, Flood Forecasting Performance, Flood-related Damages, and programmes like the Flood Management Programme (FMP) and the Flood Management and Border Areas Programme (FMBAP). It also includes activities under the River Management and Border Areas (RMBA) component. Furthermore, the section presents data on the distribution of Revenue and Capital Expenditure incurred under the relevant sub-major heads of accounts.

Table 4.1: State-wise Flood Forecasting Stations of CWC

(as on 31.03.2024)

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

Table 4.1: State-wise Flood Forecasting Stations of CWC

(as on 31.03.2024)

Sl. No.	Name of State/UT	Number of Flood Forecasting Stations		
		Level	Inflow	Total
1	2	3	4	5
25	*NCT of Delhi	2	0	2
Total		**200**	**138**	**338**

Source: FFM Directorate, Central Water Commission, M/o Jal Shakti

Note: '*': Union Territory

Table 4.2: Basin-wise Flood Forecasting Stations of CWC

(as on 31.03.2024)

Sl. No.	Major Interstate River Systems	FF Stations as on Date		
		Level	Inflow	Total
1	2	3	4	5
1	Indus and its tributaries	3	0	**3**
2	Ganga & its tributaries	96	42	**138**
3	Brahmaputra & its tributaries	39	6	**45**
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	25	**43**
14	Krishna	5	19	**24**
15	West Flowing Rivers (Kutch & Saurashtra)	1	2	**3**
16	West Flowing Rivers (Tapi to Tadri))	2	1	**3**
17	Cauvery and its tributaries	4	9	**13**
18	Pennar	1	1	**2**
19	East Flowing Rivers (Pennar to Kanyakumari)	1	6	**7**
20	West Flowing Rivers (Tadri to Kanyakumari)	3	2	**5**
Total		**200**	**138**	**338**

Source: FFM Directorate, Central Water Commission, M/o Jal Shakti

Table 4.3: Flood Forecasting Performance from 2000 to 2024

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% cumec of Deviation from Actual	Accuracy (%)	Total	Within +/-15 cm or +/-20% cumec 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
21	2020	8243	8133	98.67	3478	3065	88.13	11721	11198	95.54
22	2021	6670	6456	96.79	3947	3520	89.18	10617	9976	93.96
23	2022	6779	6476	95.53	4779	4369	91.42	11558	10845	93.83
24	2023	4567	4336	94.94	1772	1616	91.20	6339	5952	93.89
25	2024	7086	6790	95.82	3356	3177	94.67	10442	9967	95.45
Average		5279	5133	97.23	1645	1486	90.33	6924	6618	95.58

Source: FFM Directorate, Central Water Commission, M/o Jal Shakti

Figure-8: Flood Forecast Performance (from 2000 to 2024)

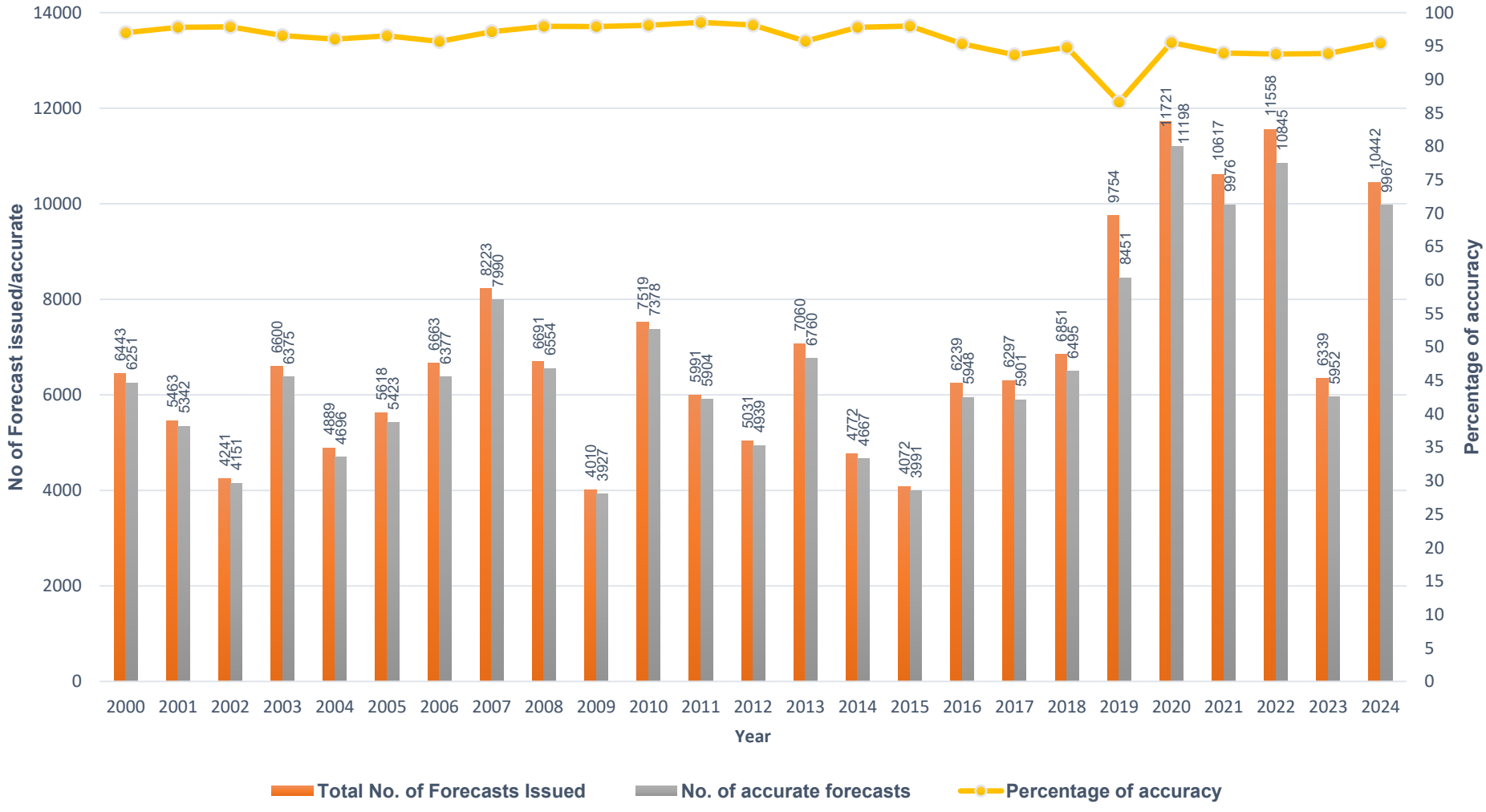


Table 4.4: Flood Damage during 2011 to 2022

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+ Col.8+ Col.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	2011	1.90	15.97	2.72	1393.85	1152518	410.48	35982	1761	6053.57	7857.89
2	2012	2.14	14.69	1.95	1534.11	174526	240.57	31558	933	9169.97	10944.65
3	2013	7.55	25.93	7.48	6378.08	699525	2032.83	163958	2180	38937.84	47348.75
4	2014	12.78	26.51	8.01	7255.15	311325	581.98	60196	1968	7710.95	15548.08
5	2015	4.48	33.20	3.37	17043.95	3959191	8046.97	45597	1420	32200.18	57291.10
6	2016	7.06	26.55	6.66	4052.72	278240	114.68	22367	1420	1507.93	5675.33
7	2017	6.07	47.34	4.97	8951.98	1252914	9384.02	26673	2063	12329.85	30665.85
8	2018	7.72	37.40	2.51	3708.19	913414	2508.66	60279	1839	12132.92	18349.76
9	2019	11.60	46.35	10.69	10902.35	656595	462.79	25852	2754	4498.39	15863.53
10	2020	6.90	26.79	6.55	5626.02	239539	272.10	46911	1474	5458.01	11356.13
11	2021	16.75	38.56	7.40	29229.71	461205	3960.08	64880	1371	25243.61	58433.40
12	2022	7.57	25.36	6.66	18171.64	374905	3210.07	574499	1673	5955.33	27337.03
Total		**92.52**	**364.65**	**68.97**	**114247.75**	**10473897**	**31225.23**	**1158752**	**20856**	**161198.55**	**306671.50**
Avg.		**7.71**	**30.39**	**5.75**	**9520.65**	**872825**	**2602.10**	**96563**	**1738**	**13433.21**	**25555.96**
Max.		**16.75**	**47.34**	**10.69**	**29229.71**	**3959191**	**9384.02**	**574499**	**2754**	**38937.84**	**58433.40**
(Year)		**2021**	**2017**	**2019**	**2021**	**2015**	**2017**	**2022**	**2019**	**2013**	**2021**

Source: FM-II Directorate, Central Water Commission, M/o Jal Shakti (as per the latest availability of data)

4.1 Flood Management Programme (FMP)

1. To strengthen the structural measures for flood management in the country, Flood Management Programme (FMP), a State Sector scheme amounting to Rs. 8,000 Cr under Central Plan proposed by the erstwhile M/o Water Resources, RD&GR, was approved by the Government of India during XI Plan (November, 2007). The continuation of Flood Management Programme was approved by the Government of India during XII Plan with an outlay of Rs 10,000 Cr.

2. Total 522 schemes costing Rs 13238.36 Cr were approved during XI Plan (420 projects costing Rs 7857.08 Cr) and XII Plan (102 projects costing Rs 5381.28 Cr). Out of these 522 schemes, 427 schemes have been completed; 64 schemes are foreclosed, dropped and shifted (47-foreclosed; 16-dropped & 1 shifted to RMBA component) and 31 schemes are ongoing. These 427 completed schemes have given protection to an area of around 4.99 Mha and protected a population of about 53.57 million.

3. Total Central Assistance of Rs 4873.07 Cr (Rs. 3566.00 Cr during XI Plan & Rs. 1307.07 Cr during XII Plan was released to States/UTs during XI Plan and XII Plan) under Flood Management Programme (FMP) scheme.

Table 4.5: State-wise approved schemes and completed/foreclosed/ongoing schemes & fund released under Flood Management Programme (FMP) since start of XI Plan (Rs. in Cr) till FY 2023-24

Sl. No.	State	XI Plan (Schemes Approved)	XII Plan (Schemes Approved)	Total (XI+XII Plan)				FMBAP 2021-26 (till FY 2023-24)	Total schemes approved since XI Plan till FY 2023-24	Total Central fund released since XI Plan till FY 2023-24
		Nos.	Nos.	Schemes Approved (No.)	Schemes Completed (Nos.)	Schemes shifted/ Foreclosed (Nos.)	Schemes Ongoing (Nos.)	Schemes Approved (No.)	(No.)	(Rs. In Cr)
1	2	3	4	5	6	7	8	9	10	11
1	Arunachal Pradesh	21	0	21	21	0	0	2	23	190.78
2	Assam	100	41	141	111	30	0	1	142	1557.04
3	Bihar	43	4	47	42	1	4	1	48	924.4
4	Chhattisgarh	3	0	3	3	0	0		3	19.32
5	Goa	2	0	2	2	0	0		2	11.98

Table 4.5: State-wise approved schemes and completed/foreclosed/ongoing schemes & fund released under Flood Management Programme (FMP) since start of XI Plan (Rs. in Cr) till FY 2023-24

Sl. No.	State	XI Plan (Schemes Approved)	XII Plan (Schemes Approved)	Total (XI+XII Plan)				FMBAP 2021-26 (till FY 2023-24)	Total schemes approved since XI Plan till FY 2023-24	Total Central fund released since XI Plan till FY 2023-24
		Nos.	Nos.	Schemes Approved (No.)	Schemes Completed (Nos.)	Schemes shifted/ Foreclosed (Nos.)	Schemes Ongoing (Nos.)	Schemes Approved (No.)	(No.)	(Rs. In Cr)
1	2	3	4	5	6	7	8	9	10	11
6	Gujarat	2	0	2	2	0	0		2	2
7	Haryana	1	0	1	1	0	0		1	46.91
8	Himachal Pradesh	3	4	7	6	1	0	1	8	862.73
9	Jammu & Kashmir	28	15	43	24	3	16	1	44	798.25
10	Jharkhand	3	0	3	3		0		3	22.71
11	Karnataka	3	0	3	2	1	0		3	23.8
12	Kerala	4	0	4	2	2	0		4	137.95
13	Manipur	22	0	22	22		0	1	23	281.71
14	Meghalaya	0	0	0	0		0		0	3.81
15	Mizoram	2	0	2	1	1	0		2	16.88
16	Nagaland	11	6	17	14		3		17	94.83
17	Odisha	67	1	68	66	2	0		68	119.42
18	Puducherry*	1	0	1	0	1	0		1	7.5
19	Punjab	5	0	5	4	1	0		5	40.43
20	Sikkim	28	17	45	28	17	0		45	91.84
21	Tamil Nadu	5	0	5	5		0		5	59.82
22	Tripura	11	0	11	11		0		11	23.62

Table 4.5: State-wise approved schemes and completed/foreclosed/ongoing schemes & fund released under Flood Management Programme (FMP) since start of XI Plan (Rs. in Cr) till FY 2023-24

Sl. No.	State	XI Plan (Schemes Approved)	XII Plan (Schemes Approved)	Total (XI+XII Plan)				FMBAP 2021-26 (till FY 2023-24)	Total schemes approved since XI Plan till FY 2023-24	Total Central fund released since XI Plan till FY 2023-24
		Nos.	Nos.	Schemes Approved (No.)	Schemes Completed (Nos.)	Schemes shifted/ Foreclosed (Nos.)	Schemes Ongoing (Nos.)	Schemes Approved (No.)	(No.)	(Rs. In Cr)
1	2	3	4	5	6	7	8	9	10	11
23	Uttar Pradesh	26	3	29	24	2	3		29	470.19
24	Uttarakhand	12	10	22	18	2	2		22	246.59
25	West Bengal	17	1	18	15		3		18	1051.96
Total		**420**	**102**	**522**	**427**	**64**	**31**	**7**	**529**	**7106.47**

Source: FMP Directorate, Central Water Commission, M/o Jal Shakti

Note: '*': The scheme has been shifted to be funded under RMBA component.

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

1. 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 Pancheshwar 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 continuation of River Management Activities & Works related to Border Areas (RMBA), was approved by the Government of India during XII Plan with an outlay of Rs 740 Cr.

2. Total Central Assistance (as Grant-in-Aid) of Rs. 563.61 Cr (Rs. 340.41 Cr during XI Plan & Rs. 223.20 Cr during XII Plan) was released during XI Plan and XII Plan.

4.3 Flood Management and Border Areas Programme (FMBAP)

1. **(FMBAP) 2017-21:** In continuation of Flood Management Programme (FMP), a comprehensive scheme titled 'Flood Management and Border Areas Programme (FMBAP) for period 2017-20' with an outlay of Rs 3342.00 Cr (FMP-Rs. 2642 Cr & RMBA-Rs. 700 Cr) 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 was approved by the Union Cabinet on 7th March, 2019 with the aim for completion of the on-going projects, which were already approved under FMP scheme. The scheme was extended till March, 2021.

2. **(FMBAP) 2021-26:** The continuation of FMBAP scheme for the period FY 2021-2026 has been approved by Cabinet in February, 2024 with outlay of Rs. 4100 Cr. Funding ratio has been kept as 90:10 (for special category States) and 60:40 (for general States) under FMP component of FMBAP scheme.7 schemes (2 schemes from Arunachal Pradesh & 1 scheme each from J&K, Himachal Pradesh, Assam, Manipur and Bihar) have been included under FMP component of FMBAP: 2021-26 till FY 2023-24. The release under the FMP as well as RMBA is as under:

(Rs. in Cr)

Sl. No.	Component	XI Plan	XII Plan	Total during (XI+XII)	Total FMBAP 2017-21	FMBAP 2021-26 FY: 2021-24	Total Fund Released since XI plan till FY 2023-24
1	2	3	4	5	6	7	8
1	FMP	3566.00	1307.07	4873.07	1574.68	658.72	7106.47
2	RMBA (Grant-in-Aid)	340.41	223.20	563.61	527.83	167.29	1258.73
Total		**3906.41**	**1530.27**	**5436.68**	**2102.51**	**826.01**	**8365.20**

Source: FMP Directorate, Central Water Commission, M/o Jal Shakti

Section-V
Land Use Statistics

1. Based on the nine-fold land-use classification system, land-use statistics are available for approximately 308 million hectares (Mha) out of India's total geographic area of 329 Mha, accounting for 93.6 % of the country's land. Land is a vital environmental asset, providing the spatial framework within which natural processes and human and economic activities take place. With a growing population and an evolving industrial profile, shifts in socio-economic priorities are driving significant changes in land use. Such land-use changes have far-reaching implications for economic growth, quality of life, environmental resource management, and national food security.

2. Land serves both agricultural and non-agricultural purposes, including industrial development, housing, transportation networks, recreational areas, and related infrastructure. Rapid industrialization and population growth are exerting pressure on land resources, compounded by various physical, anthropogenic, and environmental challenges such as soil erosion, desertification, pollution, food and water shortages, land conflicts, and climate change. Increasing urbanisation is also having a measurable impact on both the quantity and quality of water resources.

3. This Section presents data on selected land-use and irrigation statistics, including irrigation coverage under principal crops, sources of irrigation, irrigated area, and productivity of food grains. It also provides State/UT-wise information on water rates for flow and lift irrigation.

Table 5.1: Year-wise Net Area Sown, Net Irrigated Area and Net Un-Irrigated Area

(In Th. Ha)

Sl. No.	Year	Net Area Sown	Net Irrigated Area	Net Un-Irrigated Area =Col (3)-Col (4)
1	2	3	4	5
1	2011-12	140792	66009	74783
2	2012-13	139746	66589	73157
3	2013-14	141238	68419	72819
4	2014-15	139445	68582	70863
5	2015-16	138974	67772	71202
6	2016-17	139000	69270	69730
7	2017-18	138770	70164	68606
8	2018-19	138439	72244	66195
9	2019-20	139901	75469	64432
10	2020-21	141544	77729	63815
11	2021-22	141007	77916	63091
12	2022-23	140705	79312	61393
13	2023-24 (P)	138992	82416	56576

Source: 'Land Use Statistics at a Glance 2023-24', Economics Statistics & Evaluation Division, D/o Agriculture & Farmers Welfare, M/o Agriculture & Farmers Welfare (as per the latest availability of data) ; **Note** : P :- `Provisional'

Figure-9: Net Area Sown , Net Irrigated Area and Net Un-Irrigated Area

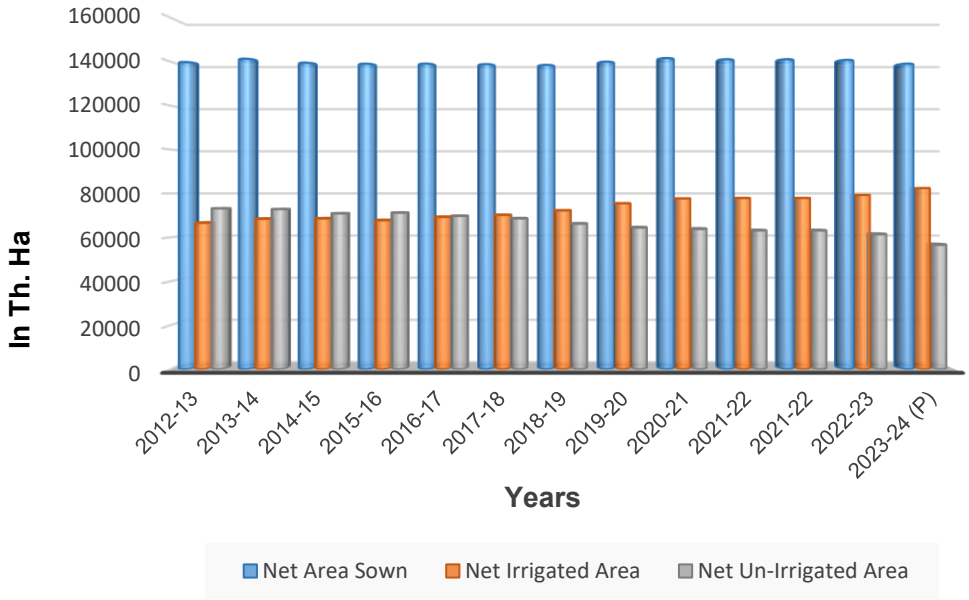


Table 5.2: Year-wise Gross Area Sown, Gross Irrigated Area and Gross Un-Irrigated Area (In Th. Ha)

Sl. No.	Year	Gross Area Sown (Total Cropped Area)	Gross Irrigated Area	Gross Un-Irrigated Area =Col (3)-Col (4)
1	2	3	4	5
1	2011-12	195546	91931	103614
2	2012-13	194455	92780	101675
3	2013-14	201300	96270	105030
4	2014-15	198285	97846	100439
5	2015-16	198122	97754	100368
6	2016-17	201158	99620	101538
7	2017-18	200876	101467	99409
8	2018-19	201179	104711	96469
9	2019-20	211359	112443	98916
10	2020-21	216107	118934	97173
11	2021-22	219158	120380	98778
12	2022-23	219357	122294	97063
13	2023-24(P)	217882	130548	87334

Source: 'Land Use Statistics at a Glance 2023-24', Economics Statistics & Evaluation Division, D/o Agriculture & Farmers Welfare, M/o Agriculture & Farmers Welfare (as per the latest availability of data)

Note :-P:- `Provisional'

Figure-10: Gross Area Sown, Gross Irrigated Area and Gross Un-irrigated Area

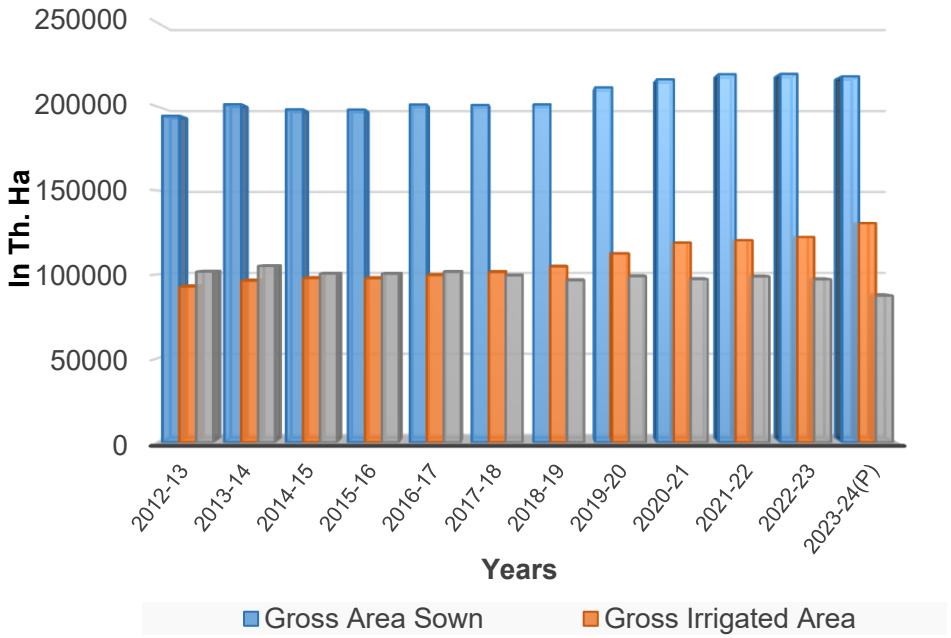


Table 5.3: Total Cultivable Land and Cropping Intensity

(In Th. Ha)

Sl. No.	Year	Cultivated Land	Net Area Sown	Gross Irrigated Area	% of Gross Irrigated Area to Total Cropped Area =[Col (5)/Col (7)]*100	Gross Area Sown (Total Cropped Area)	Cropping Intensity (%) =[Col (7)/Col (4)]*100
1	2	3	4	5	6	7	8
1	2011-12	155451	140792	91931	47.0	195546	138.9
2	2012-13	155185	139746	92780	47.7	194455	139.1
3	2013-14	155542	141238	96270	47.8	201300	142.5
4	2014-15	154520	139445	97846	49.3	198285	142.2
5	2015-16	154685	138974	97754	49.3	198122	142.6
6	2016-17	154298	139000	99620	49.5	201158	144.7
7	2017-18	153759	138770	101467	50.5	200876	144.8
8	2018-19	153653	138439	104711	52.0	201179	145.3
9	2019-20	153671	139901	112443	53.2	211359	151.1
10	2020-21	154530	141544	118934	55.0	216107	152.7
11	2021-22	154262	141007	120380	54.9	219158	155.4
12	2022-23	154203	140705	122294	55.8	219357	155.9
13	2023-24(P)	153899	138992	130548	59.9	217882	156.8

Source: 'Land Use Statistics at a Glance 2023-24', Economics Statistics & Evaluation Division, D/o Agriculture & Farmers Welfare, M/o Agriculture & Farmers Welfare.

Note: 'Cropping Intensity': It is the percentage of the 'Gross Cropped Area' to 'Net Area Sown'.,
P:-` Provisional'

Table 5.4: Agriculture Land by use in India

(In Th. Ha)

Sl. No.	Classification	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24 (P)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
I.	**Geographical Area**	328726	328726	328726	328726	328726	328726	328726	328726	328747	328747	328747	328755	328755
II.	**Reporting Area for Land Utilisation Statistics (1 to 5)**	307134	307232	307538	307523	307493	308058	307509	307528	306542	306982	306486	306650	306934
1	Forests	71618	71590	71848	72071	72137	72295	72334	72295	71751	71980	72000	72021	72021
2	Not Available for Cultivation (A+B)	43335	43382	43664	43985	43771	44550	44067	44282	44319	44409	44093	44399	45138
(A)	Area Under Non-agricultural Uses	26355	26549	26958	27146	27270	28042	27557	27589	27777	27726	27578	27845	28549
(B)	Barren & Un-culturable Land	16980	16833	16706	16839	16502	16507	16510	16693	16542	16684	16515	16554	16589
3	Other Uncultivated land excluding Fallow Land (A+B+C)	26061	26034	25787	25854	25590	25628	25709	25645	25559	25244	25214	24899	24743
(A)	Permanent Pasture & other Grazing Land	10264	10211	10215	10199	10214	10291	10291	10328	10480	10327	10281	10248	10210
(B)	Land under Miscellaneous Tree Crops & Groves not included in Net Area Sown	3160	3181	3186	3103	3092	3125	3169	3155	3134	3012	3013	2992	2948
(C)	Culturable Waste Land	12636	12642	12386	12553	12284	12211	12250	12162	11945	11905	11920	11659	11586
4	Fallow Lands (A+B)	25328	26480	25002	26168	27021	26586	26629	26868	25012	23804	24172	24626	26070
(A)	Fallow Lands other than Current Fallows	10669	11040	10698	11093	11310	11288	11640	11654	11242	10818	10917	11128	11163
(B)	Current Fallows	14660	15439	14304	15075	15711	15298	14988	15214	13770	12986	13255	13498	14907
5	Net Area Sown (6-7)	140792	139746	141238	139445	138974	139000	138770	138439	139901	141544	141007	140705	138992
6	Total Cropped Area (Gross Cropped Area)	195546	194455	201300	198285	198122	201158	200876	201179	211359	216107	219158	219357	217882
7	Area Sown more than once (6-5)	54754	54709	60061	58840	59148	62159	62106	62740	71457	74563	78152	78652	78890
8	Cropping Intensity*	139	139	143	142	143	145	145	145	151	153	155	156	157
III.	**Net Irrigated Area**	**66009**	**66589**	**68419**	**68582**	**67772**	**69270**	**70164**	**72244**	**75469**	**77729**	**77916**	**79312**	**82416**
IV.	**Gross Irrigated Area**	**91931**	**92780**	**96270**	**97846**	**97754**	**99620**	**101467**	**104711**	**112443**	**118934**	**120380**	**122294**	**130548**

Source: 'Land Use Statistics at a Glance 2023-24', Economics Statistics & Evaluation Division, D/o Agriculture & Farmers Welfare, M/o Agriculture & Farmers Welfare;

Note: 'Cropping Intensity': It is the percentage of the 'Gross Cropped Area' to 'Net Area Sown'; **P**:- `Provisional'

5.1 Irrigated Area under Principal Crops

1. To assess the quantum of water used for irrigation, it is essential to consider the irrigated area under various crops, as water requirements differ significantly from crop to crop. The following Table 5.5 presents the gross irrigated area for selected crops.

Table 5.5: Total Gross Irrigated Area for Crops - All India

(Th. Ha)

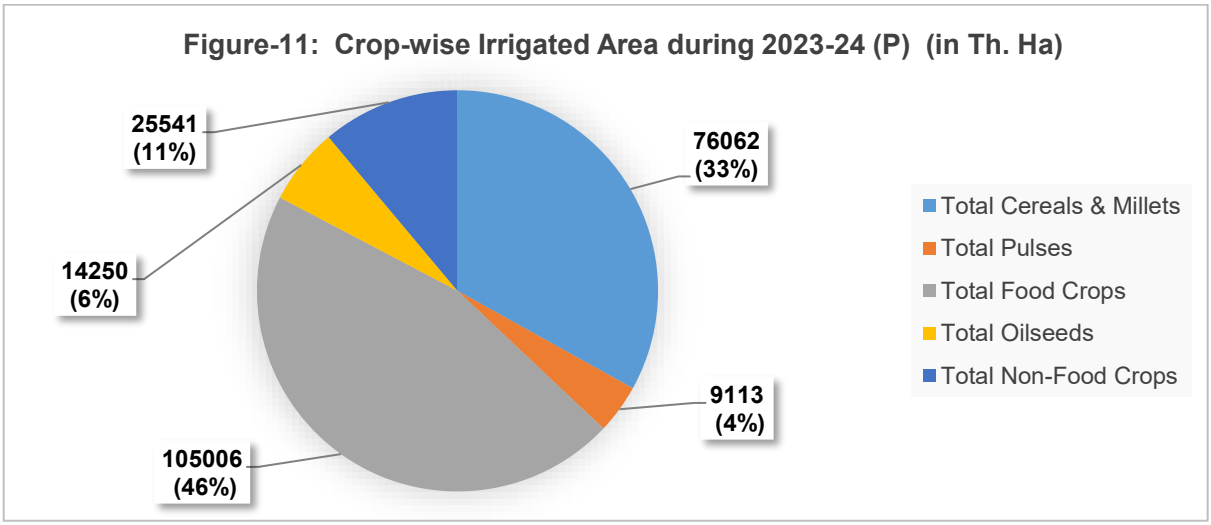
Crop/Year	Rice	Wheat	Total Cereals & Millets	Total Pulses	Total Food Crops	Total Oilseeds	Cotton	Total Non-Food Crops	Gross Irrigated Area
1	2	3	4	5	6	7	8	9	10
2011-12	25579	27748	57802	3849	75970	7733	4252	15961	91931
2012-13	25006	28282	57796	4172	76010	8283	4171	16769	92780
2013-14	26519	29149	60394	4765	79446	8347	4010	16824	96270
2014-15	26614	30261	61457	4345	80539	7867	4484	17307	97846
2015-16	26204	29290	59978	4471	80158	8271	4132	17597	97754
2016-17	27067	30402	62040	5074	82357	8401	3972	17263	99620
2017-18	27721	29525	61864	6561	83855	8325	4537	17613	101467
2018-19	28599	30181	62997	6515	85855	8985	4853	18855	104711
2019-20	31265	34012	70445	6100	93286	9348	4977	19156	112443
2020-21	33634	33902	73105	7297	98276	10432	5024	20658	118934
2021-22	33718	33171	71925	7472	98721	12046	4605	21659	120380
2022-23	34140	33434	72952	6623	99383	12847	4926	22912	122294
2023-24(P)	34624	33405	76062	9113	105006	14250	6368	25541	130548

Source: 'Land Use Statistics at a Glance 2023-24', Economics Statistics & Evaluation Division, D/o Agriculture & Farmers Welfare, M/o Agriculture & FW

Note:- P :- `Provisional'

From Table 5.5, it is observed that, among the cereals, the irrigated area under rice varied between 25579 to 34624 Th Ha during the period 2011-12 to 2023-24(P). The irrigated area under wheat varies from 27748 to 33405 Th. Ha during the same period. The crop-wise irrigated area during 2023-24 (P) is presented in the following Figure-10. It is observed that the maximum contribution is from Food crops (46%), followed by Cereals & Millets (33%).

Figure-11: Crop-wise Irrigated Area during 2023-24 (P) (in Th. Ha)



5.2 Sources of Irrigation and Area Irrigated

1. The principal sources of irrigation in India are canals, tanks, and wells (including tube-wells). Data on irrigated area by source are compiled by the Ministry of Agriculture, which collects this information at the district, state, and national levels.

2. The erstwhile Planning Commission compiled figures on Irrigation Potential Created (IPC) and Irrigation Potential Utilised (IPU) for major and medium irrigation projects. For minor irrigation schemes, the Department of Water Resources, River Development & Ganga Rejuvenation (DoWR, RD & GR), Ministry of Jal Shakti, conducts a Minor Irrigation Census at regular intervals. These censuses provide source-wise data on IPC and IPU.
Six such censuses have been conducted so far, for the reference years 1986-87, 1993-94, 2000-01, 2006-07, 2013-14, and 2017-18. The All-India and State-wise reports of the 6th Minor Irrigation Census (reference year 2017-18) were released in August 2023 and are available on the website of the DoWR, RD & GR, Ministry of Jal Shakti.

3. An analysis of the net area irrigated by source during 2023-24 (P) indicates that groundwater continues to be the predominant source of irrigation in the country. Wells (including Tube-Wells) accounted for 62.94 % of the total irrigated area, followed by canals, which contributed 21.13 % at the all-India level during 2023-24 (P).

Table 5.6: Source-wise Net Irrigated Area in India

(Th. Ha)

S. No.	Year	Canal	Tank	Wells	Other Sources	Total (All Sources)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	2011-12	16120	2007	40455	7426	66009
2	2012-13	15789	1842	41224	7734	66589
3	2013-14	16395	1932	42358	7734	68419
4	2014-15	16274	1883	42600	7826	68582
5	2015-16	15497	1874	42886	7515	67772
6	2016-17	16817	1793	42932	7727	69270
7	2017-18	16914	1813	43948	7489	70164
8	2018-19	17611	1747	44947	7938	72244
9	2019-20	18543	2013	46496	8416	75469
10	2020-21	18600	2190	47327	9612	77729
11	2021-22	19218	2205	47105	9387	77916
12	2022-23	18124	2235	49806	9147	79312
13	2023-24(P)	17420	3136	51873	9987	82416

Source: 'Land Use Statistics at a Glance 2023-24', Economics Statistics & Evaluation Division, D/o Agriculture & Farmers Welfare, M/o Agriculture & FW (as per the latest availability of data)

Note :- P:- `Provisional'

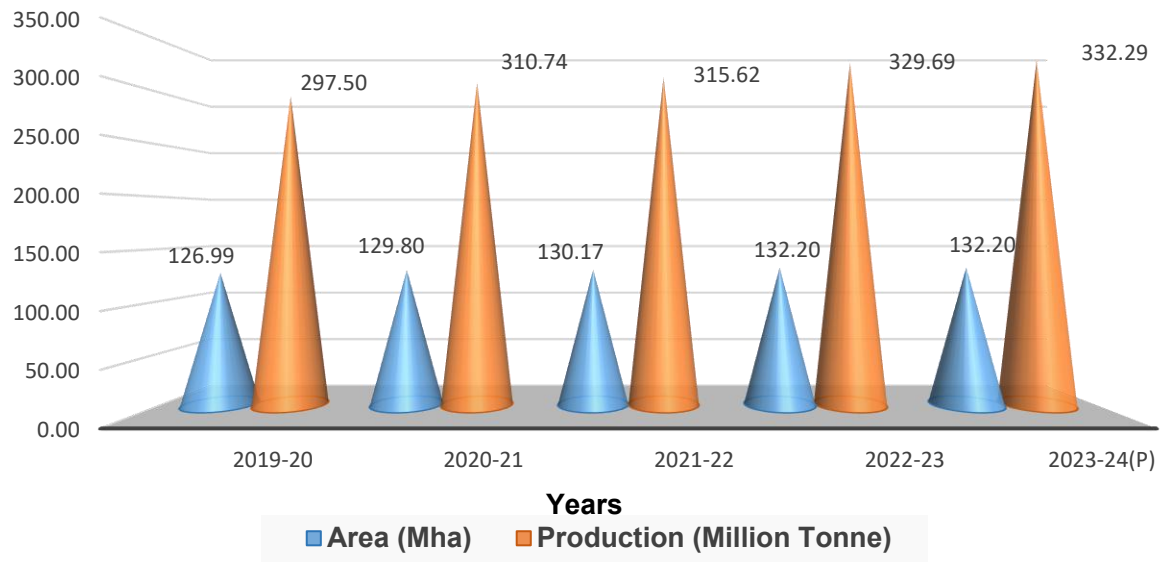
Table 5.7: All India Estimates of Maximum Area, Production and Productivity of Food Grains

Sl. No.	Year	Area (Mha)	Production (Million Tonne)	Yield (Tonne/Ha)
1	2	3	4	5
1	1950-51	97.32	50.82	0.52
2	1960-61	115.58	82.02	0.71
3	1970-71	124.32	108.42	0.87
4	1980-81	126.67	129.59	1.02
5	1990-91	127.84	176.39	1.30
6	2000-01	121.05	196.81	1.63
7	2010-11	126.67	244.49	1.93
8	2011-12	124.75	259.29	2.08
9	2012-13	120.78	257.13	2.13
10	2013-14	125.05	265.05	2.12
11	2014-15	124.30	252.03	2.03
12	2015-16	123.22	251.54	2.04
13	2016-17	129.23	275.11	2.13
14	2017-18	127.52	285.01	2.24
15	2018-19	124.78	285.21	2.29
16	2019-20	126.99	297.50	2.34
17	2020-21	129.80	310.74	2.39
18	2021-22	130.17	315.62	2.43
19	2022-23	132.20	329.69	2.49
20	2023-24 (P)	132.20	332.29	2.51

Source: Economics, Statistics & Evaluation Division, Department of Agriculture & Farmers Welfare, M/o Agriculture & Farmers Welfare

Note: 'P': Provisional

Figure-12: Area and Production of Food Grains (Last 5 years)



Section-VI
Navigation-Inland Water and Transport

1. 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. Length of waterways along with its navigable length is an indicator of inland water potential of a State.

2. This Section provides the criteria for declaration of National Waterway, details of National Waterways (1-5) and development of 106 new National Waterways. It also provides the details of cargo movement on the major waterways in the country.

6.1 National Waterways

1. Criteria for declaration of National Waterway

   (i) It should possess capability of navigation by mechanically propelled vessels of minimum 300 Tonnes (DWT) capacity (45m x 8m x1.2m);

   (ii) It should have a fairway of minimum 40m wide channel with 1.4m depth in case of rivers and minimum 30m wide channel with 1.8m 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;

   (iii) 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

   (iv) 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.

2. 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):

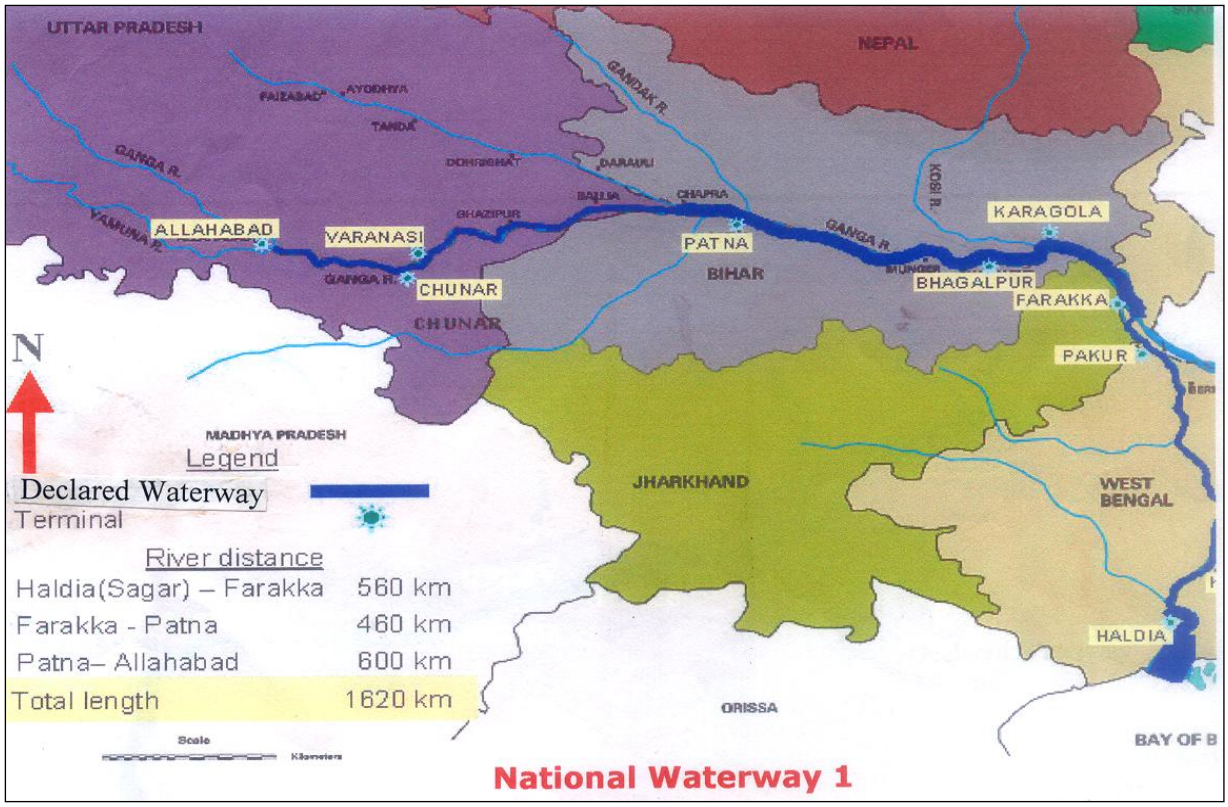
   (i) Allahabad-Haldia stretch (1620 km) of Ganga-Bhagirathi-Hooghly River System was declared National Waterway-1 in 1982 and effective in October,1986.
   (ii) Sadiya-Dhubri stretch (891 km) of the Brahmaputra River was declared National Waterways-2 in September, 1988.
   (iii) Kottapuram-Kollam stretch (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).
   (iv) Kakinada- Puducherry canals along with Godavari and Krishna Rivers (1078 km) as National Waterway-4 in 2008 and

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

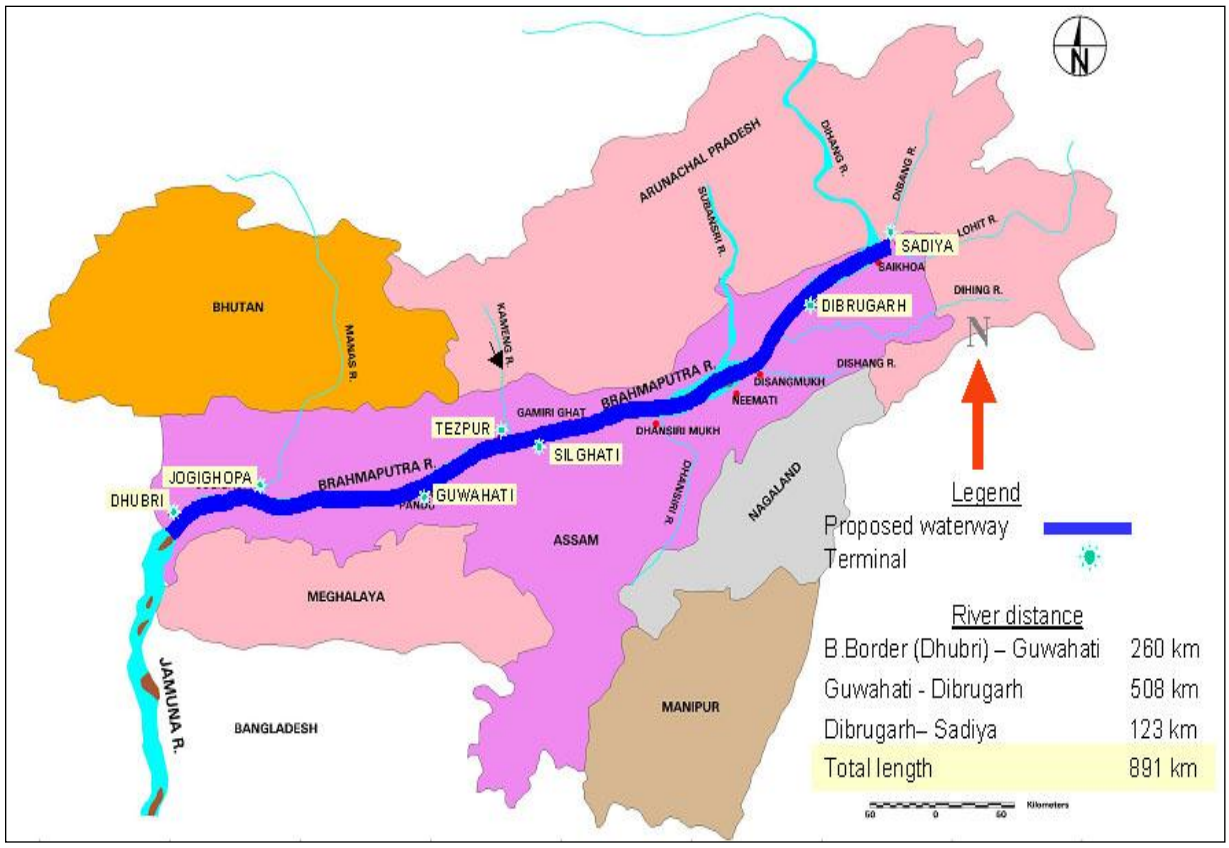
6.1.1 National Waterways-1 (The Ganga-Bhagirathi-Hooghly)

The Ganga - Bhagirathi - Hooghly River System between Haldia (Sagar) and Allahabad (1620 km) was declared as National Waterway-1 in 1986. Since then, Inland Waterways Authority of India (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 2023-24, 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):

1. Haldia - Farakka stretch (560 km) – 2.6 m to 3.0 m
2. Farakka - Barh stretch (400 km) – 2.1 m to 2.5 m
3. Barh - Ghazipur stretch (290 km) – 1.6 m to 2.0 m
4. Ghazipur - Chunar/Allahabad (369 km) – 1.5 m to 2.2 m



6.1.2 National Waterways-2 (River Brahmaputra)



National Waterway-2: River Brahmaputra from Dhubri (Bangladesh Border) to Sadiya (891 km) was declared as National Waterway-2 (NW-2) in 1988. A navigable fairway of 45-meter width and 2.50 meter Least Available Depth (LAD) from Dhubri to Neamati (629km) and 2.00 meter LAD from Neamati to Dibrugarh (139 Km) and 1.50 meter from Dibrugarh to Oriumghat/Sadiya (123km) is being maintained with day and night navigational aids and terminals at strategic locations. The development of NW-2 enables waterway connectivity of NER with Kolkata/Haldia Ports via IBP Route.

6.1.3 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 165 km, thereby extending the total length of NW-3 to 370 km. IWAI is conducting channel developmental works that includes dredging for providing fairway of 2.20 m LAD, channel width of 38/32 m, 24 hours navigational facilities and terminal facilities equipped with mechanical cargo handling equipment. IWAI has constructed nine permanent terminals at Kottapuram, Aluva, Maradu, Vaikkom, Thanneermukkom (Cherthala), Alapuzha, Kayamkulam, Thrikkunnapuzha and Kollam. The Volume of cargo on NW-3 increased to 32.93 lakh tonnes in 2023-24 from 32.28 lakh tonnes in 2022-23 recording an increase of 2%.

6.1.4 National Waterway-4

National Waterway-4 was 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 2,916 km by extending river Godavari up to Nasik and river Krishna up to Galagali. Projects completed so far include fairway development works in the Vijayawada-Muktyala stretch of river Krishna, fabrication/installation of four floating pontoons and land acquisition for the Ro-Ro terminals at Harichandrapuram and Muktyala.

6.1.5 National Waterway-5

1. Government of India declared National Waterway-5 (NW-5) in Mahanadi / Brahmani delta, Matai River & East Coast Canal (ECC) in November 2008 for total length of about 588 km. The Brahmani / Mahanadi river basins extending in Madhya Pradesh, Jharkhand & Odisha have rich deposits of minerals, coal, iron ore and large production of various industrial & agricultural products. The commodities to be transported through NW-5 could be divided into three groups namely, Minerals (Coal, Iron Ore), Agricultural products (Paddy, Rice, Straw, Animal fodder, fish, Jute) and Finished goods / Manufactured products (from Kalinganagar industries, textiles and forest). IWAI awarded the work for preparation of Detailed Project Report on NW-5 (East Coast Canal & Brahmani/Kharsua River System) to WAPCOS Ltd. and DPR submitted in March, 2010.

2. The length-wise distribution of NW-5 in 3 different stretches a total of 588 km, as per the DPR is given below:
   (i) Stretch I: Talcher to Mangalgadi : 237 km
   (ii) Stretch II: Dhamra to Paradip : 95 km
   (iii) Stretch III: Dhamra to Geonkhali : 256 km
   Total : 588 km

3. Based on the feasibility studies conducted and DPR updated on 2016 and also keeping the potential of cargo movements as emanated through various studies, it was decided to initially develop 332 km of economically & commercially viable stretches of NW-5 between Paradip/Dhamra and Talcher in following 2 phases.

4. Status of development of National Waterways :
   (i) Development of NW-5 (both Phase-I & II) to be under taken simultaneously. Awarded the work for vetting of cross structures on NW-5 on 10.08.2023 and work for preparation on TEFR/DPR for Phase-2 awarded to NTCPWC, IIT-M Chennai on 17.08.2023.

   (ii) Formation of a new SPV-an existing SPV namely Inland Waterways Consortium of Odisha Limited (IWCOL) formed by Govt. of Odisha with Paradip Port Authority and Dhamra Port Company Ltd was identified. On boarding of IWAI approved by IWCOL board vide its 30th Board meeting, IWAI has remitted the equity due of Rs.33 lakh on 21.03.2024. Subsequent to onboarding of IWAI, Dhamra Port Company Ltd has exited the SPV. Paradip Port Authority has remitted its equity due on 01.05.2024.

6.2 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 12thApril, 2016 to promote Inland Water Transport (IWT) in the country. A list of all the NWs with their approx. length is given at the following link: https://shipmin.gov.in/sites/default/files/IWT%202023-24.pdf. 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.

6.2.1 Status of 106 new National Waterways

1. The Feasibility Reports (FRs) and the Detailed Project Reports (DPRs) of new 106 NWs, have been completed. After detailed analysis of the outcomes and recommendations of the FRs/DPRs, input from stakeholders, 106 NWs have been categorized into three categories. The detailed parameters which have been analysed and considered for above categorization has been elaborated in the table below:

(i)	Category 'A': Feasible NWs with Cargo	18 NWs	NW-9, 10, 16, 27, 68, 111, 25, 28, 37, 40, 44, 73, 85, 86, 97, 100, 57 & 94
(ii)	Category 'B': Feasible NWs with only Tourism potential/Ferry/Cruise	25 NWs	NW-6, 7, 8, 14, 15, 18, 20, 23, 24, 29, 30, 36, 42, 47, 50, 52, 83, 87, 88, 90, 91, 95, 104, 108 & 110
(iii)	Category 'C': NWs not feasible for Cargo/Cruise	63 NWs	Remaining NWs except enlisted in 1 & 2 above

2. In addition to earlier existing 5 NWs as detailed in Para 6.1 above, new national waterways which are considered the most viable and where development activities have been initiated in Phase I are:
   (i) River Barak (NW-16),
   (ii) Sundarbans (Protocol Route) Waterways (NW-97),
   (iii) Cumberjua River (NW-27),
   (iv) Mandovi River (NW-68),
   (v) Zuari River (NW-111),
   (vi) Alappuzha- Kottayam- Athirampuzha Canal (NW-9),
   (vii) Alappuzha-Changanassery Canal (NW-8),
   (viii) Rupnarayan River (West Bengal) (NW-86),
   (ix) River Ghaghra (NW-40),
   (x) Kali River (NW-52),
   (xi) Ichamati River (NW-44),
   (xii) Kopili River (NW-57),
   (xiii) Dhansiri River (NW-31)

6.3 Cargo Movement on Major Waterways

The details of cargo moved on the national waterways, waterways of Goa, Maharashtra, Gujarat which carry most of the cargo traffic on India's Inland Waterways are given at Table 6.1. The total cargo movement on India's waterways comprising the national waterways and NWs in the State of Goa, Maharashtra, Gujarat was 1330.31 Lakh tonnes in 2023-24 as against 1261.49 Lakhs tonnes in 2022-23, reflecting an increase of 5.45%. In terms of tonne km (movement of one tonne of cargo over a distance of one km) there was an increase by 9.56% in 2023-24 over 2022-23 and cargo carried on Indian Waterways is 34.14 tonne km. Goa, Maharashtra and Gujarat waterways though accounted 77.95% of the total cargo movement on inland waterways across India, there share was only 31.46% in terms of tonne km.

Table 6.1: Cargo Movement on Major Waterways

Sl. No.	Details of Waterways	Cargo Moved (Lakh Tonnes)			Tonne kms (In Lakh)		
		2021-22	2022-23	2023-24	2021-22	2022-23	2023-24
1	National Waterways No.1	109.28	131.70	128.24	20082.07	18703.99	16554.28
		(10.04)	(10.44)	(9.64)	(53.30)	(45.12)	(36.45)
2	National Waterways No.2	4.28	6.30	5.89	74.38	106.67	151.63
		(0.39)	(0.5)	(0.44)	(0.20)	(0.26)	(0.33)
3	National Waterways No.3	16.95	32.28	32.93	179.19	213.19	194.94
		(1.56)	(2.56)	(2.48)	(0.48)	(0.51)	(0.43)
4	National Waterways No.4	112.34	84.18	43.03	316.47	295.22	190.66
		(10.33)	(6.67)	(3.23)	(0.84)	(0.71)	(0.42)
5	National Waterways No.5	0.15	4.03	6.35			95.06
		(0.01)	(0.32)	(0.48)			(0.21)
6	National Waterways No.8		0.34	0.36			5.79
			(0.03)	(0.03)			(0.01)
7	National Waterways No.9		0.17	0.22			4.79
			(0.01)	(0.02)			(0.01)
8	National Waterways No.14			0.01			0.07
				(0.00)			(0.00)
9	National Waterways No.16	0.05	0.11	0.03			0.01
		(0.00)	(0.01)	(0.00)			(0.00)
10	National Waterways No. 23		0.30	0.25			1.21
			(0.02)	(0.02)			(0.00)
11	National Waterways No.31			0.07			56.97
				(0.01)			(0.13)
12	National Waterways No.44	8.18	4.63	4.84			362.08
		(0.75)	(0.37)	(0.36)			(0.80)
13	National Waterways No.64	0.15	4.50	6.71			94.01
		(0.01)	(0.36)	(0.50)			(0.21)
14	National Waterways No.86	0.01	0.88	0.99			54.82
		(0.00)	(0.07)	(0.07)			(0.12)
15	National Waterways No.94			11.61			273.41
				(0.87)			(0.60)
16	National Waterways No.97	61.03	54.73	51.85	10160.54	9202.31	13089.32
		(5.61)	(4.34)	(3.90)	(26.97)	(22.20)	(28.82)
Sub Total NWs		**312.42**	**324.15**	**293.38**	**30812.65**	**28521.39**	**31129.04**
		(28.72)	(25.70)	(22.05)	(81.78)	(68.81)	(68.54)
17	Goa Waterways	45.78	29.29	35.21	2155.39	1587.47	1626.72
		(4.21)	(2.32)	(2.65)	(5.72)	(3.83)	(3.58)
18	Maharashtra Waterways	436.06	631.49	686.56	1592.35	8177.97	9092.8
		(40.08)	(50.06)	(51.61)	(4.23)	(19.73)	(20.02)

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Table 6.1: Cargo Movement on Major Waterways

Sl. No.	Details of Waterways	Cargo Moved (Lakh Tonnes)			Tonne kms (In Lakh)		
		2021-22	2022-23	2023-24	2021-22	2022-23	2023-24
19	Gujarat Waterways	293.67	276.57	315.14	3117.61	3163.83	3566.75
		(26.99)	(21.92)	(23.69)	(8.27)	(7.63)	(7.85)
Grand Total		**1087.93**	**1261.49**	**1330.31**	**37678.00**	**41450.66**	**45415.31**

Source: 'Statistics of Inland Water Transport, 2023-24, M/o Ports, Shipping & Waterways

Note: 1. Cargo handled in Kolkata-Bangladesh-Kolkata route is included in the traffic on National Waterway I. The route is a link between NW-I & NW-II through Bangladesh.

2. Figure within brackets indicates percentage to the total.

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Section-VII
Hydro-Electric Potential

1. 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.

2. India has total identified hydropower potential of about 148701 MW out of which 133410.03 MW of hydropower potential is in stations with installed capacity over 25 MW as per the reassessment study-(2017-23). During 2023-24, the Hydel generation was 134,053.92 GWh which was about 7.73% of total electricity generation.

3. This Section provides the data/information on electricity generation & consumption. It also provides Region/State-wise and Basin-wise status of Large Hydro Electric Potential Development (in terms of installed capacity - above 25 MW).

Table 7.1: 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	155769.12	11.26	211294.89	20.08
9	2020-21	150299.52	10.95	221303.44	21.25
10	2021-22	151627.33	10.21	228451.46	17.35
11	2022-23	162098.77	10.02	243852.25	16.93
12	2023-24	134,053.92	7.73	255000.00*	16.53

Source: PDM Division, Central Electricity Authority, M/o Power
Note-1: '*': Provisional;
Note-2: 'GWh$': Gigawatt hours/Billionwatt hours/Million kilowatt hours (Million Units).

Table 7.2 Status of Large Hydro Electric Potential Development Region/State-wise (In terms of Installed Capacity - Above 25 MW)

(as on 31.03.2024)

Region/ State	Identified Capacity as per Reassessment Study (2017-23)	Capacity In Operation		Capacity Under Active Construction $		Capacity on which Construction is held up		Capacity yet to be taken up under construction #	
	(MW)	(MW)	%	(MW)	(%)	(MW)	(%)	(MW)	%
1	2	3	4	5	6	7	8	9	10
Northern									
Jammu & Kashmir	12264.5	3360.0	27.40	3051.5	24.88	48	0.39	3119	25.43
Ladakh	707.0	89.0	12.59	0.00	0.00	0	0.00	0.0	0.00
Himachal Pradesh	18305.0	10281.0	56.16	2446.0	13.36	44	0.24	937	5.12
Punjab	1300.73	1096.30	84.28	206.0	15.84	0.0	0.00	0.0	0.00
Haryana	0.0	0.0	0.0	0.00	0.00	0.0	0.00	0.0	0.00
Rajasthan	411.0	411.0	100.00	0.00	0.00	0.0	0.00	0.0	0.00
Uttarakhand	13481.35	4035.35	29.93	1264.0	9.38	247	1.83	815	6.05
Uttar Pradesh	501.6	501.60	100.00	0.0	0.00	0.0	0.00	0.0	0.00
Sub Total (NR)	**46971.18**	**19774.25**	**42.10**	**6968**	**14.83**	**339.0**	**0.72**	**4871**	**10.37**
Western									
Madhya Pradesh	2819.0	2235.0	79.28	0.0	0.00	400.0	14.19	0.0	0.00
Chhattisgarh	1311.0	120.0	9.15	0.0	0.00	0	0.00	0.0	0.00
Gujarat	550.0	550.0	100.00	0.0	0.00	0	0.00	0.0	0.00
Maharashtra	3144.0	2647.0	84.19	0.0	0.00	0	0.00	0.0	0.00

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Table 7.2 Status of Large Hydro Electric Potential Development Region/State-wise (In terms of Installed Capacity - Above 25 MW)

(as on 31.03.2024)

Region/ State	Identified Capacity as per Reassessment Study (2017-23)	Capacity In Operation		Capacity Under Active Construction $		Capacity on which Construction is held up		Capacity yet to be taken up under construction #	
	(MW)	(MW)	%	(MW)	(%)	(MW)	(%)	(MW)	%
1	2	3	4	5	6	7	8	9	10
Goa	0.00	0.0	0.00	0.0	0.00	0	0.00	0.0	0.00
Sub Total (WR)	**7824.0**	**5552.0**	**70.96**	**0.0**	**0.00**	**400.00**	**5.11**	**0.0**	**0.00**
Southern									
Andhra Pradesh	2596.0	1610.0	62.02	1190.0	45.84	0.0	0.00	0.0	0.00
Telangana	1302.0	800.0	61.44	0.0	0.00	0.0	0.00	0.0	0.00
Karnataka	4414.4	3689.20	83.57	0.0	0.00	0.0	0.00	0.0	0.00
Kerala	2472.75	1864.15	75.39	140.0	5.66	0.0	0.00	0.0	0.00
Tamil Nadu	1785.2	1778.20	99.61	0.0	0.00	0.0	0.00	0.0	0.00
Sub Total (SR)	**12570.4**	**9741.55**	**77.50**	**1330.0**	**10.58**	**0.0**	**0.00**	**0.0**	**0.00**
Eastern									
Jharkhand	300.0	210.0	70.00	0.0	0.00	0.0	0.00	0.0	0.00
Bihar	130.1	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00
Odisha	2824.50	2154.55	76.28	0.0	0.00	0.0	0.00	0.0	0.00
West Bengal	809.2	441.20	54.52	120.0	14.83	0.0	0.00	0.0	0.00
Sikkim	6051.0	2282.0	37.71	620.0	10.25	417.0	6.89	520.0	8.59

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Table 7.2 Status of Large Hydro Electric Potential Development Region/State-wise (In terms of Installed Capacity - Above 25 MW)

(as on 31.03.2024)

Region/ State	Identified Capacity as per Reassessment Study (2017-23)	Capacity In Operation		Capacity Under Active Construction $		Capacity on which Construction is held up		Capacity yet to be taken up under construction #	
	(MW)	(MW)	%	(MW)	(%)	(MW)	(%)	(MW)	%
1	2	3	4	5	6	7	8	9	10
Sub Total (ER)	**10114.8**	**5087.75**	**50.30**	**740.0**	**7.32**	**417.0**	**4.12**	**520.0**	**5.14**
North Eastern									
Meghalaya	2026.0	322.0	15.89	0.00	0.00	0.0	0.00	85	4.20
Tripura	0.0	0.0	0.00	0.00	0.00	0.0	0.00	0.0	0.00
Manipur	615.0	105.0	17.07	0.00	0.00	0.0	0.00	0.0	0.00
Assam	643.0	350.0	54.43	120.0	18.66	0.0	0.00	0.0	0.00
Nagaland	325.0	75.0	23.08	0.00	0.00	0.0	0.00	186	57.23
Arunachal Pradesh	50394.0	1115.0	2.21	4880.0	9.68	0.0	0.00	13798	27.38
Mizoram	1926.7	60.0	3.11	0.00	0.00	0.0	0.00	0.0	0.00
Sub Total (NER)	**55929.7**	**2027.0**	**3.62**	**5000.0**	**8.94**	**0.0**	**0.00**	**14069**	**25.15**
All India	**133410**	**42182.55**	**31.62**	**14037.5**	**10.52**	**1156.0**	**0.87**	**19460**	**14.59**

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

Note 1: (i) Does not include pumped storage projects.
(ii). In addition to above 8 PSS (4745.6 MW) are under operation, 3 PSS (2700 MW) are under active construction, 1 PSS (80 MW) on which construction is held up, 2 PSS (2350 MW) is Concurred by CEA, 44 PSS (60050 MW) are under S&I, 8 PSS (9500 MW) are Under S&I held up.
(iii) '$': The above list includes 6 Multi-purpose Project (MPP) namely Upper Siang project (11200 MW) in Arunachal Pradesh, Bursar (800MW) in J&K, Simsang Dam project (60 MW) in Meghalaya, Kishau MPP (660MW) in Uttarakhand, Drass Suru link project (95 MW) in Ladakh & Hathnikund Dam project (250 MW) in Haryana.

(iv) '#': In addition to above, DPR of one project namely Ujh Multipurpose Project (196 MW) is accepted by 148th meeting of Advisory Committee of DOWR, RD&GR on irrigation, Flood Control & Multipurpose on 17.01.2022 but the PIB does not support proposal of Department of Water Resources, River Department and Ganga Rejuvenation in respect of Ujh Multipurpose project. And also for one project namely Sirkari Bhyol Rupsiabagar, it has been initimated by UJVNL that total cost has been estimated at Rs. 964.12 crore at price level of March, 2023 and as per Section 8(1) of Electricity Act, M/S UJVNL is required to submit the DPR to State Government.

Note 2: Multi-purpose projects (International Projects) are under examination (India and Nepal) namely, Pancheshwar MPP (2400 MW) whose DPR is being revised & Rupali Garh Regulating Dam (120 MW) which is Under S&I.

- Balance Capacity is different from arithmetic calculation from the potential accessed due to change in capacity of the Projects, addition/deletion of the Projects and merger of two Projects into one etc.

Table 7.3: Status of Large Hydro Electric Potential Development Basin-wise (In terms of Installed Capacity - Above 25 MW)

(as on 31.03.2024)

Basin	Identified Capacity as per Reassessment Study (2017-23)	Capacity In Operation		Capacity under Active Construction $		Capacity on which Construction is held up		Capacity yet to be taken up under Construction #	
	MW	(MW)	%	(MW)	%	(MW)	%	(MW)	%
1	2	3	4	5	6	7	8	9	10
Indus	32322.23	14665.30	45.34	5703.5	17.65	48.0	0.15	4056	12.55
Ganga	15591.25	5747.15	36.86	1264.0	8.11	291.0	1.87	815	5.23
Central Indian Rivers	4498.50	3159.80	70.24	0.0	0.00	400.0	8.89	0.0	0.00
West Flowing Rivers	7001.95	5684.35	81.18	140.0	2.00	0.0	0.00	0.0	0.00
East Flowing Rivers	11269.40	8248.95	73.20	1190.0	10.56	0.0	0.00	0.0	0.00
Brahmaputra	62726.70	4687.00	7.47	5740.0	9.15	417.0	0.66	14589.0	23.26
All India	**133410**	**42182.55**	**31.62**	**14037.5**	**10.52**	**1156.0**	**0.87**	**19460.0**	**14.59**

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

Note 1: (i). Does not include pumped storage projects.
(ii). In addition to above 8 PSS (4745.6 MW) are under operation, 3 PSS (2700 MW) are under active construction, 1 PSS (80 MW) on which construction is held up, 2 PSS (2350 MW) is Concurred by CEA, 44 PSS (60050 MW) are under S&I, 8 PSS (9500 MW) are Under S&I held up.
(iii) '$': The above list includes 5 Multipurpose Project (MPP) namely Upper Siang project (11200 MW) in Arunachal Pradesh, Bursar (800 MW) in J&K, Simsang Dam project (60 MW) in Meghalaya, Kishau MPP (660MW) in Uttarakhand, Drass Suru link project (95 MW) in Ladakh & Hathnikund Dam project (250 MW) in Haryana.
(iv) '#': in addition to above, DPR of one project namely Ujh Multipurpose Project (196 MW) is accepted by 148th meeting of Advisory Committee of DOWR, RD&GR on Irrigation, Flood Control & Multipurpose on 17.01.2022 but the PIB does not support proposal of Department of Water Resources, River Department and Ganga Rejuvenation in respect of Ujh Multipurpose project. And also for one project namely Sirkari Bhyol Rupsiabagar, it has been initimated by UJVNL that total cost has been estimated at Rs.964.12 crore at price level of March, 2023 and as per Section 8(1) of Electricity Act, M/s UJVNL is required to submit the DPR to State Government.

Note 2: Multi-purpose projects (International Projects) are under examination (India and Nepal) namely, Pancheshwar MPP (2400 MW) whose DPR is being revised & Rupali Garh Regulating Dam (120 MW) which is Under S&I.

Section – VIII
International Treaties and Cooperation

8.1 Cooperation with other countries in the field of Water Resources Management

This Section consists of the list of 14 Nos. of Memorandum of Understanding (MoU) and 2 Nos. of Memorandum of Cooperation (MoC) between India & other countries and brief note on the International Treaties and Transboundary Cooperation of India with five neighbouring countries on trans-boundary rivers in the field of Water Resources Management.

Sl. No.	MoU Details	Current Progress/ Status of Activities undertaken
1.	MoU between India and Australia	The MoU between India and Australia on cooperation, in the field of water resources management, was signed on 10.11.2009 and subsequently renewed on 5.9.2014 and 20.05.2020 for a period of 5 years. The basin planning studies for Brahmani and Baitarni was carried out in association with Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia during July 2013 to June 2016. Brahmani Basin study was done by CSIRO, Australia and Baitarani basin study was done by BPMO, CWC. The report was disseminated to the basin states namely Odisha, Chhattisgarh and Jharkhand in June 2016. 4th Joint Implementation Group (JIG) meeting was held on 18.08.2023. 6th Joint Working Group (JWG) meeting was held on 08.11.2023.
2.	MoU between India and Hungary	MoU between India and Hungary on Water Management was signed on 16.10.2016 and automatically renewed w.e.f. 16.10.2021 for a further period of 5 years as per automatic renewal clause in MoU. Following issues has been agreed under Working program for bilateral Hungarian Indian Cooperation for the period of 2021-2023: i. Integrated water resources management ii. Flood management iii. Drought and water scarcity management iv. Rejuvenation of rivers and other water bodies v. Research and education 1st Pre Meeting of the JWG was held virtually on dated 20.11.2020. The pre JWG Indo-Hungary meeting was held on 20.11.2020 under the Co-Chairmanship of Shri Subodh Yadav, JS (Admn./IC&GW), D/o WR, RD&GR, Government of India and Mr. Peter Kovacs, Water Director, Ministry of Interior of Hungary. During the meeting, both the sides agreed to put priority on management of extreme phenomena, mitigation of the impact of

Sl. No.	MoU Details	Current Progress/ Status of Activities undertaken
		climate change on water resources, protection and preservation of the quality of water resources and to facilitate knowledge exchange programs between experts & relevant institutions. A three year working program has also been finalized in the meeting which will be signed by both sides in the next JWG meeting. JWG is reconstituted on 11.01.2024 and shall be responsible for coordination, engagement, operationalization and enhancement of bilateral cooperation and to implement the activities to be carried out in fulfilment of the MoU.
3.	MoU between India and Morocco	MoU between India and the Morocco was signed on 14.12.2017 for a period of 5 years on cooperation in the field of Water Resources. MoU automatically renewed w.e.f. 14.12.2022 for a further period of 5 years as per automatic renewal clause in MoU. Further cooperation in various areas like Sediment management, climate change impacts, Ground water management, Nuclear Science application (Basin wise Isotope studies of ground water and surface water) in water resources and capacity building is expected. 3rd Joint Working Group (JWG) meeting was held on 13th July, 2021 via virtual platform under the joint chairmanship of Commissioner (CAD)- D/o WR, RD&WR and Director of Research and Planification of Water, Ministry of Equipment, Transport, Logistics and Water, Government of Morocco.

Sl. No.	MoU Details	Current Progress/ Status of Activities undertaken
4.	MoU between India and European Union	MoU between India and European Union was signed on 07.10.2016 for a period of 5 years on water cooperation. The MoU automatically renewed w.e.f. 07.10.2021 for a further period of 5 years as per automatic renewal clause in MoU. Phase-I of the Indo-European Water Partnership (IEWP) was implemented from October 2017 to October, 2020. Phase-II of the IEWP was carried out from November 2020 to September, 2023. Phase-III, renamed as the India-EU Water Initiative (IEWI), has commenced from 1st March 2024 and will continue till 28th February, 2027. Indo-European Water Partnership (IEWP) was established with a view to bringing together representatives of relevant stakeholders, including interested EU Member States and Indian States, European and Indian institutions, business, and civil society. The objective of the MoU is to strengthen the technological, scientific, and management capabilities of India and the EU in the field of water management on the basis of equality, reciprocity and mutual benefit. Under Phase I of IEWP, significant progress was made across nine priority areas, including river basin management, environmental flows, Ganga rejuvenation, groundwater use, irrigation efficiency, treated wastewater reuse, and water-related innovation and capacity building. In Phase II (2020–2023), the focus was streamlined into four thematic pillars—River Basin Management, Environmental Flows, Water Use Efficiency, and Safe Reuse of Treated Wastewater—leading to the development of the Tapi River Basin Management Plan, enhanced stakeholder engagement, and initiation of the Solution Forum platform to support practical implementation. Phase-III (IEWI) builds upon the progress of the earlier phases and introduces two new focus areas: Urban Hydrology and Impact of Climate Change on Water Resources, in addition to continuing efforts on River Basin Management and Safe Reuse of Treated Water. A key component of this phase is the implementation of the Solution Forum, which will facilitate on-ground execution of measures identified under earlier river basin plans, particularly in the Tapi and Ramganga basins.

Sl. No.	MoU Details	Current Progress/ Status of Activities undertaken
5.	MoU between India and Israel	MoU between India and Israel was signed on 11.11.2016 for a period of 5 years on water resource management and development. The MoU automatically renewed w.e.f. 11.11.2021 for a further period of 5 years as per automatic renewal clause in MoU. MoU envisages cooperation at the regional, national and international level in the field of water resources development and management by collaborating and sharing of experience and expertise in the areas mutually agreed upon, including technique in the efficient use of waste water desalination, aquifer recharge and in-situ water conservation techniques and water management. 1st JWG meeting was held on 03.05.2018 in India. 2nd JWG meeting was held on 08.12.2020 (virtually).
6.	MoU between India and Netherlands	MoU between India and Netherlands in the field of water management was signed on 27.6.2017 for a period of 5 years. Further, on 29th March, 2022, a Strategic Partnership on Water was signed between Ministry of Jal Shakti and Ministry of Infrastructure and Water Management, Kingdom of the Netherlands. MoU envisages cooperation in the River Basin Management Planning/Integrated Water Resources Management, Pollution abatement for Rivers including River Ganga, Decision Support Systems (data gathering, applications of Remote Sensing & GIS in Hydrology and Water Resources), Delta management-Water safety including Flood Management along rivers, deltas and coasts, Promoting water management, water quality issues and waste water recycling and re-use through innovative concession arrangements. 3rd Joint Working Group (JWG) meeting was held on 7th September, 2021 via virtual platform under the joint Chairmanship of DG, NMCG and Special Envoy for International Water Affairs, Ministry of Infrastructure and Water Management, Government of Netherlands. The Joint Steering Committee (JSC) and Project Review Committee (PRC) regarding Center of Excellence (CoE) under India-Netherlands MoU has been constituted on 28.04.2025

Sl. No.	MoU Details	Current Progress/ Status of Activities undertaken
7.	MoU between India and United States of America	MoU between India and United States Geological Survey, United States of America was signed in 17.12.2019 on scientific and technical cooperation in the field of water resources. Suggestive list of activities proposed by Principal Representative/Interlocutor: a) Collaborating in Developing Integrated Hydrological Modeling Tools. b) Collaboration in the field of Modern Irrigation Management Using low cost and water efficient technologies. Applications of IoT (Internet of Things) for improving water use/application efficiency at various spatial scales (eg. at farm level, canal head, reservoir, river basin scale etc.) c) Stream channel Morphology, Erosion Processes and Geomorphology. Ecological Flows. d) Aquifer Mapping in 2D/3D, Aquifer Response Modeling, Aquifer Management, Coastal Aquifer Management. e) Capacity Building& Technology transfer. Remarks: The USGS and the D/o WR, RD&GR have agreed to pursue scientific and technical cooperation in the field of water resources through the MoU signed between both countries.
8.	MoU between India and Tanzania	MoU between India and Tanzania on bilateral cooperation in the field of Water Resources Management and Development was signed on 10.07.2016 for period of 5 years and renewed w.e.f. 10.07.2021 for a further period of 5 years. 1st JWG Meeting was held in Tanzania on 17.05.2019. As per outcome of JWG Meeting, bilateral cooperation may be extended in technical fields like IWRM, preparation of DPRs of water projects, application of GIS and remote sensing in WRM, Aquifer mapping, Bilateral arrangements for capacity building Training to Tanzanian Officials by NWA, Pune or RGI, Raipur depending on the areas of interests in water sector. NWA, Pune has submitted a Training Programme proposal for conducting Two weeks training programme including financial implication for 15 number of officers of Tanzania. This Training is proposed of officials of Tanzania to be on 'Investigation and preparation of DPRs of water resources projects at a total cost of Rs.14,57,000/-. The proposal has been sent to MEA seeking their comments regarding funding possibility of this training programme under ITEC. Tanzanian side informed that they wish to amend the MOU and submitted the draft MoU.

Sl. No.	MoU Details	Current Progress/ Status of Activities undertaken
		EA&IC Section proposed two dates in 2023 for holding the 2nd JWG and provided Departments comments to MEA on amendment / additions suggested by Tanzanian side on draft MoU. Further, EA&IC Section requested MEA to finalize the date for amending the MoU.
9.	MoU between India and Cambodia	MoU between India and Cambodia on cooperation in the field of water resource management was signed on 08.12.2007 and extended for a period of five years w.e.f. 7.12.2017 Exchange of experts and organization of training programs; study tour in the areas of development and management of water resources, both surface and groundwater. No bilateral request. This MoU is de-prioritized'. The action on this MoU will be taken on bilateral request received through Ministry of External Affairs.
10.	MoU between India and Rwanda	MoU between India and Rwanda in the field of water resource development and management was signed on 22.01.2013 for a period of 5 years and automatically renewed w.e.f. 22.01.2018 for a further period of 5 years as per automatic renewal clause in MoU. Cooperation in agriculture, water resources management & capacity building including marshland and hillside irrigation; watershed management & water governance; irrigation projects techniques; procedure of planning irrigation projects; guidelines for water management for irrigation; crop water requirement; pressurized and surface irrigation techniques; water availability and reliability for irrigation projects; water use efficiency technology; on-farm water management, etc. MoU between India and Rwanda was signed on 22.01.2013 and as per the renewal clause of the MoU the MoU may be extended for a further period of 5 year unless either of the parties given a written notice before 6 months of its expiry to terminate the MoU. There is no progress in this MoU and hence it has been kept in deprioritized category and action may be initiated on the request from MEA/ Rwanda side.

Sl. No.	MoU Details	Current Progress/ Status of Activities undertaken
11.	MoU between India and Iraq	MoU between India and Iraq in the water resource development and management was signed on 23.08.2013 for a period of 5 years and stands automatically renewed w.e.f. 23.08.2018 for a further period of 5 years as per automatic renewal clause in MoU. Mutual cooperation in water resources development and management including hydrology and hydrological modelling, application of remote sensing & GIS in hydrology and water resources, integrated water resources development and management, irrigation and drainage, surface and groundwater management and development minor irrigation, hydrometeorology, watershed, lakes and wetlands development, dam safety & surveillance, reservoir regulation, training and capacity building. A request letter for imparting training to Iraqi Officials was received through MEA and accordingly, a Training programme has been customized for Iraqi officials which has been submitted to MEA for consideration and funding under ITEC programme. The training proposal has been prepared and under finalization.
12.	MoU between India and Fiji	MoU between India and Fiji in the field of water resources management was signed on 12.2.2014 for a period of 5 years. A suggestion for visit of Indian experts to Fiji to train Fijian officials on issues related to water engineering, hydrology, modelling etc. MEA has been requested to take up the matter with Fijian Government for sending a format proposal seeking training in water sector through MEA. The proposal from Fiji is awaited.
13.	MoU between India and Bahrain	MoU between India and Bahrain in the field of water resources development and management was signed on 22.02.2015 for a period of 5 years and stands automatically renewed w.e.f. 22.02.2020 for a further period of 5 years as per automatic renewal clause in MoU. Cooperation in the field of water resources development and management, both surface and ground water through the sharing of technical expertise and experiences. There is no progress in this MoU and hence it has been kept in deprioritized category and action may be initiated on the request from MEA/Bahrain side. This MoU may be helpful for WAPCOS in establishing contact and initial footprint in the country from where leads are taken to Procure business through global tenders.

Sl. No.	MoU Details	Current Progress/ Status of Activities undertaken
14.	MoC between India and Water and Japan	MoC between India and Water and Disaster Management Bureau, M/o Land, Infrastructure, Transport and Tourism of Japan in the field of Water Resource was signed on 11.12.2019 for a period of five years. On Feb, 2021, a meeting was held between Deputy Secretary (EA&IC) of this Department with Counsellor, Embassy of Japan in New Delhi wherein the key issues were discussed in this meeting as part of future cooperation under MoC included flood control, integrated water resource management, water quality management, reclaimed water utilization, etc. 1st JWG *(*virtual*)* was held on 21.12.2021 through VC organised by Japan. During the meeting, both sides confirmed to continue discussions on the possible cooperation themes and establish a sub-group under JWG organized at the administrative level to discuss & prioritize the cooperation themes based on mutual interest such as Water Conservation, Water Use Efficiency, Mitigation of Urban Floods-Integrated Urban Flood Management, Integrated water cycle simulation, Dam inspection technology etc.
15.	MoC between India and Ministry of Environment, Japan	MoC between M/o Jal Shakti, India and Ministry of Environment, Japan was signed on 19.03.2022 for a period of 2 years in the areas decentralized domestic waste water management.
16.	MoU between India and Denmark	MoU between India and Denmark in the field of water resources development and management was signed on 12.09.2022 for a period of five years under the India-Denmark Green Strategic Partnership. Subsequently, the Terms of Reference (ToR) and Biennial Work Plan (2024–25 & 2025–26) for the Centre of Excellence were jointly finalized and signed between the Chairman, Central Water Commission (CWC), and the Ambassador of the Royal Danish Embassy in India on 21.02.2024. These documents laid the foundation for implementing collaborative activities under the MoU. The MoU includes the establishment of a Centre of Excellence for Smart Water Resources Management (CoESWaRM) in CWC, New Delhi, and a Smart Laboratory for Clean Rivers (SLCR) in Varanasi. A Joint Steering Committee (JSC) has been constituted for the SLCR in Varanasi, with representatives from both countries, tasked with evaluating the scope of work and finalizing the work plan, manpower, and requirements. The Centre of Excellence, formally named the Smart Water Resources Modelling Organisation (SWRMO), was established in

Sl. No.	MoU Details	Current Progress/ Status of Activities undertaken
		CWC on 04.09.2024 to lead activities in smart water management and modelling. Steering Committee (SC) and Programme Management Unit (PMU) have been constituted to guide and implement the activities under CoE. Three priority areas—Flood Forecasting with Accurate Inundation Modelling, GLOF Model Studies, and Extended Hydrological Prediction Modelling—have been identified for collaboration. The 1st Joint Working Group (JWG) meeting held on 05.12.2024 reviewed the progress of India–Denmark cooperation in water resource management. The meeting reviewed progress under the MoU and emphasized operationalizing the PMU with Danish expert nominations, refining existing models (Godavari, Tapi), and including groundwater mapping as a new sub-theme with CGWB and DEPA. Joint concept notes were shared for the three priority areas. A three-phase Capacity Building Programme under India-Denmark collaboration has been planned under CoE for2025-26. The Smart Lab for Clean Rivers in Varanasi is progressing with Danish funding and IIT-BHU collaboration. Updates were shared on urban water cooperation with Rajasthan and Aarhus. External funding options were discussed, and sustainability of MIKE software licensing was noted. The next JWG meeting has been planned in Denmark in early 2026.

Source: ISM-2 Directorate, Central Water Commission, M/o Jal Shakti

8.2 Transboundary Water Cooperation

The three major river systems of India, namely, Ganga, Brahmaputra and Indus cross international borders. These three river systems alone drain around 42% of geographical area in India and contribute around 60% to the total water regime in the country.

1. Cooperation with Bangladesh

(i) Joint Rivers Commission (JRC) was established in 1972 to cooperate in harnessing & maximizing the benefits from common river system to both the countries. JRC is headed by Union Minister of Water Resources of both the countries. The last (38th) meeting of JRC was held at New Delhi on 25th August, 2022.

(ii) India and Bangladesh share 54 trans-boundary/common border rivers. As on date, the two countries have formally signed the following Treaty/ MoU regarding sharing of water:

a) A Treaty on the sharing of Ganga/ Ganges River waters at Farakka during the lean season -1st January to 31st May every year (signed in 1996). The Treaty was signed for a period of thirty years.

b) MoU for the withdrawal of 1.82 cusecs of water from Feni River by India for drinking water needs (signed on 5th October, 2019).

c) MoU on withdrawal of upto 153 cusecs of water each by India and Bangladesh from common border river Kushiyara (signed on 6th September, 2022). The MoU was signed for a period of fifteen years.

(iii) A Joint Committee has been set up for implementing, joint inspection and monitoring of the sharing arrangements (as per provisions of Ganga/Ganges Water Sharing Treaty-1996) at Farakka in India and at Hardinge Bridge in Bangladesh for the lean period. So far 87 meetings of the Joint Committee have taken place.

(iv) There is an existing arrangement between India and Bangladesh wherein, flood related data of certain identified stations of Ganga, Brahmaputra, Barak and other rivers is transmitted by India to Bangladesh during monsoon season (1st May to 31st October) for the purpose of flood forecasting and warning in their territory.

2. Cooperation with Nepal

(i) India and Nepal signed 'Mahakali Treaty' in February, 1996 and implementation of India Nepal Pancheshwar Multipurpose Project (PMP) on river Mahakali (Sarda in India) is the centre piece of the Mahakali Treaty.

(ii) India-Nepal Pancheshwar Development Authority (PDA) has been set up in September, 2014 for implementation of PMP.

(iii) India-Nepal has signed an Agreement on Kosi Project in 1954 (amended in 1966) for building, operation and maintenance of Kosi Barrage on River Kosi and associated structures. Later on, both countries signed an agreement on Gandak Project in 1959 (amended in 1964), for building, operation and maintenance of Gandak Barrage on Gandak River and associated structures.

(iv) A 'Letter of Exchange' happened between two countries on 21st June, 2004 for facilitating establishment of a Joint Project Office (JPO) of the two countries in Nepal. Accordingly, Joint Project Office (JPO) of Govt. of India and Govt. of Nepal established at Biratnagar, Nepal on 17th August, 2004 for carrying out the survey, investigation and other studies for the purpose of preparation of DPR of Sapta Kosi High Dam Multipurpose Project and Sun Kosi Storage-cum-Diversion Scheme in Nepal. DPR of both projects are under preparation.

(v) An India-Nepal Joint Committee on Water Resources (JCWR) headed by Water Resource Secretaries of both countries has been functioning with the mandate to act as an Umbrella Committee for other committees and groups, namely:

a) Joint Standing Technical Committee (JSTC)
b) Joint Committee on Inundation and Flood Management (JCIFM)
c) Joint Team of Experts (JTE)

3. Cooperation with Bhutan

(i) A scheme titled 'Comprehensive Scheme for Establishment of Hydro-meteorological and Flood Forecasting Network on rivers common to India and Bhutan' is in operation which consists of 36 Hydro-meteorological stations located in Bhutan out of which funding for the running and maintenance of 27 stations is provided by D/o WR, RD & GR, Government of India under the above-mentioned comprehensive scheme as well as the FMBAP scheme. The data received from these stations are utilised in India for formulating flood forecasts. Joint Experts Team (JET) reviews the progress and other requirements of a network of 36 hydro-meteorological sites. The JET has so far held 38 meetings. The 38th meeting was held at Mandarmani, West Bengal in Dec 2024.

(ii) 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. So far, 11 meetings of JGE have been held. The 11th meeting was held during 14-15 May 2025 at Paro, Bhutan.

(iii) In accordance with the decision taken during the first meeting of JGE, a Joint Technical Team (JTT) on Flood Management between the two countries was constituted. The purpose of JTT is to assess the field situation and provide technical support to JGE on flood management. So far, 8 meetings of JTT have been held. The 8th meeting of JTT was held during 18th -20th November, 2024 at Jalpaiguri, India.

4. Cooperation with Pakistan

(i) India had signed Indus Waters Treaty, 1960 with Pakistan concerning the use of waters of the Indus system of rivers.

(ii) Under the Treaty, both countries undertook to establish a permanent post of Commissioner of Indus Waters. The two Commissioners constitute the Permanent Indus Commission (PIC).

(iii) A total of 118 meetings of PIC have been held so far. The last meeting was held in May, 2022 at New Delhi.

5. Cooperation with China

Expert Level Mechanism (ELM) between India and China was set up in 2006 for co-operation on exchange of flood season hydrological data, emergency management and other issues regarding trans-border Rivers. The 16th meeting of ELM was held during 22-23 April, 2025 at New Delhi (India).

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Appendix Glossary

GLOSSARY OF TERMS

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 Area Sown from Total Cropped Area.
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 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.
Cropping Intensity	It is the ratio of gross (total) area sown to the net area sown expressed as a percentage.
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.
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.
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.

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GLOSSARY OF TERMS

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.
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.

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Appendix Glossary

GLOSSARY OF TERMS

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).
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.
Surface Water	Water that flows in streams and rivers and in natural lakes, in wetlands, and in reservoirs constructed by humans.
Total Cultivable Area	This consists of net area sown, current fallows, fallow lands other than current fallows, culturable waste and land under miscellaneous tree crops.
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.

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Appendix Glossary

GLOSSARY OF TERMS

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.

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