11. National Institute of Hydrology (NIH) Roorkee

The National Institute of Hydrology (NIH), a Govt. of India Society under the MoJS, DoWR, RD & GR and established in December 1978 at Roorkee, is conducting basic, applied and strategic research in the fields of hydrology and water resources development. The major theme-wise R&D activities of the Institute at headquarters are taken up under six scientific divisions.The Institute has 6 regional centers to carry our region specific research activities in the area of hydrology and water resources. During the year 2023, the 7thRegional Centre of NIH [North Western Regional Centre (NWRC)] was inaugurated by the Hon'ble Union Minister for Water Resources at Jodhpur (13th June, 2023) to cater to the hydrological problems of the north-western region of the country.

During the year 2023-2024 (up to Dec 2023), the Institute has published more than 180research papers in reputed international and national journals and proceedings of international and national conferences and symposia. During the year, 52 internal and 34 sponsored R&D studies are under progress.The Institute has completed 15 R&D studies and has organized 23 training programmes for capacity building of field engineers enabling training of 518 people during the year. The Institute has also organized various activities under 2nd phase of Azadi Ka Amrit Mahotsav@ India 75.

Keeping in view the NHP objectives and initiatives, NIH is coordinating the research activities under Purpose Driven Studies (PDS). Of the 40 approved PDS, 28 PDS have been completed. NIH is the Nodal Agency for planning and organizing the training programmes for capacity building of the implementing agencies under NHP. More than 75 training courses under NHP have been organized in different areas of hydrology and water resources.

Under the Centre of Excellence for Hydrological Modelling (CEHM), Decision Support System – Planning & Management (DSS - PM) has been developed. New applications of DSS-PM (Planning & Management) have been created in association with states.

During the year 2023, one scientist of the NIH received Patent entitled "A Fixed Depth Horizontal Soil Profile Sampler (Patent No. 476627 dated 4/12/2023)" for R&D activities at NIH. In addition, two MOUs were signed between (i) NIH, Roorkee and MI (Stat), DoWR, RD&GR (MoJS, GoI), New Delhi for conducting nationwide First Spring Census on Sep. 29^{th,} 2023, and (ii) between NIH, Roorkee and JNTU, Kakinada (A.P.) for research collaboration, guiding Ph.D. scholars, and internships on 1st Nov., 2023, respectively.

Inauguration of 7th regional Centre of NIH at Jodhpur (13th June, 2023)

12. Command Area Development and Water Management (CADWM)

"The Ministry of Jal Shakti is modernizing the CADWM component of PMKSY to make it more relevant in the current context and is also envisaging transforming the existing command (whether rain fed or gravity based) to a Pressurized Piped Irrigation Command (PPIC) by providing pressurized irrigation water from Established source to Farm Gate below Minor (Tertiary) Level Network. This will make the entire command area micro-irrigation ready with robust back end infrastructure using Surface Water. The focus is to shift Micro-Irrigation which is presently on Groundwater based to Surface Water based to achieve the policy goals on Water Use Efficiency. Central share of Rs.3274 crore out of PMKSY-CADWM scheme is earmarked for the proposed scheme and is likely to take up project(s) from States/UTs pan India after approval."

13. North East Regional Institute of Water and Land Management (NERIWALM)

- During the year 2023-24 (April 2023 to March 2024), the target for training programme recommended by Technical Advisory Committee of NERIWALM was 65 for different target groups like officers, farmers, water users associations, women group/farmers, other stakeholders and students.

- In the year 2023, from January to December, 60 Nos. of training programmes were organized by the institute and benefitted 2012 persons.
- Out of the 60 trainings, 2 were meant for foreign officers, 21targeted officer from State and Central Government, 9 for WUAs/Farmers, 14 for women group and 14 were forstudent.
- Out of 2012 participants, 1200 were male and 812 were female participants.
- 2 (Two) international training programme were organised, first was for the officers of TMO, NCHM, Royal Government of Bhutan and the second was for officers of Mekong Region under Mekong Ganga Coordination, in collaboration with Indo Pacific Division, MEA, GoI.
- The institute organised 13 (twelve) weekly induction training programmes as per demand by Irrigation Department Government of Assam, RGNGWTRI and National Water Academy.

14. Policy and Planning (P&P)

India-EU Water Partnership (IEWP):

The India-EU Water Partnership (IEWP) is an outcome of the 'Joint Declaration on Water' adopted by India and the EU on 30 March 2016 during the 13th EU-India Summit in Brussels, to enhance cooperation on water issues, including 'Clean Ganga' programme of the Government of India. A 'Memorandum of Understanding on the India-EU Water Partnership' was signed in October 2016, with an objective to strengthen the technological, scientific and the management capabilities of India and EU in the area of water management on the basis of equality, reciprocity and mutual benefit.

The India-EU Water Partnership (IEWP) Phase-1 and Phase-II have already been concluded on 30th October 2020 and 30th Nov, 2023 respectively. IEWP organized the 5th India EU Water Forum on Water Cooperation on 27th October, 2022 at New Delhi. The 3rd meeting of the India EU Joint Working Group on Water, between the Ministry of Jal Shakti & European Commission was held on 12th July 2023 co-chaired by Ms. Debashree Mukherjee, Special Secretary (DoWR, RD&GR) MoJS, Govt. of India and Ms. Astrid Shomaker, Director EC DG ENV.

In continuation of on-going activates in Phase-II and additionally Urban Hydrology and impact of Climate change on Water sector may be taken up in Phase-III. The Plan Document of Phase –III has been received and is under examination in CWC.

Coastal Management Information System (CMIS): Implementation of Coastal Management Information System (CMIS) in the States of Tamil Nadu, Kerala and UT of Puducherry was awarded to IIT Madras, Chennai and a tripartite MoU was signed among CWC, IIT, Madras and respective States/UTs (Kerala, Tamil Nadu and Puducherry) for establishment of one coastal data collection site in each States/UT. Establishment of three no. of coastal data collection sites has been completed under this project & sites have been handed over to CWC on 31.05.2021. Data collection activities are continuously being carried out by CWC at the three nos. of coastal data collection sites (Devanari-Tamil Nadu, Karaikal-Puducherry and Ponnani-Kerala).

Implementation of Coastal Management Information System (CMIS) at 2 sites, one each in Maharashtra (northern region) and Gujarat (southern region) was awarded to CWPRS, Pune and a tripartite MoU was signed among CWC, CWPRS and respective States (Gujarat and Maharashtra) for three years. Establishment of two no. of coastal data collection sites (Satpati-Maharashtra, Nanidanti Motidanti-Gujarat) is in progress under this project. The project completion period has been extended for a period of two years i.e., up-to June, 2024.

Implementation of CMIS at 3 sites, 2 in Goa and 1 in Southern Maharashtra, work was awarded to NIO, Goa and a tripartite MoU was signed among CWC, NIO and respective States (Goa and Maharashtra) for three years. Establishment of three no. of coastal data collection sites (Tarkarli-Maharashtra, Benaulim-Goa, Baga-Goa) is in progress under this project. The project completion period has been extended for a period of two years i.e., up-to November, 2024.

National Framework for Sediment Management (NSFM)

The Department of Water Resources, RD & GR, Ministry of Jal Shakti in consultation with Central Water Commission has prepared the “National Framework for Sediment Management” after extensive consultations with Central Government Ministries/ Departments/State Governments/UTs. This National Framework document will serve as guidance document for efficient and sustainable sediment management in the country. The “National Framework for Sediment Management” was launched by Hon’ble Minister of Jal Shakti during the 1st All India Annual State Ministers Conference on Water held in Bhopal,

Madhya Pradesh on 5th -6th January, 2023. Copy of NFSM is available on the Ministry's website (https://jalshakti-dowr.gov.in/policies/)

15. Central Water & Power Research Station (CWPRS)

The Central Water and Power Research Station (CWPRS), Pune, established in 1916 is the leading national hydraulic research institute under the Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation (MoJS, DoWR, RD&GR), New Delhi. CWPRS is the principal central agency to cater to the research and development (R&D) needs of hydraulics and allied disciplines for evolving safe and economical designs of hydraulic structures involved in water resources projects, river engineering, power generation and coastal engineering projects. The research activities at CWPRS can be grouped into seven major disciplines as listed below.

- **River Engineering**: River Engineering mainly deals with river training and bank protection works, hydraulic design of barrages and bridges, and location and design of water intakes using morphological studies. Field studies for measuring water and sediment discharge in rivers and canals are also conducted.
- **River and Reservoir Systems Modelling**: Hydrologic and meteorological studies are conducted to estimate extreme values of various parameters such as rainfall, temperature and humidity. Flood estimation and forecast, reservoir sedimentation and water quality studies are carried out using mathematical models and field surveys.

- **Reservoir and Appurtenant Structures**: Spillways and Energy Dissipators are studied on physical models. Water conductor systems including head race and tail race channels/tunnels and surge shafts are studied on both physical and mathematical models. Studies are carried out on physical models for desilting basins, sedimentation and flushing through reservoirs, sediment exclusion devices. Sedimentation in reservoirs is also assessed through remote sensing.

- **Coastal and Offshore Engineering:** This discipline deals with optimization of location, length and alignment of breakwaters, jetties, berths, approach channel, turning circle etc. for development of ports and harbours. Estimation of siltation in

harbours, their disposal and sand bypassing, location of sand trap and hot water recirculation studies are carried out using both physical and mathematical models. Suggesting suitable coastal protection measures based on locally available materials is an important activity of the group.

- **Foundation and Structures:** Laboratory and field tests are carried out to determine soil, rock and concrete properties. Mathematical modelling as well as experimental studies are conducted for studying the stability and structural safety of dams and appurtenant structures. Field studies are carried out for assessing the health of hydraulic structures and suggesting suitable repairing measures.

- **Applied Earth Sciences**: Seismic surveillance of river-valley projects, assessment of site-specific design seismic parameters, controlled blasting studies for civil engineering construction sites, evaluation of quality of concrete and masonry is done by non-destructive methods and estimation of elastic properties for foundation of massive structures for geophysical methods are the main activities of this group.

- **Instrumentation, Calibration and Testing Facilities**: Hydraulic Instrumentation is used for data collection on physical hydraulic models. Field data collection is carried out on coastal parameters like water level, velocity, waveheight etc. A Random Sea Wave Generation (RSWG) system is used for wave flumes and basins. Dam instrumentation is provided on prototype. Current meter and flow meter calibration facilities are also available, which are used extensively.

The significant contributions of CWPRS during the period include:

- 102 Technical reports were published on the various significant studies of carried out.
- 80 Research Papers published in various National/International Conferences and Journals
- 50 Lectures delivered by Scientists of CWPRS in various National / International Conferences
- 21 Training programs were organized by CWPRS for dissemination of research findings.

CWPRS Contribution under National Hydrology Project (NHP)

CWPRS revised PIP has been approved by the Ministry vide NO X-63013/1/2017-NHP-2962 dated 08.12.2021 amounting Rs 39.74 crore. Till date, the total cumulative expenditure of the project is Rs **25.34 crore**.

Following major activities under NHP have been completed:

- Up-gradation of CMRT Lab for Testing/ Calibration of Current Meter, ADCP etc
- Establishment of Reference AWS for Testing/ Training Purpose to IA'S
- Establishment of Field Testing setup (Field Calibrator) for AWS Senor
- Establishment of Reference GW Station for Testing/ Training Purpose to IA'S
- Establishment of Field Testing/ Calibration (Field Calibrator) Setup for GW level Sensor
- Establishment of laboratory Calibrator Setup for GW level Sensor
- Establishment of Field and lab Testing/ Calibration Setup for Telemetry-GSM/GPRS
- Establishment of Reference Data Logger Setup for Training Purpose to IA'S
- Establishment of Lab Testing/Calibration Setup for Data Logger
- Establishment of Reference Surface Water Level Station for Training Purpose to IA'S
- Establishment of Testing/Calibration Setup for Water Quality Sensor

CWPRS completed the following Purpose Driven Studies and submitted the reports 1) Study of Surface and Subsurface Water Interaction using Remote Sensing, Geo hydrological and Geophysical Techniques and its Modeling and, 2) River Rejuvenation of Mutha River Reach Flowing through Pune City and Suburbs, Maharashtra

Engagement of CWPRS in DRIP and Dam Safety Act 2021

- Five Scientists from CWPRS have been nominated as dam instrumentation and seismic instrumentation experts. They are carrying out inspection of distressed hydraulic structures along with DSRP members and suggesting suitable remedial measures as well as identifying studies required to be conducted for structural safety audit and rehabilitation. Till date nearly, 70 projects have been inspected in states participating in DRIP.

Coastal Management Information System (CMIS)

- Central Water and Power Research Station (CWPRS) was awarded the work as Project Executor for implementation of CMIS at two sites viz. Satpati in Maharashtra (Northern region) and Nani Danti- Moti Danti in Gujarat (Southern region). The total cost of the project is Rs. 6.95 Crores with total duration of the work as five years (up to June 2024) wherein various coastal data such as wave, tide, tidal currents, shoreline and cross-shore profile, suspended and bed sediments, river /creek discharges, winds, rainfall etc. is being collected.
- The equipments viz., detailed bathymetric survey instruments, tide gauge, Marine Current Profiler, Automatic weather station, Sieve shakers, Beach survey instruments, river discharge profiler, LISST for in situ sediment data and CTD meter, have already been procured and installed for data collection at both sites.
- Comprehensive beach profile surveys and beach sediment analysis were carried out at both the sites for a reach of about 1.5 km each during as per the mandate of scheme. Bathymetric surveys have been carried out for pre monsoon and post monsoon periods. Similarly, riverine data which include river discharge, salinity, temperature and river sediment load was collected in pre-monsoon and monsoon periods.

16. Ganga Flood Control Commission (GFCC) Patna

GFCC has appeared in various Committees meeting in 2023;

1. **Kosi High Level Committee (KHLC)**

   The Kosi High Level Committee (KHLC) was constituted by the then Irrigation Department, Government of Bihar in the year 1978 under the Chairmanship of Chairman, GFCC. The mandate of this committee is to review/examine the protection works already executed on the river and recommend protection measures to be taken up and completed before the next flood season.

   The Committee is inspecting every year the protection works on the river and is making recommendations regarding protection work to be executed on the river before the next flood season. The last meeting of the KHLC was held during 06th to 9thNovember, 2023.

2. **Gandak High Level Standing Committee (GHLSC)**

A Committee for the river Gandak namely Gandak High Level Committee (GHLC) was initially constituted by the then Ministry of Irrigation, Government of India vide office memorandum No.10/12/80-FC dated 12th November, 1981 to evaluate the performance of flood protection works on the right bank of the river Gandak in the States of Uttar Pradesh and Bihar during the floods of 1981, to guide and advise construction activities in the two States and to suggest programme of works for the year 1981-82. The term of the committee was extended from time to time. This Committee was renamed as Gandak High Level Standing Committee (GHLSC) vide Ministry of Water Resources letter No. 5/15/2002-ER/Ganga /1219-27 dated 21.03.2006.The terms of reference of the Committee are:

i. To review the flood control and anti-erosion works so far executed by the State Governments of U.P and Bihar and evaluate their performance during the floods.
ii. To recommend a programme of works, this could be executed by the two States in a co-ordinated manner.
iii. To guide the construction activities in the States and advise on the steps to be taken to get over any difficulties that may arise with a view to ensure that all the necessary works are completed by the States latest by June each year.

The last Meeting of GHLSC was held during 31st October to 3rd November 2023.

Proposal recommended for release/reimbursement in 2023:-

1. Reimbursement claim of Rs. 57.45 Crore recommended in 2023-24 towards expenditure incurred by theGovt Bihar. for the maintenance of flood protection works on Kosi river in the Nepalterritory before the flood of 2022 was sent to DoWR, RD&GR
2. Recommended Rs.45.163 Crore release towards Kandi Master Plan(WB-18), West Bengalproposal for Centralassistance under FMP component of FMBAP during FY 2023-24–reg.

Visit of various projects in 2023:-Under FMBAP schemes

Total 24 no of Project visited in the year 2023. State wise as under;

Bihar-**09 projects,**

West Bengal-**02projects,**

Uttarakhand-**10projects and**
Uttar Pradesh-**03projects**.

17. National Hydrology Project

National Hydrology Project (NHP), a Central Sector Scheme, is being implemented w.e.f 06-04-2016 by Department of Water Resources, River Development & Ganga Rejuvenation (DOWR, RD & GR) on pan India basis with the support of the World Bank. The objective of the project is to improve the extent, quality, and accessibility of water resources information and to strengthen the capacity of targeted water resources professionals and institutions in India.In line with the defined objectives, NHP is striving hard to bring transformation in the water resources sector. Moving away from the current system of decision making based on experience and judgment, improved water management is being attempted through introduction of informed decision making, using modern analytical tools and loads of data from automated sensors and IoT devices on each component of the water cycle in real-time or near real-time. The same is being done in a collaborative mode by involvement of Central and State Implementing Agencies (IA) of NHP to ensure proper capacity building. There are 48 IAs which are taking forward this initiative spanned from 2016-17 to September 2025.

Project Concept:Modernizing of Water Resources Monitoring Network Transforming

- Knowledge Access
- Development of Analytical Tools
- Modernizing Institutions and Capacity Building

Beneficiaries-Central and State agencies responsible for surface water and/or ground water planning and management, including river basin organizations (RBOs)

Other stakeholders including general public and farmers

Initiatives under this project:

I. Establishment of National Water Informatics Centre (NWIC) as a nation-wide repository of water resources data - Single window system for accessing water resources related information, analytical tools and knowledge products. NWIC was established in 2018 and strengthened for acquiring and disseminating water resources information to various stake holders through web enabled system in public domain.

NWIC has undertaken an ambitious initiative to develop Water and Allied Resources Information andManagement System (WARIMS) which will provide support to the various stakeholders in knowing the resources well and taking informed decision for better management of water resources. The development of WARIMS is under progress.

II. Modernization of hydro-meteorological data acquisition system with thrust on real time data acquisition system (RTDAS). As on date around 19,074 hydro-met stations installed for acquiring real time data from the remote surface and ground water monitoring locations.

III. Seamless sharing of hydro-meteorological data among all the Central and State Implementing agencies of National Hydrology Project so that data can be used by various organizations in development of analytical tools for informed decision making.

IV. Capacity building of Water resources professionals of the IAs in using various analytical tools including mathematical models, remote sensing and GIS techniques, etc. as required for planning and management of water resources and dealing with extreme event management such as floods and droughts. In Nov. 2021, a unique Young Water Professional Programme was launched in collaboration with Australia Water Partnership and Australia India Water Centre and the same has been successfully completed in November 2022. The preparation of phase-2 of Young Water Professional Programme i.e. Cohort-II is under progress, which is being planned for FY 2024-25.

V. Number of analytical tools, which are required for basin level planning of water resources as well as to deal with extreme climate events, are being developed at National/Basin level.

18. Central Soil and Materials Research Station (CSMRS):

CSMRS is an ISO 9001:2015 certified organization which deals with field and laboratory investigations, research and problems in geotechnical engineering, concrete technology, construction materials and associated environmental issues, having direct bearing on the development of irrigation and power in the country and functions as an adviser and consultant in the above fields to various projects and organizations in India and abroad. The Research Station is involved in the safety evaluation of existing hydraulic structures and quality control

of construction for various river valley projects. The function of CSMRS is covered in three main disciplines namely Soil Discipline, Rock Discipline and Concrete Discipline.

The sphere of activity of CSMRS is covered by the following key areas.

- The **Soil Discipline** deals with soil characterization, rockfill material characterization and geosynthetics material characterization. This discipline conducts foundation investigations for assessing the competency of the foundation strata for the construction of the structures and borrow area investigations for ascertaining the suitability of the soils collected from the borrow area to be used for the construction of the structures. It also carries out studies on expansive and dispersive soils, hydraulic fracturing of core materials, quality control, quality assurance, dynamic characterization of soil, and numerical modelling based research in this area.
- The **Rock Discipline** deals with in-situ rock mass characterisation, laboratory assessment of intact rocks, geophysical investigations and geotechnical instrumentation. This discipline conducts laboratory investigation of intact rock, in-situ tests for determination of shear strength properties, deformability characteristics of rock mass, in-situ stress measurements, groutability tests in rock and rock bolt/anchor pull-out tests. It carries out investigations using the geophysical methods to decipher the sub-surface ground conditions, delineation of bed rock, thickness of overburden, detection of geological anomalies, blast vibration monitoring studies etc. It is also involved in health monitoring of the structures through instrumentation, geophysical studies and numerical modelling.
- The **Concrete Discipline** deals with construction materials characterization, concrete mix design, special studies on concrete and non destructive diagnosis of the concrete structures. It carries out special tests for concrete durability assessment, under water abrasion test, concrete permeability test, testing of epoxy materials, alkali aggregate reactivity study etc. It also carries out chemical characterization of all construction materials including the admixtures. It provides consultancy for quality control and quality assurance services for concrete structures. It is also involved in diagnostics health monitoring, repair and rehabilitation of structures, durability of concrete etc.

The contributions of CSMRS in the field of Geotechnical Investigation of River Valley Projects are:

- Carried out Geotechnical Investigations for 41 Water Resources Projects.

- 41Project Reports on Geotechnical and Construction material Investigations were prepared.
- Publication of 30 Research Papers in National and International Journals/Conferences.
- Comments imparted on 59 Detailed Project Reports and their compliances.
- Organization of 3training courses in which 46 Engineers/ trainees/students from various Organizations/Institutions/colleges participated.
- CSMRSis having Institutional Cooperation with the organizations for development and knowledge sharing / gaining in the field of Geotechnical Investigation of River Valley Projects
- Norwegian Geotechnical Institute Oslo, Norway on cooperation in the field of geotechnical engineering and materials sciences.
- Satluj Jal Vidyut Nigam Limited, Himachal Pradesh on Cooperation in geotechnical investigation and construction material survey of hydroelectric projects.
- NEHARI, Brahmaputra Board, Assam on Cooperation in the fields of geotechnical engineering and construction materials including training of officers of NEHARI.
- CSMRS hassignedMoU with the organizations for quality improvement, right geotechnical investigations and to ensure viable materials available for the project
- QA/QC withPolavaram Project Authority, Tehri Hydro Development Corporation India Limited, Uttarakhand;Uttarakhand Jal Vidyut Nigam Limited, Irrigation Construction Division – II, Uttar Pradesh, Water Resources Department, Rajasthan and Uttar Pradesh Irrigation Department, Uttar Pradesh.
- Geotechnical Investigation and Construction Material Survey with Central Water Commission, National Water Development Agency, Satluj Jal Vidyut Nigam Limited (SJVNL), Shimla and Uttarakhand Jal Vidyut Nigam Limited.
- Representing in BIS committees dealing geotechnical investigation, materials, design parameters etc for River Valley Projects in the Civil Engineering Division, Water Resources Division and Geosynthetics Division. Presence of CSMRS in the committees of CEDC, CED-2, CED2:1, CED-2:2, CED-4, CED-6,CED-30, CED-39, CED-43, CED-48, CED-53, CED-55, CED-56, WRDC, WRD-5, WRD-6, WRD-8, WRD-9, WRD-13, WRD-14, WRD-15, WRD-16, WRD-22 AND TXD-30 and actively participated in the framing of new codes and updating existing in the relevant field.
- Applied research work on the issues comes up while Geotechnical Investigation of River Valley Projects are taken up and based on that:

- Two research works is in progress under self sponsored research.
- Published four research review report.

The contribution of CSMRS towards the realization of the Interlinking of rivers to utilize every single drop of water for country's development has been highly fruitful – not only in providing design parameters but also in reducing the project cost by suggesting changes in the alignment of the links based on the investigations.

19.National Dam Safety Authority (NDSA)

Dam Safety Act, 2021

After China and USA, India is the 3rd largest dam-owning nation in the world. There are around 5,700 large dams in the country, of which about 80% are already over 25 years old. Nearly 227 dams that are over 100 years old are still functional. Although India's track record of dam safety is at par with that of the developed nations, there have been instances of unwarranted dam failures and of poor maintenance issues.

In order to address the dam safety issues holistically, Union Government has enacted the Dam Safety Act in December 2021 and notified vide Gazette of India notification S.O. 5422(E) dated 28.12.2021 which will be effective from 30.12.2021. The Act provides for four tiers of institutional mechanism: establishment of National Committee on Dam Safety (NCDS), National Dam Safety Authority (NDSA), State Committee on Dam Safety (SCDS), and the State Dam Safety Organization (SDSO).After enactment of the Dam Safety Act, Central Government has constituted the National Committee on Dam Safety (NCDS) and has established the National Dam Safety Authority (NDSA) vide Gazette Notifications S.O. 757(E) and G.S.R. 134(E) dated 17th February, 2022& S.O. 758(E) and G.S.R. 135(E) dated 17th February 2022 respectively.

In exercise of powers conferred under Section 52 of the Dam Safety Act, the Central Government vide Gazette Notification dated 17th February 2022 published the "National Committee on Dam Safety (Procedures, Allowance and Other Expenditure) Rules, 2022" and published the "National Dam Safety Authority (Functions and Power Rules, 2022)".

The two meetings of the National Committee on Dam Safety (NCDS), constituted per the Act's provisions, have been held in year 2023 on 06.06.2023 and 05.12.2023 under the chairmanship of the Chairman, NCDS & CWC.

MoU was signed on 22nd May 2023 between Malviya National Institute of Technology (MNIT), Jaipur and National Dam Safety Authority (NDSA) to establish the National Centre for Earthquake Safety of dams. The proposed National Centre will coordinate and work with all available domain experts in IITs, NITs, and leading academic & research institutes in India and with domain experts worldwide. The estimated budget is Rs. 30 Crores for establishing and running the said Centre for five years. A grant of Rs. 2.5 crore has been released to MNIT Jaipur for year 2023-24.

International Conference on Dam Safety (ICDS) 2023 was organised at Jaipur from 14-15 September 2023. The conference was based on the theme “Safe & Secure Dams for Nation’s Prosperity”. Around 800 delegates from Central Govt./State Govt./CPSUs/ Pvt dam owners attended the conference. Over 130 technical papers were received from Central/State Govt. Organisation, PSUs, Technical Institutes, National/International Experts and 15 poster paper presentations were done during the Conference. In the conference, officials from WRDs of various State Governments participated and were made aware of the state-of-the-art technologies and new developments in dam safety.

The National Register on Specified (Large) Dams 2023 was released by the Hon’ble Vice President of India at the International Conference on Dam Safety held on 14-15th September 2023 at Jaipur. As per the latest information from the State Government WRD, 6138 are constructed, and 143 are under construction in the country.

During the year 2023, the dam-owning agencies reported a pre-monsoon inspection of a total of 6414 specified dams. As per the latest information as on 21.12.2023, the dam-owning agencies have carried out post monsoon inspection of 1821 specified dams.

There are 19 subjects under Section 54(2) of the Dam Safety Act, for which regulations are to be framed by the NDSA. In this context, 14 regulations have been approved by NCDS and these regulations have been submitted to the DoWR, MoJS.

As per the decision of the 1st meeting of NCDS, nine sub-committees are to be constituted in a phased manner for undertaking different tasks concerning dam safety. In this context, the following two sub-committees have been constituted vide order dated 18.10.2023:-

1. Structural Engineering and earthquake Safety of Dams
2. Capacity Development

Further, the two sub-committee(s) namely “Dam Safety Management” and “Monitoring and Instrumentation” were approved by the NCDS in its 3rd meeting held on 05.12.2023.

Outreach Programs at the Iconic Dam Sites across the country with community participation under "AzadiKaAmritMahotsav (AKAM)" for promoting Dam Tourism and spreading awareness regarding dam safety at 25 iconic Dams namelyTungabhadra, Idduki, Maithon, SardarSarovar, Sathnur, Tehri dam, Durgavati reservoir, Rihand, Indira Sagar, Bisalpur, Srisailam, Gosikurd Irrigation Project, Farakka Barrage, Ravi Shankar, Salaulim, Bhakra Dam, NagarjunaSagar, Umiam, NimooBazgo, Kalpong, Hirakud, Teesta-V, Kameng, RanjitSagar and Baglihar dam.

20. Peninsular Rivers Wing (PR):

Under DRIP Ph-II,CWC signed contract Agreement on August 14, 2023 for Engineering and Management Consultancy for duration of 10 years to provide technical and managerial support to States for implementation of DRIP Phase II and III.

During FY 2023-24, the dam-owning agencies have carried out pre-monsoon and post-monsoon inspections of 6414 and 1821 specified dams respectively. State Governments have been advised to take up immediately the remedial measures for the dams falling in Category-I (dams having deficiencies which may lead to failure) and Category-II dams to ensure the safety of such dams.

As per section 54 (2) of the Dam Safety Act, total 19 regulations are required to be framed by the National Dam Safety Authority about various aspects of dam safety. Out of these 19 regulations, 14 regulations have been finalised and approved by the National Committee on Dam Safety.

MoU was signed on 22nd May 2023 between Malviya National Institute of Technology (MNIT), Jaipur and National Dam Safety Authority (NDSA) to establish the National Centre for Earthquake Safety of dams.

Ministry of Jal Shakti through NDSA and CWC, has organized outreach program at the 25 iconic dam sites across the Country with community participation under “Azadi Ka Amrit Mahotsav (AKAM)’’ for promoting Dam Tourism.

International Conference on Dam Safety (ICDS) 2023 was organized at Jaipur from 14-15th September 2023. The conference was based on the theme “Safe & Secure Dams for Nation’s

Prosperity". Around 800 delegates from Central Govt./State Govt./CPSUs/ Pvt dam owners including international delegates attended the conference.

Dam Rehabilitation and Improvement Project (DRIP) Phase II and Phase III: India ranks third globally after China and USA with 6138 large dams in operation. About 143 dams are under construction. In addition, there are several thousand smaller dams. These dams are vital for ensuring the water security of the Country. The Union Cabinet approved externally aided DRIP Phase II and Phase III in its meeting held on October 29, 2020. 19 States and 3 Central Agencies are involved in the scheme with a provision for rehabilitation of about 736 dams. The Budget Outlay is Rs. 10,211 crores (Phase II: Rs. 5107 Cr, Phase III: Rs. 5104 Cr) and duration of Scheme is ten (10) years, to be implemented in two phases, each of six (6) years duration with two (2) years overlap.

The funding pattern of Scheme is 80:20 (Special Category States), 70:30 (General Category States) and 50:50(Central Agencies). The Scheme also has provision of Central Grant of 90% of loan amount for special category States (Manipur, Meghalaya and Uttarakhand).

The Scheme has four components; (i) Rehabilitation of dams and associated appurtenances to improve the safety and operational performance of selected dams in a sustainable manner; (ii) Dam safety Institutional Strengthening to strengthen the dam safety institutional setup in participating States as well as at the Central level; (iii) Incidental Revenue Generation for sustainable operation and maintenance of dams; and (iv) Project Management.

The Phase II of the Scheme is being co-financed by two multi-lateral funding Agencies - World Bank and Asian Infrastructure Investment Bank (AIIB). The Loan Agreement and the Project Agreements with World Bank in respect of 10 States and CWC, has been declared effective since October 12, 2021.The inclusion of additional four States (Karnataka, Uttarakhand, Uttar Pradesh and West Bengal) has also been notified by the World Bank in June 2022. The Loan signing with AIIB for remaining US$ 250 million held on 19th May, 2022 with original 10 States.

Important project achievements include approval of rehabilitation proposals called Project Screening Templates (PST) of 123 dams costing Rs 3937 Cr by the World Bank. The tenders amounting to Rs. 2875 Cr has been published. Contract(s) amounting approximately Rs 1945 Cr have been awarded by various Implementing Agencies and an amount of Rs 839 Cr spent on various project activities including dam rehabilitation, institutional strengthening and project management activities.

CWC signed contract Agreement on August 14, 2023 for Engineering and Management Consultancy for duration of 10 years to provide technical and managerial support to States for implementation of DRIP Phase II and III.

CWC signed Memorandum of Agreement (MoA) in February 14, 2023 with IIT Roorkee for development of International Centre of Excellence for Dams (ICED) in two emerging dam safety areas viz Reservoir Sedimentation and Seismic Hazard Analysis. Envisaged as world class State of Art Centre, this Centre will provide specialized technical support in investigations, modelling, research and innovations, and technical support services to the Indian and overseas dam owners. With regard to establishment of Second Centre of Excellence for dam safety at Indian Institute of Science, Bengaluru, proposal is under advance stage of finalization and approval.

International Conference on Dam Safety (ICDS) 2023 was organized at Jaipur from 14-15th September 2023. The conference was based on the theme “Safe & Secure Dams for Nation’s Prosperity”. Around 800 delegates from Central Govt./State Govt./CPSUs/ Pvt dam owners including international delegates attended the conference.

Monitoring of Reservoir: Central Water Commission is monitoring live storage status of reservoirs of the country on weekly basis and is issuing weekly bulletin on every Thursday. During 2023, 7 reservoirs has been added and presently 150 number of reservoirs are being monitored by CWC, having total live storage capacity of **178.784 BCM** which is about **69.35%** of the live storage capacity of 257.812 BCM which is estimated to have been created in the country. Out of these reservoirs, 20 reservoirs are of hydropower projects having total live storage capacity of 35.299 BCM. The weekly bulletin contains current storage position vis-à-vis storage status on the corresponding day of the previous year and average of last 10 years on the corresponding day.

Weekly Bulletin is shared with Prime Minister Office, NITI Aayog, Ministry of Jal Shakti, Ministry of Power, Ministry of Agriculture & Farmers Welfare, India Meteorological Department, and the Water Resources Departments of concerned states and also uploaded on the CWC website. This weekly bulletin is also shared with Crop Weather Watch Group (CWWG) of the Ministry of Agriculture and Farmers Welfare of which representative of CWC is also a member. The meeting of CWWG is convened on every Friday to review agricultural activities across the country and to suggest remedial measures to states in case of distress situation.

Implementation of Dam Safety Act, 2021

After China and USA, India is the 3rd largest dam-owning nation in the world. There are around 6138 completed and operational large dams in the country, of which about 80% are already over 25 years old. Nearly 234 dams that are over 100 years old are still functional. Although India's track record of dam safety is at par with that of the developed nations, there have been instances of unwarranted dam failures and of poor maintenance issues.

In order to address the dam safety issues holistically, Union Government has enacted the Dam Safety Act in December 2021.The Act was notified in the Gazette of India on 14th December 2021, and itcame into force on 30th Dec 2021. The Act provides for four tiers of institutional mechanism: establishment of National Committee on Dam Safety (NCDS), National Dam Safety Authority (NDSA), State Committee on Dam Safety (SCDS), and the State Dam Safety Organization (SDSO).After enactment of the Dam Safety Act, Central Government has constituted the National Committee on Dam Safety (NCDS) and has established the National Dam Safety Authority (NDSA) vide Gazette Notifications dated 17th February 2022 respectively. Further, as of now, all the 28 States & 3 UTs having specified dams have constituted the SCDSs and SDSOs as per the provisions under Section 11 and Section 14 of the Act.

In exercise of powers conferred under Section 52 of the Dam Safety Act, the Central Government vide Gazette Notifications dated 17th February 2022 published the "National Committee on Dam Safety (Procedures, Allowance and Other Expenditure) Rules, 2022" and published the "National Dam Safety Authority (Functions and Power Rules, 2022". Further, Central Government vide Gazette Notification dated 14th November 2023 published the "National Dam Safety Authority (Functions and Power) Amendment Rules, 2023"

Further, as per the Section 31(1) of Act 2021, every owner of a specified dam shall undertake a pre-monsoon and post-monsoon inspections every year, through their dam safety unit. As per the latest information for FY 2023-24, the dam-owning agencies have carried out pre-monsoon and post-monsoon inspections of 6414 and 1821 specified dams respectively. The inspections reports have been examined and the State Governments have been informed to take up immediately the remedial measures for the dams falling in Category-I (dams having deficiencies which may lead to failure) and Category-II dams to ensure the safety of such dams.

As per section 54 (2) of the Dam Safety Act, total 19 regulations are required to be framed by the National Dam Safety Authority about various aspects of dam safety. Out of these 19 regulations, 14 regulations have been finalised and approved by the NCDS. Six regulations have been approved by the Ministry and it will be published through the Gazette Notifications. NDSA has recently prepared 8 more regulations and these have been approved by the NCDS.

Apart from the two Centre of Excellence for dam safety at IIT Roorkee and IISc Bengaluru, Govt. of India is also intended to develop various National Resource Centres for specific domain areas in the reputed academic institutions. Accordingly, MoU was signed on 22nd May 2023 between Malviya National Institute of Technology (MNIT), Jaipur and National Dam Safety Authority (NDSA) to establish the National Centre for Earthquake Safety of dams. This Centre will provide the need-based support to the various dam owners in seismic evaluation of dams besides developing various types of standards, and codes, particularly in the area of seismic

Ministry of Jal Shakti through NDSA and CWC, has organized outreach program at the 25 iconic dam sites across the Country with community participation under “Azadi Ka Amrit Mahotsav (AKAM)’’ for promoting Dam Tourism.

21. National Water Informatics Centre (NWIC)

NWIC was setup in March, 2018 as a subordinate office under the Ministry of Jal Shakti, DoWR, RD&GR to act as a central repository of updated water data and allied themes. NWIC's vision is 'To be a modern, state-of-the-art data repository of water resources and allied themes to facilitate informatics based sustainable development and management of water resources of the country. The Centre is mandated to provide a ‘single window’ source of updated data on water resources and allied themes. The primary roles and responsibilities of NWIC include:

- Collection, collation, updation, management and dissemination of water data and information
- Sharing of hydro-meteorological data with Central & State Government and other stakeholders
- Development of decision support systems

In order to achieve the above objectives, NWIC is currently into the Operations and Management of two water resources data platforms WIMS & India- WRIS:

1. **Water Information Management System (WIMS):** It is a centralized web enabled data aggregating platform developed to capture both surface water and ground water resources data in automated manner through telemetric sensors and by manual data entry. Almost all central & State agencies are sharing their time series data on river level, discharge, reservoir level, ground water level, surface & ground water quality etc on the portal.
2. **India-Water Resource Information System (India-WRIS):** India- WRIS (https://indiawris.gov.in/wris/#/) is a repository of nation-wide water resources data, providing a 'Single Window' source of updated data on water resources & allied themes as a part of the National Hydrology Project. India- WRIS acts as a data dissemination platform for hosting static, dynamic, and semi-dynamic water resources spatial and non-spatial data under six themes through various modules comprising 136 GIS layers representing entire country through 36 modules.

Activities related to development, improvement and data enrichment of India-WRIS & WIMS:

i) India-WRIS

- Development of new modules:

a. Jal Itihaas: showcases select water heritage structures over 100 years old. India has a variety of heritage structures with stories of architectural and civil engineering technologies and associated human history.
b. Jal Dharohar: Showcasing the Data Provided by MI Division for 1st Water Body Census.
    - Revamping of Modules: Ground Water Level module of old India-WRIS has been revamped to make them more users friendly.
    - Code audit of India-WRIS
    - Implemented Hindi content of India WRIS as per GIGW guidelines.
    - Data update/enhancement: Data for various modules have been updated.

- Trainings on India- WRIS are organized for users and NHP implementing agencies (State Governments/ Central agencies)
- NWIC successfully executing bug resolution and module improvement of India-WRIS within its software development framework. This process involved systematic bug identification, prioritization, and resolution, coupled with ongoing efforts in code reviews, automated testing, user feedback integration, and technology updates to ensure the continuous enhancement of its modules.

ii) Water Information Management System (WIMS):

- Development of script of decoder for the Telemetry data integration.
- Development of SCADA Module for Integration of SCADA data.
- Development of Ground Water Data Download Module for CGWB.
- Historical Data Migration: Historical data migration for various hydrological, meteorological and water quality related parameters for multiple agencies done in WIMS database.
- Flood Forecasting Module Updates: Various issues related to flood forecast website functionalities were resolved along with implementation of advanced features in the website.
- Development of provision for Mean Sea Level data entry.
- Development of Data Import Tool for the agencies.
- Code audit of WIMS
- Trainings on WIMS are organized for users and NHP implementing agencies (State Governments/ Central agencies).
- NWIC successfully executing bug resolution and module improvement of WIMS within its software development framework.

This process involved systematic bug identification, prioritization, and resolution, coupled with ongoing efforts in code reviews, automated testing, user feedback integration, and technology updates to ensure the continuous enhancement of its modules.

Data Dissemination: Apart from regular arrangements made with organizations under the Department of Water Resources RD & GR like Central Water Commission, Central Ground Water Board etc., arrangements have been made with Survey of India, Central Pollution

Control Board and other departments of state governments, stakeholders for regular data sharing and further dissemination of information to public.

In WIMS, data on various hydro-meteorological parameters along with meta-data is shared with various user agencies and other stake-holders by means of FTP, APIs, DB exports. The data available in India-WRIS is shared through API withdata.gov.in, an open government data platform and NRSC for developing flood forecasting applications.

Special Assignment:

NWIC has carried out a pilot study for preparing District Water Body Atlas of 5 over exploited districts (Odisha (Gajapati), Uttar Pradesh (Jhansi), Tamil Nadu (Tirunelveli), Assam (Kamrup) and Madhya Pradesh (Tikamgarh)) of the country. The study has been completed using Remote Sensing Data in respect of waterbodies which are having a water spread area of >1 ha. The final report of these 5 districts has been presented to Secretary, DoWR, RD&GR.

Preparation of similar atlas for 150 districts selected for JSA-CTR is under progress for which data has been extracted and report automation is in progress. Module with editing tool is also to be developed to assist District Administration for updating the database of water bodies and to act as base data for water body census in years to come.

In addition to the above, NWIC is engaged in the implementation of two projects:

- **Setting up of State Water Informatics Centres (SWIC):** SWIC is envisaged to empower States with digital, validated, unified on-line water resources information system required for better planning and management of water re- sources at State level and simultaneously to feed the central system for basin and regional level policy planning and taking decisions based on authentic data analytics. In coordination with NWIC, the SWIC shall act as a single point solution for regional and micro-level data amalgamation and its dissemination. Policy framework for providing support by NWIC has been sent to States as well as UTs. As of now, 22 States have signed the MoA for establishing SWIC. After signing of MoA with the states, training is being provided by NWIC for the experts/ professionals of States in setting up of the State-WRIS. SWIC directories have been prepared. As on date, Virtual Machines and Arc GIS nodes of the enterprise server have been shared with 10 states. NWIC is also assisting States in the development of State Water Resource Information System (State-WRIS) as a

State water data repository and by providing them necessary technical guidance and IT infrastructure support

- **An upcoming project on Water and Allied Resources Information and Management System (WARIMS) *(formerly known as "Integrated Water and Crop Information and Management System (IWCIMS)")* is under development process:** Water and Allied Resources Information and Management System (WARIMS)*(formerly known as "Integrated Water and Crop Information and Management System (IWCIMS)")* is envisaged to be a cloud based digital platform (Decision Support System) for management of water resources and allied themes in an integrated manner. The platform would be capable of handling large amount of hydro-meteorological and hydrogeological data to bring meaningful insights to decision-making processes. WARIMS is planned to be developed as a holistic and comprehensive platform that can integrate applications related to water resources and allied themes for irrigation management, reservoir management, water use efficiency, flood forecasting, ground water level, ground water quality etc. thereby acting as a unified system covering nearly all the related programs / schemes of MoJS.