



# INFORMATION BROCHURE



आपो हिष्टा मयोभुवः

# NATIONAL INSTITUTE OF HYDROLOGY

An ISO-9001:2015 Certified Organization

(Department of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti, Government of India)



आपो हिष्ठा मयोभुवस्था न उर्जे दधातन महे रणाय चक्षसे ॥१॥

ऋग्वेद (Rig Veda)

हे जल! आपकी उपस्थिति से वायुमंडल बहुत तरोताजा है, और यह हमें उत्साह और शक्ति प्रदान करता है।  
आपका शुद्ध सार हमें प्रसन्न करता है, इसके लिए हम आपको आदर देते हैं।

**O Water, because of your presence, the atmosphere is so refreshing, and imparts us with vigour and strength.  
We revere you who gladdens us by your pure essence.**

# THE INSTITUTE

National Institute of Hydrology (NIH) is a premier Research and Development organization under the Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation, Government of India. It was established as an autonomous Society in 1978 with its headquarters at Roorkee. The Institute has carries out a significant number of demand-driven, user-defined, and strategic studies such as:-

- Basic and applied research
- Sponsored research
- Advisory services to NGT & judiciary
- Software development
- Capacity building and training activities
- Inputs in policy making



## OBJECTIVES

- To undertake, aid, promote and coordinate systematic and scientific work in all aspects of hydrology.
- To cooperate and collaborate with other national, foreign and international organization in the field of hydrology.
- To establish and maintain a research and reference library in pursuance of the objectives of the Society and equip the same with books, reviews, magazines and other relevant publications.
- To do all other such things as the Society may consider necessary, incidental or conducive to the attainment of the objectives for which the Institute has been established.



## VISION

Providing leadership in hydrologic research through effective R&D solutions for achieving sustainable development and self-reliance of the water sector in India.



## MISSION

- Develop methodologies for optimum utilization of water resources and environment.
- Propagate applications of emerging technologies for water resources development and management.
- Find ways to save the society from water- related hazards.
- Develop mass awareness for water conservation and optimum water utilization.



# Scientific Divisions

The Institute has 6 theme-based scientific divisions encompassing all aspects of hydrology and is well-known nationally and internationally for pioneering projects and strategic studies in these field.

The studies are carried out at the headquarters at Roorkee and the seven regional centers located at Belagavi, Jammu, Kakinada, Bhopal, Guwahati, Jodhpur and Patna.

The main focus at the headquarters is on applied and user-defined research, while the regional centers deal with the field oriented research topics and problems endemic to the hydrological regions in which they are located.



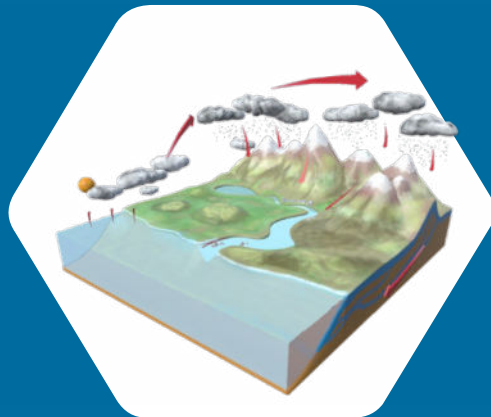
Climate Hydrology



Enviromental Hydrology



Ground Water Hydrology



Hydrological Investigations



Surface Water Hydrology



Water Resources Systems



## Laboratories/Observatories

The Institute has six state of the art laboratories with advanced monitoring and analytical instruments, which provide dynamic and broad-based research environment in different areas of hydrology.

- Hydrological instrumentation laboratory
- Nuclear hydrology laboratory
- Remote sensing and GIS Laboratory
- Soil water laboratory
- Water quality laboratory



## IT Infrastructure

The Computer Centre of Institute is equipped with the latest configuration of computers for conducting complex hydrological analyses and modeling studies. The local area network (LAN) provides inter connectivity amongst the computers in different buildings of the campus. The Centre has implemented 1Gbps internet connectivity in the Institute under National Knowledge Network (NKN) framework. A dedicated web server ([www.nihroorkee.gov.in](http://www.nihroorkee.gov.in)) provides a platform for hosting the Institute information, hydrology related information, research publications, important, announcements, tender notices, jobs, etc. Wi-Fi arrangement in the Institute is also looked after by this Centre.

## Thrust Areas of Research

The Institute hosts the Secretariat of Indian National Committee on Climate Change (INC-CC), The INC-CC supports funding of R&D projects on climate change and provides sponsorship of seminars, symposia, workshops, etc. The Institute also hosts the secretariat of Indian National Committee of Inter-governmental Hydrological Program. (INC-IHP) of UNESCO.

- Water Resources Planning and Management
- Ground Water Modeling and Management
- Flood and Drought Prediction and Management
- Snow and Glacier Melt Runoff Estimation
- Prediction of Discharge in Ungauged Basins
- Water Quality Assessment
- Hydrology of Arid, Semi-arid Regions
- Hydrology of Coastal & Deltaic Zones
- Reservoir/Lake Sedimentation
- Impact of Climate Change on Water Resources
- Application of Modern Techniques in Hydrology
- Hydrology of Reservoir Lakes and Wetlands
- Hydrology of Extremes
- Environmental Hydrology
- Regional Hydrology
- Hydrology for Watershed Management
- Integrated Water Resource Management (IWRM)
- Springs
- Isotope
- Hydrology for Arid Region
- Cryosphere
- Forest Hydrology & Urban Hydrology
- Climate Change Studies in Hydrology



# Contributing to Key Areas in Nation Building



## Contributing to Key Infrastructure Sectors

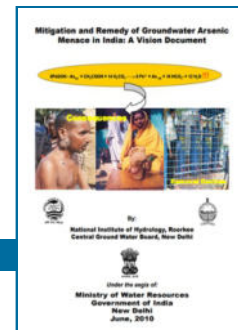
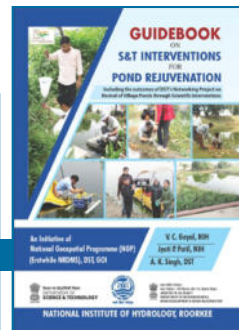
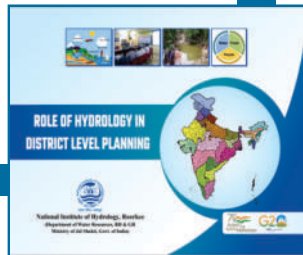
NIH has so far completed more than 230 sponsored research and consultancy projects. The sponsors included Indian Army, PSU's, Industries, Planning Commission, National Productivity Council, State Government Departments, and Central Ministries of Science & Technology, Earth Sciences, Environment & Forests, Agriculture, Rural Development, DST, etc.

### Hydropower Sector

- GLOF-design flood
- Cumulative impact assessment
- Environmental flow assessment
- Assessment of power potential

### Thermal/Nuclear Power Sector

- Flood safety studies
- Area drainage studies
- Impact on groundwater
- Hydrogeological studies
- Impact of ash disposal
- Rainwater harvesting



### Defence Sector

- GLOF flood estimate
- Discharge monitoring

### Disaster Preparedness

- Dam break studies
- Emergency action plan : Hydro-power

### Riverfront Design

- Riverfront development and planning

### Transport Sector

- Bridges design for flood

### Water Management

- Paleochannel mapping
- Aquifer mapping
- Deep groundwater recharge zone identification
- Lake conservation
- Wetland management
- Urban drainage planning
- Pond rejuvenation
- Eco-prudent wastewater solutions

### Other Salient contributions to GoI Programs

- Hydraulic modelling for Brahmaputra riverfront development.
- Mapping of drains polluting river Ganga.
- Benchmarking indicators for watersheds.
- Tackling water logging problems in canal commands.
- Monitoring of potential hazards of industrial development.
- State Specific Action Plan (SSAP) for water-sector under National Water Mission.
- Program on National Mission on Himalayan Studies (NMHS) for MoEF&CC.

### Inputs in policy planning

- Vision document on mitigation and remedy of groundwater arsenic menace in India.
- Policy document on problems of salinization of land in coastal areas of India and suitable protection measures.
- Planning of use of treated wastewater from STP's for groundwater recharge.
- Flood plain zoning plans for rivers in India.
- Preparation and review of Standards by Bureau of Indian Standard
- Role of hydrology in district level planning.
- Guide book on S&T Intervention in pond rejuvenation.

NIH has contributed in preparation of an international standard on Measurement of liquid flow in open-channels-stage-fall-discharge relationship (ISO:9123) and contributed in the finalization of a standard on guidelines for measurement and control of sediments in natural lakes.





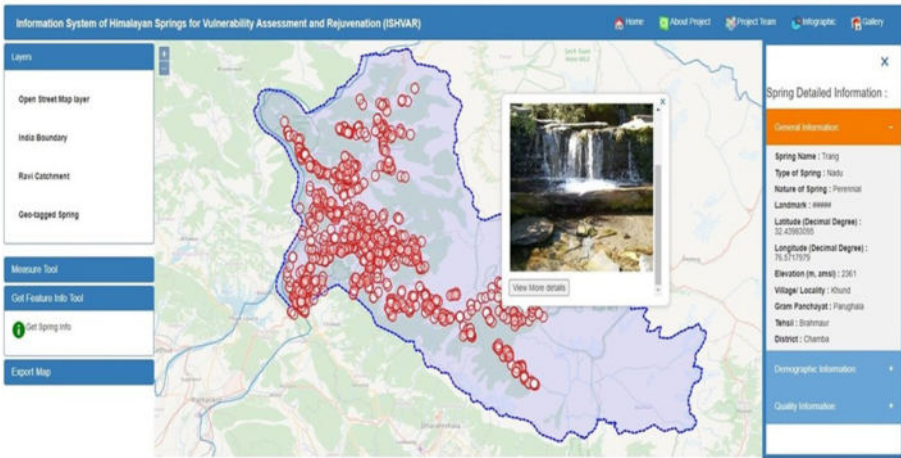
## National Collaborations

- Bhabha Atomic Research Centre (BARC)
- Central Water Commission (CWC)
- Central Ground Water Board (CGWB)
- Central Water and Power Res. Station (CWPRS)
- Central Pollution Control Board (CPCB)
- Department of Science and Technology (DST)
- Department of Land Resources (DoLR)
- Indian Council of Agri. Research (ICAR)
- Indian Institute of Remote Sensing (IIRS)
- Indian Institute of Science (IISc)
- Indian Institutes of Technology (IITs)
- India Meteorological Department (IMD)
- Indian Council of Forestry Research (ICFRE)
- Min. of Environment, Forests and Climate Change (MoEF&CC)
- Ministry of Earth Sciences (MoES)
- Ministry of Agriculture & Farmers Welfare (MoA)
- National Environmental Engg. Res.Institute (NEERI)
- National Geophysical Research Institute (NGRI)
- National Institutes of Technology (NITs)
- National Water Academy (NWA)
- National Water Development Agency (NWDA)
- National Remote Sensing Centre (NRSC)
- NGOs and PSUs
- Space Application Centre (SAC)
- Northeast Power Corporation Council (NPCC)

## International Collaborations



- British Geological Survey (BGS)
- Carleton University
- Cambridge University
- Commonwealth Scientific and Industrial Research Organization (CSIRO)
- Centre for Ecology and Hydrology (CEH)
- European Union (EU)
- Food and Agriculture Organization (FAO)
- International Centre for Integrated Mountain Development (ICIMOD)
- International Atomic Energy Agency (IAEA)
- Indo-US Science & Technology Forum (IUSSTF)
- International Water Management Institute (IWMI)
- International Institute for hydraulic and environmental Engg. (IHE).
- International institute for applied systems analysis (IIASA)
- Natural Environment Research Council (NERC)
- Swedish Metrological Aand Hydrological Institute (SMHI)
- The World Bank
- United Nations Development Program (UNDP)
- United National Scientific, Educational and Cultural Organization (UNESCO)
- World Metrological Organisation (WMO)



## Software Developed

- NIH\_ReSyP (NIH\_Reservoir Systems Package)
- SNOMOD (Model for Snow-melt Modeling)
- Web Enabled "Conjunctive Use Management Model using concept of MAR and ASR"
- WEGREM-Web-Enabled Groundwater Recharge Estimation Model
- ISHVAR
- G-MCDA
- FLPACK
- UHPACK
- NIH-WISDM
- NIH-RFROM

## Major R&D Projects

- UNDP Project-I 1979-1984
- CEC funded Project 1987-91
- Indo-Dutch Project WAMATRA 1990-1992
- UNDP Project-II 1991-1996
- USAID Project 1993-1996
- UNESCO Project 1993-1996
- Hydrology Project-I 1995-2001
- Hydrology Project-II 2006-2014
- EU Project 'Saph Pani' 2011-2014
- NMSHE Project 2016 - 2022 Completed
- National Hydrology Project 2016-Ongoing
- IC-EcoWS DST (GoI) 2019-Ongoing

# NIH\_ReSyP - 2022

## NIH\_Reservoir Systems Package

Analysis Modules

- Sequent-Peak analysis
- Storage-Yield-Reliability analysis
  - Working table
  - Relationship
- Elevation-Area-Capacity table
  - Interpolation
  - Approximation
- Inflow estimation
  - Table for different Rate-of-Rise
  - Instantaneous estimation
  - From working table including adjustment for negative flows
- Reservoir routing
- Reservoir sedimentation profile

Development Team

- **Reservoir Modules**
  - Dr. M. K. Goel, Scientist 'G', NIH
  - Dr. Sharad K. Jain, Director (Rtd.), NIH
- **WINDOWS Interface**
  - Smt. D. Chalisgaonkar, Scientist 'G' (Rtd.), NIH
  - Dr. M. K. Goel, Scientist 'G', NIH
  - Mr. Sanjeev Kumar, Resource Person (J), NIH

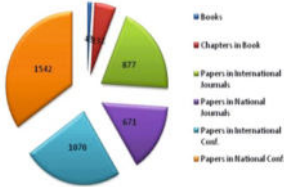
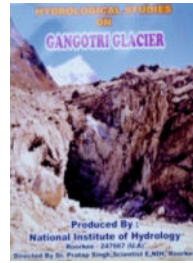
Analysis Modules

- Hydropower analysis
  - Firm power determination
  - Hydropower simulation
- Probable flow estimation
- Initial rule curve derivation
- Conservation operation of multi-reservoir system
- Instant release for cons. demand
- Flood control operation of multi-reservoir system
- Instant flood releases
  - Rating tables
  - Instantaneous estimations

Start NIH\_ReSyP

Quit NIH\_ReSyP

# Library & Documentation Services



NIH Library maintains one of the world's most comprehensive collection of technical hydrology literature. This consists of published and unpublished documents in print and electronic formats by scientists working in many parts of the globe. Also, NIH has a well-rounded collection of materials (print, electronic, or other formats), dealing with other related subjects.

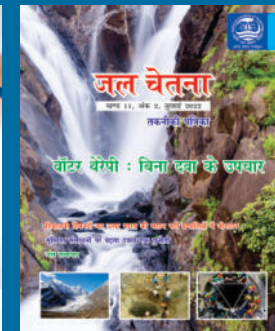
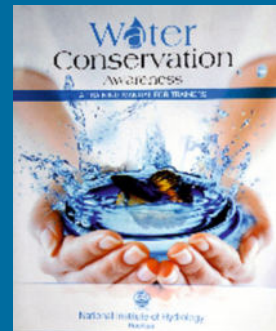
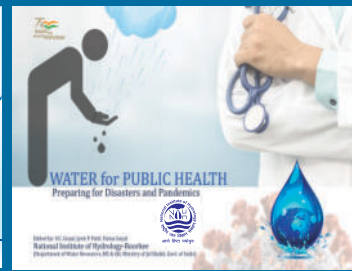
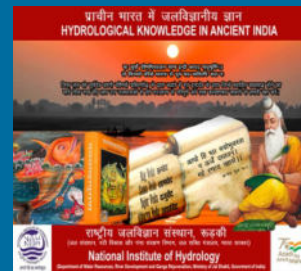
NIH is providing 'Library and Documentation Services' through a process of reproducing any available material and making it available to readers. It includes the periodicals and journals, documents and reprographical service.

An Institutional Digital Repository (IDR) is a portal for collecting, preserving, and disseminating the intellectual output of an Institution in digital form. NIH has recently established an IDR, hosting all NIH publications at one place.



NIH publishes its research output in the form of various types of reports, books, chapters in books, research papers in International and National peer reviewed journals, and in International and National conferences, symposium, seminars, workshops, etc. The institute has an impressive repertoire of published research work. NIH has produced more than 5000 research publications since its inception and the list is further growing.

## Publications



## Major Ongoing/Completed Projects & Studies



- National Hydrology Project (NHP)
- Future Secular Changes and Remediation of Groundwater Arsenic in the Ganga River Basin-FAR GANGA
- National Mission for Sustaining Himalayan Ecosystem (NMSHE)
- Impact of Rainwater Harvesting on Groundwater Quality in India with Specific Reference to Fluoride and Micro-pollutants (Indo-UK)
- Innovation Centre for Eco-Prudent Wastewater Solutions (DST).
- Impact of LULC and Catchment Characteristics on Runoff and Groundwater Dynamics of Western Ghats, Karnataka (MoES).

- Hydrological Studies for Inter Linking of Rivers .
- Exploring and Managing Groundwater Quality.
- River Bank Filtration for Drinking Water Supply.
- Glaciers and Permafrost Studies.
- Impact of Climate Change on Water Resources Assessment in River Basins
- Development of Decision Support System (DSS-PM).
- Changing the Fate of the Hindon River by Evaluating the Impact of the Agriculture on the Water Balance-Developing a Template for a Cleaner Ganga River (DST-NWO).
- High Performance Advanced Septic System (HPAS) for villages and Roadside Restaurants (EPS-Canada)

## Large Projects at NIH

### National Hydrology Project (NHP) (World bank funded: DoWR, RD & GR, MoJS, GoI)

The World Bank funded Hydrology Projects have been the Central Government initiatives and entail improving the planning, development and management of water resources, as well as flood forecasting and reservoir operations in real-time. The project completed in two phases (Phase-I from 1996 to 2003 and Phase-II from 2006 to 2014) has established the backbone of a comprehensive Hydrological Information System (HIS) in India, providing scientifically verified, uniformly accepted and widely accessed hydrological records covering all aspects of the hydrological cycle.

The Hydrology Project Phase-III, named as National Hydrology Project (NHP) is a follow-up to the earlier Hydrology Projects.

#### Role of NIH in NHP

- Nodal Agency for Demand Driven Research
- Nodal Agency for Training and Capacity building
- Training Courses on hydrological topics
- Training/Meetings and multi-media distance learning
- Centre of Excellence for Hydrological Modeling
- Development of Decision Support System (DSS-PM) software.

### Decision Support System (Planning & Management) DSS(PM)

Under the National Hydrology Project (NHP), development of the Decision Support System (Planning & Management) DSS-PM is one of the major objectives to provide the water management authorities with a structured, user friendly practical water resources management tool which includes the following components:

- Surface water and groundwater planning including conjunctive use.
- Integrated operation of reservoirs
- Flood and drought management
- Water quality management and environmental flows

The DSS-PM software integrates climatological and hydrological data with water simulation models, cost-benefit analysis, and multi-criteria analysis tools in order to address water resource management issues. The complete system is web-based with connections to some of the widely used software such as HEC-HMS, HEC-RAS, MIKE HYDRO BASIN, MODFLOW, QUAL2K, and NIH\_ReSyP is developed at NIH.

## National Mission for Sustaining Himalayan Ecosystem (NMSHE) (FUNDED BY MINISTRY OF SCIENCE OF TECHNOLOGY, GoI)

- Development of hydrological database in Upper Ganga basin
- Real-time snow cover information system for Upper Ganga basin
- Glacial Lakes & Glacial Lake Outburst Flood (GLOF) in Western Himalayan region
- Assessment of downstream impact of Gangotri glacier system at Dabrani and future run off variations under climate change scenarios
- Observation and modeling of various hydrological processes in a small watershed in Upper Ganga basin
- Hydrological modeling in Alaknanda basin and assessment of climate change impact
- Hydrological modeling in Bhagirathi basin up to Tehri dam and assessment of climate change impact
- Study of river - aquifer interactions and groundwater potential in the upper Ganga basin up to Dabrani
- Understanding of hydrological processes in study basin by using isotopic techniques
- Environmental assessment of aquatic ecosystem of upper Ganga basin
- Water census and hotspot analysis in selected villages in upper Ganga basin

## Capacity Building/Training and Outreach Activities

The Institute vigorously pursues capacity development by way of organising specialized training programs on different aspects of hydrology. NIH has trained field engineers, scientists, researchers, and students, Organised International Seminars / Conferences / Workshops, Organised National Seminars/ Symposia/Workshops, and Organized Interaction Workshop/ Mass Awareness Programs.

## Academic Activities

The Institute is recognized by several IIT'S, IISc, Universities and other academic organizations for supervising research scholars and Ph.D degree in hydrology and related subjects. Institute scientists have guided number of research scholars for Ph.D degree and M.E./M. Tech./M.Sc. thesis. The scientists also provide their inputs to the academic programs through lecturers as guest/ visiting faculty and working as examiners of Ph.D and M.E./M. Tech theses and members of various committees as experts.



## Future Outlook

- Integrated Assessment of Water Availability in River Basins.
- Hydrologic Extremes.
- Coastal Groundwater Dynamics.
- Water and Food Security Assessment Contribution to SDGs.
- Understanding Hydrological Processes in the Himalayas.
- Emerging Contaminants, Micro-pollutants Geogenic Contaminants and their Impacts on Water Resources.
- Impact of Climate Change on Water Resources.
- Urban Floods and Storm Water Management.

## Use of Advanced Techniques and Tools

- Hydrologic Analysis and Design using Soft Computing.
- Artificial Intelligence, Virtual Water, Internet of Things (IoT).
- Isotopic Investigations, use of Satellite Data for Estimation of Hydrological Variables.
- Decision Support Systems.
- Use of Electronic Sensors and Data Loggers.
- Web-based Water Resources Information System.

## Action Research

- River Bank Filtration (RBF)
- Managed Aquifer Recharge (MAR)
- Pond Rejuvenation
- Lake/Wetland Rejuvenation
- IWRM Plan for Watersheds
- Flood Early Warning Systems
- Spring Rejuvenation



Centre for Cryosphere and Climate Change Studies



# Regional Centers



Western Himalayan Regional Centre, Jammu



NIH, HQ, Roorkee



North Western Regional Centre, Jodhpur



North Eastern Regional Centre, Guwahati



Central India Hydrology Regional Centre, Bhopal



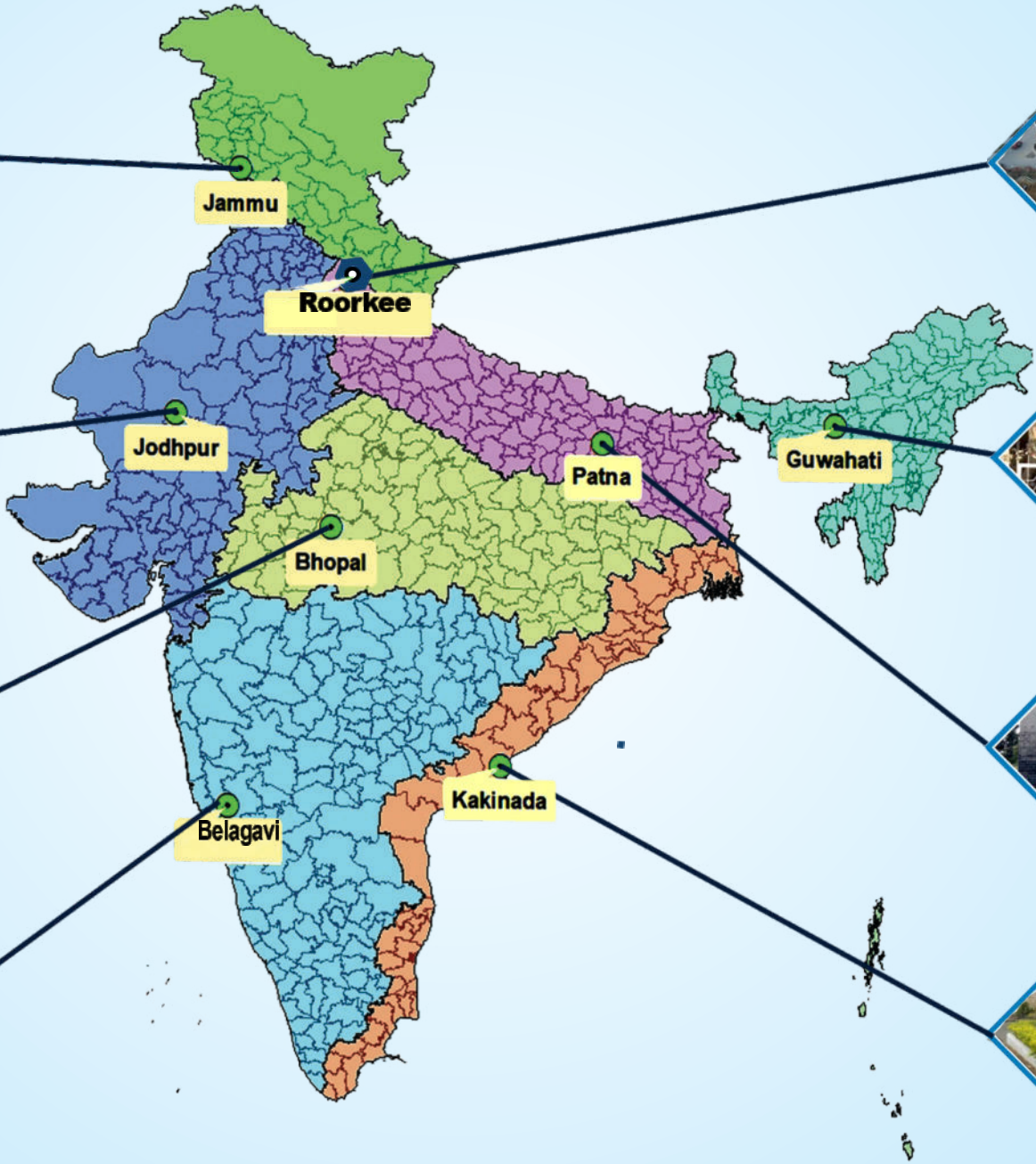
Centre for Flood Management Studies, Patna



Hard Rock Regional Centre, Belagavi



Deltaic Regional Centre Kakinada



## Contact us

## Regional Centers

Hard Rock Regional Center  
National Institute of Hydrology,  
Main Road, Irrigation Colony,  
Vishvesvaraya Nagar,  
Belagavi- 590019 (Karnataka)  
Ph: 0831-2447714  
Email: hrrc.nihr@gov.in

Western Himalayan Regional Centre  
National Institute of Hydrology,  
Irrigation & Flood Control Complex,  
Satwari, Opposite Military Hospital,  
Jammu Cantt.-180003 (Jammu)  
Ph: 0191-2432619  
Email: whrc.nihr@gov.in

Centre for Flood Managements Studies  
National Institute of Hydrology,  
Walmi Complex, Khagaul,  
PO Phulwari Sharif, Patna-801505 (Bihar)  
Ph: 0612-2452219  
Email: cfmisp.nihr@gov.in

Central India Hydrology Regional Centre  
National Institute of Hydrology,  
WALMI Complex, Near Kaliasot Dam,  
Bhopal- 462016 (Madhya Pradesh)  
Ph: 07582-237347  
Email : cihr.nihr@gov.in

Deltaic Regional Centre  
National Institute of Hydrology,  
Siddhartha Nagar, Vakalpudi Road,  
Kakinada-533003 (Andhra Pradesh)  
Ph: 0884-2372254  
Email: drc.nihr@gov.in

North Eastern Regional Centre  
National Institute of Hydrology,  
Mathuranagar, G.S. Road, S.Sahid Path,  
Dispur-781006 (Guwahati)  
Ph: 0361-2228150  
Email: nerc.nihr@gov.in

North Western Regional Centre  
National Institute of Hydrology,  
G-83, Shastri Nagar,  
Jodhpur - 342003 (Rajasthan)  
Ph: 0291-13100941  
Email: nwrc.nihr@gov.in

### Director

National Institute of Hydrology  
Jal Vigyan Bhawan,  
Roorkee- 247667 (Uttarakhand)  
Phone : +91-1332-272106, 249201  
Email : dir.nihr@gov.in

