अपार शक्तेः स्त्रौतः गंगेयम्

उत्तराखण्ड राज्य

IRRIGATION RESEARCH INSTITUTE
ROORKEE–247667(UTTARAKHAND)

IRRIGATION DEPARTMENT
GOVT. OF UTTARAKHAND

Activity Profile

THE INSTITUTE

- Initially, established at Lucknow in 1928 for R&D works related to Hydraulic Engineering.
- Mr. Garald Lacey, profounder of Lacey Theory, was the first Research Officer of that station.
- In 1946, station was shifted from Lucknow to Bahadrabad to conduct Model Studies on Large Scale & area with Larger Discharge and Water Drop.
- In 1954, the Institute was established for testing of Civil Engineering Materials and other R&D works in addition to Hydraulic Model Studies.
- The Institute is serving as advisory member of several technical committees of State TAC, USDMA, BIS, CBI&P, GFCC, IRC, WRD, various Departmental Technical Committee, SDSO & SCDS Uttarakhand under Dam Safety Act, 2021, etc.
- The Institute is maintaining a close liaison with CBI&P New Delhi, CBRI Roorkee, IIT Roorkee, NIH Roorkee, SEA Roorkee, WALMI, Govt. Workshop Roorkee, IDO Roorkee etc.
- In 2012, Institute got ISO 9001:2008 Certificate.

INFRASTRUCTURE FACILITIES

* Water Resources R&D Works

❖ **Physical Model Studies-** Hydraulic Research Station, Bahadrabad is located at 18 km from Roorkee on Delhi-Haridwar Highway and is facilitated with
- More than 18 hectares area,
- 6-8 cumecs water and
- 4-10 m head drop for carrying out physical model studies

❖ **Reservoir Sedimentation Studies**
- Latest fully Automatic Echo-Sounder with GPS.

❖ **Ground Water Development**
- Well Equipped Aquifer Modelling Laboratory
- Well Equipped EHDA Laboratory

❖ **Basic Research & Development Studies**
- Computer Centre having more than 15 PC with different Software, Large size scanner, Plotter and several types of printers.

* Testing of Construction & Engineering Materials

- Well equipped Concrete Laboratory with NDT facilities, Soil Testing Lab., Pipe Testing Lab., Water Quality Lab., Highway Lab., Timber Testing Lab., Paint Testing Lab., Rock Mechanics Lab.,
- Field test facilities for Rock, Soil, Bridge, Core, Road and Highways, Buildings, etc.

OUTSTANDING CONTRIBUTIONS

❖ Design of "Sharda Type Fall"
❖ Design of different types of Desilting Chambers
❖ Design of Surge Systems
❖ Drainage arrangement for Diversion Tunnel
❖ Well equipped Remote Sensing Laboratory
❖ Criterion for Design of Energy Dissipaters of different structures.
❖ Design criteria for River Training Works
❖ Estimation of Down Pull of gates
❖ Energy dissipaters for Shaft Spillway
❖ Hydraulic design of Intermediate Level Outlets for high dams.
❖ About 1400 Hydraulic Model Studies of indigenous and abroad projects
❖ Preparation of DPR for Artificial Recharge to Groundwater
❖ Mix Design of High Performance Concrete, Roller Compacted Concrete, Shotcrete, etc.

OTHER ACTIVITIES

❖ **Observations of Hydro-met & Ground Water Data under State-WRIS.**

❖ **Implementation of National Hydrology Project (NHP), State Specific Action Plan (SSAP) & Flood Plain Zoning (FPZ) in Uttarakhand.**

❖ **Studies related to Landslide Mitigation Measures, Water Spread Area Variation of Glacial Lakes.**

❖ **Preparation of DPR of Various Water Resources Projects.**

❖ **Training programme** – The institute has been organised more than 100 computer and other training programme for in-service Engineers, Research Personal and Students.

❖ **Contribution in Implementation of Dam Safety Act, 2021 in Uttarakhand.**

CONSULTANCY AREAS

❖ Major Consultancy Areas

- Water Resources R&D Works
- Testing of Materials

Water Resources R&D Works

❖ Physical Model Studies

Different Hydraulic Structures Related to

- River Valley Projects,
- Highways (Bridges, etc.),
- Irrigation & Drinking Water Projects,
- River Training, Flood Protection & Anti Erosion Measures, etc.

❖ Mathematical Modeling

- Surface and Sub-Surface Flow,
- Hydraulic Structures,
- Dam Break Modeling

❖ Reservoir Sedimentation Studies

- Reservoir Sedimentation and Sediment Transport at Intakes, Reservoirs, etc.

Model of Ram ki Paidi (U.P.)

Model of Alauli, Khagaria (Bihar)

EHDA Laboratory

Ground Water Development Studies for:

- Uplift pressure, Exit Gradient, depth of cut-off, etc.
- Conjunctive use of subsurface and surface water
- Water Logging
- Regeneration/Seepage of water from perennial river
- Suitability of Canal Linings, Seepage from Canals, Tube Wells
- Preparation of DPR for Artificial Recharge to Groundwater

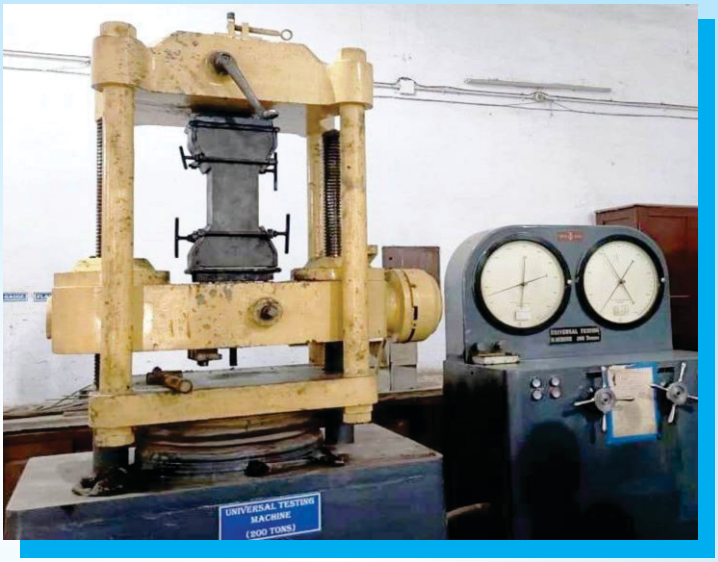
Basic Research & Development Studies

- Studies of River Migration and Sinuosity Index using Remote Sensing and GIS Technique.
- Discharge Measurement of different rivers.
- Organising skill development training programmes for IRI officials.
- Maintenance & Updation of IRI Website.
- Observation of Hydro-Meteorological Data.

Testing of Materials

❖ Details of Tests of Cement & Concrete

- Physical & Chemical Tests of fresh & hardened Concrete, Cement & Mineral Admixtures.
- Aggregates.
- Physical Tests of Chemical Admixtures
- Heat of Hydration.
- Concrete Mix Design (RCC, SCC, HPC, etc.)



❖ Details of Test of Steel & Steel Wire

- Physical Properties

❖ Pressure Release Valve Test Lab.

- Testing of Pressure Release Valves (PRV)
- Sensitivity Test,
- Back-Leakage Test

❖ Testing of GI, MS, PVC, uPVC Pipes upto 400 mm dia. & Cement & Hume Pipe

- Physical Parameters
- Hydrostatic Pressure Test

❖ Testing of Paint

- Testing facilities available for all Physical Properties of Enamel, Emulsion and other Paints.

❖ Details of Test of Soil :

- Bearing Capacity at foundation of structures.
- In-situ Shear Parameters
- Modulus of Subgrade Reaction
- In-situ Permeability and Sub-Soil Strata to study the seepage behaviour etc.
- California Bearing Ratio Test


Soil Lab


Rock Mechanics Lab


Block Shear Test

Details of Test of Rock :

❖ Lab Tests

- Modulus of Elasticity & Poisson's Ratio.
- Unconfined Compressive Strength on Rock core specimen.
- Shear Parameters – 'c' and 'Ø'.
- Point Load Strength Index.
- Water Absorption, Specific Gravity.

❖ Field Tests :

- Bearing Capacity by Plate Load Test.
- Block Shear Test for ('c' and 'Ø').
- Pull out Test (Anchor Bar & Rock Bolts).
- Uniaxial Jacking Test (Modulus of Deformation).
- Load Test for Bridges and Aqueduct.


Timber Testing Lab

❖ Details of Test of Timber & Plywood:

- Physical Properties
- Shrinkage
- Mechanical Properties
- Compressive Strength
- Tensile strength
- Cleavage test
- Torsion test

❖ Details of Test of Highway Construction Materials

- Thickness Design of Rigid & Flexible Pavements
- Job mix Formula for Bituminous Pavement
- Testing of all ingredients of Rigid & Flexible Pavements
- Core Cutting and Testing of Bituminous & Concrete Pavements


Highway Laboratory

❖ Hydrographic Survey

- Capacity Survey
- Estimation of Life of Reservoirs
- Sedimentation Studies, etc.


Capacity Survey in Reservoir


Chemical Laboratory

❖Details of Test of Water Quality

- **Testing of Drinking/ River/ Lake/ Sewage water**
- Physical & Chemical Parameter
- E-Coli & Total Coliform
- Heavy Metals & Pesticide residue


Water Quality Laboratory

Details of Test of Chemical Analysis of Cement & Cement Mortar :

- Chemical analysis of water for construction purpose, Cement & Mineral Admixtures (Fly Ash, silica Fume, etc.)
- Proportional ratio of its ingredients of Cement Mortar & Cement concrete
- Alkali Aggregate Reactivity Test of Aggregate samples.
- Determination of suspended sediment concentration in PPM.
- Grain size distribution of silt samples by using Puri's Siltometer

SPECIFIC ACTION PLAN (SSAP) :

❖ For the development of Water Database which can be accessible to all and to study the impacts on climate change on Water Resources and state level action for Water Conservation, Water Resource Enhancement and Preservation.

Mandate of SSAP is to:

❖ Formulate a comprehensive and integrated water plan for Water Security, Safety and Sustainability till 2050 with equity through Convergence, Synergy and Accountability of all stakeholders.

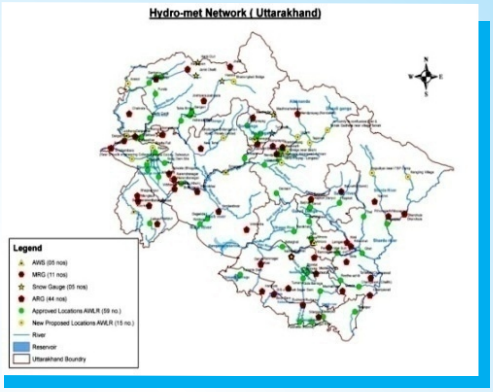
Status of Work:

❖ Water Budget of Uttarakhand for the year 2023-24, was estimated as 89.0 BCM (Rainfall-73.4 BCM & Snow melt- 15.6 BCM)

❖ Draft Status Report (DSR) was prepared and approved by both the Committees of National Water Mission (NWM).

NATIONAL HYDROLOGY PROJECT (NHP):

- It is aimed at improving the country's Water Resources Management and focuses on enhancing the availability and quality of hydrological data and making it available to all stakeholders.
- Developing reliable Water Resources Information and improve water monitoring systems of states for Flood Routing, Efficient Water Use, Irrigation Benchmarking etc.



Mandate of NHP is to:

- Improving Hydrological Information System
- Water Resource Assessment
- Flood Forecasting and Early Warning Systems
- Research and Innovation
- Sustainable Water Management Practices
- Strengthening Institution and Inter-Agency Coordination

Status of Work:

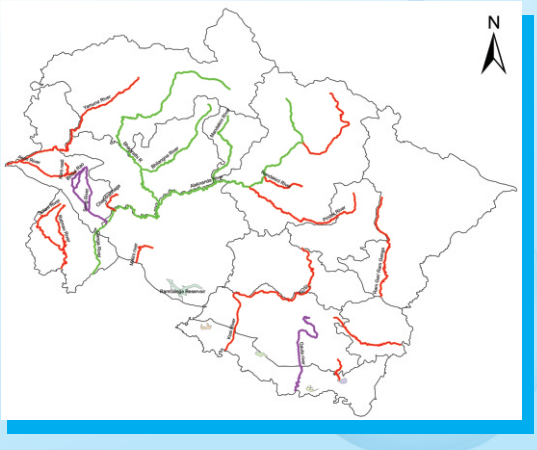
- Real Time Data Acquisition System (RTDAS) for Surface Water and Ground Water have been established.
- SCADA (Supervisory Control and Data Acquisition) Systems for Gaula and Ramnagar Barrage have been commissioned.
- Purpose Driven Studies (PDS) for Bhimtal and Naukuchiatal lakes were completed.
- Establishment of State WRIS and its integration with India WRIS.
- DPR for Khairna and Talghati drinking water projects were completed.
- Water quality monitoring of Rivers /Lakes of each districts of Uttarakhand is being carried out.
- Mapping of Springs/Springshed in Dehradun District has been completed.

FLOOD PLAIN ZONING (FPZ)

It is aimed at managing Flood Risks and minimizing damage to Life, Property and Environment.

Mandate of FPZ is to:

- Identification of Flood-prone Areas
- Zoning Regulation
- Land Use Planning and Flood Proofing
- Evacuation and Safety Plan and Public Awareness
- Flood Management Infrastructure
- Legal and Institutional Framework



Final Notification Issued	614.6 Km	
Study Completed But Final Notification Not Issued	401.0 Km	
Study Under Progress	847.4 Km	

ACHIEVEMENTS

Opinions of Distinguished Visitors

❖ "It was very great pleasure for me to visit and study the very interesting and high scientific level researches carried out in the laboratory"

- Prof. Emil Mosonyi,
Budapest Tech University.

❖ "Today has been my first opportunity to observe both the model research and the actual construction of large Indian Projects."

- Peter Rogers,
Harvard University

❖ "It was a privilege and pleasure to see this important station."

- J W Hilf,
Ex-Chief (Designs), USBR, Colorado

❖ "A very impressive water management project and one that surely has stood the test of time. It must rank among the greatest Irrigation undertakings in the world."

- J F Kennedy,
Ex- Chairman, IAHR

❖ "Very interesting and useful experiments are in progress. The Director and staff deserves congratulations for their energetic and original approach in solving practical problems."

- Dr K L Rao,
Ex- Union Irrigation Minister

❖ "This station needs to be developed as a centre of excellence in hydraulic model studies, particularly in view of the large hydropowerpotential of the Himalayan region."

- A D Mohile,
Ex-Chairman, Central Water Commission

❖ "I am very pleased to see further development of the station since my last visit about three years back, very important researches are being carried out, which would lead to efficient and economical hydraulic structures, I wish the staff all success."

- D.V. Joglekar,
Ex-Director, CWPRS, Pune

❖ "पूरे देश के लिये यह संस्थान उपयोगी है।"

- नीतीश कुमार
पूर्व रेल मंत्री

❖ "The Institute has excellent facilities and an asset to the Nation."

Ex- Prof. Bharat Singh,
Vice Chancellor, University of Roorkee

AWARDS

❖ In 1986, first "CBI&P Trophy" for Outstanding R&D Works.

❖ In 1987, "CBI&P - IRPO-HI-TECH-87"

❖ In 2018, CBI&P Award for the Best R&D Institute in Water Resources Sector

❖ Research Personnel's Award

- CBIP-Pt. Jawahar Lal Birth Centenary Research Award
- CBIP- Young Engineers Award
- CBIP-Cash Your Idea Award
- HYDROSEM Award of the Institution of Engineers (India), U.P. State Centre
- Gold Medals, Cash Awards
- Certificate of Merits for Best Research Papers, etc.

CBI&P Award 2022 for the Best R&D Institute in Water Resources Sector

GLORY OF ROORKEE TOWN

Recognized as Educational and R&D Hub.

- IRI, Roorkee
- IIT, Roorkee
- NIH, Roorkee
- Bengal Engineers Group
- CBRI, Roorkee
- Govt. Workshop, Roorkee

In India, first train was run on 22nd Dec. 1851 between Roorkee and Piran Kaliyar

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