



Water Resources Systems Division

National Institute of Hydrology

Ministry of Water Resources, River Development & Ganga Rejuvenation
Govt. of India
Roorkee – 247 667, (India)



Water Resources of India and Related Issues

India has monsoon climate and more than 75% of annual precipitation occurs in four months. India has large quantity of renewable surface and ground water resources. Main water resources issues in this country are:

- Water stress in many areas due to rapid growth in population, irrigation needs, industrialization, and urbanization.
- Large temporal and spatial variation in rainfall water resulting in disasters such as floods, droughts, erosion, river shifting etc.
- Unsustainable exploitation of groundwater and its pollution.
- Lack of accessible databases on hydrology and related sectors.
- Water resources projects are planned in isolated manner without giving due consideration to optimum utilization and environment sustainability.
- Inter-State / Regional disputes in sharing of water.
- Inadequate maintenance of water resources infrastructures.
- Lack of adequate trained personnel.



Vision of the Division

The WRS division envisions to contribute in the following areas:

- Develop and apply methodologies for optimum and integrated management of water resources at basin scale.
- Develop and apply advanced tools such as remote sensing, GIS, ANN, Fuzzy Logic etc. to solve water resources problems
- Develop user-friendly software for analysis of water systems
- Develop Web-based water resources information systems
- Model hydrological response of basins including predictions in ungauged catchments
- Contribute scientific inputs for water governance

Achievements since 2010-11

Title	No
Internal Studies	31
Sponsored and consultancy projects	46
Training courses organized	60
Seminar/symposium organized	18
Books published	06
Chapters in Books	12
Students' thesis supervision	10
Publication in international journals	66
Publication in national journals	57
Publication in conferences	92

Thrust Areas

Major thrust areas of water resources systems division are:

- Integrated river basin planning and management
- Reservoir operation and sedimentation
- Inter-basin water transfer
- Hydrologic modeling including study of ungauged basins
- Impact of climatic change on water resources
- Software development
- Development of web-based applications and information dissemination
- Development and application of advanced tools such as remote sensing, GIS, ANN, Fuzzy Logic etc. for solving water resources problems
- Water governance

Software Developed

- Reservoir Systems Package (NIH_ReSyP)
- Hydrology and Water Resources Information System for India (HWRIS)
- Web-based Lake Information System of India (WEBLIS)
- Web-GIS-based Dam and Drought Information System

Training Courses Organised

Training courses are organized in following areas for Central/ State Government officers, academicians, & research scholars:

- Operation of reservoir systems
- Remote sensing and GIS applications in WR management
- Predictions in ungauged basins
- Climate change impact on water resources
- Web-based hydrological tools

Courses on other relevant topics are organized as per demand.



Remote Sensing and GIS Lab

The division has a well equipped remote sensing and GIS lab with popular image processing and GIS software like ERDAS IMAGINE, Arc GIS, ENVI and ILWIS for carrying out various hydrological studies.

Main areas in which studies have been carried out/in-progress using remote sensing and GIS techniques include snow cover/snowmelt runoff modelling, flood management studies, flood inundation and zoning, river shifting, soil erosion and modelling, rainfall-runoff modelling, reservoir sediment assessment, reservoir capacity computations, water balance studies, soil moisture assessment, drought studies etc.



Expertise Available

Currently the division has 10 scientists with background in hydrology, hydraulics, remote sensing, GIS, agricultural engineering, snow hydrology, computer science etc.

Consultancy/ Sponsored Projects

Scientists of division are coordinating with Departments of various States/ Central Govt. Organizations for solving specific sponsored projects. Topics on which sponsored research projects have been completed/ under-progress include impact of climate change on water resources, operation of reservoir systems, reservoir sedimentation, prediction in ungauged basins, preparation of basin scale WR management plans, water availability assessment, interlinking of rivers etc.

Projects have been completed in use of remote sensing & GIS in snow / glacial studies, river migration, flood studies etc.

Looking in Future

- Development of methodologies/guidelines and software
- Outreach activities within India and International collaboration
- Sponsored/ Consultancy projects
- Publication of papers and Preparation of Manuals
- Organization of training courses/conference
- Capacity building of scientists/ staff



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