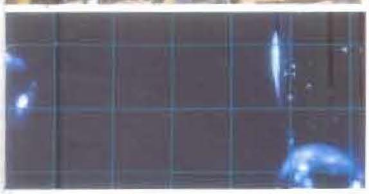
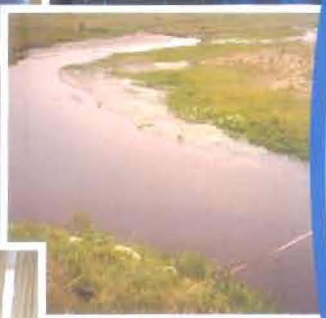
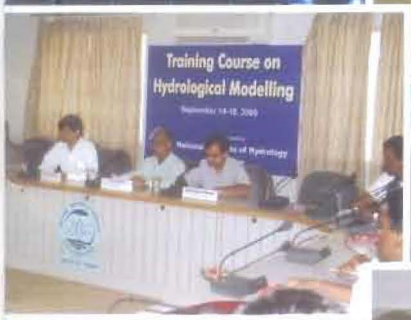
Issue 4 & 5, Jan & July 2012

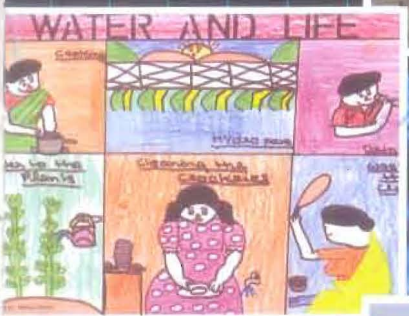
Hydrology for People™

Newsletter of National Institute of Hydrology, Roorkee (India)









From Director's Desk

Water is the most important and perishable asset of our planet. On a global scale, we have only 0.75 percent accessible fresh water of the total water resources available on the earth. Our global economy, agricultural production, industrial growth, socio-economic structures, governance mechanisms and everyday life depends on this finite and vulnerable resource. In most parts of the world, including India, the water resources are under stress due to growing imbalance between the mounting demand for water and shrinking water reserve. In our country, the water table is falling due to intense ground water use, thus hampering our quest for the sustainable development. With increased prospects of feeding increased population in 2050, the industrial, individual and agricultural demand is expected to escalate dramatically. Also, the climate change is becoming a more and more important issue for growing water scarcity. This calls for awareness that water is very scare and valuable natural resource and that we need to initiate innovative technological and management changes. Thus, we have to go for a 'blue revolution' to achieve food security and prevent a serious water crisis in the future.

National Institute of Hydrology has been conducting the research in the field of hydrology and water resources, over the last three decades. Many purpose driven studies and strategic projects were carried out to solve the various need based problems touching almost every sphere of water resources development. With growing interest of managing water resources under the constant threat of climate change, the Institute is gearing-up to conquer the challenges and fulfil the needs of the country via demand driven strategic studies. The Institute is also pro-actively contributing to the knowledge dissemination, mass awareness and capacity building programmes.

R D Singh

Editorial

Securing scarce natural resources such as water has been one of the primary objectives of Government of India for long with respect to environment conservation. In this regard, a National Water Mission has been put in place with Prime Minister's Council on Climate Change. The National Water Mission is one of the eight National Missions which form the core of the National Action Plan for Climate Change.

The objective of National Water Mission is "conservation of water, minimizing wastage and ensuring its equitable distribution both across and within States through integrated water resources development and management". Five goals identified in the National Water Mission are Comprehensive water data base in public domain and assessment of the impact of climate change on water resources; Promotion of citizen and state actions for water conservation, augmentation and preservation; Focused attention to vulnerable areas including over-exploited areas; Increasing water use efficiency by 20%; and Promotion of basin level integrated water resources management. Two important activities in the Mission include exploring options to augment water supply in critical areas and ensuring more effective management of water resources. Hydrological studies provide vital research inputs in carrying out these activities and the National Institute of Hydrology is playing a key role in the National Water Mission in achieving the targets. Intensive capacity building and awareness creation including those for Panchayati Raj Institutions, urban local bodies and youths are integral component of the Mission efforts.

Publication of this newsletter is an attempt to rejuvenate the knowledge dissemination efforts of the Institute, with a flavour of 'connecting to the people'. The intent is to take the research findings to the community so that they are incited to develop interest in the scientific developments taking place in the country. This is the time to make information related with water reach all nooks of the country. And, NIH fraternity is zestful enough to do its bit in this endeavour.

Response to the previous issues has been encouraging. Your suggestions and feedback are welcome, and will help us in improving future issues!

V C Goyal

About National Institute of Hydrology

The National Institute of Hydrology (NIH), established in 1978 as an autonomus organization under Ministry of Water Resources (Government of India), is a premier R&D institute in the country to undertake, aid, promote and coordinate basic, applied and strategic research on all aspects of hydrology and water resources development. The Institute has its headquarters at Roorkee (Uttarakhand). To carry out field related research covering different regions of the country, the Institute has four Regional Centers located at Belgaum, Jammu, Kakinada and Bhopal, and two Centres for Flood Management Studies at Guwahati & Patna in Hydrology, Water Quality, Soil Water, Remote Sensing & GIS Applications, Groundwater Modelling and Hydrological Instrumentation.

The Institute act as a center of excellence for transfer of technology, human resources development and institutional development in specialized areas of hydrology, and conducts user defined, demand-driven research through collaboration with relevant national and international organizations. The Institute vigorously pursues capacity development activities by organizing training programmes for field engineers, scientists and researchers, NGOs. NIH has so far completed more than 150 sponsored research and consultancy projects- the sponsors included Indian Army, PSUs, Planning Commission, National Productivity Council, State Government Departments, and central ministries of Science & Technology, Environment & Forests, Agriculture, Rural Development, etc. The Institute has undertaken a number of internationally funded projects, including those from UNDP, USAID, UNESCO, The World Bank, The Netherlands, Sweden, European Union. The Institute is presently participating in the World Bank funded Hydrology Project Phase-II.

Some of the significant contributions of NIH include studies for solution of real-life problems related to augmentation of water supply and water management in cities, glacier contribution in streamflow of Himalayan rivers for hydro-electric power projects, watershed development, water quality management plan for lakes, watershed development, storm water drainage network in cities, flood inundation mapping and flood risk zoning, and water quality assessment in major cities. The Institute is actively pursuing the IEC activities and mass awareness programmes of the Ministry of Water Resources. NIH works as a nodal centre of the Ministry for effective implementation of the National Water Mission.

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 cost-effective techniques, procedures, software packages, field instrumentation, etc. for hydrological studies
- Study scenarios of water resource availability under varying hydrogeological, climatic, socio-cultural conditions through modelling techniques
- Assess impact of climate change on water resources and suggesting measures for mitigation, adaptation and resilience

- Propagate application of emerging technologies for water resources development and management
- Provide cost-effective R&D solutions to need-based water-related problems
- Provide reliable advice to the various stakeholders
- Empower community through capacity building and awareness on water resources development and conservation

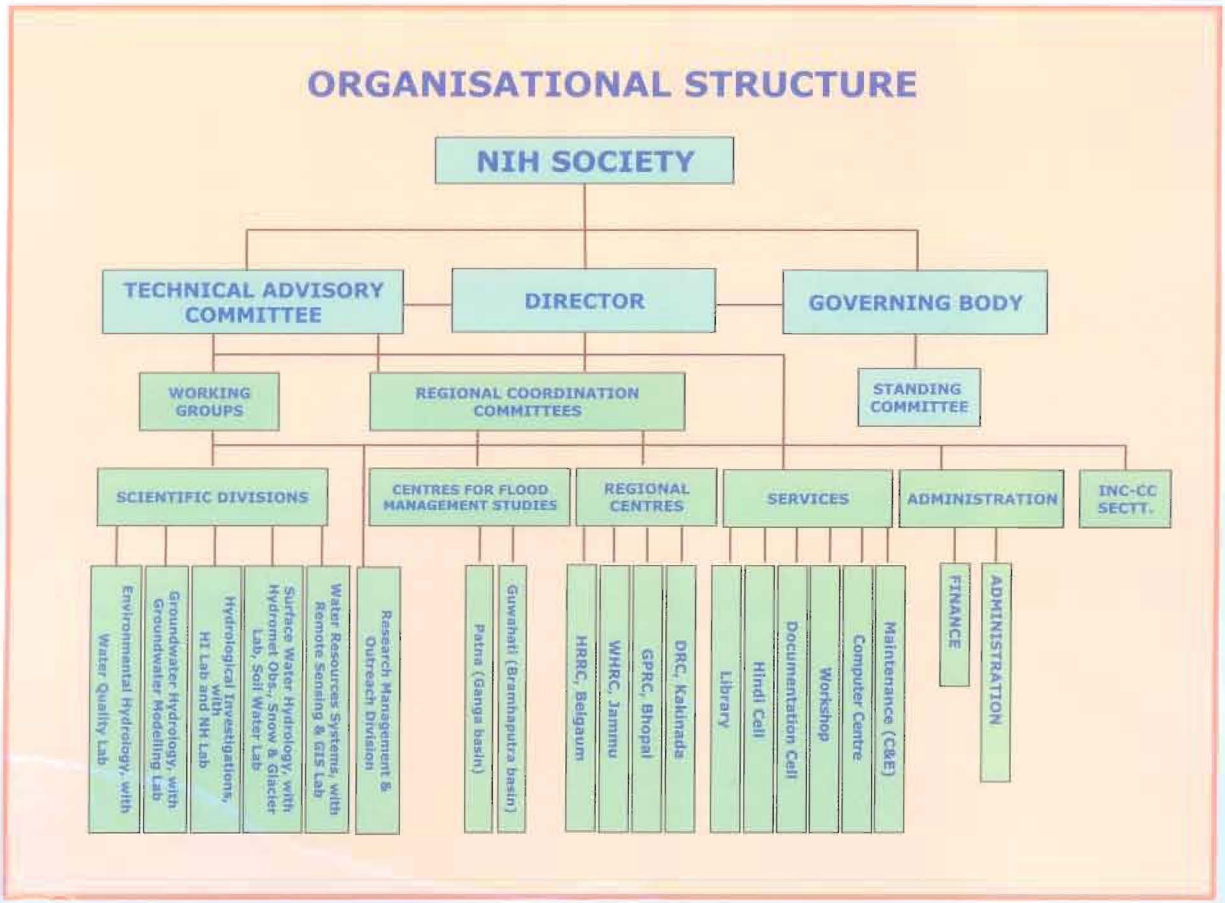
Thrust Areas

- 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 is specific areas
- Hydrology of Arid, Semi-arid, Coastal & Deltaic Zones
- Reservoir / Lake Sedimentation
- Impact of Climate Change on Water Resources
- Application of modern techniques to provide the solution to hydrological problems

Hydrology Primer

Hydrology is the science that treats the waters of the earth, their occurrence, circulation, movement and distribution, their chemical and biological properties and their reaction with the environment, including their relation to living things. The domain of hydrology embraces the full life history of water on the earth.

- The hydrologic cycle is a continuous process that exists on the earth by which the water from over and beneath the earth's surface (including the ocean) is transported to the atmosphere through the process of evaporation and evapo-transpiration from the vegetative cover and to the land surface through the process of rainfall and snowfall, and reaches to the surface and groundwater storages, and the ocean by means of the various paths.
- The various phases of the hydrologic cycle may be short, or it may take millions of years. Water may be captured for millions of years in polar ice caps, groundwater reservoirs (aquifers) and in the sea.
- The hydrological cycle moves enormous quantities of water about the globe. However, much of the world's water has little potential for human use because 97.5% of all water on earth is saline water. Out of remaining 2.5% fresh water, most of which lies deep and frozen in Antarctica and Greenland, only about



0.26% flows in rivers, lakes and in the soils and shallow aquifers which can be readily used.

- Certain hydrological problems and weaknesses have affected a large number of water resources all over the world due to the effect of Climate Change due to Global Warming.
- In case of India, floods and droughts affect vast areas of the country, transcending state boundaries. One-sixth area of the country is drought-prone. Out of 40 million hectares of the flood prone area in the country, on an average, floods affect an area of around 7.5 million hectares per year.

Role of Hydrologist

- The hydrologist plays very important role in solving water-related problems in society such as quantity, quality and water availability or basin water budgeting through application of the proper scientific knowledge and mathematical principles.
- The hydrologist studies the fundamental transport processes to be able to describe the quantity and quality of water as it moves through the hydrologic cycle (evaporation, precipitation, streamflow, infiltration, groundwater flow, and other components).
- Hydrologists estimate the volume of water stored underground by measuring water levels in local wells and by examining geologic records from well-drilling to determine the extent, depth and thickness of water-bearing sediments and rocks. Before an investment is made in full-sized wells, hydrologists may supervise the drilling of test wells. They note the depths at which water is encountered and collect samples of soils, rock and water for laboratory analyses. They may run a variety of geophysical tests on the completed hole, keeping and accurate log of their observations and test results. Hydrologists determine the most efficient pumping rate by monitoring the extent that water levels drop in the pumped well and in its nearest neighbors.
- The engineering hydrologist, or water resources engineer, is involved in the planning, analysis, design, construction and operation of projects for the control, utilization, and management of water resources.
- He may also deal with the study concerning the municipal water supply, irrigation water supply and management, mitigation of floods and droughts, integrated watershed management, ground water recharge and solving reservoir sedimentation problems.
- Scientists and engineers in the field of hydrology may be involved both in the field investigation and office work.
- In the field investigation, they may collect basic hydrological, geological, meteorological and water quality data, sometimes from remote and rugged terrains with use of measuring instruments and equipments. While, in the office, they may do many jobs that includes the assessment of water quality in the laboratory, remote sensing data processing and analysis using GIS, interpretation and analysis of field data, modelling studies for flood hazards mitigation, groundwater replenishment, water-logging problems, sea water intrusion, reservoir operations in the command area and assessment of their impacts on environment.

International Decade for Action Water for Life 2005–2015

World Water Day, 22 March 2005, heralded the start of the International Decade for Action proclaimed by the United Nations General Assembly. 'Water for Life' calls for a coordinated response from the whole United Nations system. The timing is significant: the end of the action decade in 2015 is the target date for achievement of many of the Millennium Development Goals (MDGs). Those goals were amplified by the 2002 World Summit on Sustainable Development in the Johannesburg Plan of Implementation, which set the following target:

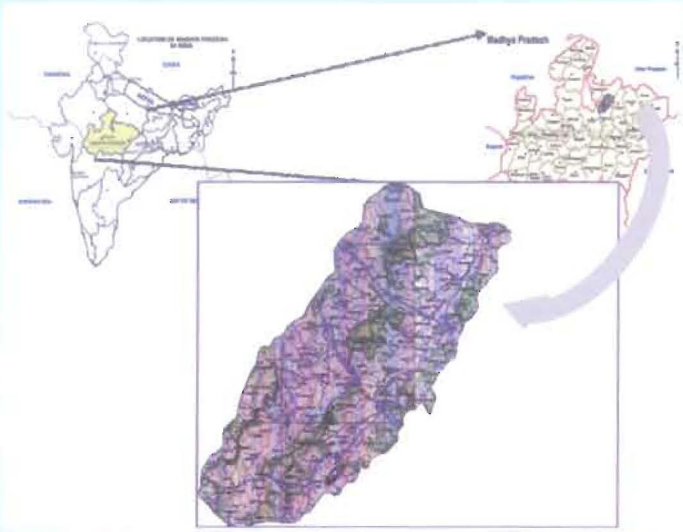
HALVE, BY 2015, THE PROPORTION OF PEOPLE WITHOUT SUSTAINABLE ACCESS TO SAFE DRINKING WATER AND BASIC SANITATION.

PROJECTS SOLVING REAL LIFE PROBLEM

Impact of Climate Change on Dynamic Groundwater Recharge in a Drought Prone Area

This study focuses on impact assessment of climate change on groundwater recharge and simulation of the groundwater levels and investigation of the temporal response of the aquifer system to historic and future climate periods in the Sonar sub-basin, Madhya Pradesh. Sonar sub-basin (See the figure) falls in Bundelkhand region of Madhya Pradesh, India. Sonar river is a tributary of Ken river. This basin lies between Latitude of 23°21'14"–23°50'05" and Longitude of 78°35'48"–79°10'50" E having geographical Area of 1,528 sq.km.

The major findings of this study are summarised as follows:



Historical rainfall and temperature show declining and increasing trend, respectively (1972-2003), as a result future rainfall has a declining trend for the baseline scenario.

As compared to baseline scenario:

- Change in temperature during 2010-2039 under A1F1 and B1 scenarios is +1.27 and +1.22 oC, respectively.
- Change in rainfall during 2010-2039 under A1F1 and B1 scenarios is +3.0 and +4.4%, respectively.
- Change in GW recharge during 2010-2039 under A1F1 and B1 scenarios is +2.1 to +3.8% and +1.8 to +6.1%, respectively.
- Change in GW levels during 2010-2039 under A1F1 and B1 scenarios is +8.0 and +14%, respectively (See the figure).

Additional recharge required to maintain the sustainable GW levels is 4.3% more recharge, which is 0.6% of average annual rainfall.

Study may be used as decision support for:

- Developing scenarios of GW levels for various recharge conditions.
- Volume of artificial recharge required for GW sustainability.

Feasibility study of surface water and groundwater availability including identification of potential groundwater recharge sites in the CIFMR campus, Dhanbad

The CIMFR campus meets its water supply requirements for population of 2400 by pumping groundwater with the help of number of open and bore wells installed within the campus, the CIMFR has planned to accommodate population of about 4800, in future. The CIMFR wanted to know; (i) the availability of groundwater in terms of quantity and quality to cater to the existing and the future demands, and (ii) conservation and management practices to be adopted for sustainable groundwater supply to the campus. The CIMFR campus has an area of 65.5 ha. The campus comprises of three distinct zones, namely; Housing Zone, Institutional Zone and Restricted Research Zone (Figure 1).

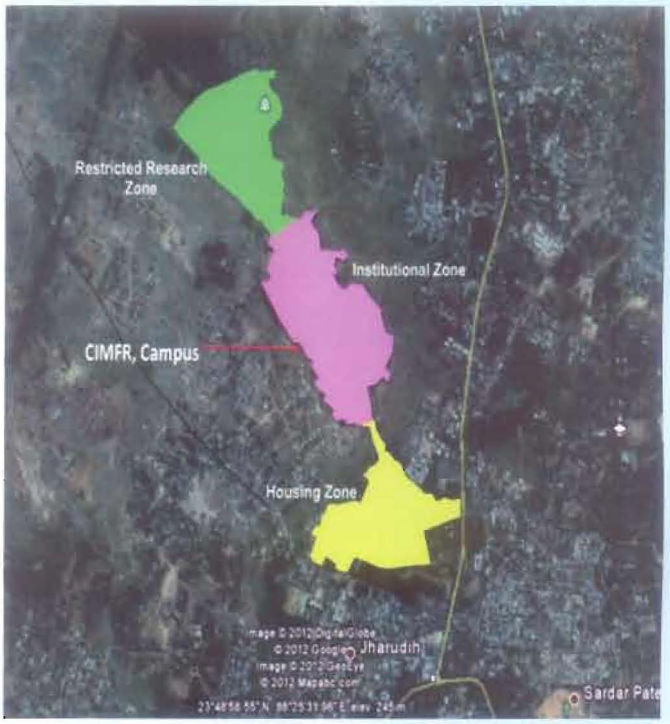


Figure1. Location map of Study area

Based on the analysis following recomm-endations have been given:

(I) The CIMFR campus is located on Gneiss fissured formation, which normally posses low aquifer properties to provide safe and sustainable yield. Already, 11 open/tube wells are in operation within an area of 655300 sq. m. These wells are pumped for about 16-21 hours in a day to meet present water demand. Therefore, Installation of additional 9 tube wells and pumping those for about 21 hours in a day along with the RRWH and feasible surface water conservation schemes may create some operational hazards like; some wells may go dry due to long duration of pumping in day. Therefore, it is suggested as non favorable proposition.

(ii) It was, therefore, strongly recommended that CIMFR should look forward for alternate sustainable water supply arrangements, preferably surface water based supply scheme to meet future additional water supply

requirements. Dual water supply sources can be implemented; partly from available groundwater source, i.e., continuation of the present arrangements, and the other part, particularly the additional water requirements can be transported from the nearby surface water based scheme.

Identification of Recharge Zones of Some Selected Springs of Uttarakhand Using Isotopes

There are a number of springs in Uttarakhand which are facing problem of reduction in discharges over the years. A request has been received from Uttarakhand Jal Sansthan, Dehradun to study the springs of about 10 districts which are the only sources of water in their respective regions, so that conservation and management measures can be suggested for these springs based on scientific investigations. Four springs namely Ratoli, Moli, Gothiyara and Kandha Dhangi, located in the Chandrabhaga watershed in Jakhanidhar block, Devprayag in Tehri Garhwal district of Utarakhand in the catchment of river Bhagirathi have been selected for study. The terrain of the study area is highly rugged and hilly with steep slopes. The altitude varies from 800-2300 m. The Ratoli spring is located at 2140 m, Moli Spring at 1942 m, Gothoyara Spring at 1872 m and the Kandha Dhangi spring at 1005 m altitude. The geological formation of the study area consists of greenish grey slaty and schistose phyllite inter-bedded with quartzite. The soils are generally shallow, varying in texture and depth.

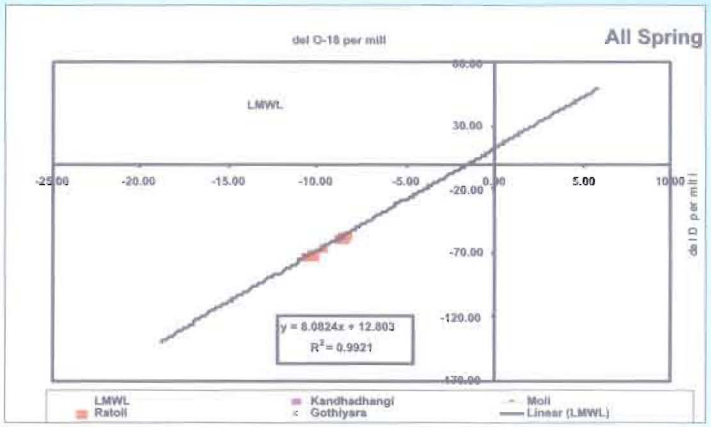


Figure. Isotopic variation of springs vis-à-vis the Local Met. Line

Analysis of the variation of rainfall versus-spring discharge indicates a delayed response of the springs to the rainfall as far as discharge is concerned.

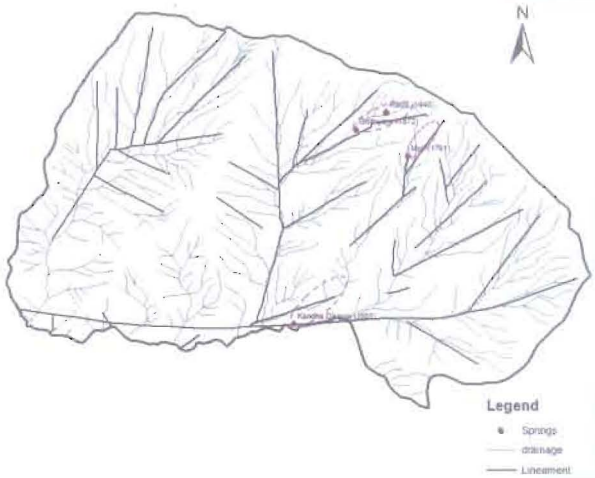
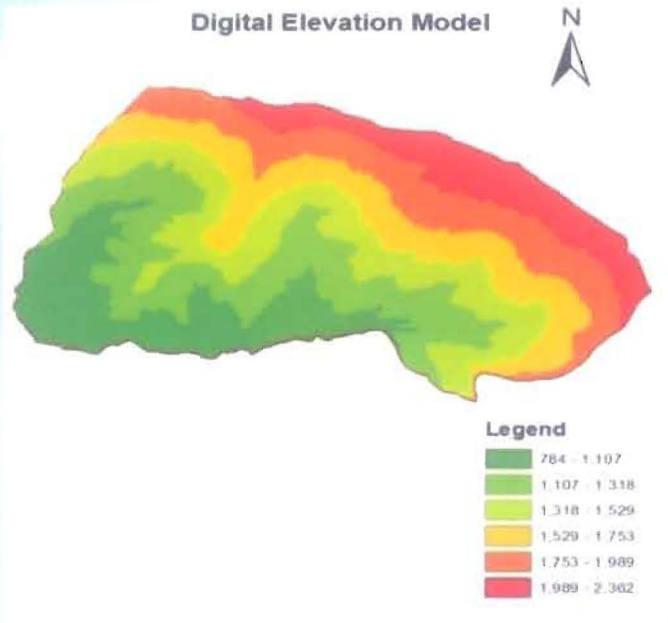
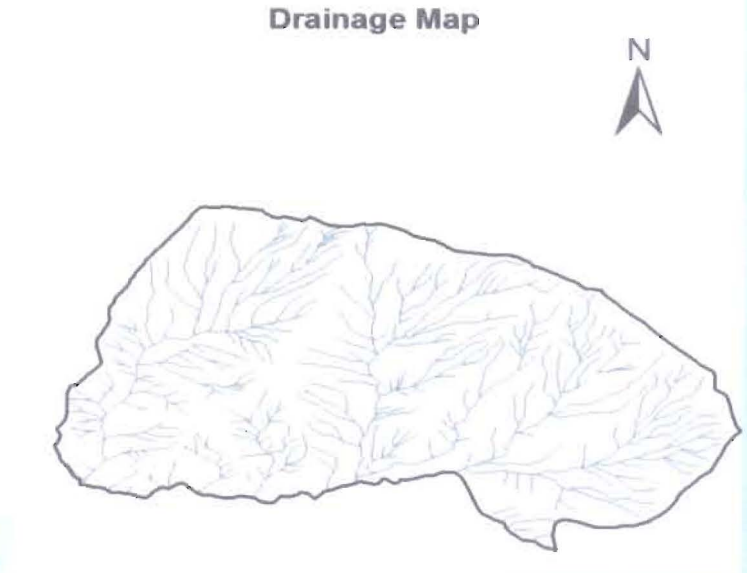


Figure: Recharge zones of springs

However, the response time of different springs vary. Analysis of the δ-O^{18} data of the three locations





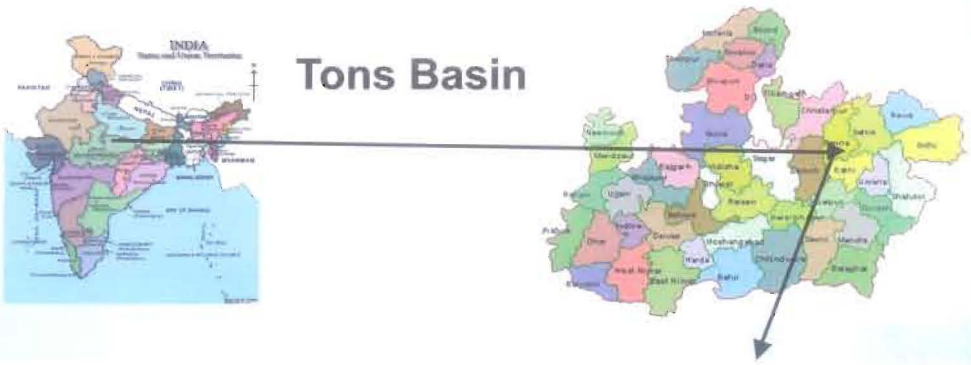
indicate that the area receives some local rainfall during October to mid July and the isotopic signatures are enriched. The enrichment is especially more during the summer months of April to June, indicating effect of evaporation. However, heavier rainfall received thereafter during the monsoon causes depleted isotopic signatures. It is found that effect of altitude for ^{18}-O can be estimated by δ-^{18}O = - 0.0026x Altitude – 7.9097.

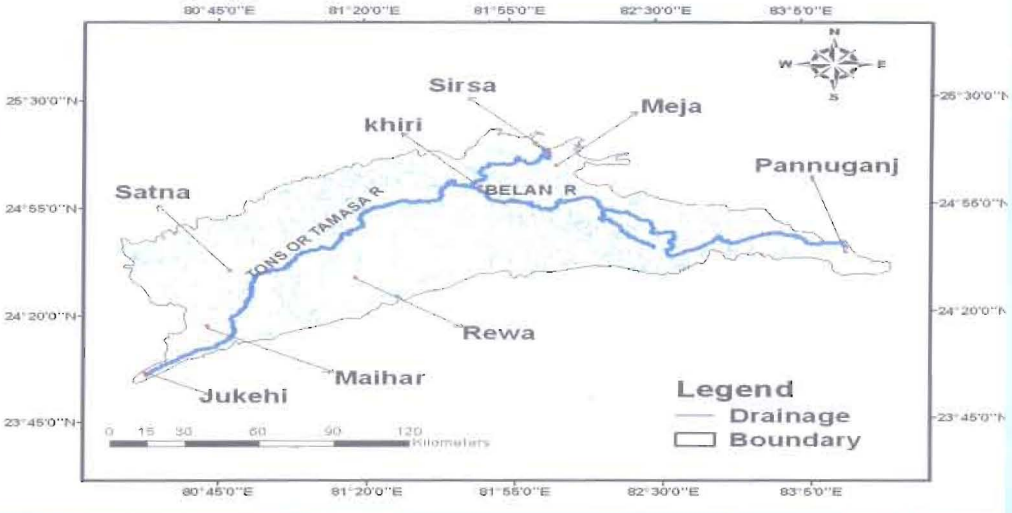
Study on integrated water resources management to cope with droughts

In this study, Tons River Basin (Madhya Pradesh), which is located between latitudes of 240 55' and 250 07' N and longitudes of 790 38' and 800 01' E, has been selected as study area/region (See figure). This river basin experiences dry sub-humid climate and receives average annual rainfall of about 1022 mm. The Ton River flows through undulating topography. Major share of the water is used by agricultural followed by domestic supply and industries. This area experiences the recurrence of drought, unprecedented economic losses and great suffering to the affected areas, reduced agricultural production and famine threat, limited and scarce water resources, huge water demand for agriculture, increased demand at a rapid rate due to demographic shifts and lifestyle changes.

Therefore, this study was taken with the specific objectives to: (a) develop inventory of drought events and water resources in the study area/region (b) classify zones vulnerable to drought in the study sub-basin (s) (c) identify strategy to use surface and groundwater resources in drought situations (d) study the water budgeting and water availability in the study basin/sub-basin (e) evaluate alternative means for minimizing adverse impacts of droughts, and (f) to device integrated water management strategies for minimizing water stress on crops, human and animal life during drought situation.

On the basis of this study, it has been found that (1) average Frequency of drought occurrence in the basin is once in every five years (2) maximum deficiency of seasonal & annual rainfall experienced in the basin is in the order of 60% and 58%, respectively (3) dry spells of more than two weeks duration often cause water stress to rainfed crops during monsoon (4) frequency of dry spells occurrence is once in every two year on an average (5) Maihar, Nagod, Mauganj and Hanumana blocks in the basin are relatively more vulnerable to sever water shortages during drought events (6) there is no major/medium storage schemes in these blocks (7) lean season water supply in these blocks largely





depends on the ground water (8) Govindgarh tank and Bansagar canal can be the strategic sources for water supply in parts of Rewa, Rampur and Sirmaure, Blocks during drought (9) seasonal rainfall during the monsoon has shown insignificant declining trends while in winter season increasing trends have been found in all the RG station (10) estimates of ETo show decreasing trends and require careful verifications of results. ETc for paddy and Soyabean are more than effective rainfall and need supplemental irrigation to save from critical dry spells (11) stream flow records show substantial depletion in lean season flow at Satna and Meja Road sites in Tons river and (12) there exists significant potential for storage of monsoon runoff to meet lean season water supplies in vulnerable blocks .

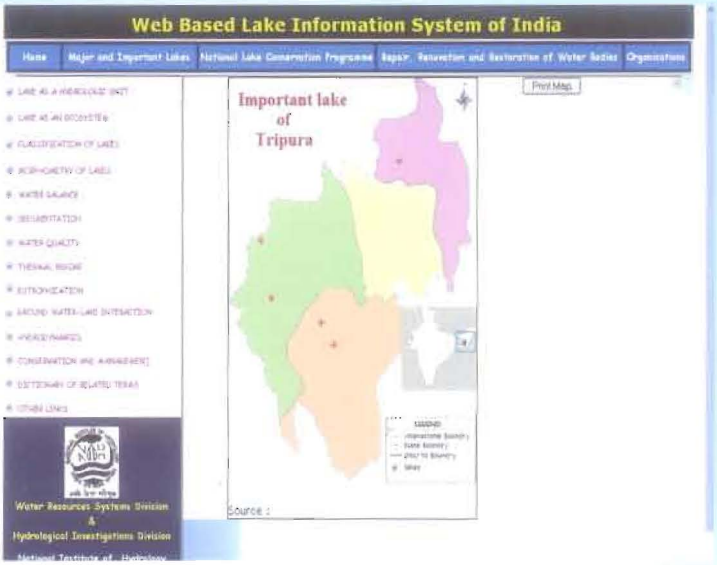
Web based Information System for Major and important Lakes in India

A web based information system WEBLIS (WEb Based Lake Information System) software has been developed to provide hydrological and limnological information related to major and important lakes of India. The lakes have been arranged state wise, and within a state district wise. A mini dictionary of the important terms related to Lake Hydrology and Limnology for the ready reference of the users has been incorporated. Important notes on various aspects of Lake Hydrology such as lake classification, morphometry, water balance, sedimentation, water quality etc have been provided.

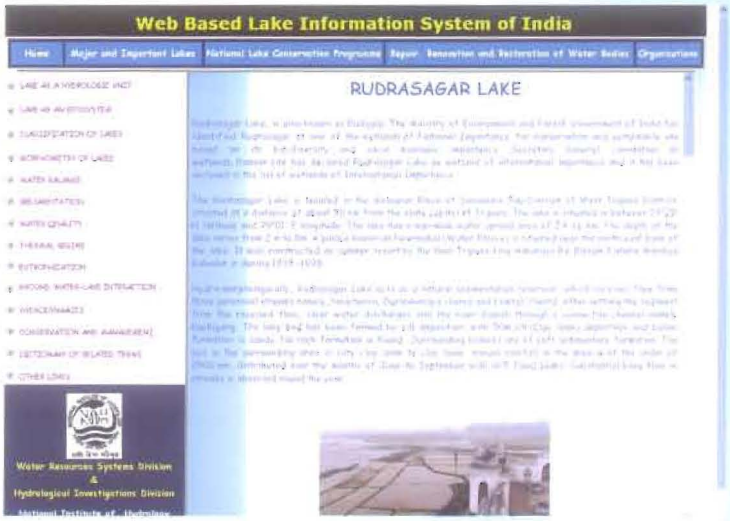
The main screen of the WEBLIS is shown below in the Figure.

The software would be of help to all those who are working in the area of lake conservation and management. This information would also be of help to the policy makers, managers and field engineers who are directly involved in the management and conservation of the lakes.

The lakes have been marked on the clickable maps of different states as given below (e.g. the clickable map of Tripura).



After developing the individual web page for the lakes, these web pages have been linked to the main page. The web page for Rudrasagar lake is shown below.



Vetting of Water Availability studies of the Gulf of Khambhat Development Projects (Kalpasar Project)

The Kalpasar project visualizes a gigantic fresh water lake-dam to be created by closing the Gulf of Khambhat (in the Arabian Sea) and thereby harness the excess water of Narmada, Mahi, Sabarmati, Dhadar rivers and other small rivers for generating tidal power, irrigation, drinking and industrial purposes. A road link will also be set up over dam to reduce the distance between Saurashtra and South Gujarat. The project has been sponsored by Narmada, Water resources, Water supply, and Kalpasar Department, Govt. of Gujarat with objectives to review the water availability study of Gulf of

Khambhat, Development Project carried out by the Central Designs Organisation (CDO), Govt. of Gujarat. The envisaged objectives are: (a) to check the database development for the study, and (b) to check the methodology adopted in the study, computational steps, model runs taken, and the results obtained.

The CDO, Gandhinagar has carried out studies for different river basins and the reports were provided to NIH for the observations. After detailed studies of the reports and after discussing various aspects with the officials of Gujarat Government during the field visit in August/September 2010, the comments on the studies were submitted to the Kalpasar Department. The database for the study has been revised and for some basins, major changes have been introduced in the methodology

Integrated water resource management for Manimala River basin, central Kerala

The project was taken up in collaboration with the Kerala Irrigation Department. This study was accomplished to fulfill the following objectives: (a) to make a detailed study of Manimala river basin to gain knowledge about the soil, land use, geology, meteorology and hydrology (b) to assess the adequacy of the existing gauge network to completely represent the hydrological characteristics of the basin (c) collection and analysis of historical hydro-meteorological data (d) to assess water demand under existing and future conditions (e) to develop alternatives and strategies to manage water resources (f) to evolve strategies to protect the water quality (g) to identify existing and future water resource infrastructure needs and to develop plans to address them.

Analysis of sediment data reveals that average annual sediment yield estimated for this basin was 74.50 t/sq. km, average annual discharge was 1732 Mm3, average annual sediment load was 54458.3 ton. The monsoon (SW and NE) months yields 91 % of the discharge and 92 % of sediment load and sediment yield rate (Denudation rate) was 0.05 mm/year. Sediment load shows large decreasing trend corresponding to an almost steady trend in discharge values. This may be due to large sand mining prevalent in the river basins.

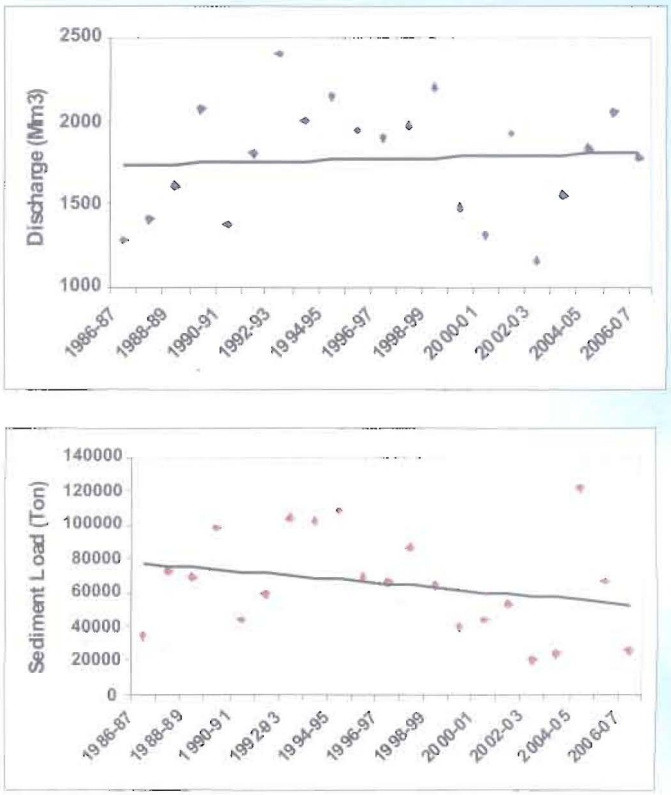


Figure: Trend in Discharge and Sediment Load at Kallooppara (CWC)

	Utilisable Water Potential		
	Surface (MCM)	Ground (MCM)	Total (MCM)
Manimala Basin	888 [835 (M) and 53 (NM)]	245 [123 (M) and 122 (NM)]	1133 [958 (M) and 175 (NM)]
High Land	348	108	456
Mid Land	540	55	595
Low Land		82	82
	M - Monsoon	NM- non-monsoon	

Analysis of Groundwater data reveals that pre-monsoon level data indicates not much reduction in water levels over the years. Subsequently, the average water level fluctuation was 0.75 to 3.5 m for lowland region, 0.6 to 5 m for midland region, and 0.8 to 4.2 m for highland region.

In this study, rainfall - runoff modelling carried out in MIKE-BASIN Model (See Fig.)

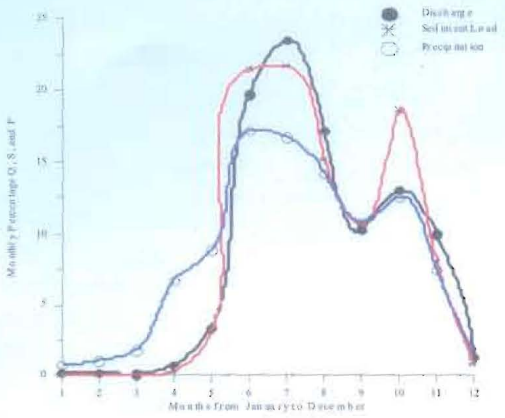


Figure: Monthly Contribution of Rainfall-Discharge-Sediment Yield

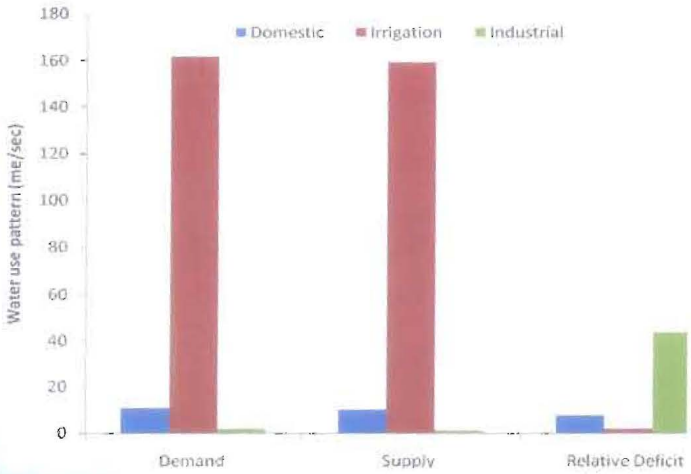


Figure: Water use pattern and deficit for various users in the catchment

Present status of salinity ingress in the coastal Andhra Pradesh, Tamilnadu and prediction of Impact due to the sea level rise in varying climatic conditions.

This project was undertaken with the aim to study the: (a) status of present groundwater salinity ingress in the coastal regions (b) status of coastal areas inundation due to sea level rise in varying climatic conditions, and (c) to identify the most vulnerable areas for salinity ingress in the coastal areas. The impact of sea level rise along Andhra Pradesh and Tamilnadu coast are evaluated. Finally, the most vulnerable areas of salinity ingress were identified.
The critical areas of salinity ingress were identified from the literature and historical groundwate database collected from state and centra departments of Andhra Pradesh and Tamilnadu. Ir Andhra Pradesh, salinity ingress occurs in the areas o Prathipadu, Kathipudi, Tuni, Amalapuram, Cheyyeru and Pedagadimoga of East Godavari district. In Krishna district, the salinity ingress is in Nandivada, Mandavalli, Kaikaluru areas and in Prakasam district, the salinity ingress areas are Addanki, Podili and Darsi. In Tamilnadu, salinity ingress was found in Minjur, Mothambedu and Besant Nagar of Chennai city. The area surrounding Pitchavaram Mangrove area of Cuddalore district, Northern side of Thambiraparani River and Udankudi of Thoothukudi district was also affected by salinity ingress. In Vaippar and Gundar basin heavy pumping of sand dune aquifers results in upward movement (up-coning) of underlying saline water causing a permanent damage to the hydrological regime.

An analysis at Mouthambedu Area of Minjur Block reveals that:

1. During 1995, the sea water and fresh water interface was 13 km from the coast and it was 16 km from the coast during May 1998.
2. The approximate rate of saline water movement is 2.74 m/day.
3. Electrical conductivity for three aquifers shows that the entire middle and bottom aquifers of the study area have been contaminated up to 16 km distance from the coast.
4. The shallow aquifer, having direct infiltration of rainfall with very limited extraction, has moderate quality of water.
5. It was suggested that the pumping in Minjur well field be stopped and also artificial recharge for groundwater with reservoir or floodwater
6. Series of recharge tube wells established in the east of Minjur on North South Direction parallel to coast and freshwater ridge arrest the interface movement further west.

Sl. No.	Location	EC values of Piezometers in Micromhos/cm		
		A (Bottom)	C (Middle)	D (Top)
1	Koranjiyur	52000	15000	7100
2	Pattamandiri	2800	2400	1480
3	Kattur	3250	2760	---

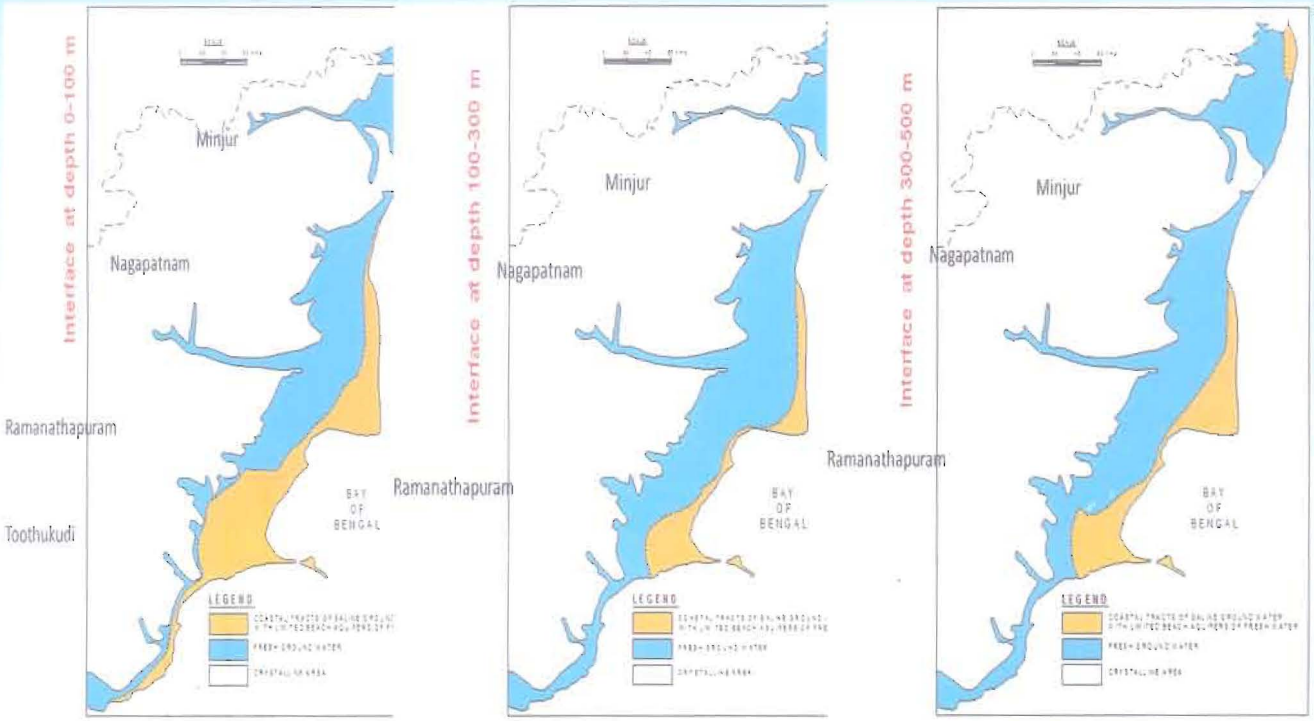


Figure: Fresh - Saline groundwater interface in Tamil Nadu & Puducherry region

Analysis of long-term tide gauge data from various stations along the Indian coastal regions indicated that sea levels are rising at a rate of about 1.0 – 1.75 mm per year due to global warming. The submergence area covered within +5 m elevation along the 970 km long coastal zone is about 10,026 sq km. Owing to the extremely gentle nature of slope in this coastal zone, the 5 m contour lies up to 30 km inland. The submergence area between the shoreline and 1.5 m contour, about 1906 sq km of which 812 sq km (42.60 %) is within the Krishna-Godavari delta region alone. Where as in Tamilnadu, 1m rises in average sea level permanently inundate about 1091 sq km inland area. The land submergence area of 1, 2, 3, 5 and 10 m sea level rise in Tamilnadu coast is around 1091, 1628, 2288, 3834 and 7796 sq km respectively. Most vulnerable salinity ingress areas have been identified for further detailed studies.

Hydrology Project-II

NIH is the nodal agency for the development of Decision Support System (Planning) for Integrated Water Resources Development and Management to be implemented in 6 Central and 9 States Agencies under HP-II. The DSS(P) consultants are working on the development and implementation of the Generic DSS(P) software for the "Upper Bhima" pilot basin in Maharashtra.

The Purpose Driven Studies (PDS) is another subcomponent under the vertical component wherein the Institute is actively participating with State and Central Agencies in carrying out 11 PDS. The Institute has conducted 52 training programs/ workshops since inception of the project on the specialized topics of hydrology, data processing software SWDES & HYMOS and demand driven trainings for the State and Central implementing Agencies.

New Initiatives: Pilot Basin Studies

NIH proposed to undertake six pilot IWRM-based Pilot Basin Studies in different locations namely 1. Deltaic Regional Centre, Kakinada 2. Hard Rock Regional Centre, Belgaum 3. Western Himalayan Regional Centre, Jammu 4.Regional Centre, Bhopal 5. Centre for Flood Management Studies (CFMS), Patna and 6. Centre for Flood Management Studies (CFMS), Guwahati) covering various agro-ecological regions in India. With availability of its functional field units in these regions (RCs and CFMSs), NIH plans to establish advanced instrumentation systems for data collection and storage from these Pilot Basins. Analysis and modeling using state-of-art software models would be carried out on the data collected to derive meaningful results and findings for ultimate implementation and use by the stakeholders. With the help of specialists from other disciplines, the various stakeholders, including the local community, would be involved at different stages of planning, execution, evaluation, impact assessment, etc. It is hoped that the pilot studies would provide useful insight into the propagation of IWRM concept for sustainable development of water resources with community participation, which could be replicated on other areas.

Important information about water related websites/portals

India-WRIS
http://www.india-wris.nrsc.gov.in/

About Water Conferences

Water-conferences.com provides a central resource for planning your attendance at these events, and for determining which events will be most relevant, timely and convenient for your organization. You can filter events by topic, date, or location, share them with colleagues, or add them instantly to your calendar.
http://www.water-conferences.com

Publications in Journal

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- Krishna,B., Satyaji Rao,Y.R. and Nayak,P.C. (2012). "Wavelet Neural Network model for River Flow Time Series", Accepted in International Journal of Water Management (WATER-D-10-00092).
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- Lohani, A.K., Rakesh Kumar, R.D. Singh. Hydrological time series modeling: A comparison between adaptive neuro-fuzzy, neural network and autoregressive techniques, Journal of Hydrology, In Press, Available online.
- Singh, S.K.,"Groundwater mound due to artificial recharge from rectangular areas", Journal of Irrigation and Drainage Engineering, ASCE, 138(5), May 2012, 461-465.
- Singh, S.K., "Closure to 'New methods for aquifer parameters from slug test data', by Sushil K. Singh" Journal of Irrigation and Drainage Engineering, ASCE, May 2012, 138(5), 489-490.
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- Singh, S.K.,"Closure to 'Simple approximation of well function for constant drawdown variable discharge artesian well', by Sushil K. Singh" Journal of Irrigation and Drainage Engineering, ASCE, May 2012, 138(5), 491-492.
- C.K. Jain and R.D Singh (2012), Technological options for the removal of arsenic with special reference to South East Asia, Journal of Environmental Pollution, 2012 (DOI: 10.1016/j.jenvman.1012.04.016).

Workshop/Conference/Symposium attended by the Scientists/Staff

S. No.	Title	Duration	Place
1.	3rd special course on "High Resolution Image Analysis for Natural Hazard Assessment"	Jan.2-20, 2012	IIRS, Dehradun
2.	IITM Golden Jubliee Int. Conference on "Opportunities and Challenges in Monsoon prediction in a changing climate"	Feb.21-25, 2012	IITM, Pune
3.	International Conference on "Geospatial technologies an applications" organized by Centre of Studies in Resources Engg. (CSRE),	Feb.26-29, 2012	IIT, Bombay
4.	46th Annual Convention of Indian Convention of Indian Society of Agricultural Engineers (ISAE) and International Symposium on Grain Storage"	Feb.27-29, 2012	G.B. Pant Univ. Pantnagar
5.	Training Course on "Pre -fabrication in concrete structures: materials and technology" organized by National council for Cement and Building Materials, Hyderabad	March 6-8, 2012	NCB, Hyderabad
6.	National Conference on "Knowlegde Sharing & IP Management Evolving Strategies in India"	March 25, 2012	Roorkee
7.	International Sym. On "Cryosphere and Climate Change" organized by Defence Research & Development Organisation Snow and Avalanche Study Establishment (SASE)	April 2-4, 2012	Manali

8.	International Conference on "India Water Week-2012"	April 10-14, 2012	NWDA, New Delhi
9.	Training Program on "Industrial & Municipal Reuse & Recycle" Organised by EA Water Pvt. Ltd.	April 20-21, 2012	IGNOU, New Delhi
10.	Training Program on "Industrial Wastewater Management" organized by Continuing Education & Quality Improvement program, IIT Bombay	April 24-25, 2012	IIT, Bombay
11.	Short term training course on "RS & GIS Application to WR"	May 7- June 29, 2012	IIRS, Dehradun
12.	National Seminar on "Applications of Isotopes & Radiation Technology for Societal Benefits – AIRTS 2012, Organised by Deptt. of Envir. Science, Banglaore Univ., Jnanabharathi, Bangalore	June 21-23, 2012	Bangalore Univ., Bangalore
13.	International meet on "Impact of Climate Change on Water Resources Development and Management" organized by Karunya University, Karunya Institute of Technology and Sciences, Coimbatore	Aug. 17-18, 2012	Coimbatore
14.	International Conference on "Water Security on Sustainable Basis" orgainsed by Indian Water Works Association (IWWA)	Aug.24-25, 2012	Goa
15.	28th National Convention of Civil Engineers & National Seminar on "Role of Infrastructure on Sustainable Development"	Oct.12-14, 2012	Roorkee
16.	National Symposium on Progress in Electronics & Allied Sciences (PEAS-2012) organised by Faculty of Engg. & Tech., NWA, Pune	Nov.3-4, 2012	GKU, Haridwar
17.	TROPMET-2012 National Symposium on "Frontiers of Meteorology with Special Reference" organised by Indian Meteorological Society, D.dun	Nov.18-22, 2012	Dehradun
18.	7th Uttarakhand State Science and Technology Congress-2012	Nov.21-23, 2012	Dehradun
19.	Seminar of BIS on "Dams & Spillway in Himalayan Region"	Nov.30, 2012	New Delhi
20.	"HYDRO-2012" Conference on "Hydraulics, Water Resources, Coastal and Environmental Engineering" organised by IIT Bombay & Indian Society for Hydraulics	Dec.7-8, 2012	Mumbai
21.	30th & 31st AHI Annual Conventions & National Seminar on Hydrology, Hydrocare 2012 @ GRI -DU with a special Colloquim on Geomatics in WR organised by Association of Hydrologists of India, Deptt. of Geophysics, Andhra Unive. Visakhapatnam	Dec.11-12, 2012	Gandhigram Rural Institute, Dindigul Dist. Tamil Nadu

Organization of Workshops/ Training Courses / Seminar / Symposia

S. No.	Topic of Training/ Workshop /Symposia	Date	Venue
1.	DSS(P) Workshop	Jan. 9-13, 2012	Roorkee
2.	DSS(P) Workshop	Jan. 16-20, 2012	Pune
3.	Data Processing and validation using SWDES & HYMOS	Jan. 30 – Feb.2, 2012	Bhopal
4.	Water Resources Management in Changing Environment (WARMICE-2012)	Feb. 8-9, 2012	Roorkee
5.	Climate Change & its Impact on Water Resources	Feb.6-10, 2012	Belgaum
6.	Basic Hydrology	Feb.14-16, 2012	WALMI, Anand
7.	Methodologies of monitoring hydrological impacts of sand mining in major rivers	Feb.23-24, 2012	Hyderabad
8.	DSS Planning Workshop on DSS Customization for Andhra Pradesh, Kerala, and Tamil Nadu	March 2, 2012	New Delhi
9.	Awareness of Hindi in technical work	March 9, 2012	Roorkee
10.	Remote Sensing, GIS and GPS for Engineers of Water Resources Deptt., Karnataka	March 19-22, 2012	Mysore

11.	Hydrological Investigations for Conservation and Management of Lakes	March 26-28, 2012	Roorkee
12.	Bank Filtration for Sustainable drinking supply in India Under the Saph Pani	April 13, 2012	New Delhi
13.	Hydrology Online	May 18-19, 2012	Roorkee
14.	Implementation of ISO 9001: 2008	July 24-27, 2012	Roorkee
15.	IWRM Studies on Yerrakalva basin (PBS)	Aug. 31, 2012	Eluru, A.P.
16.	Hydrological investigation techniques for water resource development & management	Aug.27-30, 2012	Roorkee
17.	Application of Remote Sensing and GIS in Hydrology	Sept.11-13, 2012	Belgaum
18.	Hydrologic modeling using RS/GIS with special reference to climate change	Sept. 24-28, 2012	Roorkee
19.	Storm water modeling in urban areas	Sept.27-28, 2012	Kakinada
20.	Internal Quality Auditor's Training Programme on ISO 9001:2008 QMS	Oct.1, 2012	Roorkee
21.	Advance soft computing techniques in Hydrology & its application	Oct.29-Nov.2, 2012	Roorkee
22.	Hands on advanced instruments of water quality testing	Nov.19-23, 2012	Roorkee
23.	How to maintain the service book of Govt. Employees	Nov. 22, 2012	Roorkee
24.	Processing of firm bills regarding Procurement & others services	Nov.29, 2012	Roorkee
25.	Managed Aquifer Recharge:Methods, Hydrogeological Requirements, Post & Pre-treatment Systems	Dec. 11-12, 2012	Anna Univ., Chennai

Important Meetings

S. No.	Date	Meeting - Subject	Place
1.	13.1.2012	3rd meeting of the Expert Committee on Climate Change Program (EC CCP) of DST	New Delhi
2.	25.1.2012	Wrap up meeting with the World Bank and Principal Secretaries of State IAs and Head of the Central IAs of HP-II	New Delhi
3.	31.1.2012	Function of releasing the draft National Water Policy-2012 by the Hon'ble Minister for Parliamentary Affairs and Water Resources	New Delhi
4.	2.2.2012	7th meeting of Review Committee for Customization of DSS(P) for the State of Karnataka, Madhya Pradesh and Orissa	Bangalore
5.	6.2.2012	'Interactive meeting on basin level studies with respect to Impact of Climate Change on Water Resources'	New Delhi
6.	28.2.2012	Meeting of the 'Committee to examine and suggest further actions on the recommendations of studies on performance evaluation of NIH in respect of activities under X Plan of NIH'	New Delhi
7.	21.3.2012	13th meeting of reservoirs & lakes sectional committee, WRD-10 at BIS	New Delhi
8.	22.3.2012	8th meeting of Review Committee for DSS(P) under HP-II	Gandhinagar, Gujarat
9.	10.4.2012	Inaugural Function of India Water Week 2012 organized by MoWR	New Delhi
10.	16.4.2012	28th meeting of Standing Committee of NIH	New Delhi
11.	4.5.2012	21st meeting of Regional Coordination Committee of DRC, Kakinada, NIH	Kakinada
12.	8-12.5.2012	Review meeting of project 'Saph Pani Project-Enhancement of National Water Systems and Treatment Methods for Safe and Sustainable Water Supply in India'	Basel Switzerland
13.	22.6.2012	29th meeting of the Standing Committee of NIH	New Delhi

14.	1-3.8.2012	22nd Meeting of Regional Coordination Committee of NIH-HRRC, Belgaum	Belgaum
15.	16.8.2012	First meeting of Indian National Committee on Climate Change (INCCC)	New Delhi
16.	4-6.9.2012	18th RCC meeting of WHRC, Jammu Attended meeting with the Hon'ble Minister of Water Resources, Govt. of J&K	Jammu Srinagar
17.	1.10.2012	Expenditure Finance Committee meeting on the Scheme "Research & Development Programme in Water Sector" during XIIth Plan	New Delhi
18.	22.10.2012	Expert Committee meeting of PASCO Project at MoEF	New Delhi
19.	19.11.2012	Consultative Committee meeting of National Water Mission under the Chairmanship of Hon'ble Union Minister of Water Resources at MoWR	New Delhi

Mass Awareness

Events Organised

An awareness program on "Water Quality "was organized at district level under the ongoing PDS at Kerala in collaboration with State Groundwater and Irrigation Departments. The details of the program arranged are given below:

18.01.2012 : at Ernakulam (for Ernakulam district)
15.02.2012 : at Trivandrum
16.02.2012 : at Kollam (for Kollam & Pathanamthitta districts)
17.02.2012 : at Kottayam (for Kottayam and Idukki district)

Other

09.05.2012 : at Roorkee (World Water Day)
15.08.2012 -14.09.2012 : at Roorkee (Hindi Mas)
29.10.2012-02.11.2012 : at Roorkee (Vigilance Awareness Week)
19.11.2012 : at Roorkee (Water Conservation & Water Quality)

Other News

Distinguish Visitor's Lecture

1. Prof. Chong-Yu Xu, Department of Geosciences, University of Oslo delivered a lecture on "Hydrological Modeling in Changing World" March 27, 2012 at NIH, Roorkee.

Retirement

1. Dr. V.K. Choubey, Sc.F
2. Sh. A.P. Chamoli, Sr. AO
3. Sh. A.K. Dwivedi, Sc.C
4. Sh. S.P. Sharma, Supdt.
5. Sh. R.D. Garg, S.O.
6. Sh. R.K. Garg, Draftsman Gr.I
7. Sh. Vijay Kumar, Mess.

Institute's Important Meetings

1. 72nd Governing Body meeting, held at New Delhi on January 27, 2012
2. 32nd Annual General Meeting, held at New Delhi on March 10, 2012.
3. 36th Working Group Meeting, held at Roorkee during April 3-4, 2012.
4. 65th Meeting of Technical Advisory Committee (TAC), held at CWC, New Delhi on May 14, 2012.
5. 37th Working Group Meeting, held at Roorkee during October 29-30, 2012
6. 73rd Governing Body Meeting of NIH, held at New Delhi on Dec. 3, 2012

32nd Annual General Meeting, 2012

36th Working Group Meeting, 2012

65th Technical Advisory Meeting, 2012

UpComing Events

3rd National Conference on "Innovations in Indian Science Engineering & Technology" from Feb. 25-27, 2013 at CSIR-National Physical Laboratory and IARI, New Delhi.

Water Resources Management in Changing Environment (WARMICE-2012), Feb.8-9, 2012, Roorkee

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We Will Appreciate Your Guest Articles!

You can share your knowledge with others on topics highlighting 'water resources for community benefits' by contributing an article to the Guest Article Column. For more information, please contact: Dr V C Goyal, vcg@nih.ernet.in or vcgoyal@yahoo.com

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Printed by : Anubhav Printers, Rke 9719004321