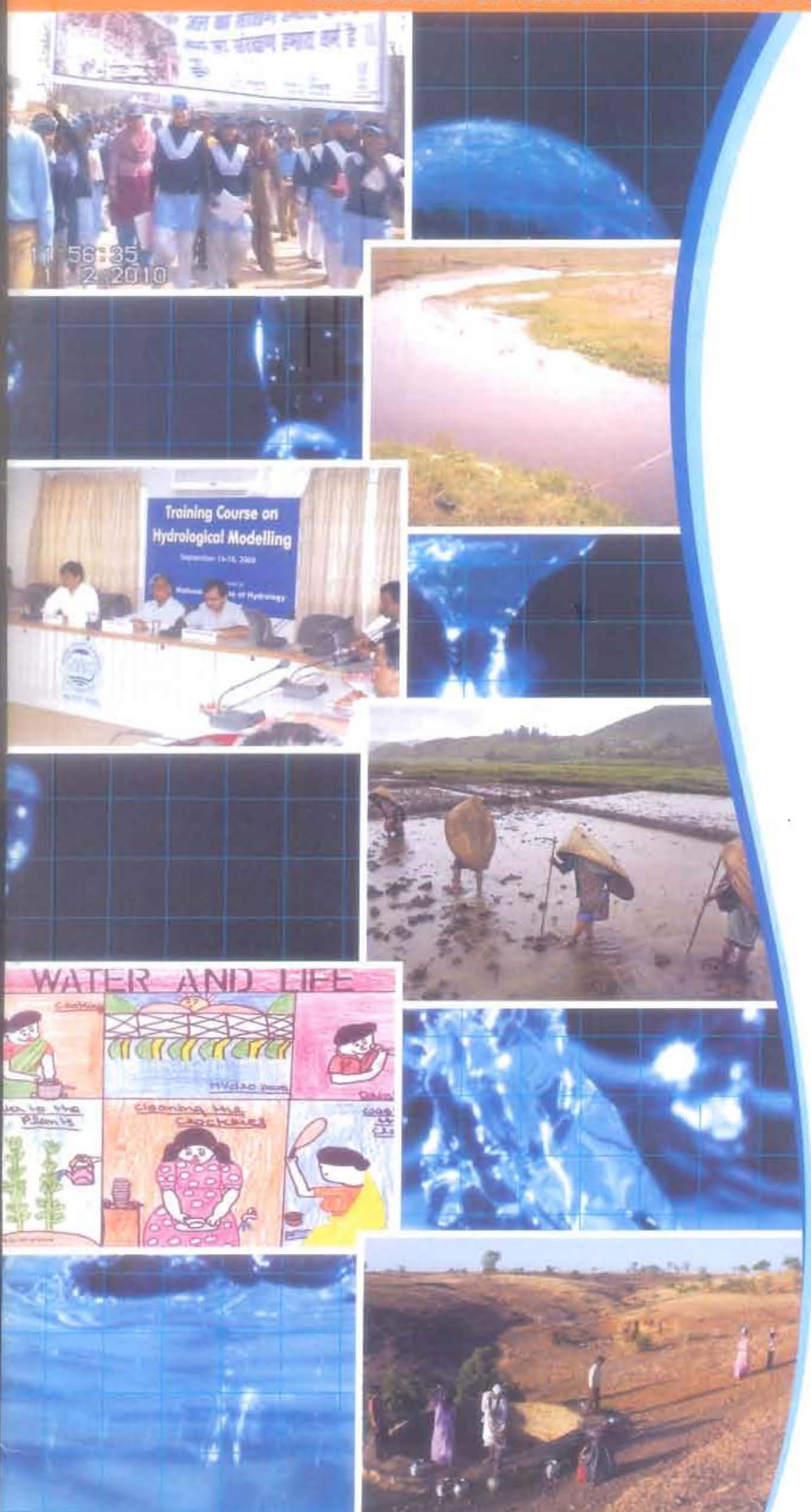
Issue 1 December 2010

Hydrology for People

Newsletter of National Institute of Hydrology, Roorkee (India)



From Director's Desk

It gives me immense pleasure to present to you the first issue of NIH newsletter aptly named as 'Hydrology for People'.

The world is changing very fast, and, with it, the water use and requirements patterns are changing rapidly as well. One of the biggest environmental challenges that developing countries face is to balance their increasing demand with the diminishing availability of water. Increases in population coupled with the ongoing processes of industrialization, urbanization and agricultural modernization are, on one hand, leading to an ever increasing demand for water and, on the other, a decreased supply of freshwater, especially in the absence of effective mechanisms to regulate pollution. An objective and analysis of water management and development in recent years indicate that the water profession has been quite good at looking at the past and present situations, but poor at assessing possible future developments.

National Institute of Hydrology has been conducting research in the field of hydrology and water resources over the last three decades. Many important studies and strategic projects were carried out providing solution to the need-based problems in the country. With the changing scenario in the water sector, the Institute is focusing more on demand driven strategic research. The Institute is also pro-actively contributing to the knowledge dissemination, mass awareness and capacity building programmes.

R D Singh

Editorial

According to Leonardo da Vinci, water is the driver of nature. It could have been considered to be an overstatement in the 16th century during his lifetime, but nearly half a millennium later, Leonardo's view on water can be considered prophetic.

The Prime Minister of India, Dr Manmohan Singh, has noted that if India's current economic growth rate is to be maintained and if all the people of the country, especially the poor and the vulnerable, are to share the benefits of rapid economic growth, two resource issues need priority consideration: energy and water. The Prime Minister further noted that if these two issues can be properly addressed, and if all the members of the society can have adequate access to energy and water, many of the existing societal problems can be resolved.

I feel that presently scientists (hydrologists) and community (specifically, those involved in implementation of water-related projects) are working in their own domains. The scientists are generally unaware of the needs of community and, as a result, don't feel interested in attempting solution to real-life problems. On the other hand, the community does not receive emphatic signals from the scientists (in a form which is easily deciphered and understood by them). Hence, the disconnect!

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.

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 Sagar, and two Centres for Flood Management Studies at Guwahati and Patna. The Institute has established state-of-art laboratory facilities in the area of Nuclear Applications in Hydrology, Water Quality, Soil Water, Remote Sensing & GIS Applications, Groundwater Modelling and Hydrological Instrumentation.

The Institute act as a centre 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

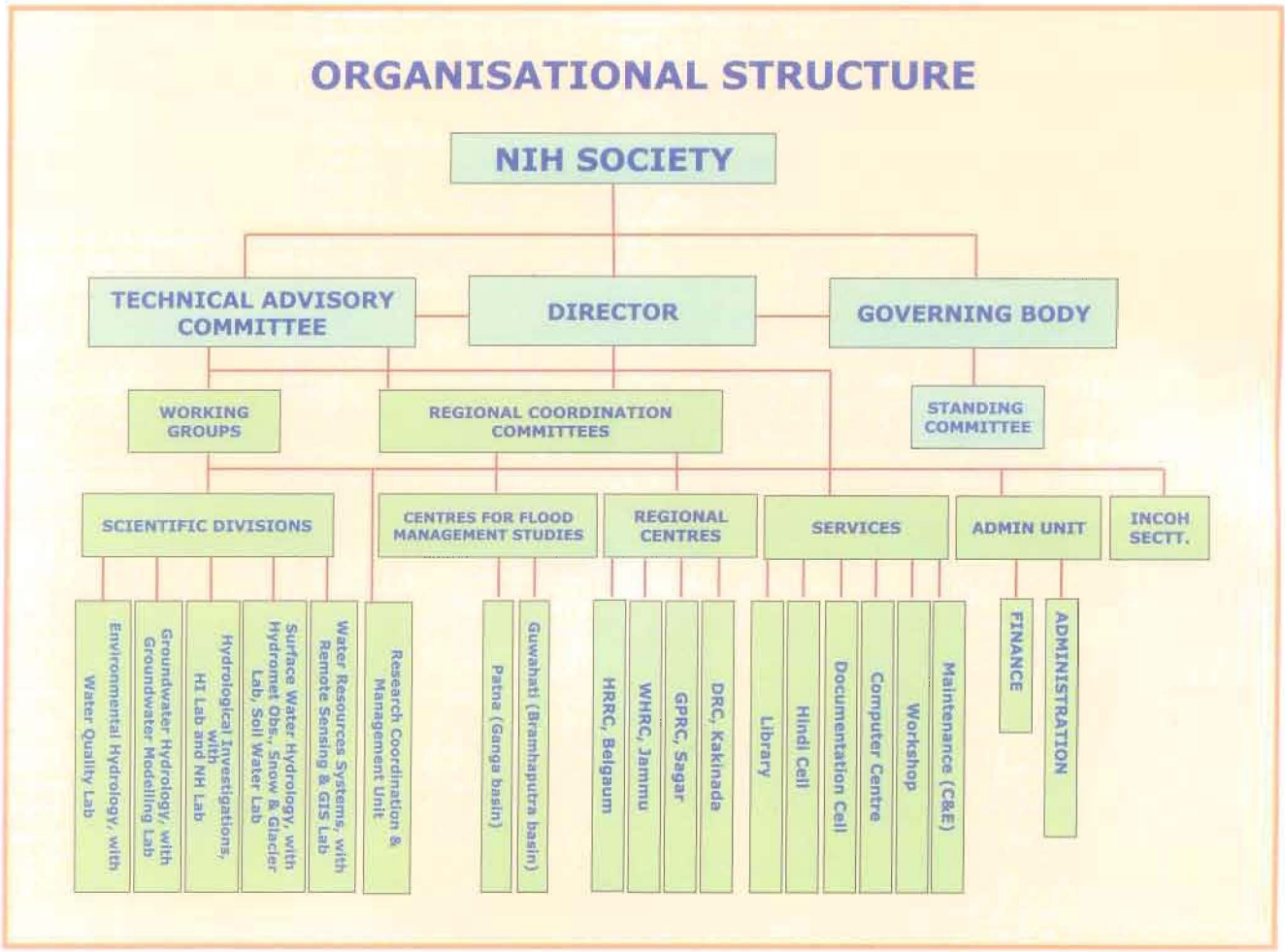
- Assess impact of climate change on water resources and suggesting measures for mitigation, adaptation and resilience
- Propagate application of emerging technologies for water resources development and management
- Provide cost-effective R&D solutions to need-based water-related problems
- Provide 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 in 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

Water is one of our most precious natural resource, vital for sustaining all life on the earth. It is in a continuous circulatory movement known as hydrologic cycle. It is not uniformly distributed in time and space. Due to its multiple benefits and the problems created by its excesses, shortages and quality deterioration, water as a resource requires special attention. In recent times, several studies around the globe underscored the significant impact of climate change upon the fresh water resources availability. Unplanned development of surface and groundwater resources, haphazard disposal of municipal and industrial wastes and application of agricultural input has leads to the problem of water quality deterioration/pollution presenting new challenges on water resources management and conservation. Anthropogenic activities such as cropping pattern, land use pattern, overexploitation of surface and ground water resources has led to modification of hydrologic cycle quantitatively and/or qualitatively. Thus, today we face with the problem of uncertain supply, protection from flooding, drought and pollution. The effects of the fresh water availability on public health and economic wellbeing of any country is the matter of great concern. Hydrology has evolved as a natural science to deal with



understanding of complex hydrological cycle of the earth and to provide solutions to the water related problem. Hydrologist play a vital role in finding solutions to water related problems, and interesting and challenging carrier options are available to those who choose to study hydrology.

Role of Hydrologist

- The hydrologist play very important role in solving water-related problems in society such as quantity, quality and water availability or basin water budgeting.
- 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 (e.g. evaporation, precipitation, streamflow, infiltration, groundwater flow).
- The engineering hydrologist is involved in the planning, analysis, design, construction and operation of projects for the control, utilization, and management of water resources, and deals with the study concerning the municipal water supply, irrigation water supply and management, mitigation of floods and droughts, watershed management, groundwater recharge and reservoir sedimentation problems.
- Hydrologists collect basic hydrological, geological, meteorological and water quality data with use of measuring instruments and equipment. They also carry out various laboratory and computer-based studies, such as 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.

Challenges in Water Resources Development

- Reduced per capita availability
- Deterioration in water quality
- Over-exploitation of ground water resources
- Sub-optimal utilization of the created facilities
- Relatively lower efficiency of water use
- Inadequate irrigation drainage system design and water logging problem
- High spatial and temporal variation in the availability of water
- Easier options of development of water resources already tapped
- Increase in conflicting demands for water
- Impacts of climate change

Opportunities in Water Sector

- National Water Mission and National Water Policy
- Insistence on green development concept
- Increasing public awareness on solution of water problems
- Central schemes like Bharat Nirman, NREGA, JNNURM, NWDPRA
- National Skill Development Mission
- Increasing number of IITs, IIMs, central universities, foregin universities
- Emerging subjects of management, IEC, animation, sustainability, livelihood, entrepreneurship, water technologies
- Emergence of Panchayati Raj Institutions, CBOs
- Large availability of degraded land (e.g. mined areas) to be used for water storage
- Adequate availability of precipitation (rain, snow, dew) and sea water

International Decade for Action "Water for Life" (2005–2015)

World Water Day, 22 March 2005, heralded the start of the International Decade for Action 'Water for Life' proclaimed by the United Nations General Assembly. 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 Problems

Hydrological and hydrogeological investigations to assess causes of seepage from the reservoir of Jaswant Sagar Dam in Jodhpur, Rajasthan

The study was aimed at to find reasons as to why the reservoir of the Jaswant Sagar dam was not able to retain water in the form of storage for a longer period as designed, and also to find reasons of excessive losses from storage of the reservoir. Jaswant Sagar is 109 years old earthen dam, across the ephemeral Luni River. Farmers have constructed 155 different categories of wells inside the reservoir area to irrigate exposed submergence areas.

Sub-surface formation representing limestone formation below the reservoir bed is deemed to be unfit and unfavorable to retain stored water in the reservoir. Only about 1/3rd of the water spread area along the right side of the reservoir, underneath of which sandstone formation is laid down, is deemed fit and favorable to retain stored water for a longer time. Time duration for the reservoir to be emptied for the estimated variable seepage rates and the average evaporation rate of 7.926 mm/day was estimated to be 57days, if there are no sinkholes on the reservoir bed. For the presence of sinkholes, the time duration for the reservoir to be emptied would be much less.

Quantification of Impact of Rainwater Harvesting on Groundwater Availability in Aravalli Hills

The project was taken up at the request of local agencies to gauge the impact of water harvesting structures. Intensive efforts were made by local villagers and governmental & non-governmental agencies to augment water supply by constructing numerous water harvesting structures in the Jaisamand lake catchment in Udaipur district of Rajasthan.

Through a combination of tracer studies and morphometric analysis, groundwater potential zones were evaluated and the fate of harvested rainwater that is recharged to groundwater was determined. Mathematical modeling at micro/ macro-watershed scale was done to analyse the hydrological impact of

RWH schemes. A local NGO 'Wells for India' provided the required logistic support during the study.

Evaluation of water quality of rivers joining Tehri Reservoir and downstream of the reservoir

The main aim of the study was to examine the suitability of water of the rivers joining Tehri reservoir and downstream for various designated uses and to identify possible sources of pollution and assess the actual changes in river water quality. A reconnaissance field visit of Tehri reservoir and its joining rivers has been carried out and three water samples from the reservoir were collected in the month of December 2008, May 2009 and August 2009 and analysed for physico-chemical, bacteriological parameters and metal concentrations. Results revealed that all the physico-chemical parameters and heavy metals are found within the limit prescribed for drinking water by Bureau of Indian Standards (BIS, 1991). Bacteriological contamination was observed in the river Bhagirathi and Bhilangana which may be attributed to runoff and washing off from the places of open defecation from bank in the catchment areas. Assessment of suitability of the river water for irrigation purpose revealed that the water is of good quality for irrigation purpose throughout the year as per recommended guidelines for evaluation of irrigation water quality.

Hydrological Studies in a Forested Watershed in Uttarakhand

The project has been carried out in collaboration with Forest Training Academy (FTA), Govt. of Uttarakhand in a Sal forested watershed in Nainital District with the objectives to study the variation of soil-hydrological and environmental parameters viz. soil moisture storage, light intensity and soil erosion under various micro-environments formed due to varying overhead canopy and their effect in terms of the variation in natural regeneration of Sal. The natural regeneration in Sal species is generally affected by the 'dying back phenomenon' which results in a very slow progress towards establishment of the seedlings.

Pre and Post Project Scenarios and IWRM of Pushkar Canal Command Area in Andhra Pradesh

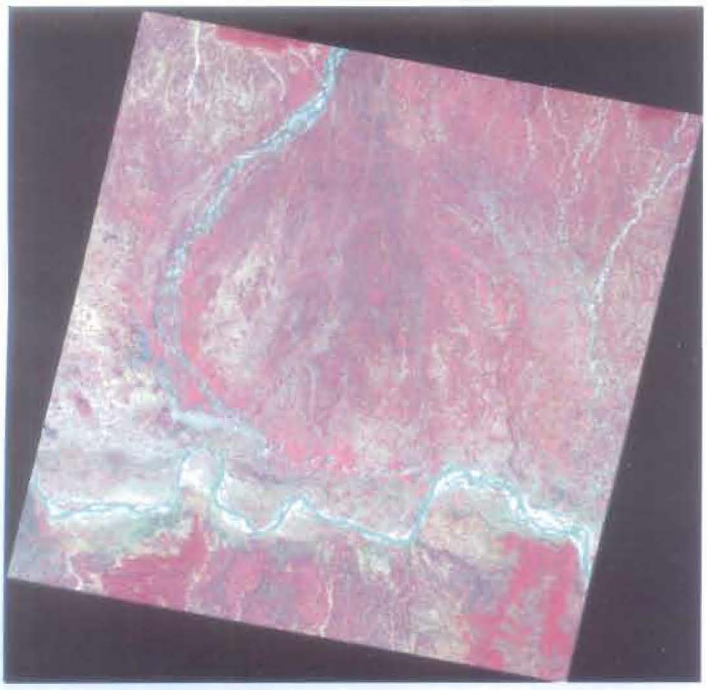
There are number of ongoing projects in East Godavari District, Andhra Pradesh for irrigation purpose. After introduction of canal water there was significant rise in groundwater table, which has led to adopt conjunctive use of surface and groundwater. Therefore, water management practices are to be planned scientifically in ongoing projects. The main objectives of the study are 1) monitoring of groundwater quantity and quality, soil salinity and land use/land cover practices within the Pushkar canal command area before release of water, and 2) impact assessment of canal water on groundwater regime, changes in land use and land cover practices and conjunctive use of groundwater and surface water.

Groundwater samples were collected during December 2009 from about 40 locations in the study area of about 1000 km^2 with a command area of 752.35 km^2 spread in 139 villages of 14 Revenue mandals in East Godavari district of Andhra Pradesh. EC of ground water ranged from 253 to 3700 micro mhos/cm. The analysis of major cations and anions indicated that, there is a

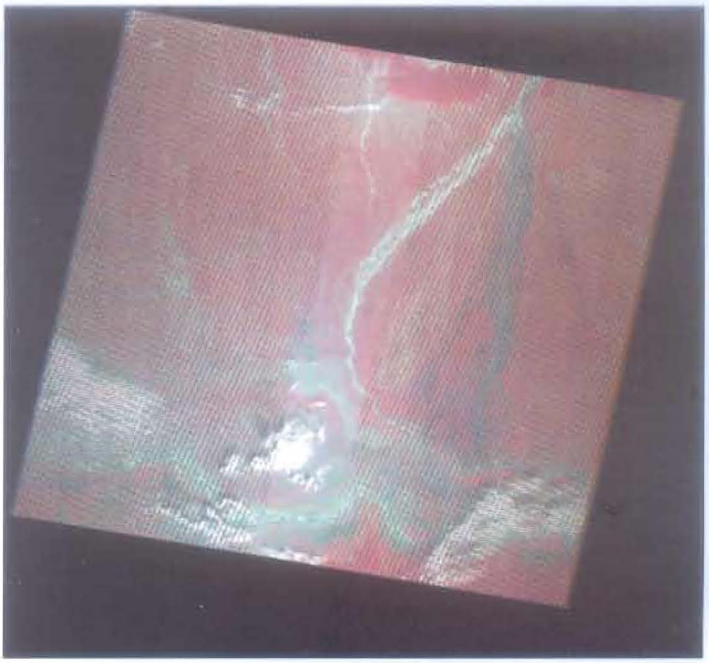
significant seasonal variation in the groundwater quality. The major groundwater quality type is Na-HCO_3. The general groundwater quality is suitable for drinking and irrigation purposes. However, the total hardness of groundwater varies between 113 to 855 ppm. This is mainly due to higher concentrations of Chloride and Sulphate.

Shifting characteristics of Kosi river

The river Kosi (also known as 'Sorrow of Bihar') is a tributary of the river Ganga. Nearly 80% of its catchment lies outside the country and the rest 20% lies in India. The portion of the catchment in India is almost flat and the river has the shifting characteristics. After entering India it travels for about 318.65 km in an alluvial plain, unloads the silt in the plains of Bihar and finally meets the river Ganges near Kursela. The river carries a mean annual discharge of 1,600 m^3/sec, with monsoon discharge 10 times the lean period discharge. Sediments load of Kosi is estimated at 120 m cu.m. As one course becomes higher than the possible adjacent paths, Kosi river shifts laterally. Shifting of Kosi from 1736 to 1964 was 112.6 km towards west. In the present study, shifting characteristic of Kosi river starting from the year of publication of SOI toposheet have been studied. The toposheets of 1936-38 on the scale of 1:250000 were used. To generate the base level information (prior to construction of Kosi Barrage project in 1954), the Landsat, MSS and TM imageries at 5 years interval from 1972 onwards have been analyzed for marking the course of river Kosi at different times. The analysis indicates that there is different trend of shifting as the river flows from north to south. Two satellite imageries in a gap of 36 years are shown below.



Kosi river 07 Nov, 1972



Kosi river 05 Nov, 2008

Web-based River Basin Information System for India

Basin wise information on rainfall, water availability, water resources projects, irrigation potential are useful inputs for planning and management. The main design objective of the package is to provide a common, integrated, and quantitative geo-spatial framework for providing the hydrological information of India over a variety of domains, from national to sub basin level. The themes of the package are topography, water facts, river basins, water resources utilization, climate and thematic maps. The package also includes information about water policy and constitutional provisions for water use. The details of several treaties (international and inter-state), signed in the past, and water related disputes have been included. Ancient literature such as The Vedas and To make the user aware of the ancient methods and practices of hydrology, e.g. the Upanisads, the system includes a section to provide some meaningful information about weather prediction, drainage, water use etc. The e-learning feature is very helpful as a reference hydrological book. It has a large number of figures and more than 600 definitions of various terminologies related to hydrology. Another important feature of the package is the option of online ET-computation using commonly used methods.

Rainfall-runoff modeling and water availability estimation for Rehar River at Rihand Dam and selected sites in Benas and Mehar river

Rainfall-runoff modeling and water availability estimation are the components of the project on "Utilization of Rihand reservoir water up to designed

MDDL and possibility of creating additional storage in the nearby catchments to meet requirements of thermal power plants". The study was taken up with the objectives to develop rainfall-runoff relationship and assess water availability in Benas, Gopad and Kanhar rivers. Rainfall records at various stations in study catchments and flow records at Benas river have been used to estimate water availability at two sites in Gopad and one site in Kanhar river. Rainfall-runoff modeling and water availability analyses showed that both the basins have surface water availability during the monsoon season to supplement the requirement of water for thermal power plants around the Rihand reservoir.

Design Flood Estimation for Kameng Power House

Design flood estimation studies were carried out for estimation of probable maximum flood (PMF) and floods of various return periods for the Kameng power house. The Kameng H.E. Project, being taken up in the Arunachal Pradesh, is a run-of-the river scheme, diverting the water flow from the Bichom (tributary of the Kameng) and Tenga (tributary of the Bichom) rivers up to a maximum of 150 cumecs, for generating 600 MW of power, under a head of about 500 m. In the present study, HEC-HMS package was used for estimation of PMF hydrograph. Floods of various return periods have also been estimated for the project site using the L-moments approach.

Dating of water from CBM wells and nearby tube wells by isotopic method (^{3}H and ^{14}C)

Coal Bed Methane (CBM) is a natural gas occurring in coal seams and is a relatively new source of energy in India. Large amount of groundwater is pumped alongwith the gas from CBM wells, especially in the early stages of production. This may create environmental problems by inducing recharge of water from the overlying leaky aquifers or surface water bodies through fractures and faults. The lowering of water table or drying of surface water bodies may impact the economic and social activities in the area. Reliance Industries Limited, Ahmedabad, awarded this consultancy project to National Institute of Hydrology to know whether the water being produced from CBM wells is connate water from coal bed of Gondwana and is not connected to ground water of the area through Isotopic analysis of water (Preferably 3H and 14 C) from CBM wells and nearby tube wells.

The study was carried out in Sohagpur East and Sohagpur West blocks falling in Shahdol and Anuppur districts of Madhya. The study indicated: (i) the groundwater present in the shallow and intermediate aquifers (30-75 m) is generated from the recent time precipitation; (ii) the groundwater pumped from deep CBM wells is older than that use for drinking from shallow water; and (iii) the uncorrected age of groundwater abstracted through the CBM wells is >20,000 yrs.

Hydrology Project-II

The National Institute of Hydrology, Roorkee has been entrusted important tasks under World Bank funded Hydrology Project Phase-II (HP-II). Eight Central Agencies (MOWR, NIH, CWC, CGWB, CWPRS, CPCB, IMD and BBMB) and thirteen States (Andhra Pradesh, Gujarat, Maharashtra, Karnataka, Kerala, Madhya Pradesh, Chattisgarh, Orissa, Tamil Nadu, Himachal Pradesh, Goa, Pondicherry and Punjab) are participating in the Project. As a follow up to HP-I; HP-II has activities under three major components viz. (i) Institutional Strengthening, (ii) Vertical Extension and (iii) Horizontal Expansion. The Institute has been actively engaged to achieve the assigned targets within stipulated time frame under the above components.

The Institute has conducted thirty seven training programs 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. The Institute is the nodal agency for the development of Decision Support System (Planning) for Integrated Water Resources Development and Management to be implemented in six Central and nine States Agencies. Based on the DSS (P) need assessment of the States, the task of DSS (P) model conceptualization has been completed.

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 eleven PDS. The PCS and World Bank have approved four Surface Water (SW) and three Ground Water (GW) PDS for NIH. Apart from these, the Institute is associated in carrying out four other PDS with the States and Central Agencies.

Funding Schemes in Water Resources Development Sector

1. Ministry of Water Resources, GoI

The Ministry of Water Resources (MoWR) has identified the following as the priority areas for research in water sector during XI Five Year Plan:

(a) Efficiency studies for completed major and medium irrigation projects,
(b) Effect of climate change on water resources,
(c) Studies in respect of adaptation as a consequence of effects of climate change on water resources, including, simulation studies for selected water systems duly incorporating the features of changed scenario,

(d) Reservoir sedimentation studies,
(e) Post facto evaluation and management plan for optimal benefit from the resources, and
(f) Initiation of benchmarking of irrigation projects for performance improvement etc.

MoWR supports projects under its plan scheme "Research and Development Programme in Water Sector". The web site of MoWR: http://mowr.gov.in

For supporting research schemes under different subject areas, the Ministry has set up the following five Indian National Committees (INC):

INC	Subject	Nodal agency
INCID	Irrigation and drainage	CWC, New Delhi
INCOH	Hydrology	NIH, Roorkee
INCH	Hydraulics	CWPRS, Pune
INCGECM	Geotechnical engineering and construction materials and structures	CSMRS, New Delhi
INCGW	Ground water	CGWB, New Delhi

Indian National Committee on Hydrology (INCOH)

Indian National Committee on Hydrology (INCOH) supports funding of research programs, dissemination of knowledge through seminars/conferences/ workshops, organization of training programmes, mass awareness programs, etc. in the field of hydrology and water resources. More information can be found on http://www.nih.ernet.in/incoh-web/index.htm

2. Ministry of Environment and Forest, GoI

Funding support for research is available in several disciplines concerned with environmental protection. Some indicative areas include: forest conservation, wildlife protection, biodiversity inventories, R&D in environmental management technologies, climate change, public health impacts of environmental degradation, etc.

Additional information for funding support can be obtained from http://www.envfor.nic.in/funding/chap1.pdf

3. Department of Drinking Water and Sanitation, Ministry of Rural Development, GoI

Funding is available under the following priority areas for research and development projects in rural drinking water and sanitation sector, for proposals from well established R&D institutions, Universities, etc.:

i. Water resources exploration, assessment & exploitation related technology development
ii. Technology development for improvement in water extraction techniques
iii. Water scarcity reduction and related technology development
iv. Technology for water quality enhancement for rural areas
v. Watershed management to optimize drinking water supply
vi. Water-health interaction in the socio economic cultural set up
vii. Development of appropriate rural sanitation technology

Additional information on the programme is available on http://ddws.gov.in/rnd.htm

4. Department of Science & Technology, GoI

Water Technology Initiative (WTI) Programme

DST's Programme on 'Water Technology Initiative' aims to promote R&D activities to provide safe drinking water at affordable cost and in adequate quantity using appropriate S&T interventions. The focus is to develop holistic solution to the problem of water contamination and water scarcity through development of indigenous systems/ devices to provide safe / and adequate drinking water to households.

More information on this programme can be found on http://dst.gov.in/scientific-programme/t-d-wti.htm

Beside this, DST has a number of funding schemes for Scientific & Engineering Research and Technology Transfer, and detailed information is available on http://dst.gov.in/scientific-programme/ser-index.htm

Important information about water related websites/portals

Hydrology Forum (Topica)

A forum for discussion of scientific research in all aspects of Hydrology including hydrologic design, surface water analysis and modelling, flood studies, drought studies, watershed development, groundwater assessment and modelling, conjunctive use, drainage, mountain hydrology, environmental hydrology, lake hydrology, nuclear hydrology, urban hydrology, forest hydrology, hydrological investigations, remote sensing and GIS applications etc. hydrology-forum-subscribe@topica.com

Hydrology Forum (Yahoo!)

A forum for discussion of scientific research in all aspects of Hydrology including hydrologic design, surface water analysis and modelling, flood studies, drought studies, watershed development, groundwater assessment and modelling, conjunctive use, drainage, mountain hydrology, environmental hydrology, lake hydrology, nuclear hydrology, urban hydrology, forest hydrology, hydrological investigations, remote sensing and GIS applications etc. hydforum-subscribe@yahoogroups.com

Hydrological Modelling

A forum for discussion of scientific research in modelling of hydrologic systems. It intends to provide a forum for technical discussions; announcement of new public domain and commercial softwares; calls for abstracts and papers; conference and workshop announcements; and summaries of research results, recent publications, and case studies. hydrologymodel-subscribe@yahoogroups.co.in

Groundwater Research and Management

This group aims to provide an interaction between groundwater researchers and managers to synthesize their knowledge, perceptions and ideas for improved groundwater management and research. gwrm-subscribe@yahoogroups.co.in

The India Water Portal

The India Water Portal is an open, inclusive, web-based platform for sharing water management knowledge amongst practitioners and the general public. It aims to draw on the rich experience of water-sector experts, package their knowledge and add value to it through technology and then disseminate it to a larger audience through the internet. For more information, visit the webpage: http://www.indiawaterportal.org/

Water Harvesting (CSE)

The Centre for Science and Environment, New Delhi, has been promoting the revival of traditional systems of water harvesting as a practical solution for drought proofing in the affected areas. The organisation has developed a website providing information on water harvesting techniques. Webpage:

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Vision Document on Mitigation and Remediation of Ground Water Arsenic Menace in India (2010)

The document presents status of arsenic menace in India, availability of scientific knowledgebase, understanding and technologies, preventive and corrective measures taken so far and results thereof, and possibility of employing success stories of one place to another region. It also presents further work to be undertaken and a roadmap to achieve the targeted milestones.

Workshop/Conference/Symposium attended by the Scientists/Staff

SN	Title	Period	Place
1	National Seminar on 'Climate Change and its Impact on Water Resources	Apr 23, 2010	IWRS, Patna Centre
2	Workshop on 'Climatic Change and Water'	May 3-4, 2010	IIT Bombay
3	Workshop on Hydrological Information System (HIS)	May 11-12, 2010	Sagar
4	National Seminar on Water Auditing	May 18-20, 2010	Jaipur
5	Seminar on Clean Water for a Healthy World	May 26, 2010	IE(I), Guwahati
6	"Geomorphological Hazards" jointly organized by Manonmaniam Sundaranar University and IAG	Jul 21-23, 2010	Kanyakumari
7	SWAT Workshops in India, organized by IIT Delhi	Jul 12-16, 2010	Delhi
8	Asia Oceania Geosciene Sociaty (AOGS) Intern. Conf.	Jul 2010	Hyderabad
9	Hydro-Science and Engineering (ICHE-2010) organized by Deptt. of Ocean Engineering, IIT Madras	Aug 2-5, 2010	Chennai
10	International Workshop on Water Resources Management & Sustainability	Sep 3-5, 2010	TIFAC, New Delhi
11	World Water Week - Stockholm-2010	Sep 5-11, 2010	Stockholm (Sweden)
12	'Sanitation and Health: Issues and Challenges – a transdisciplinary approach – WPSH-2010	Oct 4-5, 2010	Bangalore
13	'COOLING THE EARTH: Tactics for restoring climate order and saving the living planet'	Nov 15-17, 2010	Pantnagar, U.S. Nagar
14	'National Science Congress in Indian Languages'	Nov 22-23, 2010	NPL, New Delhi

Technology Transfer Programmes Organized

SN	Title of the Training Course	Period/ Month and Place
1	Climate Change and its Impact on Water Resources	May 17 - 21, 2010, Roorkee
2	Flood Inundation Modelling and Flood Risk Assessment	Jun 23-26, 2010, Patna
3	Water Quality Monitoring Analysis and Management	Jun 29-Jul 1, 2010, Shimla
4	Predictions in Ungauged Basins	Jul 26-30, 2010, Roorkee
5	Advanced Techniques for Hydrological Investigations	Aug 16-21, 2010, Roorkee
6	Ground Water Modelling	Sept 20-24, 2010, Roorkee
7	Hydrological data analysis	Sep 28-30, 2010, Bhopal
8	Urban Hydrology	Oct 4 - 6, 2010, Chennai
9	Soil erosion modelling and reservoir sedimentation	Oct 10-14, 2010, Chandigarh
10	Hydroiogical Analysis for Hydropower Projects	Oct 10-22, 2010, Rishikesh
11	Water Quality Monitoring : Network Design, Sampling Analysis and Quality Assurance	Nov 8-12, 2010, New Delhi
12	Coastal Groundwater Modeling and Management	Nov 22-26, 2010, Anand, Gujarat
13	Data Entry and Processing Using SWDES	Nov 29 -Dec 3, 2010, Kerala
14	Hydrologic Extremes -Prediction, Management & Mitigation	Dec 6-10, 2010, Belgaum

Events Organized

SN	Programme/Event	Date	Venue
1	World Water Day-2010	Mar 22, 2010	Roorkee
2	Round-table discussion with stakeholders on the theme "Water quality and its sustainability"	Mar 22, 2010	Roorkee
3	Brainstorming session on review of National Water Policy	Oct 26, 2010	New Delhi
4	Course on Communication Skills and Time Management	Nov 1, 2010	Roorkee

Capacity Building of NIH Employees

- Dr V C Goyal, Sc. 'F' & Head, RCMU, attended a 1-week course on "Management and Leadership Development", at LBS National Academy of Administration, Mussorie, during June 14-18, 2010.
- Mrs Deepa Chalisgaonkar, Sc. 'E-1' attended a training course on "Performance Teams and Leadership issues for Woman Scientist", at Administrative Staff College, Hyderabad, during Jul 26-30, 2010, and another course on "National Security and Strategic Contexts" at National Institute of Advance Science, Bangalore, during Sep 20-24, 2010.
- Sri A P Chamoli, Senior Administrative Officer attended a seminar on "Capacity building and awareness generation for implementation of RTI Act, 2005", Institute of Secretariat Training & Management, New Delhi, December, 2010.

Training Under Hydrology Project

The following scientists from NIH were trained at DHI, Denmark during Oct 26 to Nov 12, 2010, to acquire in-depth knowledge about the Decision Support System (Planning) for Integrated Water Resources Development and Management, and to develop skills and understanding of various modules in the software:

1. Sri D S Rathore, Sc. 'E-2'
2. Dr M K Goel, Sc. 'E-2'
3. Dr A K Lohani, Sc. 'E-1'
4. Dr Vijay Kumar, Sc. 'E-1'
5. Dr R P Pandey, Sc. 'E-1'
6. Dr Surjeet Singh, Sc. 'C'
7. Sri Sanjay Kumar, Sc. 'C'

News

Renovation of Guest Houses

The Institute's VIP Guest House has been renovated with extension of dining area and facilities for use of computers and internet. The other guest house is presently under renovation.

Computer Centre

Institute's Computer Centre has been renovated with a contemporary look. A spacious Training Hall has been established in the Centre itself with advanced computing, printing and audio-visual facilities to provide hand-on experience on various hydrological

and data processing softwares. The training Hall has the capacity to provide training to about 25 trainees at a time.

Groundwater Modelling Lab

A Ground Water Modeling Unit was established at the Institute, with exhaustive computational facilities required to resolve ground water related issues by accumulating advanced computational devices and software. The modeling unit is equipped with software like Visual MODFLOW coupled with MT3D, ArcGIS, ROCKWORK, AquaChem, Aquifer Test, SIGMAPLOT, SYSTAT, Hydro Geoanalyst, WHI UnSat Suite Plus, Soil Vision, MIKE-SHE ENTERPRISE + MIKE 11 + TEMPORAL ANALYST, etc.

Electronic Display Board

An electronic display board has been installed in the campus with the facility of displaying instant temperature and humidity through sensors installed at the observatory. It also displays the previous day's weather report including maximum and minimum temperature, rainfall and total season rainfall, deviation from normal. This also has provision of displaying any photographs/films.

- Sri G Mohan Kumar, IAS, Add. Secretary (WR), visited the Institute during Sep 9-10, 2010. During discussion with the Scientists, he highlighted the following emerging issues:
  1. Evolve a mechanism for screening/review of results of NIH research studies, and selected technologies should be considered for implementation in field
  2. Prepare a brochure listing products (including technologies, procedures) useful for the user organizations, and pro-actively approach user organizations
  3. Link research results and outputs with line Ministries/Departments (e.g. Central and State Highway Authorities, Railways, PWD)
  4. Develop linkage with other ministries/ departments (e.g. Ministry of Rural Development) for providing scientific inputs to the water-related programmes for rural areas
- Under the direction of Uttarakhand High Court, a team of NIH scientists led by Dr Bhishm Kumar visited Chinayli Saud, district Utarkashi (Uttarakhand) during May 11-12, 2010, to evaluate the availability of water to the villagers in that region. The report was submitted to the Hon'ble High Court to resolve the litigation filed by the Villagers with Uttarkhand Pey Jal Nigam.
- A team of NIH scientists led by Dr Bhishm Kumar visited Singoly, Bhatwari in district Rudraprayag (Uttarakhand) during Oct 27-28, 2010, to evaluate the possible impact of the construction of a power project in the area and availability of water to villagers in the region.
- Dr. S. Vasudevan, Asst. Professor, Department of Earth Sciences, Annamalai University, Annamalainagar (Tamilnadu), worked under the guidance of Dr. Bhishm Kumar at Nuclear Hydrology Laboratory, during May 17-Jun 16, 2010, on an INSA fellowship.

Institute's Important Meetings

- 30th Annual General Meeting of NIH Society held on April 6, 2010, at Roorkee
- 62nd meeting of Technical Advisory Committee (TAC) held on May 6, 2010, at New Delhi
- 71st meeting of the Governing Body held on Sep 27, 2010, at Roorkee
- 33rd meeting of the Working Groups held during Oct 7-8, 2010, at Roorkee

Achievement Review Committee (ARC)

An ARC has been constituted by the Ministry of Water Resources (GoI) to review the work done by NIH during the last five years. The ARC has begun consultations with the scientists and staff of the Institute, and is scheduled to submit its report by the end of January, 2011.

Distinguished Visitors

SN	Name, Address of visitor	Date of visit
1	Dr K N Dube, HOD, Rural Management, DSW, Haridwar	Mar 25, 2010
2	Sri Pawan Kumar Bansal, Hon'ble Union Minister (WR)	Apr 6, 2010
3	Sri Vincent Pala, Hon'ble Minister of State (WR)	Apr 6, 2010
4	Sri U N Panjiar, IAS, Secretary (WR)	Apr 6, 2010, Sep 27, 2010
5	Sri A K Bajaj, Chairman, Central Water Commission	Apr 6, 2010
6	Dr S C Saxena, Director, IIT Roorkee	Apr 6, 2010
7	Dr Rajendra Singh, Chairman, Tarun Bharat Sangh	Apr 6, 2010
8	Sri M Gopalakrishnan, Secretary General, ICID	Apr 6, 2010
9	Sri Shaikh Maiw U, Secretary (WR), Bangladesh	Jun 3, 2010
10	Sri G Mohan Kumar, IAS, Add. Secretary (WR)	Sep 9-10, 2010, Sep 27, 2010 Oct 22-23, 2010
11	Sri S Manoharan, IAS (Retd.), Chairman-ARC	Nov 15-16, 2010

Other News

Invited Lectures and Important Meetings by the Director and Scientists

Name	Event	Place
Sri R D Singh	Int. Conference on Hydrology and Watershed Management, at JNTU Feb, 2010	Hyderabad
Dr V C Goyal	Aquatech-2010 Conference Feb 3-5, 2010	New Delhi
Dr Bhishm Kumar and Dr V C Goyal	Ganga Sewa Kumbh Aadesh Apr 7, 2010	Haridwar Kumbh Mela
Sri R D Singh	3rd meeting of Advisory Council on Artificial Recharge of Ground Water Apr 8, 2010	New Delhi
Sri R D Singh	Training Course on Climate Change and its Impact on Water Resources May 17-21, 2010	Roorkee
Sri R D Singh	Briefing meeting with Secretary (WR) on National Water Mission Document May 26, 2010	New Delhi
Sri R D Singh	4th meeting of Technical Expert Committee of DST for 'WAR on Water' Jun 9, 2010	New Delhi
Dr Bhishm Kumar	Meeting on Nuclear Safety Bill 2010 June 9, 2010	MoWR, New Delhi
Dr Bhishm Kumar	Conference on "Programmes and Status of water Resources Activities in States and UT" June 14, 2010	MoWR, New Delhi
Sri R D Singh	Seminar on "Latest Advances in Flood Forecasting and Early Warning Systems" Jun 25, 2010	CWC, New Delhi
Sri R D Singh	2nd meeting of Research Advisory Committee (RAC) under National Ganga River Basin Authority (NGRBA), MoEF Jun 29, 2010	New Delhi
Dr V C Goyal	4th Edition "Harvest rainwater & recycle water for future: water efficiency and green initiatives " Jul 16, 2010	Pune
Dr Bhishm Kumar	Consultation meeting with the Hon'ble Members of Parliament to review the National Water Policy July 28, 2010	New Delhi
Dr V C Goyal	Workshop on 'Action plan on sustainability of rural drinking water sources and augmentation of water supply in problem villages of Bundelkhand region falling in UP State' Aug 18-20, 2010	Jhansi
Dr N C Ghosh and Dr V C Goyal	TIFAC-IIASA Workshop on "Water Resource Management and Sustainability" Sep 3-4, 2010	New Delhi
Sri R D Singh	24th Induction Training Programme (ITP) for the new appointees of Central Water Engineering (Group A) services at NWA Sep 7, 2010	Pune
Sri R D Singh	Meeting with World Bank officials for review of the progress of DSS(P) Sep 22, 2010	New Delhi
Sri R D Singh	National Mirror Committee meeting for the work of ISO related to Water Resources at Bureau of Indian Standards (BIS) Oct 7, 2010	New Delhi
Dr Bhishm Kumar, Dr N C Ghosh and Dr V C Goyal	Uttarakhand S&T Congress Nov 10-12, 2010	Dehradun
Dr V C Goyal	DST-sponsored course on "Science & Technology for Rural Societies" Dec 7, 2010	LBSNAA, Mussorie

New Initiatives

Citizens Charter

'Sevottam' scheme has been initiated by the Government of India as a mechanism to assess initiatives and best practices relating to service delivery. It is a model of service delivery standards based on experiments in e-governance. It essentially covers three areas of (1) citizen charters, (2) grievance redressal and (3) service delivery capability. The Institute has prepared its Citizen's Charter as part of the Sevottam Compliant System.

Result Framework Document (RFD)

Under "Performance Monitoring and Evaluation System (PMES) for Government Departments", each department is required to prepare a Results-Framework Document (RFD). A RFD provides a summary of the most important results that a department/ministry expects to achieve during the financial year. This document contains not only the agreed objectives, policies, programs and projects but also success indicators and targets to measure progress in implementing them, and provides an objective and fair basis to evaluate department's overall performance at the end of the year. The Institute has finalized its RFD after exhaustive deliberations with the Ministry officials.

Consultancy Rules

Governing Body of the Institute, in its 70th meeting in December 2009, approved the guidelines for "Consultancy & Technical Services" at the Institute. The Institute is taking up consultancy projects, which provide a good opportunity for the scientists of NIH to implement the results of their research for solving need-based problems.

IEC Activities

World Water Day was celebrated at NIH Roorkee on March 22, 2010. The celebrations started with a colloquium of school students on the theme of "Clean water for a healthy world". A short film was screened highlighting the importance of water conservation, efficient water management and improved water quality. A "Hydrology and Water Resources Information System for India" package was launched on the occasion. Dr R C Trivedi, former Additional Director, Central Pollution Control Board, New Delhi, delivered an expert lecture on the theme of Water Quality. A round-table discussion was organized with various

stakeholders to discuss the issues related to the theme of water quality.

Various mass awareness activities were organized during the Kumbh Mela-2010 at Hardwar (Uttarakhand). The activities included street plays, hoardings, exhibitions, slogans in collaboration with Shanti Kunj (Hardwar), rallies, debates and competitions.

Mass awareness programmes were organized at various locations in the country. The topics covered in these programmes included water conservation, flood management/ flood preparedness, water quality, etc.

Interaction with the Stakeholders

On the request of Director, Uttarakhand Space Application Centre, a meeting was organized in Dehradun on September 13, 2010 to discuss various issues of mutual interest of collaboration between the Institute and the organizations of the Government of Uttarakhand. Based on the deliberations, the following areas of studies were identified for the State of Uttarakhand:

- Groundwater quality assessment in industrial belts
- Early warning system for floods
- Glacial Lake Outburst Flood (GLOF) studies
- Hydrologic inputs for integrated water management in an urbanizing area (Dehradun)
- Reservoir sedimentation
- Factors influencing diminishing discharge in rivers/streams of selected watersheds
- Hydrologic studies in selected watersheds
- Rejuvenation of springs/khals
- Hydrological study of lakes

- Inputs for State plan on impact of climate change on water resources (with adaptation strategies)
- The Institute also plans to organize 'User Interaction Workshops' in different States, involving various stakeholders including line departments, NGOs, Panchayati Raj Institutions, etc. to explore various location-specific needs and to plan their solution with scientific interventions.

Key Resource Centre (DDWS)

The Institute has been identified as a Key Resource Centre by the Department of Drinking Water and Sanitation (DDWS), Ministry of Rural Development, GoI. The major objective of the KRC activity of DDWS is to upgrade the knowledge, skills and attitudes of the PHED engineers, PRI representatives, master trainers and other stakeholders operating in different States. The Institute proposes to impart training to the trainers to build the capacity of field engineers and skilled personnel of CBOs and PRIs in handling the projects related to water conservation and management in rural areas. The proposed training modules are broadly categorized under the following headings:

1. Hydrological cycle principles and watershed concepts,
2. Conjunctive use of surface water and groundwater,
3. Planning for groundwater recharge,
4. Monitoring and impact assessment of water management projects.

Library Information System

The Institute Library has a total collection of 20,982 publications, comprising 11433 books, 2925 bound periodicals, 5239 technical reports, 308 Indian and foreign standards, 1036 technical papers / reprints and 41 microfiches. The library is currently subscribing 29 Indian and 23 foreign periodicals, including online versions of 8 international periodicals. Recently a Library Information System has been implemented through LibSys software with Web OPAC. The library's building has also been extended and a separate air conditioned journals section-cum-reading room is going to be started soon.

Upgradation of Institute's Website

A beta version of the Institute's new website has been launched. The new website provides fast loading and visually appealing format. Besides its aesthetic appearance, the information about the Institute, its functioning and R&D studies, as well as learning packages with useful hydrological information, is available under major links.

Software for information related to RFD

The Institute has initiated development of a web-based software module automated collection of information/data from various Divisions at NIH HQs and its Regional Centres. The software module will aid in timely collection and dissemination of the relevant information required for preparation of report on monthly RFD achievements and for preparation of agenda items of various technical meetings, e.g. Technical Advisory Committee, Working Group.

Curriculum Development

On request of the Dev Sanskriti Vishwavidyalaya (DSVV), Hardwar, Dr Bhishm Kumar and Dr V C Goyal interacted with the faculty members of the DSVV and helped them in developing the curriculum of a 6-month certificate course on 'Water Resources and River Management'.

Recruitment

1. Sh. Ravi Galkate, Sc.E1, Sagar
2. Dr. Ravindra Vitthal Kale, Sc.B, Roorkee
3. Ms. Patil Jyoti Parasharam, Sc.B, Delhi
4. Sh. Manish Kumar Nema, Sc.B, Jammu
5. Sh. Pradeep Kumar, Sc.B, Jammu
6. Sh. Jagdish Prasad Patra, Sc.B, Roorkee
7. Sh. L.N. Thakral, Sc.B, Roorkee
8. Ms. Melony Zorahosangi, Sc.B, Guwahati
9. Sh. Sanjay Kumar Sharma, Sc.B, Guwahati

Retirement

1. Sh. C.P. Singh, Sr.Tech.

Exhibition

- NIH participated in the 30th India International Trade Fair– 2010 at Pragati Maidan, New Delhi, during Nov 14-27, 2010.

Upcoming Events

- International Workshop on River Management (IWRM-2010), Dec 14-16, 2010, at IIT Roorkee
- NIH Foundation Day, Dec 15-16, 2010, Roorkee
- 14th National Symposium on Hydrology with focal theme on Management of Water Resources under Drought Situation, Dec 21-22, 2010, MNIT Jaipur
- Global Indian Scientists & Technocrats Convention-2010: Scientific and technological approaches for sustainable use of water resources, Maharashtra Education Society, Dec 26-27, 2010, Pune
- International Conference on Community Based Water Resources Management in Northeast India: Lessons from a Global Context (WATERCON 2011), Jan 28-30, 2011, Guwahati (India).
- Aquatech India Conference: Innovative technologies in water sustainability, March 2-4, 2011, Mumbai

Training Programmes

S N	Title	Period and Place
1	Hydrological Data Entry and Processing Using SWDES	Dec 13-17, 2010 Goa
2	Water Availability and Management in Punjab	Dec 13-15, 2010 Chandigarh
3	Conjunctive use and management of surface water and groundwater including water quality aspects	Dec 20-25, 2010 Kolkata
4	Basic Hydrology	Jan11-13, 2010, Anand (Gujarat)
5	Flood Management	Feb 2-4, 2011 Anand (Gujarat)
6	Flood Management	Feb 9-11, 2011 CWPRS, Pune
7	Applications of remote sensing and GIS in water resources management, under HPII	Feb 14-18, 2011 Roorkee
8	Hydrological data analysis & Validation using SWDES	Feb 22-25, 2011 Jammu
9	Hydrological Investigations for Conservation and Management of Lakes	Mar 1-3, 2011 Roorkee
10	Drought Management	Mar 7-11, 2010 Roorkee
11	Hydrological Modelling	Mar 21-25, 2011 Kerala

Editor
Dr V C Goyal, Head, Research Coordination & Management Unit
Assistance by
Dr Ravindra Kale, Scientist 'B'
Sri Rajesh Agarwal, RA

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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