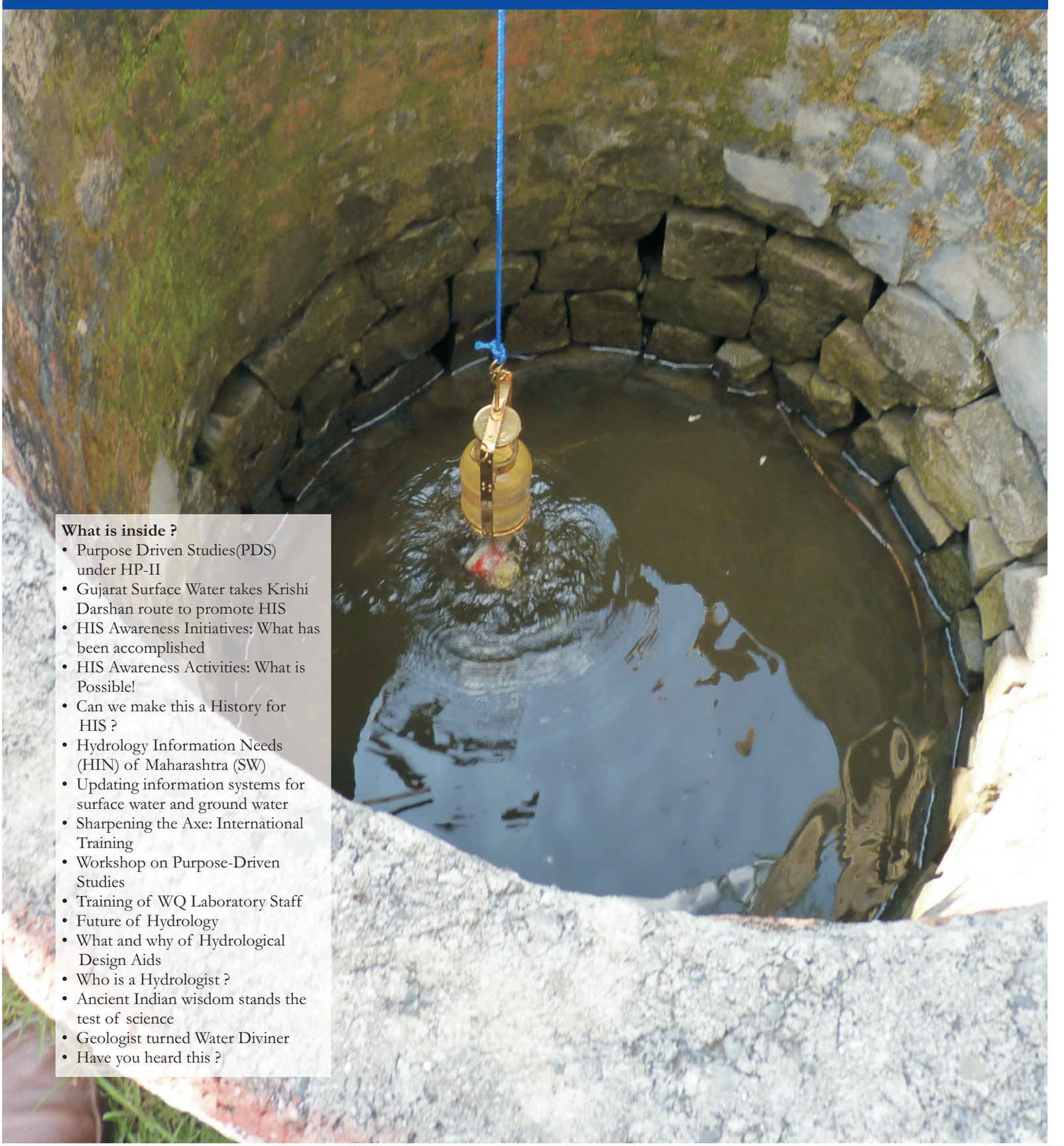
A S S I S T E D B Y T H E W O R L D B A N K

July – September, 2011 Volume: V

HYDROLOGY PROJECT-II

NEWSLETTER



What is inside ?

HYDROLOGY PROJECT-II

Message from the Project Coordinator

Dear friends and colleagues,

The fifth issue of the Newsletter is now in your hand. My team has put in efforts to ensure that it is content rich and a pleasure to read.

After taking charge as Project Coordinator in May 2011, I have interacted with many of you on various occasions. The interactions have helped me to appreciate the intricacies of critical project components and provided insights into what has been achieved, what are the gaps and what needs to be strengthened. I and my team members are working on those issues and I assure you that we will do our best to resolve all outstanding issues and help you perform better.

While we are progressing well on many fronts, I have observed that barring a few agencies most of you have not taken any significant steps forward in promoting HIS and data dissemination. Using this Newsletter platform, I wish to bring your priority attention to this and urge all of you to strengthen the HIS promotion and data dissemination activities. This activity gains significance in the coming year because of the stress we are placing on long-term sustainability of HIS. As all of you are aware, the National Water Policy is currently being revised by the Ministry of Water Resources and the consultation process across a wide spectrum of stakeholders is underway. This consultation will make the revised National Water Policy inclusive in spirit. I view this as an excellent opportunity for HIS database to link-up with the policy development process and ensure that the revised policy addresses divergent spatial realities of hydrology in India. I firmly believe that when we have done this, National Water Policy would become truly evidence based and Hydrology Project would have gained respectability, because of this unique value addition. The "value add" of HIS would then be recognized by our primary stakeholder i.e. the Ministry of Water Resources. This is an assured way of ensuring long-term sustainability of HIS.

Once again, I take this opportunity to assure you of full support from PCS to achieve your HIS goals, in the remaining period of the project.

Narendra Kumar
Project Coordinator, HP-II & Commissioner (B&B), MoWR

Purpose Driven Studies (PDS)

In the previous Newsletter we had briefly reported about the Purpose Driven Studies being taken up under Hydrology Project-II. In this Newsletter, we dwell deeper and report in detail.

Purpose Driven Studies (PDS) are the corner stone of ongoing Hydrology Project Phase-II. A number of Purpose Driven Studies have been taken up and some of them have been fast tracked in the recent months. Here is an approved list of PDS taken up by implementing agencies. These studies provide an excellent opportunity for IAs to share experiences and to initiate cross learning. Are we game for capturing new insights?

1. NIH

Surface Water

• Integrated approach for snowmelt runoff studies and effect of anthropogenic activities in Beas basin.

• Impact of sewage affluent on drinking water sources of Shimla city and suggesting ameliorative measures.

• Hydrological Assessment of un-gauged catchments (Small Catchment)- Mahanadi sub basin.

• Urban Hydrology for Chennai city.

Ground Water

• Coastal Ground Water Dynamics and Management in the Saurashtra region, Gujarat

• Ground Water Management in over exploited blocks of Chitradurga and Tumkur Districts of Karnataka.

• Ground Water Dynamics of Bist Doab Area, Punjab using Isotopes

2. BBMB

Surface Water

• Assessment of effects of sedimentation on the capacity and life of Bhakra Reservoir (Gobind Sagar) on river Satluj & Pong reservoir on river Beas.

3. CGWB

Ground Water

• Specific yield studies for planning and designing of Artificial Recharge structures in sub urban areas of Chennai, Tamil Nadu.

• Study Ground Water dynamics and installation of real time Ground Water Monitoring System in NCT, Delhi.

4. Andhra Pradesh

Surface Water

• Reservoir Sedimentation studies in Andhra Pradesh.

Ground Water

• Research and Development studies on Urban Hydrology, Ground Water Quality, Pollution and management of Hussain Sagar micro Basin (in and around twin cities Hyderabad and Secunderabad) Musi sub basin, Krishna basin, Andhra Pradesh.

• Participatory Geoecological Management in Tettuvanka Basin, Rishi Valley, Kurbalakota Mandal, Chittoor District.

5. Chattisgarh

Surface Water

• Water Availability Study and Supply Demand Analysis in Seonath Sub-basin.

• Study of Reservoir Sedimentation, Impact Assessment and Development of Catchment Area Treatment Plan for Kodar Reservoir in Chhattisgarh.

6. Goa

Ground Water

• Evaluation of Downstream Consequences of bore well pumping at Verna Plateau and working out water resources management strategy.

7. Gujarat

Surface Water

• Crop water requirement of central province of Gujarat for optimum utilization of Irrigation water

• Study of water quality fluctuation in river Vishwamitri.

• To study the trend in water quality of location identified as hot spots

• Monitoring of water quality fluctuation in river Sabarmati.

Ground Water

• Ground Water Management in water-logged area of Dharoi Project Command (RBC) and Strategy to maintain harmony on water levels of perched Aquifer with Deep Aquifer.

8. Himachal Pradesh

Surface Water

• Suggested short & long term measures for combating water stress in identified areas of H.P.

• Study of impact of river / Khad Bed on Water Sources(Water Winning Structures) and evolution of policy & guidelines to prevent adverse impact

Ground Water

• Study of ground water quality characteristics in industrially predominant areas of the state

9. Karnataka

Surface Water

• Study of river water samples at various sites in southern Karnataka

Ground Water

• Urban Ground water Hydrology & Ground water Quality in and around Bangalore city.

10. Kerala

Surface Water

• Comprehensive assessment of Water Quality in Kerala State

11. Madhya Pradesh

Surface Water

• Sedimentation Survey of Tawa Reservoir

Ground Water

• Applying Aquifer modification techniques like Hydrofraking, bore blasting in the existing Ground Water abstraction structures built on various Hydro geological units of Dhasan Basin

• Ground water Quality in Jabalpur urban areas with emphasis on transport of pathogenic pollutants

• Impact of contaminated Shahpura Lake on ground water environment, Bhopal, Madhya Pradesh.

12. Maharashtra

Surface Water

• Optimisation of G&D stations network in the state.

• Effect of changing water allocation in Nathsagar project, Jayakawadi Dam, Paithon, District Aurangabad.

Ground Water

• Techno-economic feasibility of Artificial Recharge of aquifer as a mitigatory measure in fluoride affected District – Yavatmal

• Study of Ground Water Dynamics in the earthquake affected area of Manjar sub-basin, District - Lattur.

• Effects of seawater intrusion on ground water quality in and around Kelwa - Mahim village, District – Thane.

13. Orissa

Surface Water

• Water Quality Monitoring & Modeling in Taldanda Canal, Orissa.

• Modeling of sediment yield and distribution in Hirakund reservoir.

Ground Water

• Application of Remote Sensing Technique for Mapping water Logged and Salt affected Area in the Coastal Tract of Orissa

• Planning for optimum development of Ground Water in Coastal Sand dune pockets of Orissa

14. Puducherry

Ground Water

• Study to improve the ground water potential of drastically affected deep seated Cretaceous aquifer (Vanur Sandstone), northern part of Puducherry region through appropriate recharge techniques. ■

Face-to- Face with Farmers

Gujarat Surface Water takes Krishi Darshan route to promote HIS

The Surface Water Data Centre, Gujarat has pushed themselves hard to bring HIS to limelight and to put HIS outputs in the public domain. Their efforts finally succeeded with Doordarshan Ahmedabad contacting them for a detailed interview with M K Dixit, Superintending Engineer on the use of HIS data, on Krishi Darshan Program. Krishi Darshan is immensely popular in the farming community of Gujarat. The department leveraged this opportunity to attract more 'eye balls' to HIS. M K Dixit in his talk connected with the farmers on 'surface water and the use of surface water data in agriculture'. The concept of HIS is alien to farmers. Therefore, a very lucid, informal conversational method was used to narrate multiple dimensions of HIS and its utility in water resource management.

The interview revolved around characteristics of HIS, uses of surface water data in agriculture, rain fall data, weather related data, how multi-dimensional aspects of water information are collected, analyzed, validated, stored and disseminated etc. It was also explained that how data from 373 rainfall stations, 179 weather stations and 107 river gauging stations make up the total HIS data in the state.

The next course of discussion steered around the use of HIS data by the universities and engineering institutions for the benefit of farmers. Instances of the Water Management Institute of M S University Vadodara using historical HIS data for deciding the timing of planting tomatoes was cited as a typical example. This was followed up by discussions on procedure for obtaining HIS data and the fee structure. The interview proved to be very successful and it was reflected in the phone-in queries received by Doordarshan Kendra regarding HIS data and its uses.

"We know that individual farmers will not directly connect with use of HIS data for agriculture. Therefore, we hold dialogues with agriculture universities, engineering institutions and academicians who are associated with water resource management. Such institutions use our data for their research purpose with specific reference to crops. That is how we establish linkages with the farming community" says Dixit. ■

HIS Awareness Initiatives: What has been accomplished

A state level workshop on Ground water Resources of Orissa" was conducted by the Directorate of Ground Water Survey & Investigation, Orissa at the Institution of Engineers' Auditorium, Bhubaneswar on 27-28th June, 2011. The keen interest of the state polity in groundwater management was amply demonstrated by the presence of the Hon'ble Chief Minister Sri Naveen Patnaik, Hon'ble Minister of Agriculture, Sri Pradeep Maharathy, and Hon'ble Minister of State, Labour, Employment & WR (MI) Sri Puspendra Singhdeo. The Principal Secretary DOWR attended and addressed the gathering.

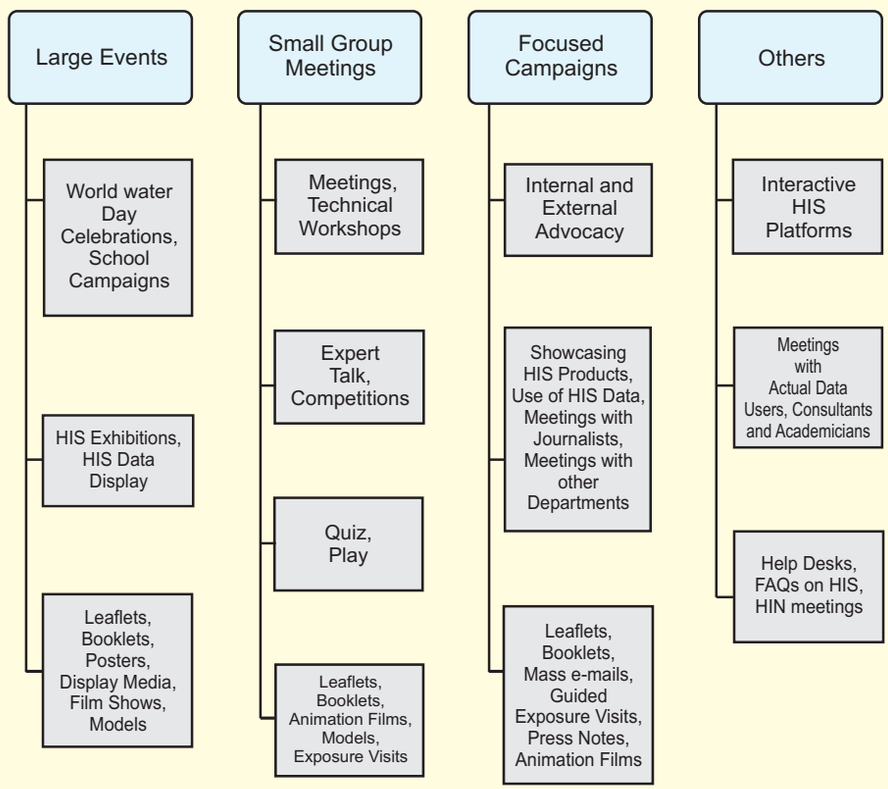
As a part of the event an exhibition was setup with physical models and poster displays. Around 300 participants

representing various state and central government organizations and NGOs attended the workshop. A report on "GW Resources of Orissa" was released by the Chief Guest, Hon'ble Chief Minister of Orissa.

"It was an interesting event which demonstrates the interest of all stakeholders in groundwater management in Orissa. I feel reassured that the groundwater management in the state is in good hands" acknowledged one participant. ■

HIS Awareness Activities: What is Possible!

Some agencies have successfully carried out a variety of HIS awareness raising programs. Many others are yet to travel this path. Here is an assembly of methods and tools you can use to carry out HIS awareness campaigns. They have been grouped under four categories viz. Large Events, Small Group Meetings, Focused Campaigns and Others. These are some of the possible options and each of you will have to design and develop tools that are appropriate to your context. Also reproduced are two fun-filled awareness activities for school children. You can lay your hands on a variety of such material in the web. If you need any assistance in this regard, you may contact TAMC.



Fun filled activities to raise Awareness

Activity 1: Aquifer in a tumbler

What is the purpose of this Activity?

To explain in simple and easy to understand terms that groundwater is found underground in the spaces and cracks between soil, sand and gravel, often hidden from view. In this activity you will "see" what ground water looks like and learn some basic groundwater vocabulary.

What do you need?

- 2 clear glass tumbler
- Sand, gravel and aquarium rock
- Pitcher of water

What vocabulary you will use?

Groundwater, aquifer, surface water, contamination, water table, saturation zone, infiltration, recharge, porosity, permeability

What are the Steps?

1. Fill 2 tumblers with layers of sand and gravel to about 3/4 from the bottom of each tumbler. Remember that in nature, aquifers consist of layers of sand, gravel and rock.
2. In one of the tumblers, pour water slowly into it. Watch how the water fills the spaces between the particles of sand and gravel. Does the water appear to move faster through the sand or faster through the gravel? Why?
3. Now continue to fill this tumbler with water to the top (above the top of the sand and gravel). Water that is located above ground, like rivers and lakes, is called surface water. Water below the surface is called groundwater.
4. In the second tumbler, slowly pour water into the tumbler until the water line is about one inch below the top of the sand/gravel. Look closely at this line created by the water. This line is called the water table. Water below the water table is called the saturation zone.
5. Now pretend that your pitcher of water is a large rain cloud and pour some more water into your second aquifer until the water table is about one and half an inch below the surface of the gravel. Your groundwater supply has just been recharged. This is what happens when it rains and water sinks into the ground.

What else can you add?

1. Use color liquid or ink to represent a source of groundwater contamination. Pour the contamination on the surface of the gravel. Sprinkle water (to represent rain) on top of the gravel and contaminant. Observe and discuss what happens.

How do you conclude?

We have learned that groundwater is water that is found underground in the cracks and spaces in soil, sand and gravel. We have learned that groundwater is stored in--and moves through--the layers of sand and gravel. This geologic formation of sand and gravel which stores groundwater is called an aquifer. Aquifers get more water when they are recharged by rain. Finally explain activities of HIS and its uses. Explain to children how HIS contributes to the acquisition of knowledge on what happens underground.

Activity Source

The Groundwater Gazette, published by The Groundwater Foundation, USA.

Activity 2: Fill it up before you take it out

What is the purpose of this Activity?

To explain the relationship between ground water extraction and recharge in a language that can be easily understood by children and illiterate farmers. This illustration can be used to demonstrate the dangers of over exploitation of ground water resources.

What do you need?

No material except for a physical or pictorial model of the illustration shown below.

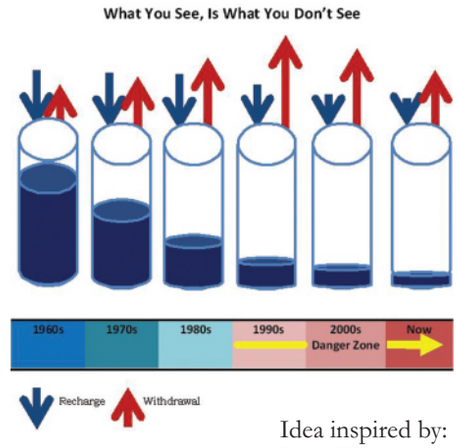
What vocabulary you will use?

Groundwater, extraction, recharge, deposit

What are the Steps?

1. Place the physical model or illustration on display
2. Explain that Groundwater aquifer is a receptacle of water underground. It is invisible to us. There is a direct relationship between rain fall and extraction of ground water.
3. Compare this with Savings Bank Account. (Children and farmers relate with this concept instantly) To maintain a healthy balance in the account, what you deposit must always be equal to or more than what you withdraw.
4. Explain that rain fall (or recharge) is similar to savings bank deposit and extraction is similar to withdrawal of money. Using a simple diagrammatic representation of what happens when the 'withdrawal' exceeds 'deposits' can be an educative experience for children.
5. Explain that we started the downhill slide towards 'danger zone' in the eighties and in this decade reached a critical stage. Then display the graph indicating our entry into "danger" zone. Ask the participants what each one of us can do to reverse this trend?
6. Explain how HIS enables us to understand this 'deposit' and 'withdrawal' relationship.

Variations of this simple illustration have been successfully used by many Groundwater Departments to communicate with semi-literate farmers and school children. If you have used any innovative presentation models in your state, please share with us. We will publish them in our next News Letter.



Idea inspired by:
India Water Portal

Can we make this a HIStory for HIS?

Three photographs of the record room of one of the agencies were taken on April 7, 2009. The challenge for you is to provide an eye catching caption. The best entry will be published in the next Newsletter. Send your entries to the editorial team at nani.bhat@gmail.com ■

Hydrology Information Needs (HIN) of Maharashtra (SW) What Do People Want?

HIS Data Centre Maharashtra (SW) tried to gauge the Hydrology Information Needs using HDUG platforms across the state. The findings are summarized below. This is not a full blown HIN survey, but a pointer towards what people are looking for from the HIS team.

Government Departments

- For design of spillways, long term flow series at specific locations is required. For this purpose, short interval (say hourly or even less than an hour) data on rainfall and runoff is essential.
- Monthly rainfall data (June to December)
- Estimated runoff volume with plotting Stage Discharge Curve
- Restart the closed raingauge stations in the catchment area of dams.
- Merge the stations of IMD in the network of Hydrology Project, so that it may give additional data for flood control.
- Provide HIS data to prepare Reservoir Operation Schedule.
- Provide individual reservoir inflow outflow for basin wise model.
- Flood forecast.
- Increase the number of rain gauge stations in the catchment area.
- Educate school children on water conservation activities.
- Prepare valley wise master plan.
- Data relating to agriculture are not used adequately; therefore, these parameters should be used on large scale.

Civil Engineering Departments of Engineering Colleges

- The Civil Engineering Department in the Indian Institute of Technology, Powai, provides consultancy in water resources sector. It deals with sophisticated techniques such as statistical, conceptual as well as stochastic modeling and time series analysis to provide solution horizons in the water sector problems. The data needs are in respect ofMeteorology, Hydrometeorology, Hydrometry and SW.
- Hydrology as a subject is introduced in the final year of degree course and for the practical project work for the final year Civil Engineering students. Students need HIS data on rainfall, velocity-discharg calculations, rainfall-runoff relationships etc. Organize workshops of one week to introduce the concept of hydrological data processing and validation through the use of

primary and secondary validation software like SWDES and HYMOS. Many institutes are willing to collaborate with HIS data centre to create awareness amongst general public by organizing Water Resources Day or World Water Day in village settings. Such joint activities will help in general to spread the message of HIS to educate the rural public.

- Some colleges provide consultancy to local municipal bodies, co-operative sugar industries and other industries on environmental impact assessment studies, watershed management and WQ aspects of the river reaches near Sangli. The data need is primarily environment pollution studies. Another important data need is the wind speed and other meteorological data of FCS on hourly basis at specific locations. The WQ analysis in the various reaches of Krishna River and its tributaries where sugar and other agro-based industries are functioning is also a major area of HIS data requirement.

Industrial Development Corporations

- In Maharashtra the industrial development corporation maintains its own sources of water supply by constructing small / medium surface water storages as well as its owndrainage arrangements. The assessment and estimation of water supply sources to these industrial areas and operation and management of these supply sources to meet the changing needs of the industries by augmentation is one of the important requirements of this agency.
- WQ of the drained water is also one of the important areas where the agency is interested in seeking the help from the HP Office, Nashik.

Municipal Corporations

- Rainfall data on monthly basis, monthly flows and water levels in the city limits and WQ parameters.
- Rainfall prediction model that can provide some clue with reference to the onset of monsoon on an average basis.
- The Mumbai Corporation has time series rainfall data for more than 100-year period,which can be integrated with HIS data.

WQ Laboratories

- WQ data concerning drinking water usage of the surface water near the downstream portion of urban conglomerates on a near real time basis.

Sugar Factories

- Guidance from Hydrology Project is required to install FCS in factory area (a consulting opportunity)
- HP to validate and certify the data of FCS installed in the factory premises (another consulting opportunity)
- Make it mandatory for industries to check the drainage water from HIS (a regulatory need)

Science Colleges

- Include Arts, Science, Commerce Colleges as members of HDUG as they require climate data for their project studies.
- Introduce evaporation loss-specific data.
- Provide hourly evaporation data.

Independent Engineering Consultants

- Evaporation losses of water
- Provide data books where internet facility is not available

HDUG Members

- Make surface water data and ground water data available at one place.
- Progressive farmers need training on discharge measurement.
- Organize guided visits of students to FCS stations.
- Put sample data on website of Hydrology project.
- Make water-shed wise data available.
- Every Taluka place should have a rainfall station.
- Make real time data on rainfall available.

Academicians and Professors

- Frequency of runoff and stream flow and rainfall data should be hourly.
- HIS should supply data regarding infiltration characteristics, Topo-sheets marked with watersheds.
- Intensity of stream gauging stations in hilly terrain should be increased. Install FCS in colleges (consulting opportunity).
- Data should include discharge through dams and simultaneously real time data.
- Provide information regarding basin wise ongoing projects.
- Training on HYMOS and Advanced HYMOS to academicians.
- Demonstrate process of data collection, validation in colleges.
- Arrange workshop for farmers, professors, students etc.
- Make HIS available on the internet.

Media and NGOs

- Need for data regarding erosion as well as conservation of soil on forestlands.
- Siltation analysis data is required.
- Need for awareness for the participation of students and women.
- Conduct series of workshops at village levels.

Private Entrepreneurs

- Need for suggestions in the improvement of hydrological equipments manufactured by various firms (an industrial integration opportunity for HIS).
- Provide information regarding the method of collection of water samples from the reservoir. ■

Updating information systems for surface water and ground water

A major component of the original Hydrology Project was the introduction of computerised Hydrological Information Systems (HIS) for collecting, processing, storing and disseminating surface water and ground water data. These systems have underpinned the work of hydrologists and hydrogeologists in much of India over the last decade, and contributed to improved knowledge of river flow and ground water conditions.

At the beginning of the Hydrology Project two simple Microsoft Access data entry and processing packages, the Surface Water Data Entry System (SWDES) and its counterpart for Ground water (GWDES), were developed. A commercial surface water analysis and modelling programme, HYMOS, was purchased for more advanced data processing. Subsequently two more specialised software packages were developed – one for Ground water data entry and processing (GEMS) and one for surface water data compilation and data dissemination (WISDOM).

Information Technology has rapidly progressed in recent years, and systems that

were at the cutting edge of technology when they were designed are now showing their age! Information managers from TAMC, with staff from CWC, CGWB and other Implementing Agencies have been analysing their strengths and weaknesses, with a view to their replacement or upgrade.

The original HIS was introduced when the Internet was in its youth. There were limitations in the availability of network connections within regional offices of Implementing Agencies, and even larger data processing centres weren't permanently online. This has meant that, some of the planned network functions in the original HIS were never fully utilised. Rather than data being transferred automatically between systems, it is normally manually transferred on CD ROM. This at best leads to duplication and delays in transfers between data centres, at worst to data being unavailable outside the original data processing centre. It has also meant that each data processing centre has needed its own installation of the specialised software packages, GEMS or WISDOM, both of which require a relatively high investment in hardware and operating system software and have proved difficult to maintain within Implementing Agencies once their original AMCs expired.

Within the surface water data community the SWDES software has met most of the data entry and routine processing requirements, and users made it clear that they wanted to see its ease of use and familiar interface incorporated within any replacement. HYMOS, while valued by experienced users, has not been updated in recent years. Of all the software packages introduced by the Hydrology Project WISDOM was the most impacted by limitations in hardware and software support, and by network constraints. In most cases where it is retained in use it is for a limited range of its original functionality, for instance data dissemination on the CWC's website.

The upgrade to the surface water HIS has been designed as a set of linked modules each addressing a user requirement. At the heart of the system will be a new 'Hydrometeorological database', replacing the data storage functions of WISDOM. This database will be able to import data from the existing SWDES databases, but a separate module will be provided to duplicate existing SWDES functions as a web based online application. Another module will extend existing SWDES analysis and processing to include the most commonly requested tasks that have been provided by HYMOS. Reporting and data dissemination haven't been neglected – a web based reporting application will be able to access data in the new central database.

The status of existing groundwater software is rather different. Once the GEMS system was commissioned, the simpler GWDES system was formally discontinued. GEMS proved to be an effective system, but installation, maintenance and support of separate instances of the GEMS software proved challenging, and GWDES, although unsupported, has remained in use within some Implementing Agencies. It is felt that if the installation and maintenance issues of GEMS could be addressed it still provides the required functionality, so the proposed upgrade involves creating a web based online version of the existing package, with central maintenance and support which will be accessible to any user with an internet connection and a web browser.

Both the surface and groundwater systems envisage agencies sharing data storage hardware, although this, emphatically, won't affect data ownership. Data ownership, and control over who can access the data, will stay with the agencies that make the measurements, even when the data sits within a national data centre. A major benefit of the new HIS will be a significant reduction in the cost of hardware and software support, with the central agencies providing these services on behalf of users across India.

Removing some of the complexity from the current HIS where data are maintained in multiple locations and on multiple

Hardware showing its age

platforms will also simplify transfer of data to other HIS software, including the Hydrology Project's Hydrometric Design Aids and Decision Support Software, and to national data portals like the India Water Resource Information System.

Of course the proposed upgrades won't be the final world in HIS development. It is fairly easy to predict that access to data and applications via mobile phones and tablet computers will be increasingly important, and the increased use of new hydrometric sensors and the increased use of telemetry to connect sensors to data centres in real time will pose new demands. An important reason for separating some of the functions of the software into independent modules is so that the HIS should, provide a solid foundation for further improvements and new functionality.

The requests for proposals and contracts for the development of the new surface water and groundwater HIS have been prepared, and hopefully by the time you read this work will be underway by the developers, whose tasks will include software development, documentation and transfer of data from existing systems. The developers and central agencies will be organising user input to make sure that the new system provides the required functionality. They will also arrange training in the new HIS, although the new systems will as far as possible retain the look and feel of existing packages, so existing users should find the transition as simple as possible. ■

Sharpening the Axe: International training

Seven senior level officers from four different organizations participated in two separate international training programs organized at UNESCO-IHE, Delft, the Netherlands from 4th July 2011 to 22nd July 2011.

· Watershed and River Basin Management

The training course gave participants a theoretical background and practical skills for the management of watersheds and river basins. The course covered a range of issues such as catchment conservation, water for domestic purposes and water management for ecosystem services and functions on watershed scale etc.

Name	Designation	Department
Sh. Ramesh Grover	Sr. Jt. Commissioner	MoWR, New Delhi
Sh. Paramesham	Superintending Engineer	Krishna Coordination Circle, CWC, Hyderabad
Sh. Yogesh Paithankar	Director(RS)	CWC, New Delhi
Smt. Anuradha Madhukar Bhokre	Dy. Director(HP)	GSDA, Pune, Maharashtra

· Public Private Partnership in Water Sector

The training course was designed to provide knowledge for the analysis of institutional capacity of water organisations within country and sector environment. The participants gained insights on the critical preconditions for successful private sector participation in the water sector.

Name	Designation	Department
Smt. Ananya Ray	Jt. Secretary & Financial Advisor	MoWR, New Delhi
Sh. Rajesh Yadav	Dy. Commissioner	B&B Wing, MoWR, New Delhi
Sh. Manish Singh	Additional Secretary	GoMP, Water Resources Dept., Madhya Pradesh

Workshop on Purpose-Driven Studies

Project Investigators and Co-Project Investigators of all Purpose Driven Studies (PDS) of the Hydrology Project participated in the workshop (September 20 and 21, 2010) for presentation and discussion of the results and work plan of respective studies.

The workshop intended to i) review technical, physical and financial progress of all approved PDS undertaken by each Implementing Agency ii) assist Implementing Agencies in their task of monitoring project implementation iii) resolve the bottlenecks, if any, and to take stock of future work plan. A total of twenty one presentations related to Surface Water and seventeen related to Ground Water were made. It was noted that in general, there is good progress now being made on many of the PDS. Some PDS are on the verge of completion and will give sound results, with some exceptions which are constrained with procurement issues. Such blocks are being cleared with joint efforts from PCS/TAMC team. ■

Training of WQ Laboratory Staff

With the intention of enabling the staff of Water Quality laboratories to prepare annual reports and other water quality reports with a 'professional touch', a four days training program was designed by TAMC. Two such programs were organized on a regional basis. The first program was hosted by the Ground Water Department, Bangalore and the second one by the Central Water and Power Research Station, Pune.

The training program covered problems and issues faced by implementing agencies in day-to-day functioning of the laboratories, laboratory management practices, WQ data, data quality assurance, data presentation tools, data interpretation, data validation, and preparing reports for public use. In addition, a guided visit to the laboratory in Bangalore and laboratory visit and working model site visits were organized in CWPRS, Pune.

Upon completion of training, the participants are expected to transfer the knowledge to other laboratory staff in each of the laboratories. Most of the scientist attended the training had good understanding on the basics of the laboratory operations. By virtue of their long association in working with laboratories some scientists had in-depth subject knowledge

"Dr R C Trivedi, infused enthusiasm into the program like 'one man army' and made this joint venture between TAMC/PCS and CWPRS truly meaningful. We are eager to give shape to similar joint ventures in future", said Dr. I D Gupta, Director of CWPRS in his valedictory address.

"We are extremely pleased with the logistics, accommodation and food arrangements made by CWPRS. The facility was among the best we have experienced so far. Kindly publish our reports in the HP Newsletter; it will help as morale booster", a participant from Madhya Pradesh

"We achieved a shared understanding of the WQ data treatment processes and the program turned out to be big 'value add'. Let us have similar refresher programs on an yearly basis" a participant from Karnataka

Future of Hydrology

Human activities exert global-scale impacts on our environment with significant implications for freshwater-driven services and hazards for humans and nature. Our approach to the science of hydrology needs to significantly change so that we can understand and predict these implications. Such an adjustment is a necessary prerequisite for the development of sustainable water resource management strategies and to achieve long-term water security for people and the environment. Hydrology requires a paradigm shift in which predictions of system behavior that are beyond the range of previously observed variability or that result from significant alterations of physical (structural) system characteristics become the new norm. To achieve this shift, hydrologists must become synthesis, observing and analyzing the system as a holistic entity, and analysts, understanding the functioning of individual system components, while operating firmly within a well-designed hypothesis testing framework. Cross-disciplinary integration must become a primary characteristic of hydrologic research, catalyzing new research and nurturing new educational models. The test of our quantitative understanding across atmosphere, hydrosphere, lithosphere, biosphere, and anthroposphere will necessarily lie in new approaches to benchmark our ability to predict the regional hydrologic and connected implications of environmental change. To address these challenges and to serve as a catalyst to bring about the necessary changes to hydrologic science, we call for a long-term initiative to address the regional implications of environmental change.

Source: Water Resources Research, Vol. 46, W05301, 2010 ■

Question for the Reader

Is Hydrology a science or an art? What is your take? Send your responses to TAMC with rationale to nani.bhat@gmail.com. We will publish it in the next Newsletter.

What and Why of Hydrological Design Aids

The Hydrological Design Aids (HDA) being developed under Hydrology Project are intended to assist with the preparation of Detailed Project Reports by providing a set of tools that allows estimation of key hydrological values in gauged and ungauged catchments. The software suite is being developed for CWC by CES Consultants.

HDA will address three main areas: i) Assessment of Water Resources Potential-Availability/ Yield Assessment ii) Estimation of Design Flood; and iii) Sedimentation Rate Estimation for reservoirs.

Assessment of Water Resources Potential- Availability/ Yield Assessment

The tools to estimate the water yield and flow series at any point of interest will operate for three different cases for which water yield estimation may be needed:

- Gauged Catchment
- Partially Gauged Catchment
- Un-gauged Catchment

Tools will include routines for data consistency tests, filling the missing gaps, extension of series (rainfall & runoff, runoff- runoff or any other combination etc.) on different time steps and will also include a number of rainfall-runoff models and guidance in their use.

Estimation of Design Flood

Estimation of the design flood is essential for the safety aspects of various structures of water resources projects. The tools will include all the standard approaches (statistical, unit hydrograph) for design flood estimation for different purposes. Three scenarios that may exist are:

- Sufficient hydro-meteorological records within project catchment are available;
- Partially observed data of that catchment and reasonably defined records at neighboring catchments are available; and
- No observed data are available.

This HDA will incorporate all approaches currently being followed in India (hydro-meteorological, statistical and regional) made up-to-date and also utilising internationally used methodologies.

Sedimentation Rate Estimation

Sedimentation has a significant impact on structures such as dams and reservoirs. Sedimentation partly fills the reservoir area, and therefore affects how the remaining volume of the reservoir can be used. The tool is to improve the estimation of economic life of reservoir.

This tool will produce appropriate estimates for necessary dead storage (mandatory assigned volume for sediment in reservoir/ new ZERO elevation) for the use for different time horizons as per Bureau of Indian Standards (BIS) and Central Board of Irrigation and Power (CBIP) standards. In case of gauged catchments, observed sediment data can be used to establish this analysis, while for un-gauged catchments regional sediment curves (iso-erosion lines) and similar analysis are required to be prepared for different regions in the country using regional analysis of all data collected to date.

Work Programme

Work is advancing on all these applications. A workshop is planned in Delhi on 7-9 February 2012 to present progress to the States. ■

Who is a Hydrologist?

Most of us in the Hydrology Project are frequently confronted with a question 'in the mesmerizing world of science what is the identity of a hydrologist?'. Nash J.E. a world famous Hydrologist answers the question by holding a mirror to the role of a Hydrologist.

"Hydrology as a science is the knowledge of the occurrence, state and behavior, particularly the movement, of water in the natural environment. Because more than one basic science is involved in this exercise, the solution of a hydrological problem requires the application of many sciences. Hydrology is a scientific activity that a mathematician, a statistician or a physicist alone can not undertake, although each can contribute to the solution once the problem is identified and quantified by a hydrologist. Therefore, Hydrologist plays an important role akin to that of a conductor of an orchestra who assembles different instrumentalists, defines their activities without usurping them, controls their interactions and ensures a harmonious whole"

Any more self-doubts?

Hanging the Boots

Shri A D Gohil of the Gujarat Water Resources Development Corporation, Gujarat retired from active public service on September 30, 2011, after distinguished service spanning about 33 years. Shri Gohil is an acclaimed geohydrologist and fellow professionals place him in high esteem. He has contributed immensely to the institutionalization of HIS work ethos in the department. He leaves behind a legacy of quality focused, result oriented work culture in the department. The HP fraternity wishes him best of luck in pursuing his larger life goals. ■

Ancient Indian wisdom stands the test of science

Ancient Indian wisdom that drinking water should be stored in brass vessels for good health has now been proved scientifically. Microbiologists say water stored in brass containers could help combat many water-borne diseases. In developing countries, such containers should be used rather than their cheaper alternatives, plastic containers, researchers said. Water-borne diseases remain a serious threat in many poor regions of the world, with around two million children dying each year from diarrhea. Efforts to provide safe drinking water have had difficulty reaching remote areas.

Even in places with basic water-purification systems, people often opt for riskier wells under trees because the water is cooler, 'Nature' magazine quoted Rob Reed, who led the research, as saying.

On a trip to India, Reed, a microbiologist at Northumbria University in Newcastle upon Tyne, United Kingdom, heard an interesting piece of local wisdom: people believe that traditional brass water containers offer some protection against sickness. The idea intrigued Reed, who was in Asia investigating the anti-bacterial effects of sunlight on water. He has now found that bacteria are indeed less likely to thrive in brass water pots than in earthenware or plastic ones. "It's one of the traditional ideas of water treatment and we were able to find a microbiological basis for it," he said. Reed, with his colleagues Puja Tandon and Sanjay Chhibber, carried out two series of experiments.

In Britain, the researchers filled brass and earthenware vessels with a diluted culture of Escherichia coli bacteria, which can cause illnesses such as dysentery. They then counted the surviving bacteria after 6, 24 and 48 hours. A similar test was carried out in India using naturally contaminated water. The amount of live E coli in the brass vessels dropped dramatically over time, and after 48 hours they fell to undetectable levels, Reed told the Society for General Microbiology's meeting this week in Edinburgh, UK. The key to the result is copper, which can disrupt biological systems, Reed explained. The element interferes with the membranes and enzymes of cells; for bacteria, this can mean death.

Pots made of brass, an alloy of copper and zinc, shed copper particles into the water they contain. The amounts that circulate into the brass water vessels could not harm humans, Reed added. Even a person drinking 10 litres of such water in a single day would take in less than the daily-recommended dose of copper or zinc, Nature quoted the researchers as saying.

Brass water pots also easily outperformed plastic ones, the researchers discovered. Plastic, Reed was quoted as saying, did not inactivate the bacteria. But many people in developing nations use plastic drinking vessels, because they view them as more modern.

Source: Rediff India Abroad, 2005 ■

Geologist turned Water Diviner

Crippled by municipal water shortages brought on in part by low rainfall last summer, an increasing number of Mumbaikars are drilling wells on their properties to tap ground water. According to the Municipal Corporation of Greater Mumbai, requests for private borewell construction have more than doubled since January this year compared to last year.

Figuring out the precise spot to dig these wells is critical — that's where these diviners come in. Flip open the Mumbai directory to the term "Water Diviner" and several listings crawl down the page. A phone call later, an entrepreneur can be at your door eager to locate

underground water sources through both scientific and traditional methods for a small fee.

Mumbai-based water diviner and geologist Amar Joshi, says there has been a major surge in business since this year's water shortage began. People hire him because they believe he has a paranormal ability to detect an underground source of water. Joshi says he has located water for about 10,000 clients in Mumbai and neighboring metropolitan areas in the last 25 years. He says he has been hired by slum dwellers, politicians, residential societies and companies like Godrej, Hindustan Lever and Air India. He charges anywhere from Rs 2,000 to Rs 2,500 to locate water on a small plot of land.

AmarJoshi usually uses a scientific device to look for water which requires him to put a probe into the soil. But when the ground is covered with cement, which is common in Mumbai, he reverts to a traditional method of water divination usually practiced only in rural India.

Vijay Sunkale used that method to locate an underground water source in Awas village. He begins by holding two twigs tied together to form a Y-shape above his head. When the wood hums and his Y-shaped instrument twists to face the ground, it is an indication that he has struck water.

Goolrukh Doongriwala, a resident of a housing society in Mumbai, says she called a water diviner after her taps started running dry by 6 PM each day. After five months of waiting, construction workers showed up at Doongriwala's home this May. They successfully struck water right where her water diviner had predicted.

Ms. Doongriwala must be relieved. In the month of Just last year, the Chief Minister of Maharashtra told reporters that there was "only one month water supply left for Mumbai if there is no rainfall by June 15".

Source: The Wall Street Journal, India Real Time, May 19, 2010 ■

Have you heard this?

Folklore	Scientific Reasoning
English: People in early England recited charms to make the rain stop. "Raine, raine, goe to Spain; faire weather come againe." You may have chanted another version of this when you were younger: "Rain, rain, go away; come again another day." Such charms were thought to be more powerful if recited while staring at a rainbow.	A rainbow is a fairly accurate sign that rain is ending, because it appears when the sun starts to shine through the clouds. That may explain why people believed that the charm worked when you stared at the colorful arches in the sky.
Peruvian: Native people in Peru once believed that the rainfall during the growing season of October to May can be predicted from the brightness of stars in the Pleiades constellation in June. The brighter the stars, the more abundant the rains.	Water recycles from Earth's surface to the atmosphere and back again in a process called the hydrologic cycle, or water cycle. Water gets from Earth's surface into the air through evaporation (transferred from rivers, lakes, and oceans) or transpiration (transferred from plants). And it gets back to Earth by the process of precipitation. Water vapor in the air rises and cools, condenses into water droplets, and collects to form clouds. Rain develops when cloud droplets become too heavy to stay in the cloud and fall to Earth. The total amount of water on Earth doesn't change, so we need to take good care of it!
India: In ancient India, it was said that a dragon stood guard over the clouds to hoard the rain and prevent it from falling to Earth, causing dry spells. The people cheered for the storm god to lure the dragon away from the cloud, allowing rain to fall.	Water actually recycles from Earth's surface to the atmosphere and back again in a process called the hydrologic cycle, or water cycle. Water gets from Earth's surface into the air through the processes of evaporation (transferred from rivers, lakes, and oceans) or transpiration (transferred from plants). And it gets back to Earth by the process of precipitation. Water vapor in the air rises and cools, condenses into water droplets, and collects to form clouds. Rain develops when cloud droplets become too heavy to stay in the cloud and fall to Earth. The GOES environmental satellites keep watch over the comings and goings of clouds in the atmosphere. ■

Views expressed in this Newsletter do not necessarily reflect views of MoWR, GOI
PCS, Hydrology Project II, Mohan Singh Place (5th floor), Baba Kharag Singh Marg, Connaught Place, New Delhi - 110 001
Tel: 011-23747060 / 4752, Fax: 011-23340787, Email: dirhp-mowr@nic.in, Web: http://hydrology-project.gov.in