

## Newsletter of National Institute of Hydrology

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### NEW DIVISION ON DROUGHT STUDIES AT N.I.H.

In view of the recurrent drought situation in India, a proposal was put before the Governing Body in its 26th meeting for setting up a drought studies division which was approved by the Governing Body and the Drought Studies division has been established in the Institute w.e.f. Feb. 28, 1986.

Drought studies, all these years have concentrated solely on the meteorological aspects of natural catastrophe, with hydrological factor being sidelined. In a bid to correct the focus, the newly created division emphasises on hydrological aspects of drought for proper understanding about the analysis of drought, assessment of drought impacts, planning both long and short term drought management strategies including reactive measures/strategies in the event of drought occurrence and to identify the hydrological measures required for preparedness strategies to manage droughts in years of low and normal rainfall for different regions of the country.

To set the things rolling, scientific and technical teams were sent to the states of Karnataka, Andhra Pradesh, Gujarat, Mahara-

shtra, and Madhya Pradesh for on the spot survey of selected drought affected areas, to collect necessary information/data, to understand the extent of drought, effectiveness of existing drought management strategies etc. After going through the collected information/data, the analysis and interpretation would be made to study the hydrological aspects of drought so as to identify the gaps or missing links and to suggest effective drought management strategies & prepare action plans for drought alleviation and management. Frequent visits of scientific and technical teams are proposed to be undertaken in future.

### DIRECTOR VISITS BANGKOK, THAILAND

Dr. Satish Chandra, Director of the Institute visited Bangkok during the third week of March to participate in the Planning and Coordination Meeting of Major Regional Project (MRP) in Water Resources for Southeast Asia as representative of ARCCOH. It was in the second meeting of the Asian Regional Coordinating Committee on Hydrology (ARCCOH) held on 10-12 January 1983, a recommendation of formulating a Major Regional Project on the conservation and utilisation of water resources for the benefit of large population which lives in rural areas of the

राष्ट्रीय जल विज्ञान संस्थान  
रुड़की

C. D. Kumar  
Scientist 'B'  
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Asian Region was made. Subsequently, it was decided to formulate MRPs for Southeast and South-Central Asian regions for the sake of operational convenience.

The Preparatory meeting on the MRP for South-east Asia in which Thailand, Philippines, Indonesia and Malaysia are participating was held in December 1984 at Kuala Lumpur, Malaysia. At this meeting the project document of MRP was finalised which was then approved by the 23rd General Conference of UNESCO. The major themes of the project include the following :

1. Watershed Development and Management.
2. Impact of Operations in Natural and Plantation Forests on Conservation of Water Resources.
3. Flood risk analysis and mapping.
4. Use of solar energy for pumping of water in remote areas.
5. Use of mathematical modelling in salt-water intrusion management.

At the planning and coordination meeting which was hosted by Thailand, the members from participating countries presented reports on their respective national projects recommended for participation in MRP. After discussions the activities in respect of each theme during the biennium 1986-87 were decided along with the financial estimates. The UNESCO Regional office at Jakarta which is coordinating this project had invited representative of ARCCOH Secretariat to this meeting to provide help in formulating and finalising another component of MRP for South-central Asia for which Dr. Satish Chandra was nominated to represent ARCCOH. The proposal of South-central component of MRP is under preparation at the Secretariat and is expected to be circulated to participating countries for comments and suggestions soon.

Dr. Satish Chandra has been offered a three-week consultancy by UNESCO to assist the Thailand Government to formulate the project document for the establishment of a National Institute of Hydrology in Thailand. He

has proceeded for Bangkok on this mission on April 13, 1986.

### Meeting of Authorities

#### (a) Governing Body (G.B.)

The 26th Governing Body meeting of the Institute was held in Shram Shakti Bhawan, New Delhi on 28th January, 1986.

#### (b) High Level Technical Committee on Hydrology (HILTECH)

The 8th HILTECH meeting was held at Maharashtra Engineering Research Institute, Nasik on 14th February, 1986.

#### (c) Technical Advisory Committee (TAC)

The 3rd meeting of the Technical Advisory committee was held at New Delhi on 16th January, 1986.

### Studies and Research Activities

Studies were conducted and reports have been prepared under different categories viz. Technical Notes, Case Studies, Documentation of Programmes and Status Reports. Some selected abstracts of these reports are given as under.

#### (a) Technical Notes

##### 1. Water Balance and Interaction of Large Depression Storage with Aquifer in Ghaggar Depression.

Interaction of depression storage and aquifer till recently was either neglected or taken as a residual of a water balance study. Understanding of the interaction of surface water body with the aquifer is necessary in order to have a meaningful regional water balance study. Mathematical modelling has been found to be a potential tool to study this interaction.

In the eastern fringe of lower Ghaggar basin, there exist nineteen interconnected sand dune depressions in Suratgarh area of Sriganganagar district of Rajasthan which are used as

flood cushion from 1968. The depressions have plan area to the tune of 100 sq. km. with storage capacity of 900 million cu. meters at full storage level. Due to the impoundment of water in the depressions, waterlogging in the isolated patches in the surrounding area has been first noticed since 1975.

In the present study, the recharge taking place from the depression storage to the aquifer has been assessed. A linear mathematical model has been developed using discrete Kernel generator and method of superposition to study the interaction between Suratgarh depression storage and aquifer. The discrete kernels for recharge have been generated by making use of solution of Boussinesq's equation for unit step rise in the depression water level. The recharge quantity from the depression has been estimated for the drawdown in the depressions because of recharge. It is found that emptying of some of the Suratgarh depressions takes  $7\frac{1}{2}$  months after being filled-up.

## **2. Water Availability Study for River (Bhimgoda to Narora.)**

Water availability of the Upper Ganga basin between Bhimgoda and Narora has been analysed, with the existing diversion works and those under construction in the Uttar Pradesh (U.P.) State. The analysis is performed using a river basin simulation model with a weekly operation period. The river basin simulation model SIMYLD developed by Texas Water Development Board, (presently known as Texas Department of Water Resources) USA is capable of modelling multi-storage or non-storage river basin systems, including the institutional framework. In the study area, the Upper Ganga Canal and Lower Ganga Canal are under operation. Along with these two canals there are three more canals known as Eastern Ganga Canal, Madhya Ganga Canal and Parallel Lower Ganga Canal under construction to make use of the excess monsoon flow available. These three new canals are envisaged to irrigate Kharif paddy for hundred days starting from the last

week of June. Therefore, in order to realistically simulate the performance of the diversion system in this geographical region the water rights structure must, in some fashion, be included in the modelling effort. SIMYLD, through its general quasi optimization capability allows for priorities or ranking of preferences of water diversions which may reflect the historical legal preferences existing or easily and quickly modified to reflect some new preferential scheme. It has an optimizing capability which is an extremely important attribute of the desired model and provides a detailed analysis of the distributional aspects of water transfers within a river basin.

Here it is considered that the existing diversion canals, the Upper Ganga Canal and the Lower Ganga Canal, are perennial and those under construction—the Eastern Ganga Canal, Madhya Ganga Canal and the Parallel Lower Ganga Canal are meant for meeting the Kharif paddy demand for hundred days. Import from Ram Ganga basin through the Ram Ganga Feeder to this system, that augments the supply at Narora head works, is included in this study on a weekly time basis. Considering the existing water rights and the topographical limitations a relative rank is fixed to meet the demands at various locations. Then the system is operated and analysed.

## **3. Unsteady Flow to a Large Diameter well influenced by a River and a No Flow Boundary**

Large-diameter wells are extensively used in many parts of the world. The cheapness and simplicity of construction and operation of these wells are often the main reasons for their use. Besides, large diameter wells are suitable for shallow aquifers with low transmissivity. In many situations an impervious boundary or a recharge boundary is encountered in the vicinity of the well. In the present report a general but simple mathematical tool has been developed to analyse unsteady flow to a large-diameter well located near a river and an impervious boundary. The analysis has

been done using image well theory and discrete kernel approach.

Variations of drawdown at the well point with time have been presented in non-dimensional form for various durations of pumping and for different values of storage coefficient for specific positions of the hydrologic boundaries. The influence of the hydrologic boundaries on drawdown at well point has been analyzed. The recovery of the well storage when the well has been pumped for different durations have been determined for different values of storage coefficient. Making use of the graphs, the time required for 90 percent recovery of the well storage can be known. It is seen that as the value of storage coefficient decreases the time span for 90 percent recovery increases.

### (b) Case Studies

#### 1. Simulation of Daily Runoff of Two Sub-Basins of River Narmada Using Tank Model

The methodology for Tank model as developed by Sugawara (1967) for daily analysis has been used to develop  $4 \times 4$  Tank model for two sub-basins Jamtara and Ginnore in Narmada basin. Jamtara basin is the basin of river Narmada from its source at Maikala hill range upto discharge measuring site at Jamtara having catchment area of 16575 sq.km. The basin experiences 86% of average annual rainfall in four Monsoon months from June to September. Using the available daily data of 1978 and 1979,  $4 \times 4$  Tank model of Jamtara basin has been calibrated.

Ginnore basin is the basin of river Chhota-Tawa, a left bank tributary of river Narmada, from its source at Satpura range in the West Nimar district of Madhya Pradesh at an elevation of 600 meter to its gauging station at Ginnore having a catchment area of 4816 sq.km. The Ginnore basin is located in the lower plains zone of Narmada basin. The river Chhota-Tawa joins the river Narmada at 829 km. from its origin. Average annual rainfall of the basin is 855.0 mm and 90% of it falls during four Monsoon months from June

to September. The basin contains permanent ordinary raingauge and self recording raingauge stations at Khandwa and Punasa. Punasa station is situated little outside of the basin, north of Khandwa station. Daily rainfall of Khandwa and Punasa stations, daily runoff at Ginnore and monthly mean of daily E.T. values of 1972 and 1973 have been used to calibrate the  $4 \times 4$  Tank model. The model has been used to simulate daily runoff of the basin for 1974, to test its performance. The simulated runoff of 1974 is then compared with the **observed runoff and the performance of the model is found to be good.**

From the present analysis it is observed that the  $4 \times 4$  Tank model is a suitable daily rainfall runoff model for simulation of daily runoff for basins in India which experience nearly 75% to 90% of annual rainfall during monsoon season followed by long dry period in non-monsoon months.

#### 2. Modelling of Daily Runoff for Kasurnala Basin Using Betson and USGS Models

Estimation of daily runoff from a natural catchment is essentially required for planning, management and evaluation of water resources. This study is based on the two watershed simulation models viz., Betson Model and USGS Model.

The Betson model, which is a lumped parameter model, can be used to predict streamflow when daily rainfall data are available. The model mainly simulates two processes viz : the soil moisture accounting and surface runoff . The soil moisture accounting is done by API ( Antecedent Precipitation Index ) method. The surface runoff volume is initially computed for the data and then its time distribution is determined using unit hydrograph theory.

The USGS model determines the parameters of rainfall runoff relationship which are used to synthesize the flood hydrograph at a specific streamflow site. The calibration of the model is based on a short term record of daily rainfall, daily evaporation, unit rainfall ( rainfall occurring during an interval of 5 to 60 minutes ), and the corresponding

unit discharge. The model determines the rainfall excess over short unit time interval and routes this rainfall excess (direct runoff) to the basin outlet (streamflow station). Runoff routing is performed by two functions viz., a translation function and an attenuation function.

The Betson and USGS models have been implemented and tested with available data from Kasurnala basin. Using rainfall records at two raingauge stations in an area of 600 sq. miles, the hydrograph of Kasurnala has been simulated.

From this study, it is found that the Betson model simulates the peak value and recession limb satisfactorily. However, the simulated rising limb does not match very well with observed rising limb.

The USGS model has been calibrated for different combination of flood events. It has simulated the peak flow and direct runoff volume quite accurately indicating the validity of model upto the catchment area of 600 sq. miles.

### (c) Documentation of Programmes

#### 1. Ordering the Series and Interpolation

The documentation for ordering the series describes the comparative studies carried out using four subroutines available in the literature. The comparison is made on the basis of compilation time, run time and memory requirements of the programme. The mean and standard deviation of run times are also compared. The test data used are ten different series of 600 real numbers each generated by a random number generation subroutine. The study shows that the subroutine ORDER 2 which uses the principle of 'division and comparison' takes minimum average run time. Also it requires less total time including compilation and execution times.

The input description and the subroutine listing are given in the documentation.

The documentation for interpolation describes the use of three subroutines. The methods employed in these subroutines are (1) spline fit, (2) second order parabolic, and (3) Lagrange's interpolation. No internal data storage is required for any of the three subroutines listed in the documentation. Input data requirements are specified. Example input and output of the subroutines are listed in the documentation.

#### 2. Flood Routing (Muskingum Cunge Procedure)

Flood routing in a natural river is complicated by the presence of irregularities of cross-section and by the presence of lateral flow. It is now possible to quantify the effect of irregularities in the width and the corresponding effect of storage caused by them. These irregular subreaches act as a series of reservoirs and provide attenuation.

Cunge brought out certain salient features of Muskingum method and stated that the attenuation seen in the routed flow using Muskingum model is just because of the numerical error and not due to the ability of the model. He showed that the finite difference approximation used in Muskingum method is also an approximation of a diffusion equation using Taylor series expansion. Cunge has developed a method of estimating the attenuation parameters using average width and slope of a river. R.K. Price worked further and improved it to include the variations in the width and slope. The routing parameter  $x$  is related to the attenuation parameter.

Based on the value of attenuation parameter and wave speed 'C' using the recurrence relation available in Flood Studies Report, Vol. III of National Environmental Research Council, London, FORTRAN programme capable of routing the flow was developed in National Institute of Hydrology, Roorkee with following features in addition to routing : (a) finds the attenuation parameter given physical features viz. the widths, slopes, and reach lengths for a given discharge, (b) the lateral flow is obtained

as the difference in observed inflow and outflow quantities and distributed as per the ordinates of either inflow or outflow as opted, and (c) the results are plotted in addition to printing of the discrete value.

The programme has been explained fully in the documentation with flow chart. The input specifications and the output descriptions are also given. An example using the data of a flood in the reach between Mortakka and Garudeshwar on the river Narmada is also given.

#### (d) Status Reports

### 1. Crop Water Requirements, Field Efficiencies and Irrigation Planning

Design of irrigation systems and judicious application of irrigation water need reliable information on the consumptive use of various crops grown in the command area. In recent past, studies on scheduling of irrigation based on soil water status, plant water status, irrigation water availability etc. have been done to develop irrigation scheduling model for different crops under varying climatic conditions. The basic idea behind all such studies is to minimise various water losses involved in an irrigation process so as to increase irrigation efficiency.

A review of different research works done at national and international levels in the fields of crop water requirement, field efficiency and irrigation planning is presented in this report. On the basis of the present review work the following research aspects have been identified in the report :

- (i) To find appropriate formula of evapotranspiration computation for an area by doing comparison between experimental methods and empirical formulae.
- (ii) Irrigation scheduling for various crops based on solution of Richards equation.
- (iii) Determination of water application points

in a field to minimise problem of non-uniform distribution of irrigation water.

- (iv) Selection of cropping pattern for a particular region depending upon the carrying capacities of canals in that region.
- (v) Development of instrumentation for irrigation scheduling.
- (vi) Selection of irrigation method for a particular crop to get maximum irrigation efficiency.

### 2. Data System and Library

The advent of sophisticated water resources and hydrological studies has necessitated the development of hydrologic data libraries in recent times. This report discusses the operating methodologies of such libraries. The report is introduced with a comprehensive description of the types and aspects of information usually encountered in hydrological investigations. The operational procedures of data banks are reviewed systematically. They are :

(i) Collection of raw data which involves the standardization of measurement/observation procedures and the establishment of data collection network.

(ii) Processing of raw data, comprising quality control, editing, analysis and synthesis, to prepare them for ready use in hydrological studies.

(iii) Storage and retrieval of data using data base management principles. The storage and retrieval techniques are discussed separately, followed by a survey of the integrated data base management process. Illustrative cases of their use in hydrology-related areas are discussed.

The current developmental status of some major hydrologic data banks are reviewed with emphasis on the scientific and organizational aspects. The data banks reviewed cover a wide spectrum of hydrologic interests, and indicate the areas of current research. The study is

concluded with a synoptic discussion of the need for a hydrologic data library in this Institute, operational strategies that can be envisaged for it, and the scientific background necessary for the same.

### **Interaction with other Organisations**

Dr. Satish Chandra, Director, National Institute of Hydrology visited Water Resources Development Organisation, Govt. of Karnataka, Bangalore and held discussions with Secretary-II, Government of Karnataka, Chief Engineer and other officers at WRDO regarding establishment of Regional Centre for Hard Rock Areas at Karnataka. A preliminary visit to Narayanpur, the Upper Krishna Project site was made for site inspection by the scientists of the institute for establishment of regional centre.

The Director proposed the establishment of a representative basin in this area for detailed hydrological studies. He emphasised the need for elaborate instrumentation of the selected basin before undertaking the study. The secretary welcomed the proposal and suggested the Malprabha river basin for this purpose. It is suggested that the representative basin may be taken upto Kanapura gauging site in the upper catchment of the river Malprabha in order to keep the size of the selected basin to the order of 1000 Sq. Km. Discussions were also held regarding Drought studies, organisation of workshops, seminars and training programmes. It was suggested that WRDO may organise a seminar on 'Drought Management Strategies.'

### **Sponsored Projects**

Final project report on 'Water Availability of Mahanadi at three sites', project sponsored by National Development Agency has been submitted to NWDA in March, 1986.

The Gujarat Irrigation Department approached NIH with a request to carryout 'Operation Study of Sabaramati System'. The project proposal has been prepared by NIH and sent to the Gujarat Irrigation Department for approval and releasing the funds.

### **Organisation of Seminars/Workshops**

Workshop on 'Observation, Processing and Analysis of Precipitation Data' was held at National Institute of Hydrology, Roorkee from 24th to 28th February, 1986. Nineteen persons from different central and state water resources organisations, including five persons from NIH attended the workshop.

### **Courses Attended**

Dr. S.M. Seth, Scientist 'F' attended the seventeenth course on Management of R & D Systems at Administrative Staff College of India, Hyderabad from 24th to 29th March, 1986. The course covered a number of topics including structure, decision making, planning and monitoring of R & D projects, managing and motivating scientists, leadership, transfer of technology, forecasting etc.

Shri K.S. Ramasastry, Scientist 'C' and Shri S.K. Jain, Scientist 'B' attended a 2 week workshop on 'Real Time Data for Water Resources Projects Planning and Design' conducted jointly by WAPCOS and CMP at New Delhi from 3rd to 14th February, 1986.

Shri Anil Kumar, Scientist 'B' attended a short term course on 'Remote Sensing Techniques applied to Water Resources Studies' at C.S.R.E., I.I.T., Bombay from 10th to 22nd February, 1986. The course was sponsored by CBI & P under research scheme on River Valley projects. Remote Sensing applications to Water Resources aspects, concept of geodata base, current trends in digital data analysis, specially on microcomputer etc. topics were covered in the course.

Shri Pratap Singh, SRA attended the 'Third Regional Training Seminar on Ice and Snow Hydrology', Organised by Snow and Avalanche Study Establishment, and Cosponsored by UNESCO at Manali from 14th March to 1st April, 1986.

## Forthcoming Seminars/Symposia etc.

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|---|---|--|--|
| 1. 53rd Research and Development Session of Central Board of Irrigation and Power         | May 8-10, 1986<br>Bhubaneswar               | Sponsored by<br>CBI & P  | Member Secretary,<br>Central Board of Irrigation<br>and Power, New Delhi.  |
| 2. Seminar on Drought Management Strategies   | May 15 & 16,<br>1986, Mysore                | Sponsored by<br>HILTECH,<br>Roorkee and<br><b>Govt. of<br/>Karnataka</b> | Shri V. Krishnamurthy, M.I.E.<br>Chief Engineer and Organising<br>Secretary,<br><b>Seminar on Drought Management<br/>Strategies for Southern Region,</b><br>Water Resources Development<br>Organisation, P.B. No. 8, Ananda Rao<br>Circle, Bangalore-560009. |
| 3. International Symposium on 'Flood Frequency and Risk Analysis                          | May 14-17, 1986<br>Baton Rouge,<br>USA      | I.A.H.R.,<br>Co-sponsored  | Dr. Vijay P. Singh,<br>Deptt. of Civil Engineering,<br>Louisiana State University,<br>Baton Rouge, LA 70803—<br>6405, USA.   |
| 4. International Conference on 'Water Quality Modelling in the Inland Natural Environment | June 10-13, 1986<br>Bournemouth,<br>England | Sponsored by<br>BHRA, The<br>Fluid<br>Engineering<br>Centre              | Conference Organiser,<br>Water Quality Modelling,<br>BHRA, The Fluid Engineering<br>Centre, Bedford MK 430 A 5,<br>England.  |
| 5. Seminar on 'Hydrology' with Colloquium on Waterlogging and Drainage                    | June 20-22, 1986<br>Bhopal                  | Sponsored by<br>Association of<br>Hydrologists of<br>India               | Prof. V.V. Jagannadha Sarma,<br>Secretary and Treasurer,<br>Assoc. of Hydrologists of<br>India, Department of Geophysics,<br>Andhra University,<br>Waltair—530003.   |

## Activities of HILTECH Secretariat

1. The eighth meeting of HILTECH was held at Maharashtra Engineering Research Institute, Nasik on 14th February, 1986 and was hosted by Government of Maharashtra.

2. Besides this, following meeting of various subcommittees/panels were held during the quarter.

(i) The first meeting on panel on Ground Water was held at Delhi on 24th Jan., 1986.

(ii) The first meeting of the merged Draft country plan and Expert Review group for IHP Phase-III was held on 29th Jan., 1986 at Delhi.

(iii) The second meeting of panel on Education and Training was held on 29th Jan., 1986 at Delhi.

(iv) The first meeting of panel on Water Quality, Erosion and Sedimentation was held on 3rd Feb., 1986 at Roorkee.



- (v) The second meeting of the Editorial Advisory Board for Hydrology Review was held on 7th Feb.'86 at Roorkee.

3. The following seminars are sponsored and funded by HILTECH.

- (i) The third regional training seminar on Ice and Snow organised by Snow and Avalanche Study Establishment from 14th March to 1st April'86 at Manali was sponsored by HILTECH.
- (ii) The Seminar on "Drought Management Strategies" being organised by Water Resources Development Organisation, Bangalore will be held on 15 and 16 May, 1986.

### **ARCCOH Secretariat**

The Secretariat has received good response from member countries concerning various actions taken on recommendations of third ARCCOH steering committee meeting held at New Delhi from 18-20 September, 1985. The Indian National Committee for IHP (HILTECH) has appointed Dr. Satish Chandra as National Coordinator of India for activities of ARCCOH. The Secretariat is in the process of compiling Annual Bulletin of ARCCOH for year 1985.

### **News From Various States**

#### **\* Nagaland**

Major part of Nagaland State comprises of undulating hilly terrain. Formation of valleys are restricted to fringe areas bordering Assam and to some isolated intermontane valleys. Drainage system constitutes upper catchment part of Brahmaputra river basin in the north and Chindwin river of Burma towards south. Drainage exercises run-off character primarily. The State Directorate of Geology and Mining with its limited infra-structural resources has recently started groundwater development activities in one of the most developed area of the State viz. Dimapur Valley. To decipher a complete picture of hydrological conditions and management of this basin would however, take a few more years. Dimapur Valley constitutes about 450 sq. km and is bounded in north and

south by hills. The Valley tends to taper in west and becomes open and wide towards north-east, merging with the plains of Assam. Dhansiri river, flowing across the Valley in NE direction is the main drainage system and forms a sub-basin of Brahmaputra system. General gradient is towards central part and to NNE and NE. Geologically, the area is underlain by Recent to Sub-Recent Alluvium and unconsolidated Tertiary formations. The State department of Geology and Mining has constructed 3 nos. of tube wells in north-eastern upslope areas of Dimapur for meeting the requirements of drinking and irrigation purposes. Based on drilling data, it is seen that aquifer granular materials range from 15-42 m and are persistent within a depth of 100 m. Possibility of encountering more argillaceous sediments occur from 150-200 m depth. Aquifer materials consist of fine to medium grained sand and sandstone interbedded with clay and shale layers. Thus rendering semi-confined to confined conditions. Thickness of aquifers appears to increase towards central and north-eastern part of the basin. Fine nature of grain size does not specify aquifers as high potential water bearing zones. Yields of tubewells range average 30m<sup>3</sup>/hr for drawdown 6-15m. (tested with 101.6 mm pump). However, it can be recapitulated to have more discharge ranging up to 50 m<sup>3</sup>/hr. or more concurring high drawdowns. Discharge tends to increase towards central part of the basin. Hydrological parameters computed reveal Transmissibility 160m<sup>3</sup>/d/m, Permeability 4 m/d. Finer nature of sediments add to development problems of wells. Keeping in view of physical characters of aquifer materials and hydrological parameters, the Valley conforms to construction of tubewell with discharge ranging 30-50 m<sup>3</sup>/hr which will cause drawdowns within permissible limit and will cause no extraneous effect on the existing hydrogeological conditions. Dynamic recharge in the area is calculated to the tune of 48 MCM which is readily available for exploitation.

#### **\* Uttar Pradesh**

Irrigation Design Organisation is engaged in hydrologic studies of important hydroelectric

projects in the state of Uttar Pradesh. The range of activities covers hydrologic design of large structures such as dams and spillways. These basically aim at suggesting suitable design flood by application of standard practices. Such studies are carried out in a planned and phased manner. It is also obligatory to attend and to provide guidance to site engineers for such day to day hydrologic problems, which need immediate attention.

Besides the routine job basic and applied research is also kept on to investigate possibility of suggesting economic flood designs through approaches befitting a particular case study. One such study has recently been completed on flood estimation for Lakhwar dam. The results of such studies are highlighted in research papers and reports.

### Lab News

After mutual interaction with Space Applications Centre, Ahmedabad (SAC) for quite sometime, an image processing software developed at SAC has been installed in the VAX-11/780 computer of the Institute during March, 1986. Test classification results obtained from the digital satellite data using this software are being studied presently by the Remote Sensing Group. The software is capable of data extraction, correction, image ratioing, smoothening, principal component analysis, supervised and unsupervised classification and producing line printer outputs of image histogram and gridded grey level maps.

Geophysics Investigations facility section has procured a Digital A.C. Resistivity Meter (Model ACR-I) from M/s A.P. Electronics Development Corporation Ltd. Hyderabad. The equipment will be used for carrying out resistivity surveys in and around NIH campus for soil moisture studies.

### Computer News

Good news for users of VAX-11/780 computer! A few more terminals have been installed in the computer centre. All these terminals (ADM 220) are VT-220 compatible and

can also be used as VT-100 as well as VT-52 terminals. As most of users like to use VT-100 terminals and previously there were only two such terminals, users will no more be disappointed as there are enough VT-100 compatible terminals at their disposal now.

### News

\* Dr. Satish Chandra, Director delivered a lecture entitled 'Mountain Hydrology and Watershed Management' at the 3rd Regional Training Seminar on Ice and Snow Hydrology held at SASE, Manali from 14th March to 1st April, 1986.

\* Dr. Satish Chandra, Director presented a key paper on 'Planning for Integrated Water Resources Development Projects with special reference to Conjunctive Water Use' at a seminar on 'Conjunctive Use of Surface and Ground Water Resources' held at New Delhi from 10th-14th February, 1986.

\* Nine papers by NIH scientists have been accepted for CBI & P 53rd Annual R & D session to be held at Bhubaneswar from 8th to 10th May, 1986.

### \* Building and Related Activity

The construction of extension of Jal Vigyan Bhawan is under progress. The work of laboratory building will be completed soon. Sewerage line of the campus has been laid.

### \* Club Activities

The club organised a Tug-of-War competition on the Republic Day which marked the inaugural of Annual Games/Sports for year 1985-86. It was inaugurated by Director, NIH. The events held till now have recorded very good participation. On March 27, 1986 a general body meeting of the club was held wherein it was decided to charge equal monthly subscription from all members. The term of present executive committee has been extended by two months. The election for the executive body for 1986-87 term took place on April 14, 1986.

**\* Appointments, Resignation etc.**

Sh. M. Perumal, Scientist 'B' has been selected and has since joined the Institute as Scientist 'C'.

Following Scientist 'B' and Asstt. Engineer have joined the Institute during the quarter.

1. Sh. Rakesh Kumar, Scientist 'B'
2. Sh. Nikhilendu Nikhil, Scientist 'B'
3. Sh. P.K. Pramanik, Asstt. Engineer.

Also, one Sr. Research Assistant, one Office Superintendent and two other Supporting staff have joined the Institute during the quarter.

Sh. S.R.B. Dhasan, Scientist 'B', Sh. K. Ethirajan, Scientist 'C' and Sh. Rakesh Kumar, Library Attendent have been relieved of their duties during the quarter.

Following posts have been advertised.

(i) Scientist 'F' (ii) Scientist 'E' (iii) Scientist 'C' (iv) Scientist 'B' (v) Sr. Research Asstt. (vi) Research Supervisor (vii) Sr. Computer Operator (viii) Research Asstt. (ix) Technical Asstt. (x) Personal-cum-Administrative Asstt. (xi) Junior Engineer (Civil) (xii) Junior Engineer (Electrical) (xiii) Sr. Draftsman (xiv) Technician (xv) Upper Division Clerk (xvi) Stenographer (xvii) Lower Division Clerk (xviii) Messenger (xix) Chowkidar (xx) Mali (xxi) Safai Karmchhari.

Interview for the post of Scientist 'C' has been held.

**Recent acquisitions in the Library**

1. Gupta S.K., Salt Movement & Dispersion Convention Equation Material Balance Concepts. Karnal, Central Soil Salinity Research Institute. 1985, Pages 48.
2. National Seminar on Remote Sensing of Water Resources (December 27, 1985) Roorkee I.W.R.S., 1986, Pages 105.

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## हिन्दी खण्ड

(१) हिन्दी के प्रयोग का चलन बढ़ाने के उद्देश्य से अहिन्दी भाषी कर्मचारियों के लिये २१ फरवरी १९८६ को एक हिन्दी साहित्य पहेली प्रतियोगिता का आयोजन किया गया। इसके अतिरिक्त ४ मार्च १९८६ को एक मुक्त 'हिन्दी निबन्ध' प्रतियोगिता का आयोजन भी किया गया। हिन्दी साहित्य पहेली प्रतियोगिता में १० कर्मचारियों एवं हिन्दी निबन्ध प्रतियोगिता में ६ कर्मचारियों ने भाग लिया। हिन्दी निबन्ध प्रतियोगिता में निम्नलिखित विषयों पर निबन्ध आमन्त्रित किए गये।

१. भारत के विकास में विज्ञान की भूमिका।
२. जल संरक्षण-समय की पुकार।
३. राष्ट्रीय एकता/वर्तमान चुनौतियां।
४. स्वतंत्रता संग्राम।

## ५. एक राज भाषा क्यों ?

इन प्रतियोगिताओं में प्रथम, द्वितीय एवं तृतीय स्थान प्राप्त करने वालों को पुरस्कृत करने का प्रस्ताव है।

(२) गणतंत्र दिवस इस वर्ष भी संस्थान में बड़े हर्षोल्लास के साथ मनाया गया। निदेशक महोदय ने राष्ट्रीय ध्वज फहराने के पश्चात सभी कर्मचारियों को सम्बोधित किया। उन्होंने राष्ट्रीय एकता और अखण्डता को बनाये रखने पर बल दिया और सभी कर्मचारियों को इस दिशा में अपना सहयोग देने का आग्रह किया। उन्होंने जल से सम्बन्धित अनुसन्धान एवं जल के तर्कसंगत प्रयोग के बारे में भी कर्मचारियों को सलाह दी।

संस्थान की स्थापना के उद्देश्यों को सार्थक बनाने के लिए उन्होंने अधिकारियों एवं कर्मचारियों से निष्ठा एवं लगन से काम करने का आग्रह किया।