

# JALVIGYAN SAMACHAR



# जलविज्ञान समाचार

## Newsletter of National Institute of Hydrology

Volume 4

Number 3

July 1987

### Meetings of Authorities

#### (a) Technical Advisory Committee (TAC)

The 17th meeting of TAC was held on 15th July, 1987 at National Institute of Hydrology, Roorkee under the Chairmanship of Shri M.A. Chitale, Chairman, Central Water Commission.

#### (b) Working Group Meetings

The Working Group meetings of the following ten scientific divisions of the Institute were held at Jal Vigyan Bhawan, Roorkee during the period.

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|--|-----------------|
| (i) Hydrological Investigations            | 20th July, 1987 |
| (ii) Information System & Data Management  | 22nd July, 1987 |
| (iii) Conjunctive Use                      | 23rd July, 1987 |
| (iv) Hydrologic Design                     | 24th July, 1987 |
| (v) Flood Studies                          | 24th July, 1987 |
| (vi) Mountain Hydrology                    | 27th July, 1987 |
| (vii) Surface Water Analysis and Modelling | 27th July, 1987 |

- |                        |                 |
|------------------------|-----------------|
| (viii) Drought Studies | 28th July, 1987 |
| (ix) Drainage          | 29th July, 1987 |
| (x) Man's Influence    | 30th July, 1987 |

### Regional Centre of N.I.H.

The regional Centre of National Institute of Hydrology for the Hard Rock region is being set up at Belgaum. Efforts are onway to start the regional centre in the North-eastern and West Himalayan regions.

### Studies and Research Activities

Reports have been prepared under different categories viz. Technical Reports, Case Studies, User's Manuals, and Status Reports for the studies conducted. Abstracts of some selected reports are given as under :

#### (a) Technical Reports

##### 1. Mathematical Modelling of Moving Storms

The magnitude of peak flood and the shape of a flood hydrograph depend not only on the magnitude of total storm rainfall depths but also on its distribution in space and with

राष्ट्रीय जल विज्ञान संस्थान  
रूड़की

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time: Improvements of the accuracy and time liness of hydrological forecasting would thus largely depend on the prediction of rainfall distribution in space and with time.

It is common knowledge that in India, tropical disturbances popularly known as storms and cyclones originate in the Bay of Bengal and Arabian Sea prior to, during and after the monsoon season, and move over the mainland of India. The direction of storm movement has the greatest effect on large elongated catchments like Narmada. During a given storm period for the same amount of total storm rainfall, the magnitude of the flood peak would be greater and the rising limb steeper if the storm moves down the valley.

Modelling of moving storms has been attempted by several authors using both dynamical and statistical approaches. Some of these methods are reviewed in the report and the statistical technique of inter-station cross correlation has been applied to model the movement of four historical storms in Narmada

basin which had caused critical floods in Narmada river. Hourly rainfall data recorded at a number of self recording rain gauges in the Narmada catchment has been used for the analysis. The storms considered for the analysis were, (i) 2-6 Sept. 1970, (ii) 28-31 August 1973, (iii) 28-31 August 1978 and (iv) 6-10 August 1979.

The hourly rainfall data are scrutinized by visual observation for each of the storms and the storm period at each of the SRRG stations was identified. The hourly rainfall data at each of the SRRG stations has been input to the cross correlation programme incorporating the lag observed through the visual observation. During the analysis, the inter-station correlation is computed for all pairwise combination of SRRG stations lagging the rainfall data at stations down the storm track in successive increments of 1 hour upto a maximum lag of 18 hours. The plot of interstation lag zero correlation versus inter-station distance is shown in fig. 1 for the storm of 1978.

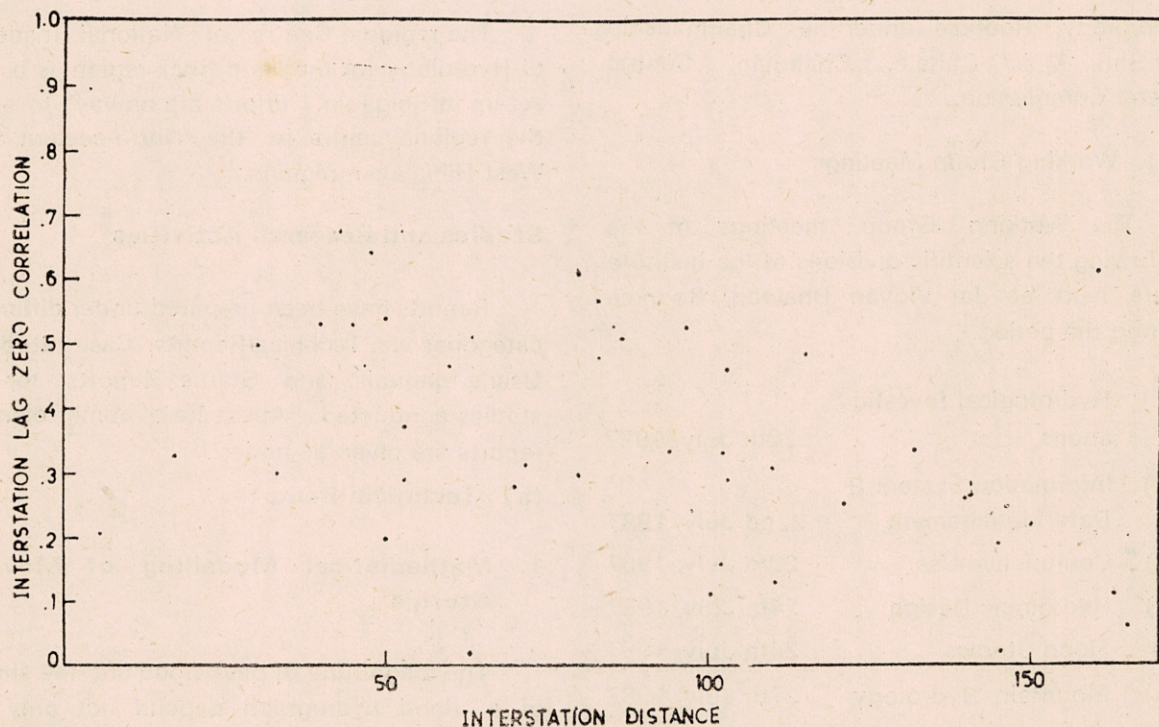


Fig. 1. Interstation Distance Vs Interstation Correlation (August 1978)



The results have indicated the usefulness of the statistical model based on cross correlation, in modelling the movement of the tropical storms inspite of the rather poor network of self recording stations in the Narmada basin.

The study further strengthened the theory regarding the size of the storm cell which has been reported in various studies to be of the order of about 5 km. The lag zero correlation obtained at any pairwise combination in all the four stations is rather poor, the maximum correlation coefficient obtained being only 0.7200.

## 2. Recharge from Large Depression Storage

The transient analysis of groundwater flow around a lake of square cross section (300m × 300 m) and having a uniform depth has been analysed for hypothetical setting of

boundaries (river on the lateralsides of the lake and no flow boundaries at the other two sides, both the boundaries being at same distance i.e. L from the lake) using a three dimensional finite difference model. Similarity approach has been employed to develop a type curve (Fig. 1) which shows that the parameter  $X^2S/T.t$  (X is the distance measured from the side of the lake, S and T are the aquifer parameters, and t is the time measured from the start of the simulation) and  $T \cdot \Delta h / Q_R$  ( $\Delta h$  is the difference of water table level at the discrete points, due to seepage occuring from the lake and the river stage; and  $Q_R$  is the recharge rate from the lake) is uniquely related irrespective of the head difference between the water level in the lake and the river stage ( $\Delta H$ ). This type curve can be used to estimate the recharge rate  $Q_R$  from the lake, knowing  $\Delta h$  at a value of  $X/L$  and t. This type curve is applicable only for  $K_h/K_v = 500$  and  $l/L =$

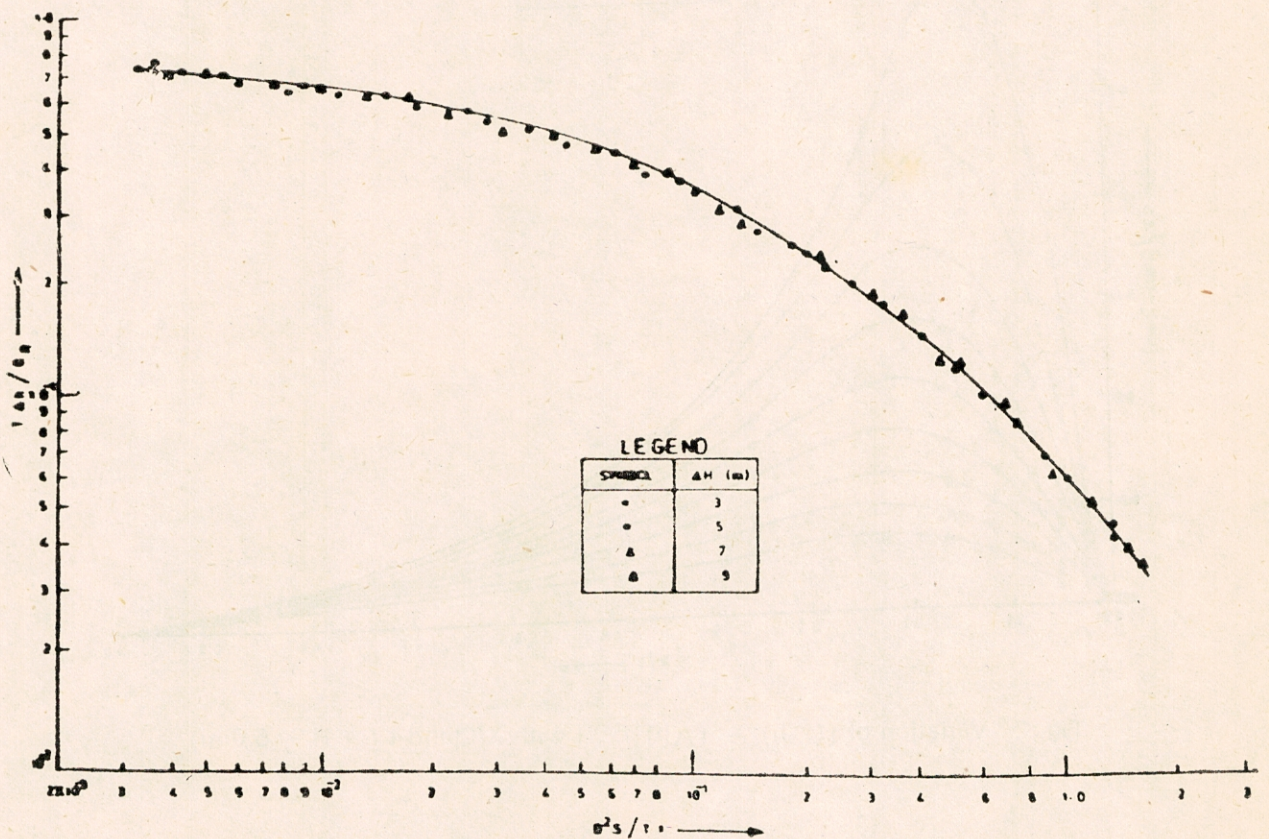


Fig. 1. Relation Between  $x^2S/Tt$  and  $T \Delta h / Q_R$  (for  $K_h/K_v = 500$  and  $l/L = 0.12$ )



0.12, where  $l$  is the length of side of the lake. In order to establish the applicability of the type curve for other values of  $K_h/K_v$  and  $l/L$ , further study is planned.

Variation of  $(\Delta h)_s - (\Delta h) / \Delta h$  with  $X/L$  and  $t$  have been shown in Fig. 2 and Fig. 3 which indicate that with increasing time the maxima of the curve shifts in a positive  $X$ -

direction and it is observed that the shifting of the maxima for all time is ranged between  $X/L = 0.15$  to  $0.25$  (this range of  $X/L$  was found to be the same for different value of  $\Delta H$ ). Therefore, the observation well located within the above range will observe a comparatively rapid change of head and thus, it will be sensitive. Therefore, it can be concluded that the location of an observation well within  $X/L = 0.15$  to  $0.25$  will be ideal.

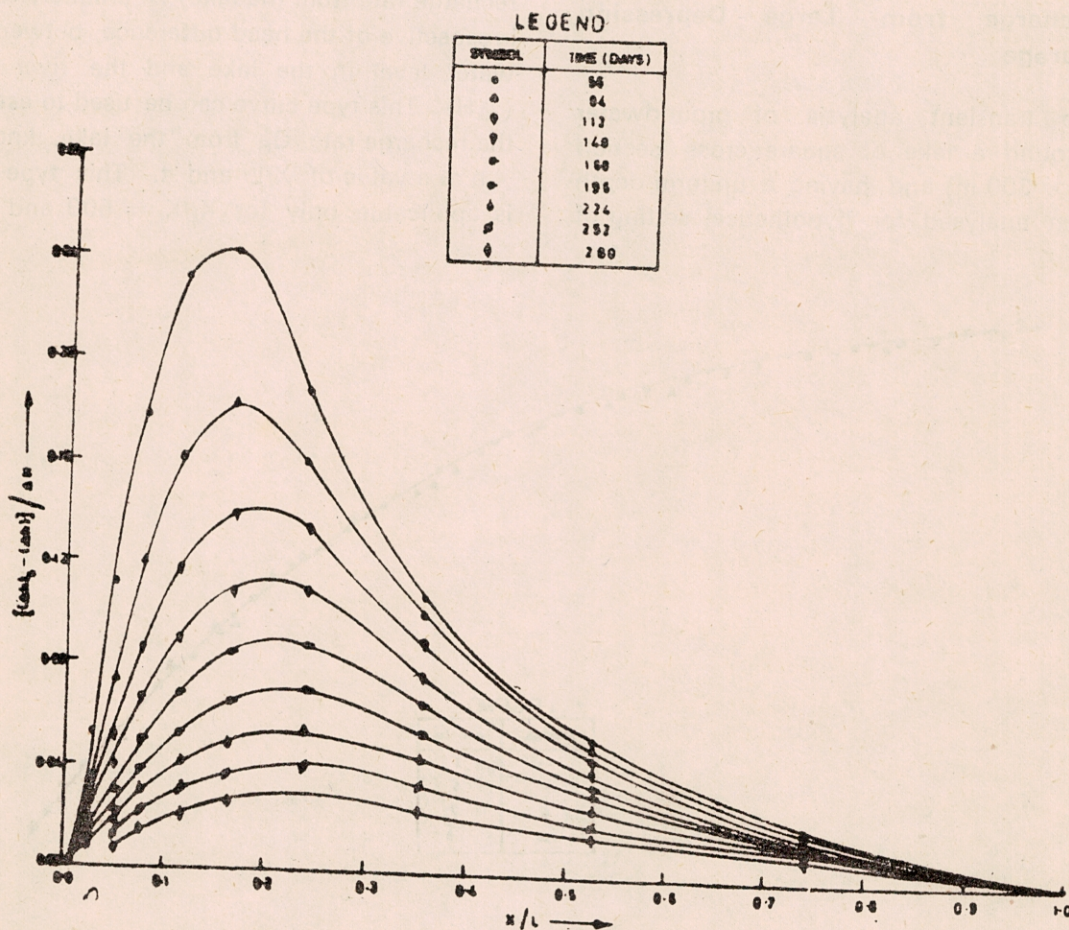


Fig. 2 Variation of  $[(\Delta h)_s - (\Delta h)] / \Delta H$  with  $X/L$  and  $t$  ( $\Delta H = 5.0$  m)



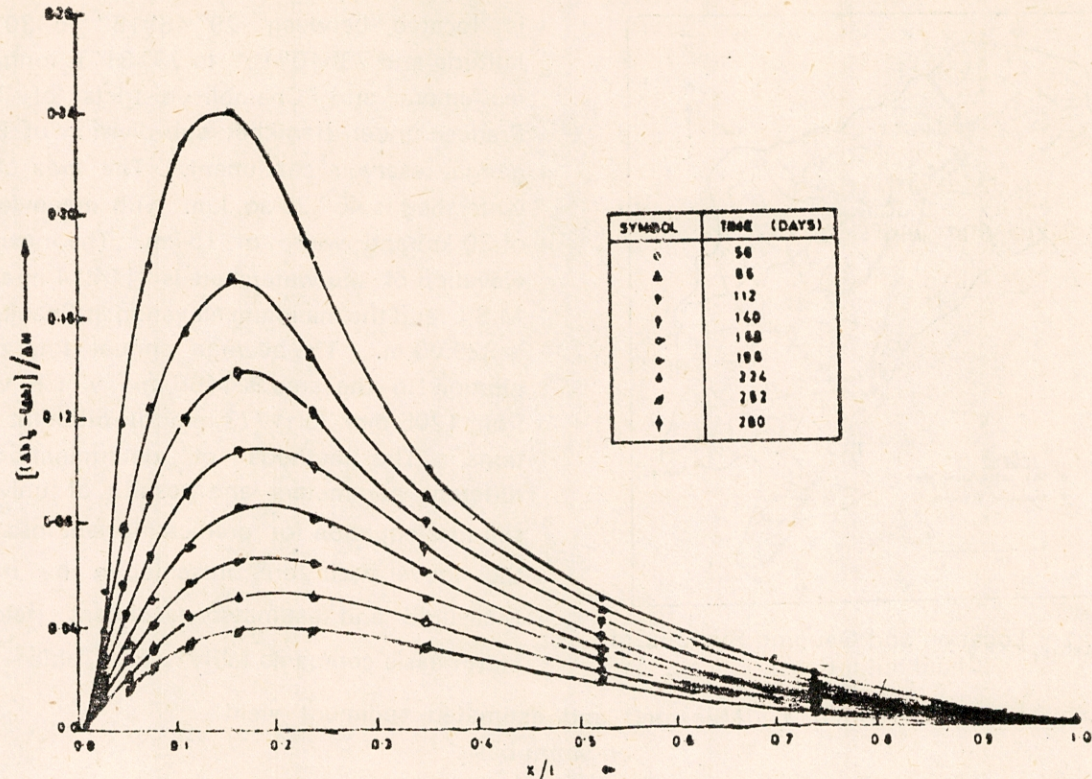


Fig. 3. Variation of  $[(\Delta h)_s - (\Delta h)]/\Delta H$  with  $X/L$  and  $t$  ( $\Delta H = 3.0$  m)

### 3. Study of Soil Erosion for Different Land Use and Vegetal Covers Using Universal Soil loss Equation

The fundamental importance of maintaining soils to meet the food and fiber needs of a burgeoning world population merits the attention and concern of all people. Erosion of soil by water poses an increasing threat as needs for food, fiber production and space for social and economic necessities of a growing population add, pressures to our nation's land resources. The soil loss prediction techniques have developed over many years as understanding of the erosion process expanded and increasingly more erosion research was conducted. Early estimates were primarily qualitative in nature and illustrated that some cultural practices differed in their ability to control soil erosion. Initially, equations were developed to describe soil loss using a single independent variable. These single factor equations were

for local situations were developed as more data become available and researchers were better able to describe contributing factors. These analyses culminated in the equation most widely used today for soil loss prediction the Universal Soil Loss Equation (USLE). The USLE is a highly useful tool for predicting sheet and rill erosion under various conditions of land use and management. Recent investigations have focussed on defining the parameters of the USLE for a greater range of conditions. Considerable work continues to define the soil erosion process and, hence, eventually predict soil loss, from a physical basis in contrast with the predominantly empirical soil loss predictions of the past and present.

The Universal Soil Loss Equation was applied to the Chaukhutia catchment of Ram ganga River (Fig. 1). The Chaukhutia watershed



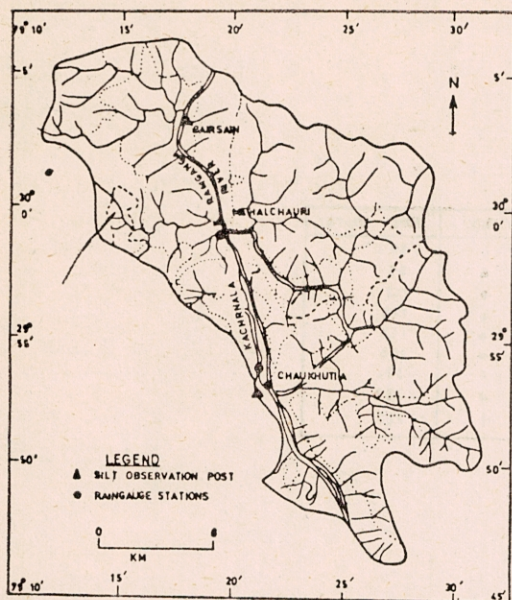


Fig. 1. Location and Gauging Stations of Chaukhutia Basin

is located between 29° 46' 15" to 30° 6' N' latitude and 79° 12' 15" to 79° 31' E longitude in Almora and Chamoli districts of Uttar Pradesh under Ranikhet sub-division of Ramganga reservoir catchment. The area of the watershed is 452.25 sq. km. with mean length of 30 km and width of 15 km. The maximum elevation of the watershed is 3114.14 m above M.S.L. and the minimum elevation at Chaukhutia is 929.00 m. The average annual total precipitation in the area is 1466 mm which varies from 1205 mm to 1773 mm at different locations. The methods of determination of different parameters and results of universal soil loss equation for predicating soil loss from the above basin are presented in the report. Measured and estimated sediment yield on storm basis compares fairly well (Table-1).

Table 1. Measured and estimated sediment yield on storm basis

Date of storm event	Measured sediment yield tons/ha	Estimated sediment yield tons/ha.	Percentage error
July 17, 1983	0.0674405	0.0632803	+ 6.168
August 22-23, 1983	0.2402211	0.2611877	- 8.72
July 20, 1984	0.0798235	0.0968675	- 21.35
August 18-19, 1984	0.0674405	0.0780225	- 15.69

$$\text{Percentage Error} = \frac{\text{Measured} - \text{Estimated}}{\text{Measured}} \times 100$$

## (b) Case Studies

### 1. Regional Flood Frequency Analysis

Whenever annual peak flow data are available or the historic recorded annual peak flow data are very short at a site, there are several methodologies available for the estimation of flood at that site using flood frequency analysis approach. A number of studies have appeared to-date which apply some sort of regionalisation in flood frequency analysis for

such situations. Some methods of importance are the USGS Index Flood Method, parameter regionalisation method, methods based on regression equations and the region curve method recommended in U.K. flood studies report.

This report describes study of regional flood frequency analysis carried out for the region of subzone 3-d of Mahanadi basin with annual peak flood series data available at 18



stations for varying number of years. The following three methods were used for the analysis : (i) the Index flood method, (ii) the method based on normalisation of peak flood data of different sites with reference to then respectiva site mean values and combine these normalized values to form a single series for regional analysis, and (iii) the method based on regional parameter of Wakeby distribution and James-Stein corrected means. Except the first method, the other two are relatively unknown in the area of regional flood frequency analysis. Out of 18 bridge sites where data are available, the data

of 15 sites were analysed and the data of remaining 3 sites were kept as independent data for verifying the results obtained from the analysis. Regional frequency curve developed for the subzone 3 d of Mahanadi basin based on Index-flood method is shown in fig. 1. fig. 2 illustrates the relationship between mean peak flood (Q 2.33) in cumec and catchment area (CA) in sq. km. for the region. The study indicates comparable performance of the later methods with that of Index-Flood method in estimating the peak floods of ungauged catchments. However, further studies are warranted on these two methods.

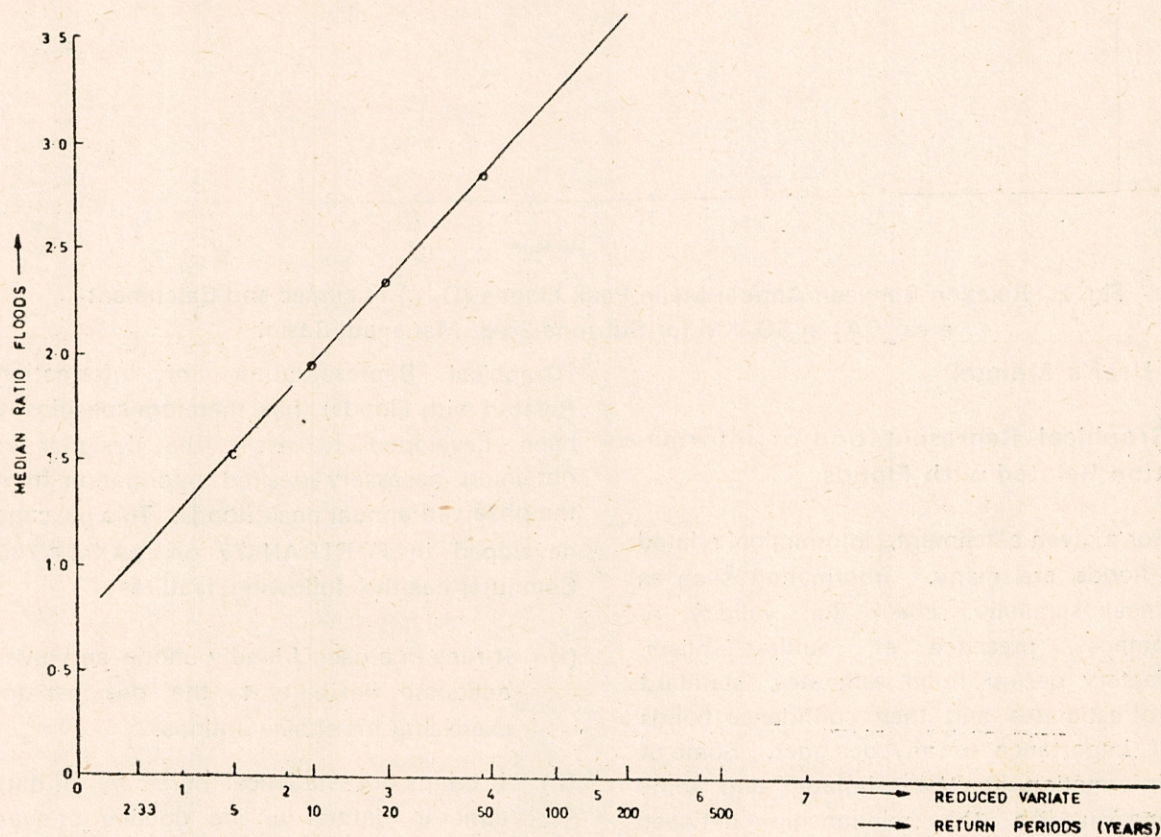


Fig. 1. Regional Frequency Curve



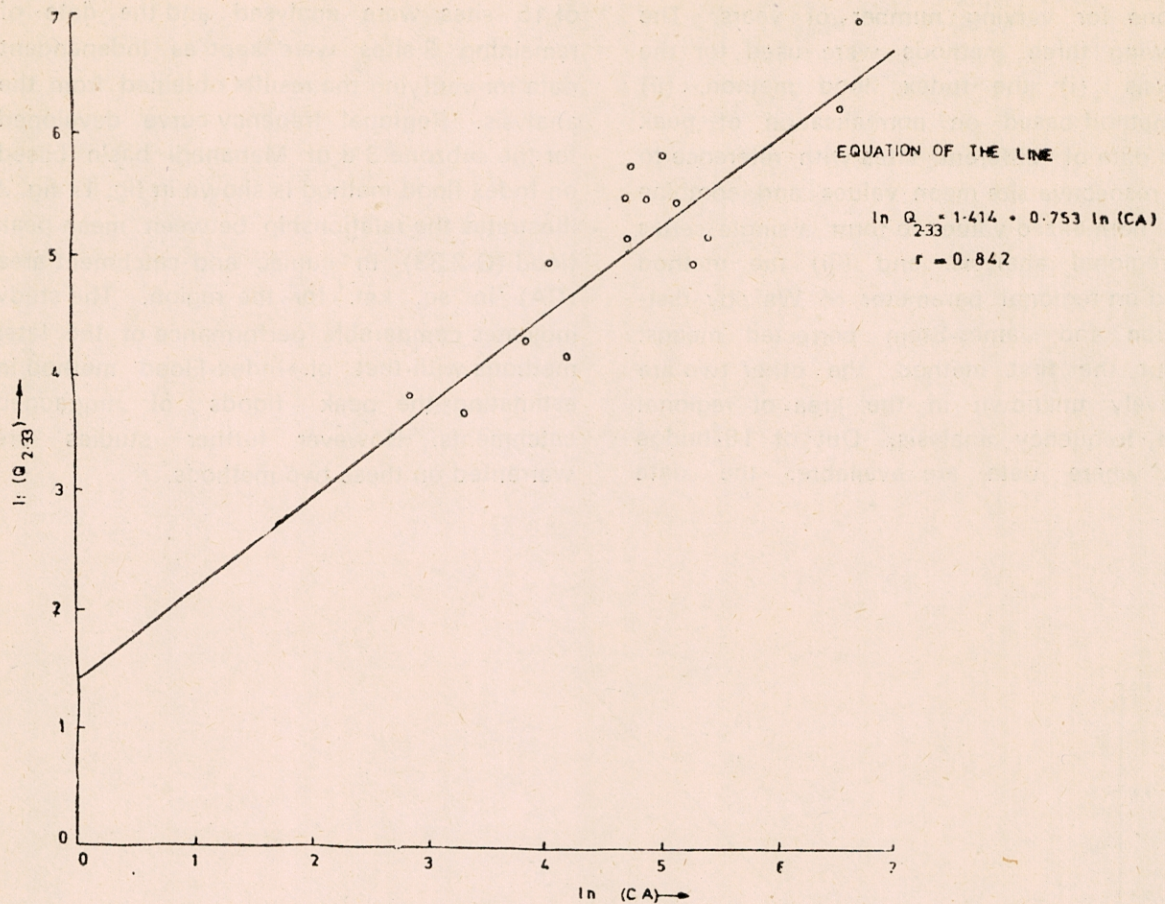


Fig. 2 - Relation Between Annual Mean Peak Floods ( $Q_{2.33}$ ) in cumec and Catchment area (CA) in SQ. KM for Subzone-3d of Mahanadi Basin.

**(c) User's Manual**

**1. Graphical Representation of Information Related with Floods**

For a given catchment, information related with floods are many. Information such as statistical summary, check for validity of randomness, presence of outliers/inliers, satisfactory design flood estimates, standard error of estimates and their confidence bands are of importance to any designer. Some of the information can be tabulated and some information like the relationship between quantile estimate and return periods (or reduced variates) for a chosen probability model can be well represented graphically.

Generalised software package 'GRIF'

(Graphical Representation of Information Related with Floods) has therefore specifically been developed to assist the designer in obtaining necessary desired information from the observed annual peak floods. This package developed in FORTRAN-77 on VAX-11/780 Computer has the following features :

- (i) It runs in a user friendly mode and gives adequate flexibility to the designer for exercising his choice/options.
- (ii) It brings out statistical summary of data either in natural or log domain or even both.
- (iii) The designer has the option to go through the analysis for outlier/inliers, view the the modifications and either accept or



reject the analysis before going over the next module.

- (iv) Analysis for checking the persistence structure of data is available to the user.
- (v) It allows the designer to choose from amongst potential distributions with different parameter estimation techniques.
- (vi) Quantile estimates together with their standard errors at specified return periods with facility to compute quantiles at additionally specified return periods are available to the user.
- (vii) Options are also available to the user to see graphical plot of quantiles on the terminal.

This user manual describes the use of the GRIF package. The operational logic has been represented through a flow chart. Detailed description of various subroutines and procedures used alongwith sample input and output are given in the manual.

### **Drought Studies in the Institute**

Except the north-east and eastern India which has been experiencing flood, practically the entire country is yet to receive monsoon. NIH has already established Drought Studies Division in 1986 and is studying the hydrological aspects of drought with a view to developing both long and short term strategies to combat drought. In a bid to lay focus on importance of hydrological aspects of drought, the Institute started studies by on the spot data collection and their analysis to study the recurrent drought situation in various States of the Country.

Like last year this year also the Institute sent scientific and technical teams to Drought affected States of Maharashtra, M.P., A.P., Gujarat, Karnataka, Rajasthan and Kerala to collect field data for carrying-out studies related to hydrological aspects of droughts. The visits were undertaken in the month of June

1987. During their visits the scientists and other staff collected the data related to rainfall, streamflow, reservoir levels and storages, ground water level fluctuations, soil moisture, agricultural production and hydrometeorological data. Also hydrological year books and memoranda of relief works being carried-out in the drought affected areas were collected. The compilation of the data collected from various states is under progress and soon a report on hydrological aspects of droughts in 1986-87, will be brought-out.

The Institute has so far prepared following reports on drought studies.

1. Drought Estimation and Control.
2. Hydrological Aspects of Droughts in 1985-86 (Interim Report).
3. Hydrological Aspects of Drought (Review Note).
4. Drought Analysis Using Soil Moisture Simulation Approach.
5. Comprehensive Review of Drought Indices
6. Analysis of Low Flow to Investigate Drought Characteristics and Plan Water Use Management.
7. Estimating Evaporation Losses from Lakes and Reservoirs.

### **Interaction with other organisations**

Dr. Satish Chandra, Director, NIH visited Bombay and had discussions with Joint Secretary and Chief Engineer of Maharashtra Irrigation Department. Drought studies being conducted by the Institute in the State, National Hydrology Project, Technician's Training, Organisation of Workshop etc. were discussed. He also held discussions with the Secretary Rural Development and Secretary, Relief, Govt. of Maharashtra regarding drought studies of the Institute in Maharashtra. The discussions were also held with Head, Isotopes Division, and senior scientists of Isotope Hydrology Group in connection with taking up of a



collaborative study with BARC on Isotope studies for surface and ground water interaction.

Director, also visited Bangalore and had discussions with Secretary and Chief Engineer, WRDO. They discussed about the Regional Centre, drought studies and other related matter,

### **News Received from other Organisations**

#### ● **Central Ground Water Board**

Drought conditions are witnessed in nearly 1/3rd of the country almost on recurrent basis. The Board had been undertaking systematic hydrogeological surveys and has already covered about 80% of such areas. In certain areas exploratory drilling has also been carried out. The Board has decided to give a special thrust to this sector with a view to finding solutions to problem. It has been decided to take up one drought district in each State every year, complete the exploratory drilling and ground water surveys, assess the ground water potential on long term basis and issue technical reports to enable State Governments to undertake follow-up action for optimal development of ground water to meet water shortage.

The Board proposes to set up a National Training Institute to impart training to professionals and staff engaged in survey, exploration, development and management of ground water resources in the country,

#### ● **Punjab Agricultural University, Ludhiana**

A workshop on "Water-logging and Soil Salinity Problems in South-West Punjab-their Causes and Practical Remedies" was organised by I.P.R.I., Amritsar at Chandigarh on 15th June, 1987. The workshop was attended by participants from CSSRI, Karnal; PAU Ludhiana; HAU Hissar; IPRI, Amritsar; Water Resources Directorate Punjab; Engineers from Department

of Irrigation and Drainage etc. More than 23 papers were presented in the workshop.

A seminar on "New Water Supply Management Techniques" was organised by the Public Health Department of Punjab in collaboration with the Punjab Water Pollution Control Board from 10-11, July, 1987 at Patiala.

#### **Organisation of Workshop**

The Institute will be organising one-week, workshop on 'Design Storm and Design Flood' from August, 10-14, 1987 at Karnataka Engineering Research Station, Krishnaraja Sagara, Mysore (Karnataka).

#### **National Symposium on 'Hydrology', December 16 to 18, 1987 at NIH, Roorkee.**

During the 7th Session of the Inter Governmental Council (IGC) of the International Hydrological Programme (IHP), it was recommended that the National Committee of the IHP should organise at least one National Seminar/Symposium every year to bring together the working hydrologists, water resources engineers and academic professionals of the country to report results, problems and exchange ideas.

The proposal to hold such an activity in India was considered by the Chairman of the Indian National Committee on Hydrology (HILTECH) and it has been recommended that to start with the National Institute of Hydrology should host a National Symposium on 'Hydrology' as a HILTECH sponsored activity from 16 to 18, December 1987 at Roorkee to coincide with the Foundation Day of the Institute. The Governing Body of the Institute has approved the proposal in principle as also Technical Advisory Committee has given its recommendations to the Technical Contents of the proposed symposium.

First circular for the symposium is being



issued inviting papers from prospective authors on following major themes :

- Floods
- Droughts
- Hydrologic Analysis and Design
- Ground Water Assessment and Modelling
- Drainage and Conjunctive Use
- Data Storage and Information System in Water Resources
- Water Resources System and Man's Influence on Hydrologic Cycle.
- Hydrologic Instrumentation
- Hydrology of Special Areas
- Remote Sensing Application in Hydrology
- Education and Training in Hydrology

The abstracts of proposed papers are to be sent by September 15, 1987 giving details of title, author(s) and subject matter. The authors of the abstracts accepted for the symposium will be informed by September 30 for writing the full length paper which should reach the organisers by October 31, 1987. The registration fee per delegate for attending the symposium will be Rs. 400/-.

Further information could be obtained from ;

Organising Secretary  
National Symposium on 'Hydrology'  
National Institute of Hydrology,  
Jal Vigyan Bhawan,  
Roorkee - 247 667  
Uttar Pradesh

Telephone : 2106  
Telex : 0597-205 NIH IN  
Gram : JALVIGYAN

#### Seminar/Symposia/Training Attended :

Shri S.K. Jain, Scientist 'C' is undertaking the Seventeenth session of International Higher Hydrological Course on "River Hydraulics, Channel processes and Hydrology of Deltas and Estuaries" at MOSCOW State Lomonosov University, USSR from June 10 to August 10, 1987.

Shri Anand Verdhien, Scientist 'C' and Dr. Pratap Singh S.R.A. proceeded to participate an inter-disciplinary glacier expedition to Chhota Sigri glacier for studying hydrological components of the glacier. The expedition has been organised by Department of Science and Technology, Government of India. The expedition has been started from the first week of July '87 and will continue till second week of September '87.

Shri N.K. Goel, Scientist 'C' attended a two-week Workshop on "Master plan for river basin management" from June 22 to July 4, 1987. The Workshop was organised by Water and Power Consultancy Services, New Delhi at Maulana Azad College of Technology, Bhopal,

#### Forthcoming Seminars/Symposia/Conferences

S. No.	Title	Date	Venue	For details contact
1.	Seminar of Hydrology Colloquium on 'Urban Water Supply'	28-30 Aug. 1987	Univ. of Madras Madras	Secretary & Treasurer, Association of Hydrologists of India C/o Deptt. of Geophysics, Andhra University, Waltair 530003 (A.P.).
2.	Regional Introductory Training Course in Estuarine Research	14-18 Sept. 1987	Calcutta	Prof. A. Chaudhary, Deptt. of Marine Sciences, Univ. of Calcutta, Calcutta.



S. No.	Title	Date	Venue	For details contact
3.	Regional Workshop on Man's Impact on Tropical Forest Ecosystems.	Sept. 1987 (5 days)	Peechy, Kerala	Mr. L.A. Mandalia, Programme Specialist (WR), 15, Jor bagh, UNESCO House, New Deihi-110003.
4.	International Symposium on New Technology in Model Testing in Hydraulic Research.	24-25 Sept. 1987	Pune	Shri C.V.J. Varma, Member-Secretary, CBIP, Malcha Marg, Chanakyapuri. New Delhi - 110021.
5.	National Water Convention.	8-10 Oct., 1987	CBI & P, Delhi	Shri C.V.J. Verma, Member Secretary, Central Board of Irrigation & Power, Malcha Marg, Chanakyapuri, New Delhi - 110021.
6.	Regional Workshop on Integrated Water Management in Urban Areas,	3-6 Dec., 1987	Bombay	Shri M.K. Gokhale, Chairman Afro Asian Conference, I.W.W.A., 203, Arun Chambers, J. Dadaji Road, Tadeo, Bombay-32.
7.	National Symposium on Hydrology.	16-18 Dec., 1987	NIH, Roorkee	Organising Secretary, National Symposium on 'Hydrology', National Institute of Hydrology, Jal Vigyan, Bhawan, Roorkee-247 667, U.P.
8.	Third Indian Agrometeorological Cengress.	20-30 Dec., 1987	Andhra Univ., Waltair	Prof. A. R. Subramaniam, Secretary & Treasurer, Deptt. of Meteorology and Oceanography, Andhra Univ., Waltair-530003.
9.	Symposium on Quality Management, Quality Assurance and Quality Control in Water Resources and Power Engineering.	29-30 Dec., 1987	New Delhi	Shri C.V.J. Verma, Member-Secretary, Central Board of Irrigation and Power, Malcha Marg, Chanakyapuri, New Delhi-110021.
10.	International Course on Modelling.	Dec. 14-Jan. 8, 1987-88.	I.I.T., New Delhi	Prof. P.N. Kapoor. Deptt., of Civil Engg. I. I. T., Hauz Khas, New Delhi-110016.



S. No.	Title	Date	Venue	For details contact
11.	Workshop on Sediment Measurement and Control.	22-24 Feb., 1988	Chandigarh	Shri T.C. Paul. Organising Secretary, Irrigation and Power Research Institute, Amritsar-143001, Punjab.
12	Regional Workshop on Integratee Water Management in Urban areas.	4-15 April, 1988	NIH, Roorkee	Dr S.M. Seth, Scientist 'F' National Institute of Hydrology, Roorkee-247 667.
13.	International Seminar on Hydrlogy of Extremes (Floods and Low Flows).	10-12 Nov., 1988	NIH, Roorkee	Organising Secretary, International Seminar on Hydrology of Extreme, National Institute of Hydrology, Roorkee - 247 667 (U.P.).
14.	XIXth IUGG General Assembly.	9-22 Aug., 1977	Vancouver,	Mr. G. J. Young, CMC/IAHS, Inland Waters Directorate, Environment Canada, Ottawa, Ontario, Canada, KIA 0E7.
15.	2nd IAHR Congress and 4th International Conference on Urban Storm Drainage.	Aug. 31-Sept. 4, 1987	Switzerland	Mr. W.H. Graf Laboratoire, Hydraulique, Ecole Polytechnique Federal de lausanne, GOB (Ecublens), CH1015 Luasanne, Switzerland.
16.	IWRA Annual Meeting and Workshop.	7-11 Sept., 1987	Rome, Italy	Mr. C. Lotti, Via del Fiume 14, I-00186, Rome, Italy.
17.	Second International Conference on Coastal & Port Engineering in Developing Countries.	7-11 Sept., 1987	Beijing, China	Conference on Coastal & Port Engineering in Developing Countries, C/o Nanjing Hydraulic Research Institute 223, Guanzhou Road, Nanjing, China.
18.	International Symposium on Avalanche Formation Movement and Effects.	14-19 Sept. 1987	Davos, Switzerland	Mr. C. Jaccard, EISLF Weissfluhjoch, CH - 7260 Davosdorf, Switzerland.
19,	2nd Asian Water Technology Exhibition and Conference.	16-20 Nov., 1987	Kuala Lumpur, Malaysia	Mr. David Dononey, International Conference and Exhibition & Ltd., Speen House, Porter Street, Baker Street, London, W1M1HY, U.K.



S. No.	Title	Date	Venue	For details contact
20.	International Symposium on Hydrological Processes and Water Management in Urban Areas.	24-29 April, 1988	Duisburg, FRG	IHP/OHP Sekretariat. C/o Bundesanstalt fur Gewasser Kunde, Postfach 309, D-5400 Koblenz, Federal Republic of Germany.
21.	Vlth World Congress on Water Resources-Water for World Development.	May 29- June 3, 1988	Ottawa, Ontario Canada	Glen E. Stout, IWRA, 208N, Romine, Urbana. Illinois 61801, USA or Peter J. Reynolds, Inland Water Directorate, Environment Canada, Ottawa, Ontario, Canada K1A0E7.

### ARCCOH Secretariat Activities

During the third meeting of ARCCOH Steering Committee held in September 1985, it was decided to bring out an annual bulletin of ARCCOH describing various hydrological activities of member countries during the year 1985. The Secretariat requested the member countries of ARCCOH to send activity details for publication in the bulletin. Due to delayed response from the countries the publication of bulletin is delayed.

The Secretariat has now completed compilation of the bulletin. The bulletin includes activities of Australia, Burma, Bhutan, China, India, Malaysia, New Zealand, Pakistan, Papua New Guinea, Sri Lanka, and activities at UNESCO Regional offices at Jakarta & New Delhi besides the background and history of ARCCOH.

### 2. Newsletter

The ARCCOH Secretariat has been bringing about the ARCCOH Newsletter on quarterly basis describing various hydrological activities of member countries. The June issue of the Newsletter is under printing.

### 3. Major Regional Project

The Secretariat has finalised the draft proposal of Second component of MRP for south-central Asia region. It has been circulated to all participating countries. The proposal is being referred to the 24th General Conference of UNESCO scheduled to be held at Paris France from Oct. 20 to Nov. 21, 1987.

### HILTECH Activities

The 10th meeting of HILTECH was held in Sewa Bhawan, New Delhi on 9th July, 1987 under the Chairmanship of Mr. M.A. Chitale, Chairman, Central Water Commission and Chairman, HILTECH. Besides members, the State coordinators from Andhra Pradesh, Bihar, Haryana, Madhya Pradesh, Punjab, Rajasthan, Tamil Nadu also participated in the deliberations.

For National Hydrology Project (Surface Water), action has been initiated to prepare detailed project proposal (Surface Water) for the 11 States covering the river basins (excluding Indus, Ganga, Brahmaputra and Barak basins). Detailed information as well as maps have been asked from the concerned



organisations. Action as also been initiated to prepare project proposal for National Hydrology project (Surface Water) for Indus, Ganga, Brahmaputra and Barak Basins.

The draft National Hydrology Project on Water Quality was prepared by the sub group after three meetings held on 24th April, 2nd May and 29th June, 1987. This was discussed in the 10th HILTECH meeting held on 9th July, 1987 at Delhi. As per the discussions during the meeting and suggestion of the members the proposal is being revised.

The sub group set up to formulate the National Hydrology project on Ground Water met on 28th April, 18th May, 16th June and 30th June, 1987 at Delhi. The draft proposal is expected to be finalised by the sub-group soon for consideration.

HILTECH Secretariat participated in a meeting held on 15th July, 1987 at Ministry of Water Resources regarding India's participation in IHP-III to be referred to UNESCO/ROSTSCA,, New Delhi during next two years. The follow up meeting held in the Ministry of Human Resource Development regarding participation and role in UNESCO's programme was also attended by HILTECH Secretariat on 17th July, 1987.

The Secretariat circulates information regarding various international hydrology and water resources activities to various concerned organisations in the country. During the quarter, information regarding seven such activities were circulated to various organisations in the country.

During the period, the HILTECH Secretariat recommended participation of Indian participants with assistance from the organisers in the following International Hydrology Courses:

1. Seventeenth session of International Higher Hydrological Course on "River Hydraulics, Channel processes and Hydrology of Deltas

and Estuaries", Moscow State Lomonosov University, USSR, June 10-Aug. 10, 1987.

2. International Postgraduate Course on "Groundwater Tracing Techniques", Graz, Austria, August 17-Sept.25, 1987.

## LIBRARY NEWS

During the period, 111 books on various themes of Hydrology and Water Resources, 85 issues of National and International Journals, 66 Bound volumes of journals, 54 Technical Reports and 8 Reprints have been procured in the NIH Library. 14 books and journals have been borrowed from W.R.D.T.C. and C.B.R.I. Libraries on Inter-Library Loan basis. In addition to the User's Services, Documentation and Reference Services have been provided to the scientists of the Institute and similar other organisations. The second (April) and third (June) issues of the Documentation Bulletin in updated format have been circulated in and outside the Institute's reader community. The updated format of the Documentation Bulletin has been appreciated by the Readers. The computerised cataloguing of the books procured during the period has been undertaken.

## Distinguished Visitors

1. Mr. G.S. Jakhade  
Member (WP)  
Central Water Commission  
New Delhi - 110066.
2. Mr. P.C. Tyagi  
Chairman  
Central Board for prevention  
and Control of Water Pollution,  
New Delhi.
3. Mr. M.Y. Oke  
Joint Secretary & Chief Engineer  
Govt. of Maharashtra  
Bombay



4. Mr. R.S. Saksena  
Director  
Ground Water Investigation  
Organisation  
Lucknow.

5. Mr. H.A.H.I. Gunneweg  
I.I.L.R., Wageningen  
The Netherlands.

6. Mr. J.G. Van Alphen  
I.I.L.R. Wageningen  
The Netherlands.

#### सलाहकार समिति की बैठक :

१. रा० ज० वि० सं० एवं रुड़की विश्वविद्यालय  
को समन्वय समिति की तेरहवीं बैठक दिनांक  
१५.७.६७ को आयोजित हुई।

#### भवन निर्माण

इस तिमाही के दौरान निर्माण कार्य में उचित  
प्रगति हुई। प्रशासनिक भवन खण्ड दो के विस्तार  
का कार्य पूर्ण होने को है। रा० ज० वि० सं के  
अहाते में आन्तरिक सड़क बिछाने का कार्य प्रगति  
पर है।

#### ३. नियुक्तियां/त्याग-पत्र/साक्षात्कार

इस तिमाही के दौरान निम्नलिखित वैज्ञानिकों  
ने संस्थान में कार्यभार ग्रहण किया :

१. डॉ० राजेन्द्र पाल सिंह छोंकर —वैज्ञानिक 'ई'  
२. श्री आनन्द बर्धन —वैज्ञानिक 'सी'  
३. श्री सुधीर कुमार —वैज्ञानिक 'बी'

उपरोक्त वैज्ञानिकों के अतिरिक्त, दो वरिष्ठ  
अनुसंधान सहायक, दो अनुसंधान सहायक और एक  
वैयक्तिक सहायक ने भी तिमाही के दौरान संस्थान  
में कार्यभार ग्रहण किया।

निम्नलिखित वैज्ञानिक एवं अन्य सहयोगी  
कर्मचारियों को उनके पदभार से मुक्त किया गया :

१. श्री रमेश चन्द्र —वैज्ञानिक 'सी'  
(अपने विभाग को पुनर्गमन)  
२. श्री आलोक कुमार सिक्का —वैज्ञानिक 'सी'  
(अपने विभाग को पुनर्गमन)  
३. श्री कमलेश कुमार सिंह  
—वरिष्ठ अनुसंधान सहायक

इस समय के दौरान निम्नलिखित पदों हेतु  
साक्षात्कार परीक्षा आयोजित की गई :

(अ) वैज्ञानिक 'एफ' (ब) वैज्ञानिक 'ई'  
(स) वैज्ञानिक 'सी' (ड) वैज्ञानिक 'बी'  
(ध) वरिष्ठ अनुसंधान सहायक  
(य) वरिष्ठ तकनीकी सहायक (पुस्तकालय)  
(र) अनुसंधान पर्यवेक्षक (ल) अनुसंधान सहायक  
(व) वैयक्तिक सहायक (च) वाहन चालक  
(घ) वरिष्ठ प्रयोगशाला सहायक  
(न) वरिष्ठ तकनीशियन एवं फोरमैन

कार्यालय अधीक्षक का पद विज्ञापित किया जा चुका  
है।

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