

Hydrological Developments in India Since Independence

A Contribution to Hydrological Sciences



NATIONAL INSTITUTE OF HYDROLOGY
ROORKEE-247 667 (Uttar Pradesh)
INDIA
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PREFACE

Rapid increase in population and its uneven spatial distribution cause change in water needs for meeting the domestic, agricultural, recreational and industrial demands. Various water resources projects have been constructed or being planned to meet the growing needs of water in the different sectors. The uneven distribution of precipitation causes highly uneven distribution of available water, both in time and space, which leads to floods and drought affecting vast areas of our country. Man's activities such as land use changes, deforestation or afforestation, agricultural practices, urbanisation, and construction of water resources projects etc. influence the hydrologic cycle to a certain extent which modify the pattern of natural availability of fresh water supplies, with respect to time and space. Hydrology is a science which helps the water resources engineers for assessing the quantity as well as quality of surface and ground water resources accurately considering the natural as well as man made changes in a basin.

Before independence of our country, in absence of the advanced computation facilities and inadequate hydrological data base, thumb rules and empirical methods were used for the planning, design and operation of water resources projects. Since then there have been considerable research and developmental activities in the area of hydrology and water resources. Hydrometeorological/hydrological networks have been established in different river basins of the country by various state and central organisations and data are being collected at regular interval using the different instruments including those developed indigenously. Nuclear techniques, remote sensing techniques, data loggers, sensors and micro processors etc. are being widely used for the automatic collection of data. Automatic hydrologic stations (AHS) have also been set up at a few research and academic institutions to provide the data for different hydro-meteorological variables for the research and developments of improved hydrological methods. The advent of high speed digital computers and their wide applications have encouraged the hydrologists to develop the advanced methodology for solving the various hydrological problems. Developments of data storage and retrieval systems have provided an efficient way for handling the huge amount of time series data. Geographical information system (GIS) are being developed to store and retrieve the geographical information such as topographical features, soil, land use etc. which are generally required for the hydrological modelling. Computer softwares are being developed to link the GIS and other data storage and retrieval systems to the macro as well as micro scale hydrological models to provide the required data for simulation in the most systematic and efficient manner. Application of remote sensing techniques not only provide the data from the places difficult to access but also help in drought monitoring; flood plain, snow cover and land use mapping; and in the other hydrological studies.

With the improvements in data base and availability of the computational facilities the hydrologists have been involved in the development of better methodologies for planning, design and operation of the water resources projects. The objective of this document is to present the status of the research and developments in the different aspects of hydrology and water resources carried out in India since independence. It includes the review of the various studies carried out in the area of hydrologic design, hydrological investigations, hydrometeorology, remote sensing applications, isotope applications, data storage and retrieval system, surface water analysis & Modelling, ground water and conjunctive use, hydrology of hard rocks, seepage and drainage, ground water modelling, agricultural hydrology and drainage, hydrological aspects of drought, hydrology of mountainous areas, high altitude hydrology, lake hydrology, water resources systems, hydrological education and training, and man's influence on hydrologic cycle. Dealing with these aspects, there are twenty chapters in the document which have been contributed by the experts from National Institute of Hydrology, Roorkee, Indian Institute of Tropical Meteorology, Pune, Indian Institute of Remote Sensing, Dehradun, Nuclear Science Centre, New Delhi and University of Roorkee, Roorkee. The authors of different chapters have also highlighted the areas in which the research and developments are currently in progress and the future research needs. Each chapter of the document has been prepared by the individual experts based on the literature available with them. If some studies are excluded, it is not intentional. It is expected that the document would provide the status of the research and developments in the area of hydrology since independence. I hope that the document would be very useful for the hydrologists and research workers for improving/developing methodology in order to provide the solutions for various hydrological problems being faced by the country.

(SATISH CHANDRA)

CONTENTS

S.No.	Title	Author	Page No.
1.	Hydrologic Design	<i>S.M. Seth</i>	1
2.	Hydrological Investigations	<i>A.A. Gupta</i>	29
3.	Hydrometeorological Studies	<i>P.R. Rakhecha</i> <i>M.K. Soman</i>	45
4.	Remote Sensing Applications in Water Resources Development in India	<i>A.K. Chakraborti</i>	73
5.	Isotope Hydrology in India	<i>Bhishm Kumar</i> <i>B.P. Singh</i>	99
6.	Data Storage & Retrieval System	<i>Mrs. Deepa Chalisgaonkar</i>	119
7.	Surface Water Analysis and Modelling	<i>R.D. Singh</i> <i>Rakesh Kumar</i>	131
8.	Flood Hydrology	<i>M.E. Haque</i>	151
9.	Ground Water and Conjunctive Use	<i>G.C. Mishra</i> <i>S.K. Singh</i>	165
10.	Hydrology of Hard Rocks	<i>B.B.S. Singhal</i>	195
11.	Seepage and Drainage	<i>G.C. Mishra</i>	225
12.	Ground Water Modelling	<i>C.P. Kumar</i>	235
13.	Agricultural Hydrology & Drainage	<i>B. Soni</i> <i>Ranvir Singh</i>	263
14.	Developments in Hydrological Drought Studies	<i>Avinash Agarwal</i>	289
15.	Hydrology of Mountainous Areas	<i>K.S. Ramasastrri</i>	313
16.	High Altitude Hydrology	<i>Pratap Singh</i>	337
17.	Lake Hydrology	<i>N.C. Ghosh</i>	357
18.	Water Resources Systems	<i>S.K. Jain</i>	377
19.	Hydrological Education and Training	<i>S.M. Seth</i>	393
20.	Man's Influence on Hydrologic Cycle	<i>K.K.S. Bhatia</i>	413