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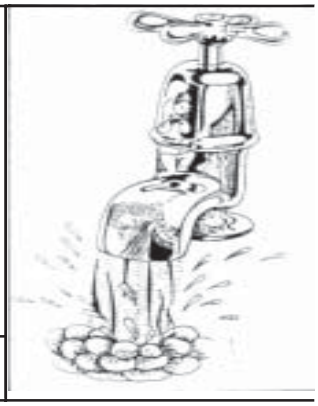

A JOURNAL OF WATER RESOURCES DEVELOPMENT

(" ... _ One of our chief resources in Nepal is water which if harnessed and managed properly holds a magic key for all-round development of our country. Used properly not only can our rivers generate electricity but also provide water for irrigation abundantly. More than that, it can also act as a catalyst for multiple forms of development including energy as alternative to our forest wealth")

H. M. King Birendra

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NEPAL
WATER

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Nepal water is published once in three months in English by the Hydraulics laboratory of the Institute of Engineering Nepal.

Nepal water aims to function as a forum for sharing of experiences among technologists, engineers, and scientists engaged in different aspects of water resources development in Nepal. It is distributed within the country among the institutions that are involved in development and management of water resources.

Views expressed in this publication are that of the writers and do not reflect the opinions of the editors or supporters of this publication. Contributions on various issues of development of water resources and its management in Nepal are invited from readers in the field. Articles should not exceed 1500 words and should be typed. Unpublished articles will not be returned. Readers are also requested to contribute discussion papers on articles. The final decision to publish any article will lie on the editorial committee.

Reproduction of the articles published in the journal are encouraged Acknowledgement of the source of the reproduced material will be appreciated.

EDITORIAL

Water is the best of all things that has happened to mankind according to Greek philosopher Pindar. Life on earth is not possible without water. Though a renewable resources, the premium put on water as a result of rapid population and technological growth is increasing day by day. If proper attention is not given today on rational uses of water, we might be caught unaware by its impending scarcity in future. The emphasis on the development of water resources should not only be on the construction of projects, but also on management of the available water, so that our current water uses become sustaining over a long run.

Our resource-poor country is blessed with this renewable resources, which if developed properly can break the vicious cirele of poverty which Nepali society is facing at present. Yet, only a meagrefraction of the available potential has been developed for productive uses so far. Development of water resources in Nepal encompasses tackling the economical, social, institutional, technological, environmental and political constraints. All these constraints are complex and interrelated and by their very nature demand tremendous efforts on the part o the institutions and the individuals involved in the processes of its development, to solve them. Among these issues, lack of interactions among institutions involved in the developmental process and therefore between technologists involved in different sectors of water development has been identified as a serious constraint.

The publications is an attempt to initiate a process of interaction among people involved in different areas of water resources development. Its objective is to act as a forum for engineers, scientists and technologists to share ideas, success, failures and different problems encountered in the development of water resources in Nepal. An attempt has been made to keep this first issues quite general and to focus on the role of hydrology in the development of water resources. Features on history of hydrology in Nepal and the role of the International Hydrological Programme (IHP) in understanding hydrological processes for better management of water resources are included. We also look at the government's strategy of water resources development.

We look forward to your experience, ideas and we will attempt to convey these to technologists in the field. Also please feel free to suggest improvements in the publication. We realise the enormity of the challenges that

Cover Photo credit : Ajaya Dixit, Bikas Rauniar

MESSAGES

The Government of Nepal, under the dynamic leadership of His Majesty King Birendra Bir Bikram Shah Dev has embarked on the task of development of the country. Harnessing of the untapped water resources potential of the country for various purposes has been recognised as one of the means that can greatly accelerate the nation's development pace. Its development is a dynamic and long-term process which requires continuous commitment from all concerned. Nepal Water a quarterly journal to be published by the Hydraulics Laboratory of the Institute of Engineering can act as a focal point of interaction among technologist working in almost fifty organisations which are involved in the development of natural resources like land and water. Efforts that emphasise on the development and utilisation of our own expertise can greatly help is to achieve sustainable development. I hope this publication will generate enthusiastic participation from the concerned and meet its objective.

Mahesh Kumar Upadhyaya
Vice Chancellor
Tribhuvan University.

Speedy development of our country is possible through our own ability to solve the country's development problems. The Institute of Engineering as a sole body for producing engineering technical manpower in Nepal has a constructive role to play in this developmental process. How effectively the Institute can contribute in this effort shall depend upon how rationally it attempts to keep in perspective the problems of development and evolve an effective learning environment. This is particularly true in the development of water resources in the country, which requires efforts from all concerned. This Institute can have an effective role to play in the development of state of art of water resources engineering in the country. This publication is an endeavor in that direction. I hope that it will receive a positive response from all concerned. It is our duty to work together and strive hard for the development of water resources to uplift the economic condition of Nepal.

Dr. Uttam Narayan Shrestha
Dean Institute of Engineering

HISTORY OF HYDROLOGY IN NEPAL

Very little had been done in the field of hydrology in Nepal before 1960. The swiss mission in the country had collected flow data in Roshi Khola at Panauti. The Government of India had collected flow data at the proposed site of the Trishuli hydel project in Trishuli river and at three sites in the Koshi river basin for the Koshi barrage project. In 1961, under a special UN fund programme, the collection of hydrological data was started in the Karnali river basin for carrying out feasibility study of power project in this basin.

A joint hydrological investigation project between HMG/Nepal and USAID/mission to Nepal began in 1961. The project was undertaken to establish a nation wide hydrological data collection system with a centralised agency to collect, compile and publish data produced by the network. The project was implemented in May 1962 by the Hydrological Survey Section under the Department of Electricity. The section was then transferred under the Department of Irrigation and water supply and in 1965 it was expanded into a Hydrological Survey Department. The name of the department was changed to its present form, the Department of Irrigation, hydrology and Meteorology in 1966. The division of hydrology functioned as a section under the department within the Ministry of Food, Agriculture and Irrigation from 1972 to 1979. As a result of the reorganisation of the ministries in 1979 and formation of the Ministry of Water Resources, the Department of Irrigation, Hydrology and Meteorology was transferred under the new ministry.

A need to collect meteorological data in a planned way was also felt as various agencies were involved in the collection of mainly rainfall data before 1966. Programme for collection of meteorological data was thus started in the same year under the sponsorship of the UN. Ground water investigation project was also started in 1969 under a joint project of HMG/Nepal and USAID/Nepal. At present the Division of hydrology and meteorology has three sections which are,

(a) Surface Water section and Sediment Analysis Laboratory.
(b) Meteorological service station.
(c) Ground Water Section with water quality Analysis Laboratory to furnish chemicle analysis of water from surface and ground water sources.

(a) Surface Water Section

The surface water section of the division is currently operating.

(1) 50 regular stations out of which 82 are equipped with cable cars and 36 with gauge houses along with staff gauge at each of the hygrometry station.
(2) 235 partial and miscellaneous stations.
(3) 19 Sediment sampling station.

The regular stations are of two types primary and secondary. Primary stations are operated on almost permanent basis. Records from these stations are used to study long term trends, seasonally and flow patterns in the rivers. Data from these stations are also used to extend shorter flow records from secondary stations on the basis of correlative studies.

Secondary satellite or roving stations are short term installations that are operated for a duration of five to ten years. Then are operated for a period long enough to obtain sample records of runoff characterstic of different rivers. Data thus obtained is compared with those in a nearby station. The operation of the secondary station terminated if a correlation exists between the two, otherwise the secondary station is upgraded to primary status.

Partial stations are installed to collect only the low flow records where as the miscellaneous stations are used for measurement of discharge depending upon the need of supplementing data from other stations or when data is required for special purposes. The sediment stations measure only the suspended sediment load. Bed load measurements and particle size analysis are not carried out.

(b) Meteorological Service Section

The meteorological service section of the division is operating 26 meteorological stations. Out of these,

27 are agro-Meteorological stations, 12 are aeronautic synoptic stations, 173 are raingauges and 44 are climatological stations. The section has been officially providing weather forecasting since 1970. Various other projects and agencies are operating about 83 meteorological stations in the country.

Courtesy: Department of Irrigation Hydrology and Meteorology, Ministry of Water Resources, Babar Mahal Kathmandu.

(c) Ground Water Section

The ground water section of the division has so far drilled wells at the following areas.

Area	Number of Wells
Lumbini	126
Bheri	45
Seti-Mahakali	222
Sunsari	13
Saptari-Siraha	15
Sarlahi	2
Morang	19
Jhapa	5
Dang	5
Mahottari	10
Kapil Bastu	10

These include wells drilled at the following areas in 1982/1983

Dang, Jhapa, Surkhet	5
Kapil Bastu	5
Mahottari	5

SUBSCRIPTION RATE PER YEAR

Institutional	Rs. 400.00
Individual	Rs. 100.00

TOWARDS A BETTER MANAGED WATER RESOURCES

INTERNATIONAL HYDROLOGICAL PROGRAMME

The realisaton of the significance of a scientific basis of hydrology in the development of water resources was not appreciated much until 1950 when UNESCO launched a programme of research on the world's arid zones, in which hydrology played an important role. This was followed by International Hydrological Decade (IHD) launched in 1964, which proved to be a truly remarkable example of international cooperation by making a significant contribution to the understanding of the processes occurring in the water cycle, assessment of surface and groundwater resources, and adoption of a rational attitude towards water use. However, because of the gaps still noted in the application of scientific advances to the advances to the solution of practical problems, difficulties raising from natural fluctuations in hydrological regime, and increasing impacts of mankind on water resources with the spread of urbanisation and industrial pollution, the need for further strengthening of international and regional cooperative efforts was felt.

In view of this, the General Conference of UNESCO decided in 1974 to launch a long-term International Hydrological Programme (IHP) with the aim of finding solution to the specific problem of countries in different geographical conditions and at different levels of technological and economic development. On January 1, 1975 the International Hydrological Programme was launched by UNESCO with following main objectives:

(i) to improve the assessment of water resources,
(ii) to improve water resources management and planning,
(iii) to improve the evalation of the influence of human activities on the water cycle,
(iv) to promote education and training in the field of water sciences, and
(v) to increase the capacity of member. States to develop and manage their water resources.

The execution of IHP is planned in medium term successive phases, the normal duration of which is six years. The six year period 1975-1980 represented the first phase of the IHP (IHP-I) during which greater emphasis was given to education and training activities in the field of hydrology and water resources. Nearly 1500 specialists were imparted advanced training.

The second phase (IHP-II) had, exceptionally only a three-year duration (1981-83). The programme during second phase was structured along four main sections viz., Section A—dealing with scientific projects concerning to hydrological processes, hydrological parameters, influence of man on the hydrological regime and assessment and management of water resources, Section B- dealing with education projects, Section C-dealing with information for planners, decision-makers and the general public and Section D—dealing with aspects of infrastructures in the field of water resources, including systems of scientific and technical information.

The programme of third phase (IHP-III) 1984-89 represents a significant departure from the earlier IHD/ IHP efforts. Although the programme will continue to have a strong emphasis on the traditional hydrological sciences, the increasing importance of national water management has required that a much broader view of the programme be taken. The ultimate goal of the third phase is to help solve the crucial hydrologic, water management and water related socio-economic development problems as can be foreseen in the second half of the

decade 1981-1990 and in the following years.

The Inter-governmental Council of the IHP

The content of each phase of IHP is determined by the General conference of UNESCO following recommendations of the IHP inter-governmental Council and adopted by inter-governmental conference bringing together all Member States. Membership of the Inter-governmental Council of IHP is composed of 30 Member States of UNESCO elected by the General Conference at its ordinary sessions taking due account of the need to ensure equitable geographical distribution.

Source: ARCCOH NEWSLETTER published by ARCCOH secretariat Roorkee.

NEED FOR BETTER WATER MANAGEMENT

The report of a survey on the environment conducted by the Organisation for economic cooperation and Development stresses the need for better management of water, land, forest and wildlife resources in member countries.

While landing progress in some spheres over the past 15 years, the survey points to a number of black sports, for instance, the fact, that millions of households remain without access to waste water treatment facilities.

It also concluded that there were a number of problems on inland waterways, notably pollution of surface and ground water, particularly by nitrogenous fertilisers and pesticides, and chemical pollution remains a matter of concern when raw waters containing organic substances must be used.

Development Strategy of Water Resources*

His Majesty's Government has classified three kinds of water resources projects and programmes which will be implemented in parallel:

1) Small-scale projects and programmes to directly benefit the rural masses.
2) Medium-sized projects to meet national needs for energy, food and water supply.
3) Large-scale projects to satisfy future national requirements and for exports. These projects would be built on a cooperative basis with neighbouring countries.

In implementing priority projects, attention will be given to ensuring greater intersectoral linkages between water resources projects and complementary investment in sectors that can use those outputs. Particular attention will be given to industries where electric power can substitute for other forms of energy. For example, electric power transport such as ropeways and rural electrification will help curb fuelwood demand and also stimulate small-scale local industries. Similarly in the cases of medium sized hydel projects they can be built back to back with electric intensive industries such a fertiliser plants.

* Extracted from Water Resources Development in Nepal Ministry of Water Resources March 1985 pp 2-3

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(Discussion letters from readers are invited. Letters should not exceed 150 words.)

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