

Network for Flood Forecasting

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Abstract : *Development of human civilization has always taken place along a river or perennial source of water. Man suffers loss of life, damage to property and crops by over flooding of the banks of the rivers and lakes but water is such a vital necessity for mankind that man does not want to go away from it. Therefore, it becomes important to forecast flood well in advance so that loss from it can be reduced to a considerable extent. In this paper importance of flood forecasting has been discussed with special reference to network for flood forecasting in India. The present C.W.C. set up of flood forecasting organisation and procedure of flood forecasting have been described. Modernisation of flood forecasting and benefits achieved by flood forecasting have been briefly explained.*

1. Introduction

Water is the source of life. From ancient time, the human civilisation has developed along a river or a perennial source of water. Man needs water for drinking, bathing, domestic uses, agriculture, industry, transport etc. For all these purposes man has to live very close to water. But the nature does not tolerate these encroachments of man over its regime. The very uncertain and uneven pattern of rainfall causes overflowing the banks of rivers and lakes and man suffers loss of life, damage to property and crops. Still man does not want to go away from river. The flooding of water in the cultivation field is also not completely undesirable. Because it increases the fertility of the land. Therefore, man started to think how to reduce the fury of floods without avoiding it.

2.0 Flood Forecasting

Experience has shown that loss of human lives and property etc. can be reduced to a considerable extent by giving reliable advance information about the incoming floods. Prediction of a serious flood will signal a host

of action, such as evacuation of areas of potential inundation, shifting of moveable property, sandhugging levees, closing of gates of sewerage outflow etc. The people could be moved to safer places in an organised manner as soon as the flood warnings are received. Vulnerable property and cattle could be saved by transferring them to places of safety. The effectiveness of non-structural measures like flood forecasting, in reducing flood damage would depend upon how accurately and timely the estimation of future stages of flow of incoming flood and its time sequence at selected points along the river, could be predicted. Therefore, flood forecasting can effectively reduce/control the flood damages, when they are properly designed and implemented in the country. Government of India laid parallel emphasis on non-structural measures (along with structural measures like construction of dams, levees, embankments etc.) for flood damage reduction and one such measure was Flood Forecasting.

2.1 Flood Forecasting in India

Constitutionally the responsibility for the

flood protection measures is of the states, but the Central Government could not remain passive particularly when most of big rivers passing through two or more states get flooded so frequently. Since unco-ordinated action by any one state was not conducive to optimum relations and might even jeopardise the interests of the other states, it was considered necessary by the Central Government to draw up a comprehensive and co-ordinated national programme on a scientific basis. Consequently, Central Water Commission was entrusted the task of flood forecasting. A small unit was created in November, 1958 to forecast floods in Yamuna at Delhi, the national capital.

2.2 Present Organisation Set-up

The present flood forecasting organisation under the overall charge of Member (River Management), C.W.C. has covered almost all the important interstant river basins in the country. In this work, Member (RM) is assisted by three Chief Engineers viz. Chief Engineer (Northern Zone) at Delhi; Chief Engineer (Eastern Zone) at Patna and Chief Engineer (Southern Zone) at Hyderabad. There are 8 field Circles, 22 Divisions, and 64 Sub-divisions/Control Rooms located in various parts of the country. So far 59 river basins, small and large, including all major rivers in India, have been covered under this flood forecasting scheme. There is a network of about 400 wireless stations covering 380 gauge/gauge and discharge sites and 147 flood forecasting sites.

2.3 Procedure of Flood Forecasting

The complete cycle of flood forecasting operation comprises of the following phases :-

- Observation and collection of data from field stations.
- Transmission of data from field station to forecasting centres
- Processing of raw data and formulation of forecast
- Disssmination of forecast

3.0 Observation of Data

River water level, River Discharge and rainfall are considered to be the basic data required for formulation of forecast. The Central Water Commission observes the Water Level data at 380 gauging sites. Discharge measurements are taken generally once in a day. However, it is taken twice a day during high floods in flashy rivers. India Meteorological Department (IMD) through its Flood Meteorological Organisation is observing daily rainfall at about 500 places at some places Self Recording Rain Gauges are also fitted). IMD supplies the rainfall data alongwith the general meteorogical situation and forecast of the country.

4.0 Transmission of Data

Transmission of data from the field stations to the flood forecasting centres plays a vital role in food forecasting. For transmission of field data, at present, there is a network of 400 wireless stations in use under Flood Forecasting Organisation. Mostly 15 Watt HF SSB sets are used for communication. But some 100 Watt HF SSB sets are used for communication. But some 100 Watt HF SSB sets are also in use for long distance communication. From sites where wireless facility is not yet provided, the data is communicated to the forecasting centres by "FLOOD IMMEDIATE" telegrams or on telephone/telex, as the case may be.

5.0 Forecast Formulation

At present C.W.C. is formulating the forecasts based on the statistical approach. These methods which are graphical techniques or mathematical relationship, are developed with the help of historical data, using statistical analysis. A graphical relation is developed to calculate the future change in water level at the forecast site with a particular change in the upstream station. Rainfall in the intervening catchment or antecedent precipitation index are introduced as third parameter, wherever required.

6.0 Forecast Dissemination

The utility of flood forecast is dependent on both accuracy and timeliness of the forecast. The organisations responsible for flood protection and flood fighting works should be informed about the incoming flood as early as possible, so that the required action is planned and activities set into operation with least possible delay. Flood forecasts which are formulated by various flood forecasting centres are supplied in the form of 'FLOOD FORECASTING BULLETINS' to concerned Civil and Engineering authorities on CWC wireless/State Police wireless / Telephone / By Special Messenger/Priority Telegram, depending upon the urgency and available communication media. Generally, the State Government set-up "Central Control Rooms" at State and District Headquarters, which receives the forecasts and disseminates the message to the affected areas and organise rescue/relief work. The forecasts are also sent to the All India Radio, Doordarshan and the local newspapers for the general information and advance warning for the public.

7.0 Modernisation of Flood Forecasting

To achieve the latest state-of-art in the field of flood forecasting, a pilot project has been set up with the aid of UNDP/WMO on River Yamuna at Delhi. It is consisting of an automatic telemetered data collection network in Upper Yamuna catchment and a computerised flood forecasting system at Delhi. The communication of data from these stations to the Central Control at Delhi through satellite is presently under installation. A computerised multi-reservoir flood forecasting system has also been set up at Maithon (on DVC system) in collaboration with Danish Hydraulic Institute, Denmark under DANIDA scheme.

8.0 Benefits achieved

The timely issue of advance flood warning in various rivers in India has saved a vast number of human lives, cattles and moveable properties. The Central Government, beneficiary State Governments and their officials have always appreciated the services rendered by flood forecasting offices of Central Water Commission.

