

PREDICTIONS IN UNGAUGED BASINS

Estimation of design flood, flood recurrences, risk involved in design flood and corresponding confidence levels are the information that are needed for river basin planning, water availability studies, design of highway culverts, railway bridges, water harvesting structures, bridges, road embankments etc. For many catchments, the stream flow data are limited and for many catchments, these are not available. Under such circumstances, regional or empirical formulae are developed using the data of gauged catchments in the region and are used to arrive at design flood for the ungauged catchment.

Since most of the basins are ungauged in India due to lack of instrumentation network, inaccessibility and monitoring difficulties, the need for such studies is still greater. Design of small projects which require design flood corresponding to a return period, unit hydrograph and water availability analysis gets delayed because of lack of data. Further, the existing regional formulae for estimation of such design parameters (if exist) need to be updated and standardized with latest available data and methods.

In India, regional flood studies have been carried out using conventional methods. For some typical regions, attempts have

been made to study application of new approaches at some of the Indian research institutions and academic organizations.

TECHNOLOGY

Two methods have been developed to determine synthetic hydrographs. Here, the term *synthetic* denotes that the flow generating from certain rainfall can be calculated in a basin without using watershed's rainfall-runoff data.

Most of the existing synthetic unit hydrograph methods involve manual and subjective fitting of a hydrograph through few data points. Since it is a tedious exercise, the generated unit hydrograph is often left unadjusted for unit runoff volume. To circumvent this problem, two simplified versions of the existing two-parameter Gamma and Beta distribution



Figure - 1 An ungauged basin

are introduced to derive a synthetic hydrograph more conveniently and accurately than the popular methods.

Another technique to develop a regional flood formula using regression approach can also be used. This formula can be employed to estimate maximum flood that a basin shall generate in a required span of time (return period).

The developed approach has been tested for a large region consisting of 100 Indian catchments (including 14 catchments of north-eastern parts of India) ranging from 25.1 to 19526 km² in area and with data length of 10 to 36 years. The model is calibrated for a variety of situations and on the basis of detailed investigations, the use of present model is advocated to compute return period flood at the outlet of any specific catchment where either no flood data or limited data are available.

ENVIRONMENTAL IMPACT

It does not have any adverse impact on the environment.

ECONOMICS

It will have intangible benefits.

BENEFICIARIES

The beneficiaries include various government organizations, such as Central Water Commission, Irrigation Departments, Research Design and Standard Organization (Ministry of Railway), Soil Conservation Departments, Forest Departments, and Rural Welfare Departments.

INTELLECTUAL PROPERTY RIGHTS

No element of Intellectual Property Rights is involved in the use of this technology.