Report No. - TR-175

Evaluation and Design of Raingauge Network in Burhi Gandak Sub Basin

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ABSTRACT

For proper management development and assessment of water resources, hydrological and meteorological data are collected. Rainfall is one of the most basic data required for correct assessment of water resources. The aim of raingauge network is to provide the number and location of raingauge stations in a region such that by interpolation between data sets at different stations it should be possible to determine with sufficient accuracy the rainfall depths in the region.

A network of raingauge stations is intended to serve more than one purpose such as water supply, hydropower generation, irrigation, flood forecasting, flood control etc. To meet these requirements, the network design should be appropriate to the target and proper scientific approach is necessary. Several authors have suggested simple and rigorous statistical techniques like estimation of error in the computed areal rainfall and optimal interpolation techniques like objective analysis and Kriging.

Burhi Gandak catchment has an area of10,150 sq. km. in Bihar with a network of 15 rain gauges. The catchment experiences extreme floods during monsoon season. A good network of raingauge stations is therefore, necessary for planning relief measures and future flood management schemes. Also an adequate network of ordinary and self-recording raingauges is necessary for providing good data base for drainage schemes, operational flood forecasting and river management. The State Irrigation Department had indicated interest in scientific assessment of present network and to determine the need of the augmentation of the raingauge network for water resources assessment and flood forecasting purposes in the catchment and other areas.

A network design study of the raingauges in the Sub-basin has been undertaken keeping in view the requirement of raingauges. Besides the WMO standard and simple well known

formula $N = (Cv/P)^2$ and the kagan's technique involving the interstation correlation, Hall's rational method for determining the key station network has also been used to determine the number of raingauges required for climatological and hydrological considerations in the Sub-basin.

The results indicate that in general the existing network seems to be adequate from climatological considerations but for hydrological purposes at least one or two raingauges should be of self recording type. (Cv/P)Z and Kagan's technique have yielded comparable results.

This case study has also indicated that for designing the raingauge network for hydrological purposes appropriate accuracy criteria needs to be laid down and the area based WMO criteria need not be the only guideline.