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An Estimation of Flood Quantiles at Ungauaged Locations by Index Flood Frequency Curves

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The study shows the possible use of the index flood frequency curves for an estimation of flood quantiles at ungauged locations. Flood frequency analysis were made for the annual maximum flood data series at 9 available stations in the Han river basin. From the flood frequency curve at each station the mean annual flood of 2.33-year return period was determined and the ratios of the flood magnitude of various return period to the mean annual flood at each station were averaged throughout the Han river basin, resulting mean flood ratios of different return periods. A correlation analysis was made between the mean annual flood and physiographic parameters of the watersheds i.e, the watershed area and mean river channel slope, resulting an empirical multiple linear regression equation over the whole Han river basin. For unguaged watershed the flood of a specified return period could be estimated by multiplying the mead flood ratio corresponding the return period with the mean annual flood computed by the empirical formula developed in terms of the watershed area and river channel slope. To verify the applicability of the methodology developed in the present study the floods of various return periods determined for the watershed in the river channel improvement plan formulation by the Ministry of Construction and Transportation (MOCT) were compared with those estimated by the present method. The result proved a resonable agreement up to the watershed area of approximately 2,000㎢. It is suggested that the practice of design flood estimation based on the rainfall-runoff analysis might have to be reevaluated because it involves too much uncertainties in the hydrologic data and rainfall-runoff model calibration.

Keywords: Ungauged location; Frequency based flood; Mean annual flood