

Development of design flood formula in ungauged catchments using index flood and L-Moment approach: study case West Java Province, Indonesia.

Flood is a frequent disaster in some areas in Indonesia and hydrological data is an important key to analyze and solve the flood problem. However, the data for analysis is not always available, unreliable and the length is too short for analysis. There are also many areas which do not have hydrological data especially in the remote area. To analyze the design flood in ungauged catchment, a study needs to be performed to develop the formula. One of the methods to develop flood formula in an ungauged catchment is regional flood frequency analysis using index flood and L-moment method since a regional flood frequency analysis can be applied when no local data are available or the data are insufficient.

There are some methods that were used in this research such as: the moment method for frequency analysis, the L-moment method for regional frequency analysis and heterogeneity test with 50 iterations, the Montecarlo method to generated 1000 years data, and the Ward Linkage method for clustering. The L-moment and index flood method were used to calculate the growth factor and the annual flood based on the catchment characteristics, respectively. Model verification was performed by removal some gauged stations (split sampling method) from the group which has a long record period. Verification was done by using bias (BIAS) and relative mean bias (BIASr) method, which is a correlation between design flood from simulation and actual design flood.

The result shows that the discharge stations follow GEV (Generalized Extreme Value) distribution. Growth factor formula has been divided into two groups while MAF (Mean Annual Flood) formula is divided into three groups based on catchment area and maximum daily precipitation. Verification shows acceptable result with BIAS values 9%, 2%, 7%, 12% and 15% for return period 2, 5, 10, 25, and 50 years respectively. Thus, BIASr values is 9%. Therefore, by using the developed formula, the design flood can be estimated for ungauged catchment by only using common catchments characteristic data such as catchments area and precipitation data.