

Regional Flood Frequency Model for the Blue Nile River Basin

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The Blue Nile River Basin (Abbay) is subdivided into five regions based on statistical characteristics of site flow data. Consequently, Region 1 comprises of the largest portion of the basin, about 37.6 %, while Region 4, with around 3.3 %, covers the smallest portion. The identified regions were tested for homogeneity and heterogeneity by means of regionally weighted average L – moments and discordance measures. The test results were found to be satisfactory, except at one station on Indris River (near Sire), which shows heterogeneity within Region 3. Therefore, this station is considered as discordant station, with characteristics more similar to Region 5.

For the identified homogeneous regions, four different best fitted distribution types and robust parameter estimation methods were selected to fit the standardised flow data for various return periods. A generalised logistic type of distribution is found to be the best fitting distribution for Region 1 and 4. Whereas, log Pearson III for Region 2, log normal for Region 3, and generalised extreme values for Region 5 are selected for fitting flood quantiles. For all distribution types, the probability weighted moment parameter estimation method is more efficient except for log Pearson III, where a method of ordinary moment is preferred. Based on this, regional flood frequency curves are developed for all regions using standardised flow data, while also estimating quantiles flow for ungauged catchments. This could be achieved when the mean annual flow of ungauged catchments is successfully determined from catchment characteristics within the identified regions. The developed result provides information about flood magnitude in different catchments within the basin for the purpose of designing culverts, bridges, dams, weirs and others hydraulic structures.