

**Regional flood frequency model selection in Tanzania using l-moments and the region of influence approach.**

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Prior to designing of a variety of engineering works in water resources planning and other water related projects, engineers require flood estimates at the site of interest. Flood frequency analysis aims at establishing a Q-T relationship based on the appropriate statistical distribution. Identification of the true statistical distribution for the various hydrological and meteorological data set continues to be a major question facing engineers and scientists today. This study aims at establishing the underlying statistical distributions for various sites, derive hydrologically homogenous regions in Tanzania and establish the regional statistical distributions, based on the L-Moments diagrams. The parameters of these distributions are estimated. Linear regression models for various regions and eventually for the whole country are also established. The region of influence (ROI) method of defining hydrologically homogenous regions has been used in this study. The method gives satisfactory results but only after coupling it with a statistical tool for checking regional homogeneity. The regions delivered using this method compares well with those defined earlier using the method of superimposition of rainfall, topography and drainage maps. Of the 14 defined hydrological homogeneous regions in Tanzania, 7 were found to be best fitted by Log Normal (LN3), by Generalized Pareto (GPA), 3 by generalized extreme value (GEV), and one each by Pearson Type Three (P3) and Log Logistics (LLG). The study revealed that, instantaneous annual maximum flows in Tanzania can be estimated by LN3, but only to some limited degree of accuracy, since heterogeneity measure (H) is as high as 18.66. Regional multiple linear regression models had their efficiency varying from 99 for region N to 56 for region C.