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# Development of L-Moment Based Models for Extreme Flood Events

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## ABSTRACT

Accurate estimation of flood frequency is needed in many hydraulic designs such as dams, culverts and urban drainage systems. Different approaches were presented which use conventional moments to extract order statistics such as mean, standard deviation, skewness and kurtosis. Due to problems arising from data quality, such as short record and outliers, conventional moments are problematic. Hosking and Wallis (1997) developed L-moments which are linear combinations of order statistics. The main advantage of L-moments over conventional moments is that they suffer less from the effects of sampling variability. They are more robust to outliers and virtually unbiased for small samples. In this study the theory of L-moment and its advantage over conventional moments is discussed. Then its application on hydrology is addressed and finally as a case study, L-moment based method of regional flood frequency in central basin of Iran is mentioned. The L-moments have been used for parameter estimation, homogeneity testing and selection of the regional distribution. Records of peak floods, is analyzed using five distributions: generalized logistic, generalized extreme value, lognormal, Pearson type III and generalized Pareto. Each of these three-parameters distributions are estimated by the L-moment method. The discordancy index and homogeneity testing show that 5 out of the 7 study sites belong to a homogenous region. Based on the L-moment ratios diagram and the goodness-of-fit measure, the three-parameter lognormal distribution is identified as the most appropriate distribution in the homogeneous study region. The regional peak flood estimates for each return period are obtained based on this distribution. It is concluded that L-moment is an effective approach on hydrological statistics study in Iran, where conventional methods is problematic due to data shortage.

Keywords: Flood frequency, L-moment, Probability weighted method