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Determining Suitable Probability Distribution Models For Flow and Precipitation Series of the Seyhan River Basin

Fatih TOPALOĞLU
University of Çukurova, Faculty of Agriculture, Agricultural Structures and Irrigation Dept.,
01330 Yüreğir, Adana - TURKEY

Abstract: The frequency analysis of the largest, or the smallest, of a sequence of hydrologic events has long been an essential part of the design of hydraulic structures. Therefore, the question of better fit among countless probability models used in frequency analysis is always a fresh one. The purpose of this study was to make a statistical comparison of currently popular probability models. Therefore, Gumbel, log-Logistic, Pearson-3, log-Pearson-3 and log-Normal-3 distributions were applied to the series of annual instantaneous flood peaks and annual peak daily precipitation for 13 flow gauging and 55 precipitation gauging stations in the Seyhan basin, respectively. The parameters of the distributions were estimated by the methods of moments (MOM) and probability weighted moments (PWM). A detailed chi-squared and Kolmogorov-Smirnov (K-S) goodness-of-fit tests were also applied. According to the evaluations of chi-squared tests, Gumbel (MOM) for both flow and precipitation stations in the Seyhan river basin were found to be the best models. As a result of the K-S test, log-Normal-3 (MOM) and log-Pearson-3 (MOM) models were determined to be the best for flow and precipitation stations, respectively.

Key Words: Frequency Analysis, Goodness-of-Fit Tests, Flow and Precipitation Series