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STATISTICAL MODELLING OF ANNUAL MAXIMUM RAINFALL FOR BOTSWANA USING EXTREME VALUE THEORY

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ABSTRACT

The objective of this paper is to find the best-fit probability model for annual maximum rainfall data for Botswana for the period January 1901 to December 2012. The Kwiatkowski-Philips-Schmidt-Shintest of stationarity on the data shows that the time series is stationary. Based on visual inspection of the generalized quantile plot, three extreme value probability distributions are considered belonging to the Gumbel and Frechet maximum domains of attractions: the gamma, lognormal and BurrXII. The maximum likelihood method is used to estimate the parameters of each distribution under study. The CDF probability plots and Q-Q plots of the data show that the three models are highly competitive in terms of goodness-of-fit. Formal model assessment criteria, namely, the Anderson-Darling test and the Bayesian Information Criterion agree on the ranking of the three models: the lognormal distribution gives the best fit to the data followed closely by the gamma whilst the BurrXII distribution comes a distant third.

KEYWORDS: *Annual Maximum Rainfall, Burrxii, A Domain of Attraction, Extreme Value Theory, Gamma, Lognormal*

AMS Classification: 62G32