

# **CLASSICAL AND BAYESIAN MARKOV CHAIN MONTECARLO (MCMC) MODELING OF EXTREME RAINFALL IN DAR ES SALAAM, TANZANIA.**

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## **ABSTRACT**

Statistical modeling of extreme rainfall essentially is aimed at quantifying extreme rainfall event with high accuracy using available small amount of rainfall data. In most cases, Maximum Likelihood Estimation (MLE) performs poorly because it needs huge amount of rainfall data, which is difficult when it comes to rainfall data as they are very scarce in nature. The study modeled extreme rainfall data of Dar es Salaam using MLE and Bayesian, compared their performance and hence derived the return levels using the results of the best method among the two.

The study examined the extreme rainfall across the Dar es Salaam region for the period of 53 years(1961 - 2014) using the Generalized Extreme Value (GEV) distribution. Both MLE and Bayesian Markov Chain Monte Carlo(MCMC) methods were used to fit Annual Maximum Series(AMS) of Dar es Salaam to GEV distribution. Using Root Mean Square Error (RMSE) and Mean Absolute Error (MAE) as the measures of goodness of fit methods and the 95% confidence intervals, the results showed that Bayesian MCMC perform better as compared to MLE. The study derived the return levels for the next 20,25,50 and 100 years using Bayesian approach, which are respectively 137.70mm, 144mm, 164.60mm and 186.63mm.

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