

The Statistical Distribution of Annual Maximum Rainfall in Colombo District

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ABSTRACT

The modeling of extreme rainfall events is a fundamental part of flood hazard estimation. Establishing a probability distribution to represent the precipitation depth at various durations has long been a topic of interest in hydrology, meteorology and others. The daily rainfall data of 110 years (1900-2009) have been collected from the Meteorology station, Colombo, Sri Lanka. The data were then analyzed to identify the maximum rainfall received on any one day (24 hours duration), in during any monsoon season (4 seasons) and in a year (365 days period). The objective of this paper is to identify the best fit probability distribution of annual maximum rainfall in Colombo district for each period of study. Distribution parameters were estimated by using the maximum likelihood method. Three statistical goodness of fit test were carried out in order to find the best fitting probability distribution among 45 probability distributions for annual maximum rainfall and maximum rainfall for 4 seasons separately. After finding three best fitting distributions from the respective tests, the parameters of the selected probability distributions are used to generate random numbers for actual and estimated maximum daily rainfall for each period of study. The best fit probability distribution was identified based on minimum absolute deviation between actual and estimated values. Based on this fitting distribution, rainfall magnitudes for different return periods were calculated. The log-Pearson 3 and Burr (4P) were found as the best fit probability model for the annual and first inter monsoon season period of study, respectively. Generalized extreme value distribution was observed in remaining period of monsoon seasons. Further, the distribution reveals that the 216 mm or more of annual maximum daily rainfall return period is ten years. Similarly, the relevant estimates of return levels are listed against the return periods for extreme rainfall events during the four seasons of a year.