Regional Analysis of Rainfall Extremes of Part of Western Ghat, India

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The state of Kerala in the southwestern corner of the Indian peninsula is climatically unique in many respects because of the impact of the Western Ghat Mountains. This results in a wide range of climates and the associated marked gradient in the annual total of rainfall which ranges from ~6000 mm at the crest of Western Ghat, to as low as 600 mm in the valley portion. Such a gradient in annual total rainfall is also associated with a wide range of rainfall intensities during storms which can result in extreme flood-producing events that severely affect human society. Their disastrous impacts may become even more pronounced in a future climate scenarios, since an increase in the severity of heavy precipitation is expected and/or observed over large parts of India. Probability estimates of these events with a given magnitude are of primary importance, for example, in the planning for weather-related emergencies, engineering practice for water resources and reservoirs and the design of urban drainage systems. However, the estimation of frequencies of extremes is difficult due to the fact that data records are usually short. The estimation of probabilities of extremes, under such conditions is based on a regional analysis. The design storm are usually estimated by regional frequency analysis of rainfall extremes where there are no measured data for the location of interest, or when data record length are short compared to the recurrence interval of interest. Most of the recent studies use the L-moment statistics developed by Husking (1990). The L-moments are derived from Probability Weighted Moments (PWM) and represent an alternative set of scale and shape statistics of a data sample or a probability distribution.

The present study analyses the annual series of precipitation maxima which have been observed within a dense raingauge network covering entire Western Ghat part of Kerala. When concerning the entire Western Ghats, there have been several studies undertaken (Ananthakrishnan, et.al., 1979; Ramachandran, and Banerjee, 1983; Sreedharan, et.al., 1990; Shadananan Nair, 1987) mainly to understand the spatial and temporal variation of rainfall patterns, the development of depth-duration-frequency of extreme rainfall, and the estimation of the Probable Maximum Precipitation (PMP). However, none of these studies attempted to relate the statistics of the extreme rainfall with the mean annual precipitation (MAP), which can be used as a surrogate of geographical location. Therefore, in this analysis, we attempt to establish a relationship between L-moment statistics of rainfall extremes and the MAP using 1 day extreme rainfall amount, and subsequently identify homogeneous regions using the Ward and Centroid method of clustering. Thus for each of these identified regions, an empirical model is developed between L-moment statistics and MAP. A Monte-Carlo analysis was applied to verify the applicability of the developed empirical equations. SOMETHING MISSIMG HERE BEFORE ONE CAN FOLLOW NEXT SENTENCE The results indicated that, the null hypothesis could not be rejected at 5 and 10% significance level as the proportion of L-Cv (COEFFICIENT OF VARIATION?) and L-Cs (L_C SPELL OUT WHAT IT MEANS) values lying out side these confidence intervals is less than these percentage thresholds respectively (see also below) . Thus, the developed model can be used to estimate the design storms for a duration of 1 day in any location in the study area. This is shown by using the empirical model to predict the extreme rainfall depth at specific rain stations with a considerable accuracy when compared with measured data.

The sentence below needs re-drafting and making clearer >>

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