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Empirical Rainfall Thresholds for Occurrence of Landslides in Wayanad, India

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Rainfall Induced landslides are one among the major natural disasters which cause destruction to lives and properties across the world. Wayanad (Kerala, India) is a region characterized by highly destructive landslides during monsoons. During the recent past, in 2018 and 2019, substantial damage to lives, agricultural land and properties have occurred due to landslides in the region. To minimize the effect of such events, a Landslide Early Warning System (LEWS) should be developed for Wayanad at the earliest. Being the major triggering factor, it is essential to study the relationship between the rainfall parameters and occurrence of landslides. Understanding the historical rainfall parameters which resulted in landslides will help to identify the critical conditions which are potent to initiate landslides in future in the study area and can effectively contribute to a LEWS. As an initial step towards achieving this goal, a study was conducted to develop regional scale rainfall threshold for the region using Intensity and Duration conditions which resulted in landslides in the recent history (2010-2018) in Wayanad. A catalogue has been prepared for the study area, collecting details of landslides happened during 2010 - 2018. Analysis has been carried out using two different statistical approaches, Bayesian and Frequentist, using 123 landslide events considered for the analysis. It is observed that both the methods are complementary and the Bayesian threshold is comparable with the Frequentist threshold with 5% exceedance probability where an intensity of 0.97mmh^{-1} can trigger landslides in the region when the duration of rainfall is 24h. Further studies can be conducted for the region using advanced methods also, to find the best suited approach to define a regional scale threshold and hence an effective LEWS.

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