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Spatial Variability of Rainfall Erosivity over India

Ravi Raj, Manabendra Saharia, Sumedha Chakma, and Arezoo Rafieeinasab
Indian Institute of Technology Delhi, Civil Engineering, New Delhi, India (cez198244@civil.iitd.ac.in)

Indian is worst affected by soil erosion, especially due to erosion induced by rainfall. A factor of Universal Soil Loss Equation (rainfall erosivity factor) needs to be estimated throughout the country to assess the soil erosion in the country. Indian climate is dominated by monsoons, and their intensity and distribution vary significantly throughout the country. Rainfall erosivity is solely derived from the rainfall intensity, which is a function of climatic properties. In this study, the distribution and variability of the rainfall erosivity factor (R factor) had been analyzed in different regions and sub-divisions of India as classified by India Meteorological Department (IMD). For estimation of rainfall erosivity, the widely adopted principle of kinetic energy and rainfall intensity had been used. A well-known precipitation index, Modified Fournier Index (MFI), was also calculated to check its influence on the R factor. Regression equations in the form of power-law are derived for all regions of the country to establish the relationship between the R factor and MFI. Further, an analysis at the sub-divisional level was also performed to visualize the spatial variability of the R-factor throughout the nation. South peninsula India with the lowest average R factor of 615.61 MJ-mm/ha/h/yr, was recognized as least vulnerable to rainfall erosivity while the East and Northeast India was recognized as most susceptible with a highest R factor of 3312.39 MJ-mm/ha/h/yr. About 36% of the entire subdivisions of the country were spotted with an average rainfall erosivity factor higher than the national average rainfall erosivity factor, and hence they are more prone to erosion induced by rainfall. Estimating rainfall erosivity factors at sub-divisional and regional levels will help policymakers and watershed experts prioritize the watershed management practices to counter soil erosion induced by rainfall erosivity.

Keywords – Rainfall erosivity, IMD, Spatial variability, Climate, Precipitation index