



## Rainfall erosivity and erosivity density in Eastern Ghats Highland of east India

Ch. Jyotiprava Dash<sup>1</sup> · N. K. Das<sup>1</sup> · Partha Pratim Adhikary<sup>1</sup> 

Received: 14 December 2016 / Accepted: 16 July 2019  
© Springer Nature B.V. 2019

### Abstract

The rainfall erosivity (*R*-factor in USLE) is the long-term average of the sum of the product of rainfall kinetic energy and its maximum 30-min intensity. Therefore, at most 30-min time intervals pluviograph records are required to calculate *R*-factor. But, such high-resolution data are scarce in many parts of the world and require lengthy processing period. In this study, *R*-factor was correlated with daily, monthly and annual rainfall, and its spatial variability in Eastern Ghats Highland of east India was mapped. The result showed that power regression models predicted satisfactorily the daily, monthly and annual *R*-factor, of which annual *R*-factor model performed best (model efficiency 0.93). Mean monsoon season *R*-factor was 15.6 and 10.0 times higher than the pre- and post-monsoon season *R*-factor, and thus remained highly critical with respect to erosion. Annual *R*-factor values ranged from 3040 to 10,127 MJ mm ha<sup>-1</sup> h<sup>-1</sup> year<sup>-1</sup>, with standard deviation of 1981 MJ mm ha<sup>-1</sup> h<sup>-1</sup> year<sup>-1</sup>. Rainfall intensity was positively correlated with erosivity density, and numerical value of rainfall intensity was almost double of the erosivity density value. The combination of rainfall and erosivity density was used to identify flood, erosion and landslide-prone areas. The developed iso-erosivity, erosivity density and risk maps can be opted as a tool for policy makers to take suitable measures against natural hazards in Eastern Ghats Highland of east India and elsewhere with similar rainfall characteristics.

**Keywords** Erosivity · Erosivity density · Spatiotemporal variation · Soil erosion · Eastern Ghats