

Soil erosion assessment of a Himalayan river basin using TRMM data

ASHISH PANDEY, S.K. MISHRA, AMAR K GAUTAM & D. KUMAR

*Department of Water Resources Development and Management, Indian Institute of Technology Roorkee,
Roorkee-247 667, Uttarakhand, India
ashisfwt@gmail.com*

In this study, an attempt has been made to assess the soil erosion of a Himalayan river basin, the Karnali basin, Nepal, using rainfall erosivity (R-factor) derived from satellite-based rainfall estimates (TRMM-3B42 V7). Average annual sediment yield was estimated using the well-known Universal Soil Loss Equation (USLE). The eight-year annual average rainfall erosivity factor (R) for the Karnali River basin was found to be 2620.84 MJ mm ha⁻¹ h⁻¹ year⁻¹. Using intensity–erosivity relationships and eight years of the TRMM daily rainfall dataset (1998–2005), average annual soil erosion was also estimated for Karnali River basin. The minimum and maximum values of the rainfall erosivity factor were 1108.7 and 4868.49 MJ mm ha⁻¹ h⁻¹ year⁻¹, respectively, during the assessment period. The average annual soil loss of the Karnali River basin was found to be 38.17 t ha⁻¹ year⁻¹.

Finally, the basin area was categorized according to the following scale of erosion severity classes: Slight (0 to 5 t ha⁻¹ year⁻¹), Moderate (5 to 10 t ha⁻¹ year⁻¹), High (10 to 20 t ha⁻¹ year⁻¹), Very High (20 to 40 t ha⁻¹ year⁻¹), Severe (40 to 80 t ha⁻¹ year⁻¹) and Very Severe (>80 t ha⁻¹ year⁻¹). About 30.86% of the river basin area was found to be in the slight erosion class. The areas covered by the moderate, high, very high, severe and very severe erosion potential zones were 13.09%, 6.36%, 11.09%, 22.02% and 16.64% respectively. The study revealed that approximately 69% of the Karnali River basin needs immediate attention from a soil conservation point of view.