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Original Article

Annual Soil Loss Estimation in a Tropical River Basin of Southern India Using RUSLE Model and AHP Techniques

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Abstract

Remote sensing and geographic information system (GIS) techniques have been shown to be effective tools for geohazard mapping. The Western Ghats of southern India are a classic terrain with a variety of geohazards such as landslides and soil erosion. The current study employs RUSLE methodology in conjunction with remote sensing and GIS to estimate annual soil loss and identify zones of high erosion potential in one of southern India's major tropical river basins, the Chalakkudy River Basin. The resulting map elaborates on the area's annual soil erosion to the tune of 14.7008 t ha[1] year[1]. The map also divides the terrain into zones based on the likelihood of soil erosion. According to the study, approximately 4.70 percent of the total area (67.13 km[2]) is prone to severe soil erosion, while the remaining 67.13 percent (972.32 km[2]) is prone to high erosion. Soil erosion prognosis analysis assists decision-makers in developing a proper conservation planning programme to reduce soil erosion. Analytical Hierarchy Process (AHP) was used to identify critical soil erosion-prone areas by integrating geo-environmental variables such as land use/land cover, geomorphology, lithology, drainage density, lineament density, slope, aspect, elevation, LS factor, rainfall, soil texture, and soil depth after determining their relative contribution in conditioning the terrain susceptible to soil erosion. Only 4.70% of the total area is highly prone to soil erosion.

Keywords: Remote Sensing, GIS, RUSLE, Soil Erosion, AHP, Chalakkudy