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Soil Loss Estimation Using the Revised Universal Soil Loss Equation (RUSLE): A Coarse Resolution Dataset in the Indian Himalayan Region

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Abstract

Soil erosion is considered a very critical environmental issue that has repercussions for almost every aspect of the world. In developing countries, such as India, soil erosion continues to be a major limitation. A prediction and assessment of erosion prone areas is of utmost importance for soil fertility and water management. Recent technological advancements have provided useful models through which remotely-sensed data for a large scale area can be analyzed and interpreted. This study aims to adopt an erosion model that is unique to the physiography, biological and climatic conditions of the Indian Himalayan Region. The Revised Universal Soil Loss Equation (RUSLE) model estimates the average annual soil loss A in tonnes ha-1 year-1. Recognizing the conditions of the region, the RUSLE developed by Renard et al., (1997) was applied in conjunction with Geographic Information System (GIS) for estimating soil loss. All parameters of the model were thoroughly studied, starting from reviews and research papers on soil erosion assessment at national and catchment levels. The study follows the RUSLE soil model in estimating the rate of soil erosion at state and district level. The model was developed around coarse resolution data requirements, with practicality in providing annual soil loss rate for a large study area. It provides a means to describe specific districts that are vulnerable to soil erosion, rendering immediate action for soil conservation practices. To determine the spatial distribution of average annual soil erosion within the study area, cell-based parameters of the RUSLE were multiplied in the specified 500m x 500m spatial resolution using the raster calculator function in ArcGIS 10.0 software. The spatial pattern of soil erosion indicates that maximum erosion takes place in the north, north-western and eastern regions of the study area while the areas with low erosion rates are located in the eastern-most part of the study area.

***Keywords*:** Soil erosion, Remote sensing, Geographic information system, Soil erodibility