Assessing the soil erosion using geospatial technique based on RUSLE model: A case study of the Kotmale watershed, Sri Lanka

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Abstract: Water based soil erosion is a serious socio-economic and environmental problem across the world especially in the tropical region. Assessing the soil erosion in quantitatively and spatially with erosion prone area provides information to prioritize the task in sustainable management for planning aspirations. Among the other soil erosion approaches, erosion modeling has been playing a significant role and provides an accurate result in a cost-effective manner. In this study, Revised Universal Soil Loss Equation (RUSLE) was integrated with Remote Sensing (RS) and Geographic Information System (GIS) to analysis the quantitative and spatial distribution of soil erosion across the entire Kotmale watershed which is located in the western part of the central mountain region in Sri Lanka. In the methodology, six parameters of the RUSLE model were estimated using pixel overlay method in Arc GIS 10.4 environment, both spatial data and remote sensing data facilitated with appropriate calibration. From the analysis, the annual soil erosion ranges from 0 to 472 t ha^{-1} yr^{-1} with the mean and standard deviation 9.8 t ha^{-1} yr^{-1} and 15.7 t ha^{-1} yr^{-1} respectively, the mean erosion is correlated with the comprehensive research result of Food and Agriculture Organization (FAO) of the United Nations, 2015. The Soil erosion probability zone map has been produced, and the result shows that major portion of the study area represent low probability zone and few portions comes under high and very high probability zone. The agricultural area which located in the soil erosion prone area should be taken into account to ensure the food security and livelihood of the farmer. The result would be an aid and sources for soil and water conservation in the Kotmale watershed.

Keywords: RUSLE, Kotmale watershed, soil erosion, agriculture land vulnerability

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