# Estimation of Soil Erosion in Samanalawewa Watershed and its Sensitivities to Land Use and Climate Variables

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Soil erosion is one of the most important environmental concerns faced by the world today, and it seriously compromised the fate of human societies and the achievement of sustainable development goals that ensure human and environmental well-being. Numerous factors affect soil erosion, while human-induced changes in climate (rainfall and temperature) and land use land cover (LULC) changes are the most important driving forces. Assessing soil erosion and understanding the impacts of climate variables and LULC changes on soil erosion are crucial for the watershed management. Thus, this study used the Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST 3.9.2) Sediment Delivery Ratio (SDR) model which was introduced by the National Capital (NatCap) Project in collaboration with the Stanford University – USA to assess soil erosion in the Samanalawewa watershed (SW), in Sri Lanka and its eight sub-watersheds, over 20 years (2000-2020) with five-year time intervals. Further, the Pearson correlation test was used to establish the relationships between climate variables, LULC changes, and soil erosion of the SW watershed. The estimated mean annual soil erosion rates were 53.2, 52.9, 69.7, 87.7, and 70.2 t $ha^{-1}year^{-1}$ for the years 2000, 2005, 2010, 2015, and 2020 respectively. Estimated soil loss values of the SW are 10 to 18 times greater than the soil erosion tolerance (5 t $ha^{-1}year^{-1}$) in Sri Lanka. Correlation analysis disclosed that there is a significant correlation ($p<0.05$) between soil erosion and two driving forces viz. temperature and LULC changes (mean annual temperature and forest cover in the watershed has slightly increased over time). These results would help in formulating watershed management policies and the implementation of proper soil and water conservation measures in the watershed.

Keywords: Climate Change, InVEST-SDR Model, LULC, Samanalawewa Watershed, Soil Erosion