

Impacts of soil erosion and land use on water quality in Samanalawewa watershed, Sri Lanka

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Soil erosion and forest quality are important parameters, which affects the water quality of watershed area. Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) Sediment Delivery Ratio (SDR), InVEST Carbon model and Normalized Difference Vegetation Index (NDVI) were evaluated for selected twelve sub-watersheds of Samanalawewa watershed (SWW) with the support of remote sensing (RS) and geographic information system (GIS). Water quality parameters; Temperature, pH, Electrical Conductivity, Total Dissolved Solids, Dissolved Oxygen, Biochemical Oxygen Demand, Alkalinity, Hardness, Nitrate-N, Phosphate-P were analyzed in monthly basis for water samples collected from twelve sampling locations (n=12) in the watershed within month of May to July. Pearson correlation was conducted to establish the relationships between water quality parameters and soil erosion, water quality indicators and forest quality / NDVI of each sub-watershed. The results of the study revealed that the annual total soil erosion rate in the SWW due to current land use and land cover is 139.9 t/ ha/ yr and the average NDVI Values/ forest quality varied from -0.2907 to 0.4628 in sub watersheds. All the water quality parameters in the study area within the standards limits of SLS (614:2013). According to the result of InVEST Carbon model the result of above ground biomass map revealed dominant carbon storage among the other carbon pools. There is no direct relationship between water quality parameters and soil erosion rates and a strongly significant ($p < 0.05$) negative correlation between average NDVI values and nitrate-N ($r^2 = 0.521$, $p = 0.008$) were detected. Soil erosion does not seem to affect water quality in SWW due to the present of a good forest cover. Therefore overall water quality in the study area is in good condition.

Keywords: invest carbon model, invest SDR model, soil erosion and water quality

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