

Statistical Correlation between Soil Erosion and the Prevalence of Chronic Kidney Disease of Uncertain Etiology (CKDu) in Uva Province, Sri Lanka

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Uva Province is one of the most prominent provinces where a number of CKDu patients have progressively increased recently. Since the water and the soil quality are hypothesized as causative factors for CKDu in Sri Lanka, assessing the soil erosion and possible sediment deposited areas in the study area is crucial for understanding the relationship between soil quality and the prevalence of CKDu. Thus, the prime objective of this study is to investigate any statistically significant correlation between soil erosion and the prevalence of (CKDu) in the study area. Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) Sediment Delivery Ratio (SDR) model was applied to estimate and map the mean annual soil loss rates of each of the 26 Divisional Secretariats Divisions (DSDs) in the study area using digital elevation model (DEM), rainfall erosivity (R) map, soil erodibility (K) map, land use land cover (LULC) map, crop management factor (C) data and support practice factor (P) data. Furthermore, the frequency of CKDu patients in each of the DSDs was recorded to compute the correlation. The results revealed that ~39% of DSDs fall into extremely high erosion category ($> 60 \text{ t ha}^{-1} \text{ year}^{-1}$) where the lowest numbers of CKDu patients were recorded while ~19% of DSDs fall into the low erosion category ($\leq 5 \text{ t ha}^{-1} \text{ year}^{-1}$) where the highest numbers of CKDu patients were recorded. Furthermore, ~15%, ~12%, and ~15% of DSDs fall into moderate ($5 \text{ to } 12 \text{ t ha}^{-1} \text{ year}^{-1}$), high ($12 \text{ to } 25 \text{ t ha}^{-1} \text{ year}^{-1}$), and very high ($25 \text{ to } 60 \text{ t ha}^{-1} \text{ year}^{-1}$) erosion categories respectively. Moreover, soil erosion was skewed (skewness = 0.39), which violated the assumption of normality. Thus, the Spearman rho statistic was calculated, $r(24) = -0.83$, $P \leq 0.01$. The direction of the correlation was strongly negative, which means that the areas with low soil erosion rates in the study area tend to have a higher number of CKDu patients.

Keywords: *CKDu, Correlation, InVEST SDR, Soil erosion, Uva province*

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