Mapping and Modelling Land Susceptibility to Water Erosion in Eastern Botswana

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Soil loss by water erosion is a major environmental challenge globally and semi-arid environments are not exempted. This study employs a spatial modelling technique that applies the Revised Universal Soil Loss Equation (RUSLE) to estimate annual soil loss in the Palapye area of the Lotsane sub-basin in Eastern Botswana. Soil loss estimation within a GIS environment allows for the integration of datasets from various sources and enables the mapping of the spatial distribution of soil loss. With the high sensitivity of semi-arid areas to climate change, this study further investigates how rates of soil loss would vary using both historical (1990-2012) and near range 21st Century (2015-2028) under two IPCC Representative Concentration Pathways (RCPs): RCP4.5 and RCP8.5. Topography and vegetation cover seems to play a prominent role in soil loss as it occurs mostly along tracks and/or footpaths, bare land, river banks and on the steep hilly slopes in the south eastern part. For RCP 4.5, the highest projected average annual soil loss due to water erosion is 307 Mg ha-1 year-1, whereas, for RCP 8.5, the highest is 330 Mg ha-1 year-1. In general, projected soil losses are higher for RCP8.5 than for RCP4.5. This study aids the validation of empirical models and contributes to the understanding of soil erosion rates under present conditions and future climate.