

GIS-Based on Assessment of Soil Erosion in Bay Region of Somalia

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Abstract

Soil erosion is a major environmental challenge that necessitates meticulous investigation and the implementation of sustainable management practices. The objective of this study is to provide a thorough assessment of soil erosion in the Bay region from 2020 to 2023, utilizing the Revised Universal Soil Loss Equation (RUSLE) and advanced geospatial technologies, particularly Google Earth Engine, to guide sustainable land management strategies. The study integrates multiple datasets, including CHIRPS for rainfall measurement, MODIS for land use analysis, and a digital elevation model for slope calculation, to offer a comprehensive understanding of the factors contributing to soil erosion. The rainfall erosivity (R) factor is calculated using CHIRPS data, while the soil erodibility (K-factor) is derived from the soil dataset. The topographic (LS-factor) is computed using the digital elevation model, and the cover-management (C) and support practice (P) factors are determined from the NDVI and land use data, respectively. The findings reveal considerable spatial variation in soil erosion across the Hirshabelle regions. The results are categorized into five levels based on the severity of soil loss: Slight (<10), Moderate (10-20), High (20-30), very high (30-40), and Severe (>40). While areas classified under “Slight” soil loss are dominant, indicating relatively stable soils, regions under “Severe” soil loss signal potential land degradation and the need for immediate intervention. Furthermore, the study revealed the intricate interplay of slope, vegetation, and land use in influencing soil erosion. Areas with steeper slopes and less vegetation were more susceptible to soil loss, emphasizing the need for targeted soil conservation measures in these regions. The land use factor played a crucial role, with certain land uses contributing more to soil erosion than others.

Keywords: Soil Erosion, Bay region, RUSLE, Somalia, Google Earth Engine (GEE), GIS

