

Erosion Influencing Factors Analysis: Case of Isser Watershed (North-West Algeria)

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Abstract : Soil water erosion poses a significant threat to the watersheds in Algeria today. The degradation of storage capacity in large dams over the past two decades, primarily due to erosion, necessitates a comprehensive understanding of the factors that contribute to soil erosion. The Isser watershed, located in the Northwestern region of Algeria, faces additional challenges such as recurrent droughts and the presence of delicate marl and clay outcrops, which amplify its susceptibility to water erosion. This study aims to employ advanced techniques such as Geographic Information Systems (GIS) and Remote Sensing (RS), in conjunction with the Canonical Correlation Analysis (CCA) method and Soil Water Assessment Tool (SWAT) model, to predict specific erosion patterns and analyze the key factors influencing erosion in the Isser basin. To accomplish this, an array of data sources including rainfall, climatic, hydrometric, land use, soil, digital elevation, and satellite data were utilized. The application of the SWAT model to the Isser basin yielded an average annual soil loss of approximately 16 t/ha/year. Particularly high erosion rates, exceeding 12 T/ha/year, were observed in the central and southern parts of the basin, encompassing 41% of the total basin area. Through Canonical Correlation Analysis, it was determined that vegetation cover and topography exerted the most substantial influence on erosion. Consequently, the study identified significant and spatially heterogeneous erosion throughout the study area. The impact of land topography on soil loss was found to be directly proportional, while vegetation cover exhibited an inverse proportional relationship. Modeling specific erosion for the Ladrat dam sub-basin estimated a rate of around 39 T/ha/year, thus accounting for the recorded capacity loss of 17.80% compared to the bathymetric survey conducted in 2019. The findings of this research provide valuable decision-support tools for soil conservation managers, empowering them to make informed decisions regarding soil conservation measures.

Keywords : Isser watershed, RS, CCA, SWAT, vegetation cover, topography

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