Environmental Engineering and Management Journal

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

"Gheorghe Asachi" Technical University of Iasi, Romania

MAPPING WATER EROSION RISKS USING USLE/GIS AND REMOTE SENSING: THE CASE OF THE ENDJA WATERSHED, EASTERN ALGERIA

Miloud Koussa

Research Laboratory in Subterranean and Surface Hydraulics, University of Biskra, PO Box 145, Biskra, 07000, Algeria
E-mail: koussamiloud@gmail.com; Phone: +213663953334

Abstract

Soil erosion by water has become a major global problem. In recent years, this phenomenon has experienced a remarkable expansion and has increasingly worrying consequences. The majority of studies on water erosion and soil degradation in Algeria do not integrate or minimally use spatial analysis techniques through Geographic Information Systems (GIS) to understand and map these phenomena. In this study, Geographic Information Systems were used to develop a series of thematic maps (slope, topography, hydrographic network map) and to assess and map the phenomenon of water erosion using the Universal Soil Loss Equation (USLE) in the Oued Endja watershed in Algeria. This watershed is characterized by high rainfall irregularity, steep slopes and sparse vegetation cover, making it highly vulnerable to erosion. The objective of our study is to couple a GIS tool with the USLE model to determine the rate of erosion due to runoff, to map areas at risk of water erosion in the Oued Endja watershed, and finally to disseminate the results for appropriate decision making. The resulting soil loss map, with an average erosion rate of 50 to 250 t/ha/year, also shows low erosion, between 0 and 50 (t/ha/year), covering 89.04% of the total catchment area, and very high erosion, from 210 to 250 (t/ha/year), not exceeding 0.16% of the area. Areas with high erosion rates, from 110 to 200 (t/ha/yr), cover more than 1.51% of the watershed. Analysis of the erosion risk map, compared with the maps of the various factors in the equation, shows a clear and significant influence of vegetation cover on soil erosive behavior, followed by the topographical factor, in particular slope.

Key words: Gis, Soil, Oued Endja watershed, USLE, Water erosion

Received: July, 2023; Revised final: March, 2025; Accepted: April, 2025