Environmental Engineering and Management Journal *April 2021, Vol. 20, No. 4, 613-624*
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

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GIS-BASED WATER EROSION MODELLING: THE CASE OF HIGH SLOPE WATER CATCHMENT AREA, ROMANIA

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Abstract

This paper shows the results of a series of hydrographic simulations by mathematical modelling of the erosion phenomenon. The main goal is to show the importance of using the GIS technique to analyse the erosion process. Our research uses several well-known mathematical models and GIS software. Mathematical modelling was performed with the USLE model running under Geo-Graph software and the WEPP model running under ArcGIS 9.2 software. The multitude of factors involved in modelling and especially their spatialization is the main argument for choosing these two models. Finally, in order to be able to compare the results, in both cases the erosion simulation was conducted in the same hydrographic area, under the same geographical, climatic, pedological and relief conditions. The research focuses on a location with steep slopes affected by significant soil degradation processes.

This paper used five input parameters in the simulation process using the USLE model: daily weather forecasting, vegetation or food growing management, land and soil topography. The model is based on daily regulates the hydrological state of the tested soils. Since climate change has had a major impact on soil erosion, the WEEP model has proven to be an efficient tool in erosion modelling, as it allows the entry of a large set of climate data. The WEEP model has also been used worldwide due to its ability to accept a multitude of data sets of soil characteristics. In the present case, in our research, the USLE model was used first, being launched before WEEP, as it has been used worldwide, but the results obtained with the WEEP model were good in almost all our simulations. The main results of this phase of our research show that the erosion is significant and exceeds acceptable limits. Therefore, in conclusion, major support practice actions and an appropriate agricultural practice are recommended to mitigate the effects of erosion process.

Key words: GIS, modelling, runoff, soil topography, water erosion

Received: June, 2020; Revised final: February, 2021; Accepted: March, 2021; Published in final edited form: April, 2021

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