



"Gheorghe Asachi" Technical University of Iasi, Romania



MATHEMATICAL MODEL FOR CALCULATION OF SOIL LOSS ON WATERSHED SLOPES

Erika Beilicci*, Ioan David, Robert Beilicci, Mircea Visescu

*Department of Hydrotechnical Engineering, Faculty of Civil Engineering,
"Politehnica" University of Timisoara, 1/A George Enescu Street, 300022 Timisoara, Romania*

Abstract

Soil erosion by water, sediment transport, sediment deposition and their impact on watershed area are complex processes. Therefore, the state of theoretical knowledge and mathematical modeling of them are still in an incipient phase. Most of the existing mathematical models are based on relations obtained either experimentally or in laboratory conditions, either in situ or physical models; because of existence of multitude factors involved in these processes and influence each other. These mathematical models, emerged in recent decades, produce results with practical use, but require a large amount of data and long working time. Therefore, it is necessary to develop the appropriate calculation tools, useful in the analysis and engineering design activity. This paper proposes a simple mathematical model for soil loss calculation caused by water erosion on the watershed slopes, due to a single torrential rain, by taking into consideration the most important factors which determine soil erosion. This relation is a rapid and simple way to calculate soil loss, necessary for a pre-sizing soil erosion control arrangement. In order to find the relation, the WEPP model (Water Erosion Prediction Project) was used, which is modern software for use in watershed erosion prediction, developed by the USDA Forest Service. By this method we can find similar relations for other intensities or durations of torrential rain, which can be applied to hillslopes, under similar conditions.

Keywords: hillslope, mathematical model, overland flow, soil erosion, solid flow

Received: December, 2012; Revised final: January, 2014; Accepted: January, 2014

*Author to whom all correspondence should be addressed: e-mail: beilicci_erika@yahoo.com; Phone: +40 256404097; Fax: +40 256404093