



Assessment of potential soil water erosion based on empirical and physical models: the case study in the Myjava Hill Land, Slovakia

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The aim of this paper is to calculate the potential soil water erosion by the physically-based model EROSION-3D and the empirical model MUSLE (Modified Universal Soil Loss Equation). Both models are event-based, modelling the soil erosion and sediment yield for a particular rainfall event. The MUSLE requires information about volume of runoff (m³) and peak flow rate (m³/s), so that the SMOERP (Simulation Model of Overland Flow and Erosion Processes) was used. The calculations were performed for chosen storm rainfall events measured at the Myjava meteorological station during 2015-2017, and for different land cover types in order to estimate the variability of the soil erosion processes for the different field management practices. EROSION-3D and MUSLE models are useful tools for prediction of potential soil water erosion. The erosion models were applied into small catchment of Svacenícký creek (6.3 km²), situated in the middle of the Myjava Hill Land in the western part of Slovakia, which is known for its quick runoff response and related erosion processes. The calculated values of erosion intensity and sediment yield significantly correspond to storm rainfall events and physical-geographic conditions in the Svacenícký creek catchment. The highest values of potential soil erosion were calculated for fallow land cover ranging between 4 to 40 t/ha/yr. On the other hand, the winter wheat can effectively protect the soil against the soil water erosion and the values are lower than 5 ton/ha/yr. The risky parts to erosion processes are located in the slopes with more than 20% angle of slope especially in the northern part of the Svacenícký creek catchment.

The results confirmed our opinion that the extreme rainfall events cause hazardous erosion processes, especially in the agricultural areas of the Myjava Hills. The modelled sediment yields were compared with the measured data obtained by the bathymetry measurement in the Svacenícký polder located in the bottom of the Svacenícký catchment. The AUV (Autonomous Underwater Vehicle) device EcoMapper was used for the mapping of bed sediments of the polder. This device is an effective tool of hydrographical survey, which investigates bathymetry of a reservoir with a high-resolution.

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