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Predicting risk of rill initiation in a sub-catchment of Lake Balaton, Hungary

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Rill erosion is an accelerated form of soil degradation. It removes much more soil and nutrients from the agricultural land than sheet erosion. Soils in the southern sub-watershed of Lake Balaton are especially prone to rill erosion and they contribute to siltation of ditches, to muddy floods and to eutrofication of the lake. The parent material in this region is mainly (sandy) loess and the soils are already moderately or strongly eroded thus, the low tolerance of loess against erosion determines erodibility. Identification of soils with high risk of rill erosion is crucial to plan mitigation measures.

Soil erodibility has been investigated in this study in the catchment of Tetves stream.

The USLE soil erodibility factor and soil slaking are widely accepted indicators for soil erosion. Both of them are published for all soil texture classes in handbooks of soil mapping. We have found that erodibility derived from our physical model has a close linear correlation with the product of the USLE soil erodibility factor and soil slaking grade thus, USLE could be directly used to assess parameters for physical based models. Rill erosion is highly probable if the product of KUSLE X slaking grade is above 2.

Digital maps were produced to delineate soils with high potential for rill erosion. The basic data for the soil properties were drawn from the 1:10,000 soil map. Soil texture classes were used to assign KUSLE and slaking grade to the soil units.

Beyond soil properties, other factors also influence rill formation: slope, surface cover, rainfall intensity. However, identifying soil properties, which make soils prone to rill erosion, is an important initial step for the reduction of diffuse agricultural loads to Lake Balaton. It might be the objective of River Basin Management Plans in the Water Framework Directive to prevent rill erosion and our study provides scientific evidence for targeting this policy.