

Monitoring of changes in gully erosion in the Myjava catchment from the 18th century to the present

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Gully erosion threatens mostly agricultural cultivated slopes. The processes of this type of erosion are closely related to the formation of muddy floods during which a large transport of soil particles occurs. The high concentration of eroded material threatens water resources and their surroundings, roads and settlements, thereby creating erosion depressions called gullies.

The Myjava river basin is one of the most affected territory of Slovakia by gully erosion. This region has been largely influenced and transformed by human activities. The greatest changes in this landscape occurred due to the “Kopanice colonization” and later in the period of the collectivization of agriculture. This historical development of the landscape resulted in the catchment being characterised as having rapid runoff responses and related muddy floods, both of which are determined by natural and socio-economic conditions.

This paper deals with the problems of the occurrence and formation of gully erosion in the Myjava river basin, with the objective of analysing the network of gullies on the historical maps. Based on the map analysis (1st military mapping, 3rd military mapping, topographic maps and basic maps), the gully erosion map was created for each time horizon.

In more detail, we focused on monitoring a selected gully in the Myjava Land Hills - in the locality of Turá Lúka. The maps (historical and current maps) and data were used to assess changes in the spatial location of the gully during different time periods. Nowadays, the gully is the subject of further experiments focusing on the assessment of changes in its volume and selected parameters using a terrestrial laser scanner, UAV technology and GNSS. The measurements were taken at various times during the RECARE project to monitor the dynamics of erosion processes in the gully. The results from the measurements show that despite stabilization measures (small wooden check dams), the erosion processes are still ongoing. When we compared the years 2014 and 2015; the volume of the gully increased by more than 10%. The gully volume increased by almost 80 m³ between the years 2015 and 2016, which represents an 8% increase. Significant changes in the parameters of the length and average slope of the erosion gully were not recorded except for the fact that the slope conditions in front of five of the wooden check dams were partly reduced, which was caused by deposits of eroded soil particles. Erosion (an increase in the longitudinal slope) was recorded on two of the check dams.

Keywords: monitoring, gully erosion, Myjava River Basin, historical maps

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