



## **High resolution studies of gully erosion, sedimentation processes, and land use changes since the late Pleistocene and future trajectories in the Kazimierz Dolny area (Nałęczów Plateau, SE-Poland)**

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This paper presents the results of 30 years of research on the Doły Podmularskie gully system (catchment 0.35 km<sup>2</sup> in size), which is situated in the south-western part of the loess-covered Nałęczów Plateau in SE-Poland. Detailed topographic, stratigraphic and pedologic investigations, and monitoring of a tributary gully (gully area: 0.7 ha, catchment: 2.5 ha), combined with historical, archaeological and palaeoecological records reveal a long and complex history in terms of the temporal and spatial extent and the impact of land use on gully erosion, and the long-term feed-back mechanisms between land use changes and natural processes since the end of the Pleistocene are also expressed. Phases of gully erosion and subsequent filling occurred in the Bronze Age and around the 10th to 11th century. The most severe deepening and expansion of the gully took place in the 17th century. The results also show that field structures and land use intensity had a significant influence on the frequency and magnitude of run-off, soil erosion, piping, and landslide events. The last significant erosion phase started in the mid-19th century with renewed headward retreatment and down-cutting into older gully fills. Today, most of the catchment is either forested or the land is covered in berry shrubs. In the future, the area will continue to produce sediments, because of the steep slopes and because there are still areas of bare soil with a low resistance to erosion, a legacy from past land uses, which will remain a factor affecting soil erosion and sedimentation processes in the future. This study is an example of how important it is to observe and understand slow geomorphologic processes, changes and rare extreme events in the light of land use changes when investigating long-term human-environment interactions.