

Landslide susceptibility estimations in the Gerecse hills (Hungary).

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Surface movement processes are constantly posing threat to property in populated and agricultural areas in the Gerecse hills (Hungary). The affected geological formations are mainly unconsolidated sediments. Pleistocene loess and alluvial terrace sediments are overwhelmingly present, but fluvio-lacustrine sediments of the latest Miocene, and consolidated Eocene and Mesozoic limestones and marls can also be found in the area. Landslides and other surface movement processes are being studied for a long time in the area, but a comprehensive GIS-based geostatistical analysis have not yet been made for the whole area. This was the reason for choosing the Gerecse as the focus area of the study. However, the base data of our study are freely accessible from online servers, so the used method can be applied to other regions in Hungary. Qualitative data was acquired from the landslide-inventory map of the Hungarian Surface Movement Survey and from the Geological Map of Hungary (1 : 100 000). Morphometric parameters derived from the SRMT-1 DEM were used as quantitative variables. Using these parameters the distribution of elevation, slope gradient, aspect and categorized geological features were computed, both for areas affected and not affected by slope movements. Then likelihood values were computed for each parameters by comparing their distribution in the two areas. With combining the likelihood values of the four parameters relative hazard values were computed for each cell. This method is known as the “empirical probability estimation” originally published by Chung (2005). The map created this way shows each cell’s place in their ranking based on the relative hazard values as a percentage for the whole study area (787 km²). These values provide information about how similar is a certain area to the areas already affected by landslides based on the four predictor variables. This map can also serve as a base for more complex landslide vulnerability studies involving economic factors. The landslide-inventory database used in the research provides information regarding the state of activity of the past surface movements, however the activity of many sites are stated as unknown. A complementary field survey have been carried out aiming to categorize these areas – near to Dunaszentmiklós and Neszmély villages – in one of the most landslide-affected part of the Gerecse.

Reference:

Chung, C. (2005). Using likelihood ratio functions for modeling the conditional probability of occurrence of future landslides for risk assessment. *Computers & Geosciences*, 32., pp. 1052-1068.