



Landslide and flood hazard assessment in urban areas of Levoča region (Eastern Slovakia)

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The case study presents the use of statistical methods and analysis tools, for hazard assessment of “urbanization units”, implemented in a Geographic Information Systems (GIS) environment. As a case study, the Levoča region (Slovakia) is selected. The region, with a total area of about 351 km², is widely affected by landslides and floods. The problem, for small urbanization areas, is nowadays particularly significant from the socio-economic point of view. It is considered, presently, also an increasing problem, mainly because of climate change and more frequent extreme rainfall events.

The geo-hazards are evaluated using a multivariate analysis. The landslide hazard assessment is based on the comparison and subsequent statistical elaboration of territorial dependence among different input factors influencing the instability of the slopes. Particularly, five factors influencing slope stability are evaluated, i.e. lithology, slope aspect, slope angle, hypsographic level and present land use. As a result a new landslide susceptibility map is compiled and different zones of stable, dormant and non-stable areas are defined.

For flood hazard map a detailed digital elevation model is created. A compose index of flood hazard is derived from topography, land cover and pedology related data. To estimate flood discharge, time series of stream flow and precipitation measurements are used.

The assessment results are prognostic maps of landslide hazard and flood hazard, which presents the optimal base for urbanization planning.