



## **Uncertainty associated with regional landslide risk analysis - a case study in Buzau County, Romania**

Veronica Zumpano (1), Roxana Ciurean (2), Mihai Micu (1), Dan Balteanu (1), and Thomas Glade (2)

(1) Romanian Academy, Institute of Geography, Bucharest, Romania (zumpanoveronica@gmail.com), (2) Dep. of Geography and Regional Research, University of Vienna, Austria

When analyzing the risk for a region where landslides constitute a threat for the society and the environment, a fully quantitative approach often becomes impracticable. The magnitude, frequency and location of landslides and a reasonably complete inventory of historical events is commonly not available. Likewise, a thorough investigation of the damaged assets and quantification of losses is rarely possible. Nevertheless, an alternative approach can be engaged in areas where information regarding the environmental conditions leading to the occurrence of landslides including their relative location, and the characteristics and distribution of elements at risk are known.

This contribution proposes a methodology for a landslide risk analysis applicable at regional scale taking into account the spatial probability and consequences of past damaging events. Since the temporal information used to calculate the detailed hazard probability is missing, a susceptibility analysis is performed by using a data-driven Bayesian method (Weights of Evidence modeling technique) which analyzes the relation between a training set (past landslide events) and multiple predisposing factors (lithology, landuse, slope, aspect, internal relief, altitude), in order to predict areas that are less-to-more susceptible to landslide initiation. The consequence analysis is based on a generalized assessment of vulnerability, exposure and value of the elements at risk (i.e. buildings and roads) using cadastral and statistical data. For both components of the risk analysis (susceptibility analysis and consequence analysis) an estimation of uncertainty is performed by defining a central value (which represents the statistical mean) and a measure of value range (minimum and maximum) of the input parameters. As the procedure operates at a spatial level, the distribution of risk and the annual probability of expected losses are expressed numerically as well as spatially with the use of GIS.

The developed landslide risk assessment methodology is tested in Buzău County, a region located in the Curvature area of the Romanian Carpathians and Subcarpathians. In this region, recurrent hydro-meteorological events and earthquakes are the cause of considerable damages to critical infrastructure incl. lifelines, build-up environment and cultivated areas.

The main advantages and limitations of the proposed methodology are outlined and recommendations for future improvements are given. The results may serve as basis for decision making and risk management in areas where no or limited information about the risk to landslides is available.