Gis Based Multi-Risk and Vulnerability Assessment. A Case Study for Niraj basin area (Transylvanian Depression, Romania)

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Natural hazards such as landslides, meandering and flash floods have caused economical damage and environmental changes in the last period of time increasing the risk level of the built-up areas and roads from Romania. Thus, an essential role in the prevention of negative effects and the identification of natural risks is played by the generation of hazard and risk maps. The purpose of the study is represented by the generation of multi-hazard and multi-risk maps using GIS technologies, which requires the identification of cumulated risk for each administrative-territorial unit situated in the study area of Niraj river basin from Transylvania Depression, Romania. The first stage in this approach was to develop the flood risk zonation which is based on floodable stripes, obtained using statistical analysis of past data series and their integration in determinist spatial analysis models, generated as a product of temporal flood probability and vulnerability of the territory. The probability of landslide occurrence was estimated using bivariate statistical analysis, by evaluating the importance of each class of preparatory factors depending of the characteristic/local conditions: lithology, geomorphology, structure, hydro-climatic factors, hydrogeology, seismicity, forestry and anthropogenic factor. Finally, the assessment of the risk associated to lateral river erosion, or meandering, was obtained by using the largest time span available (of the last 102 years) in order to identify the river's present dynamic trends of each river meander. The average and the maximum rate of erosion values were used to determine the meandering potential and to identify the meandering risk zones.

Therefore, in order to accurately identify the local risk level, we calculated the spatial and temporal probability of occurrence of potential damaging events, as well as the distribution of the elements at risk based on their characteristic vulnerability. The final results represent valuable information which could be integrated in a complex planning model for the Niraj river basin.

Keywords: multi-hazard, multi-risk, channel migration zone, landslides, flood stripes