



Debris-flow susceptibility map of Slovenia

M. Komac (1), Š. Kumelj (1), and M. Ribičič (2)

(1) Geological Survey of Slovenia, Dimičeva ulica 14, 1000 Ljubljana, Slovenia (marko.komac@geo-zs.si & spela.kumelj@geo-zs.si), (2) University of Ljubljana, Faculty of natural sciences and engineering, Department of Geology, Privoz 11, 1000 Ljubljana, Slovenia (mihael.ribicic@nft.uni-lj.si)

Until now debris-flow susceptibility was relatively poorly investigated in Slovenia. Regarding lack of such studies »Map of debris-flow susceptibility in Slovenia in scale 1:250.000« was elaborated using GIS and the latest spatial data was used; among them the latest lithological map of Slovenia in scale 1:250.000.

For the creation of debris-flow susceptibility map of Slovenia in scale 1:250.000 seven considered most important factors were used that were divided into two groups: 1) initial factors that precondition debris-flows: lithology, slope angle, slope potential, 48-hours precipitation and 2) transport factors that contribute to higher probability of the transport of debris-flow material: terrain convexity, energy potential of streams, distance to surface water. Using linear weighted sum the precondition information layer was derived, and the same principal was used to derive transport information layer. Both layers were joined into final susceptibility assessment, again with consideration of their importance to contribute to debris-flow occurrence. Different weights were applied to chosen parameters, which resulted in several different models that were evaluated according to historical or recent debris-flow phenomena.

Expert estimation was used to define the torrential areas with high probability of the debris-flow occurrence. The emphasis was on location rather than on the time of the debris-flow occurrence. There were unfortunately no adequate representative data about debris-flow in Slovenia (debris flow cadastre does not exist and not many historical studies have been done so far) for the quantitative statistical analysis. Hence only expert estimation approach was possible, based on the experience and historical events gathered from chronicles and eyewitness. Such an approach is mainly limited by subjectivity and has difficulties with sound argumentation, but at the given state it was the only possible approach.

Based upon spatial analyses of four pilot cases and the expertise from earlier risk analyses (Komac, 2005) the influence on debris-flow susceptibility of each spatial parameter was defined. All parameters were classified and normalized prior to be used in the model. Quality of different models was tested on the set of ten debris-flows from the past.

Results of modelling (the best model) are presented in the form of the Map of debris-flow susceptibility in Slovenia. Map of such scale is still not detailed enough to be used as an information source for the prevention activities on local scale, since it only indicates initial areas, to which further activities should be oriented. Nevertheless the map is a good strategic planning tool and as such represents a strong foundation for further detailed investigations focused into smaller and more detailed areas.