



Conceptual debris flows modeling for risk assessment at the municipality level

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Debris flows are a major threat to settlements and infrastructures in mountainous regions. In Switzerland, in the last 30 years about 9 Mia Fr. of direct damages were caused by natural hazards, about 10% of them by debris flows [1].

The threat due to natural hazards, also debris flows, can be reduced, by integrating them into land management and urban planning. A valid tool to estimate the effects of debris flows are computer models, capable to produce maps of the spatial distribution of past and possible future events in terms of intensity maps, hazard index maps and hazard maps. An important criterion for the choice of a simulation tool is not only the validity of the selected approach and its user-friendliness, but also its degree of integration as part of a spatial modeling environment (GIS) in order to evaluate not only the hazard process, but also its impact on the land use in the framework of a comprehensive risk assessment procedure.

We chose the rather simple, conceptual model dfwalk [2], which is based on a multiple flow direction-Monte Carlo approach to develop the expansion pattern of the debris flow on the digital terrain and a 1-D frictional 2-parameter model to determine velocity and run-out distance, and a rather simple algorithm to simulate material deposition, based on velocity and terrain slope. Within the Interreg III-B project CatchRisk [3], this model was implemented in ESRI ArcGIS, using the built-in scripting language VBA (Visual Basic for Applications). Further integrated tools were developed to analyze the risk according to the Swiss federal recommendations [4].

The poster illustrates the implementation of the model and shows a few examples of

the risk evaluation on the municipality level.

References

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[4] Risikoanalyse bei gravitativen Naturgefahren. Bundesamt für Umwelt, Wald und Landschaft. Umwelt-Materialien Nr. 107/I - Naturgefahren.