Landslide susceptibility map

A susceptibility map displays the spatial distribution and rating of the terrain units (pixels, polygons), which are classified according to their spatial probability/ propensity to produce a certain landslide type.

To some extent, landslide susceptibility zoning also involves interpretation. This depends on the topography, geology, geotechnical properties, climate, vegetation and anthropogenic factors.

Hazard map

A hazard map shows the areal extent of threatening processes: where mass movements have occurred in the past and where they occur now with a given magnitude (velocity, area or volume) within a specified period (temporal frequency). It follows that the compilation of the hazard map requires detailed knowledge gained from detailed engineering geological maps and from inventory maps about landslides in the past.

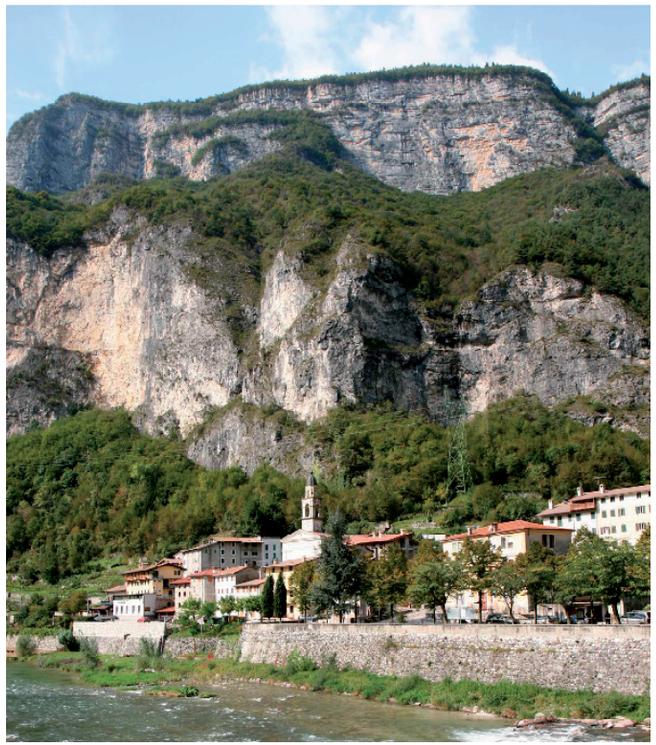

Fig. 6: Valstagna (Vicenza): Pilot Area D of Veneto Region

Project Partners

Amt der Kärntner Landesregierung, Abteilung 8, Kompetenzzentrum Umwelt, Wasser und Naturschutz

Regione Autonoma Friuli Venezia Giulia - Direzione centrale risorse rurali, agroalimentari e forestali - Servizio Gestione territorio rurale e irrigazione

Regione Autonoma Friuli Venezia Giulia - Direzione centrale ambiente, energia e politiche per la montagna - Servizio Geologico

Regione del Veneto - Segreteria Regionale per l´ Ambiente Direzione Difesa del Suolo

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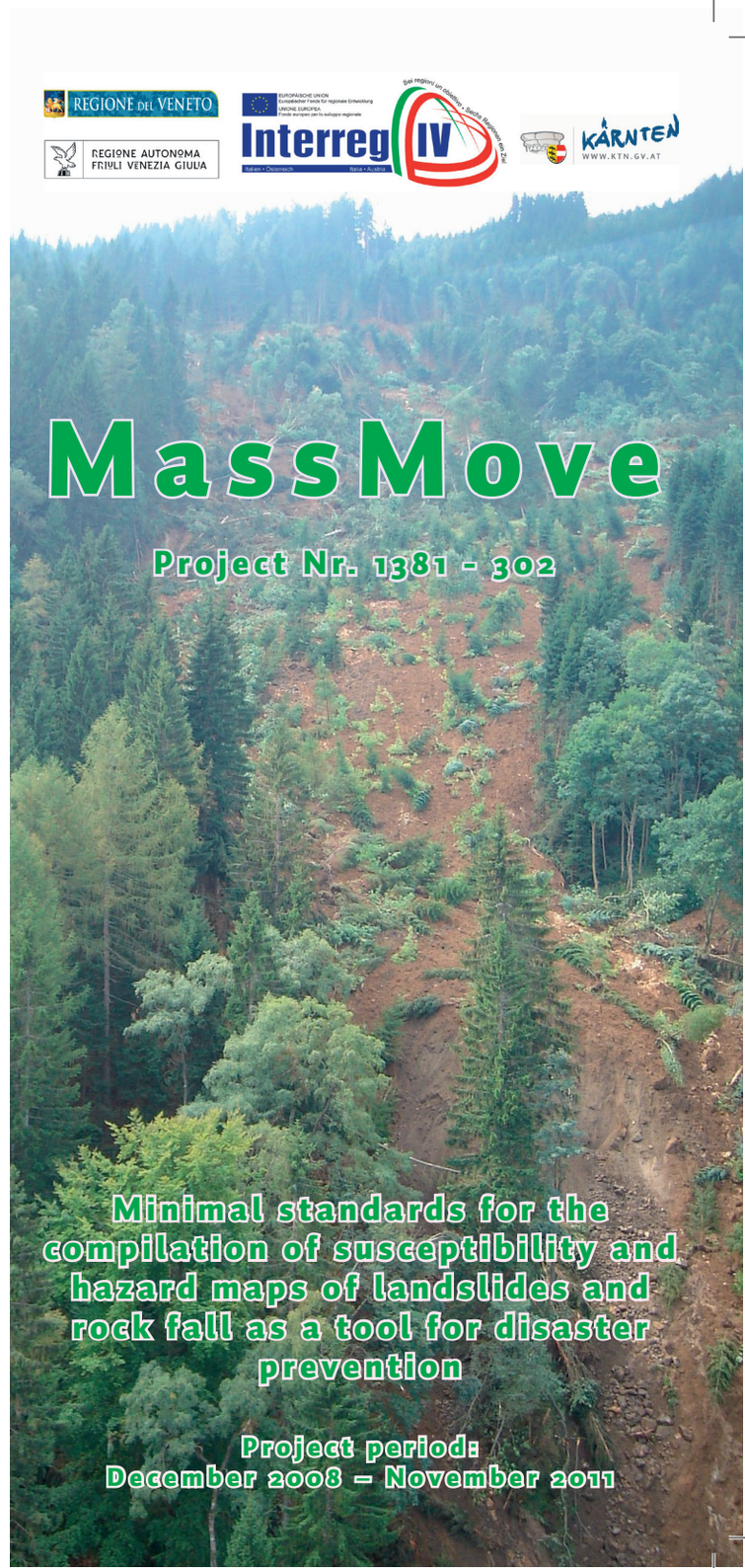
Links to further information

BÄK R. , KRANITZ F., TORRESIN M., MARIANI R., Minimal standards for creation of hazard maps for land slides and Rock fall as a tool for preventive disaster reduction (INTERREG IV A Italy/Austria, Project Nr. 1381-302, Akronym MassMove), Wildbach und Lawinenverbau, 166, p. 176 – 197, Villach 2011

www.massmove.at



Aim of the project

Natural hazards such as floods, avalanches, landslides, and rock falls cause great damage in the Alpine regions.

Landslide susceptibility and hazard maps are well suited to assess the potential risks associated with plans for future land use, and to define priorities for further investigations and measures.

The process of the map compilation must be transparent to be accepted by affected land owners and stakeholders.

Minimum requirements for landslide susceptibility/hazard mapping must be defined to allow an objective comparison of maps.

Therefore, the partners from the regions of Carinthia, Friuli Venezia Giulia and Veneto, have decided to investigate a number of model areas systematically. This work constitutes the basis for guidelines concerning landslide susceptibility and hazard mapping.

Project implementation

12 model areas with high frequency of landslides and rock falls were selected. The studies in these areas included systematic geological mapping with emphasis on various aspects of mass movements and lithology, remote sensing using laser scan data and aerial photography, and simulations with a variety of software.

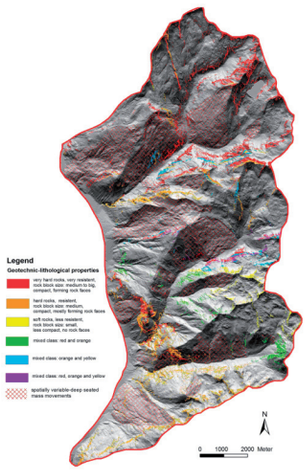


Fig. I: Mölltal (Carinthia): potential rockfall release areas

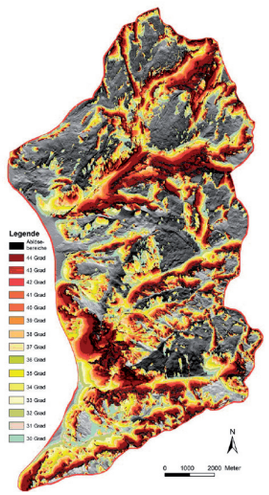


Fig. 2: Mölltal (Carinthia): delineation of runout zones using the energy line principle

The minimum requirements for the input data and the results (maps for the localization of hazards) are derived from these systematic investigations. They provide a basis for improved regulation of hazard assessment in the participating regions.

Applied methods

The methods included i) acquisition and evaluation of archived data of past events, ii) field work (engineering geological mapping at various scales), iii) remote sensing, iv) digital simulation of landslides and rock falls with various methods choce by the participating teams.

The collected basic data include digital elevation models suitable for morphological analysis, airborne laser-scan data, digital orthophotos, digital road/path vector data for removing anthropogenic lineaments, digital cadastral maps, land use geological and topographic maps, and information on landslides from geological maps. Data on documented mass movements (landslide inventories) were obtained from various archives, because assessing landslide susceptibility requires a detailed characterization of topography, structure, lithological features, and past evidence.

Landslide susceptibility/ Hazard assessment

The accuracy (and spatial resolution) of the results depends on the scale of the input data. The accuracy of the investigation has to increase with the aim of the investigation: i) susceptibility, ii) hazard and iii) protection measurements.

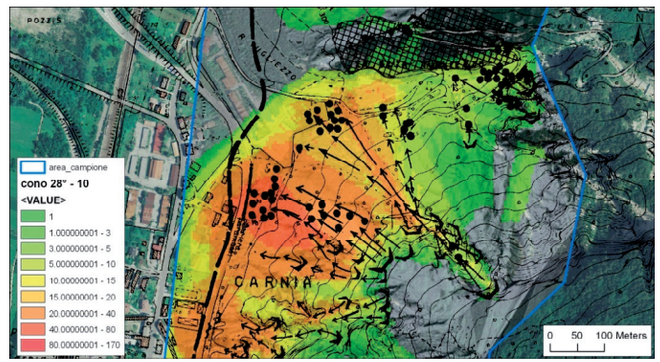


Fig. 3: Venzone (FVG Region) shadow angle approach model (extract). The historical map of blocks from Comunità Montana Gemonese is reported for comparison

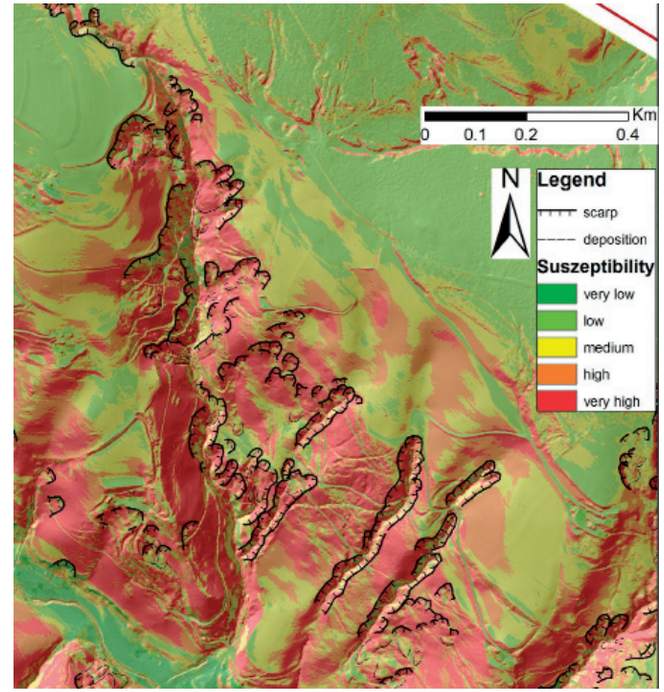


Fig. 4: Auental (Carinthia): classified susceptibility areas

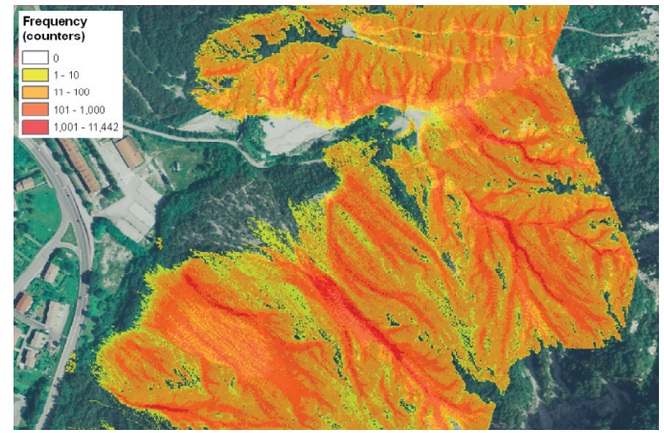


Fig. 5: Venzone (FVG Region): map representing the number of blocks passing through each cell simulated with a 3D rockfall run-out model (extract)