Evaluation of the quality indices of landslide databases for their use in susceptibility models

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The aim of this study is to define quality indices for evaluation of the homogeneity, completeness and accuracy of landslide databases. This evaluation is absolutely essential if the databases are to be used for the definition and implementation of predictive models for estimation of landslide susceptibility. In particular, descriptions are given of the quality indices defined for the Italian Landslide Inventory (IFFI Project). The IFFI Project, with the funding of 4.1 million Euro in 1997 by the Italian Government, is implemented by ISPRA (Institute for Environmental Protection and Research/Geological Survey of Italy) and by the Regions and the Self-Governing Provinces. The Project collects and maps the landslides over the entire Italian territory in accordance with standardised and shared methods. A specific "Landslide Data Sheet" has been prepared in order to collect all the landslide information, subdivided into three levels of progressively increasing detail. A detailed landslide mapping (scale 1:10,000) has been adopted throughout most of Italy. A scale of 1:25,000 has been used in high mountainous areas or in low population areas. With regard to the mapping, every landslide is represented by a georeferenced point placed, by convention, at the highest point of the landslide crown; a polygon, if the landslide may be mapped at the adopted survey scale; a line when the landslides have a very elongated form with a width which may not be mapped. The Inventory contains 482,272 landslides covering an area of approximately 20,500 km2, which is equivalent to 6.8% of the Italian territory. With regard to the homogeneity and completeness indices, comparisons have been made of the landslide indices for areas with the same outcropping lithology, statistical analyses of the landslide area have been carried out and information from the IFFI Inventory has been compared with that contained in other databases (e.g. AVI - Inventory of information on sites historically affected by landslides and floods, SCAI - Study of Unstable Urban Areas, CARG - Geological Map of Italy scale 1:50,000 and PAI - River Basin Plans). In order to estimate the reliability and accuracy of the data, each landslide has been assigned a rating on the basis of the survey method used (e.g. aerial photo interpretation, field surveys, archive data, monitoring data) and the number of significant parameters compiled in the Landslide Data Sheet (e.g. landslide volume, activation date, investigations, remedial measures, triggering factors, bibliography, etc.). These quality indices have also allowed identification of particularly representative areas in terms of homogeneity and reliability of the IFFI Project data, which may be used as training and test areas for the implementation of quantitative landslide susceptibility models. Similarly, these analyses have allowed identification of critical areas in which the data collected in the inventory has been underestimated or is not very accurate, for which it will be necessary to integrate the data in the future.