Part I

Landslide Inventory and Susceptibility and Hazard Zoning

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Landslide inventories and susceptibility and hazard maps are key tools for land use planning and management, civil protection plans, civil engineering works, and risk reduction programmes. Their importance helps understanding why approximately one sixth of all contributions to the Second World Landslide Forum were related to recent advances in these topics.

This volume presents the state of the art on landslide inventory and susceptibility and hazard zoning. It contains experiences, methods and techniques applied in different physiographic, geological and climate settings of the world and for different types of landslides, from site-specific investigations to global scale analysis. 65 % of the submitted papers describe studies carried out in Europe, 25 % in Asia, and 8 % in South America, while contributions from North America and Africa are highly underrepresented in this session. Since the number of contributions to session L04 was fairly large, with 57 oral presentations, 24 poster presentations and 78 papers accepted for publication, this preface will not make specific references to the papers included in this volume.

A landslide inventory is the most important information source for quantitative zoning of landslide susceptibility, hazard and risk. It should give insight into the location, date, type, size, activity and causal factors of landslides as well as resultant damage. Therefore, many countries have created or are creating national and/or regional landslide databases, and several of these databases are presented in this volume (e.g. the national inventories of Poland, Slovakia, Sri Lanka, and UK). An overview of national landslide databases in Europe shows, among other things, that data collection methods used for compiling national databases are generally still rather traditional (field surveys, analysis of historical documents, including scientific literature and technical reports, and aerial-photo interpretation).

In contrast with the traditional landslide identification methods generally used for national inventories, the session showed how modern remote sensing techniques can be useful in identifying landslides and their features and activity. Important progress has been made towards pixel- and object-based automatic extraction of landslides using either passive or active optical imagery. LiDAR derivatives have become well-accepted for creation and updating of landslide inventories. For the same purposes significant progress was also achieved with satellite SAR interferometry techniques, including new data processing algorithms. Another interesting trend for updating landslide inventories is the integration of remote sensing data and conventional monitoring.

This volume contains additionally numerous studies on local (from landslide site or single slope) to national (e.g. El Salvador, France, Greece, Italy, Norway) and even continental (e.g. Europe) landslide susceptibility assessment. At very local scale, some contributions show landslide characterisation, including geotechnical investigations of landslide mechanisms and runout modelling, to determine susceptibility or hazard to specific landslide types using mainly deterministic models. For other scales, a limited set of studies used heuristic models (e.g. spatial multicriteria evaluation) while well-known and more innovative statistical models (e.g. logistic regression, artificial neural networks, fuzzy emerging patterns) remain most popular. In this context, comparison of different models, a trend that started a few years ago, continues. However, rather than focussing on the comparison of different statistical models, more attention should be paid to improving the selection and pre-processing of the input variables because this has probably much more effect on the model results than the statistical model used. Standard evaluation techniques, such as ROC curves and success rate curves, are generally accepted by now. Increasing attention is also paid to representation of the classified landslide susceptibility maps. This is very important when these maps are used for spatial planning.

Compared to the relatively high number of contributions on landslide susceptibility modelling, the number of works dealing with hazard assessment is still relatively low. Inclusion of information on the landslide frequency seems to remain difficult, although several studies prove that multitemporal remote sensing analysis, rainfall data analysis, and dendrochronology contribute here. Yet, landslide hazard studies are important for landslide risk assessment.

Although not specifically envisaged in the session, a limited number of contributions deal with local scale risk assessment. Moreover, the invited keynote lecture presents a methodological approach for landslide risk assessment starting from multitemporal landslide inventory maps and susceptibility and hazard models.

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