



Multi-scale landslide susceptibility assessment for Silk Road Disaster Risk Reduction

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The research illustrates the results of the work carried out in the context of the project Silk Road Disaster Risk Reduction (SiDRR). The main aim of such project is to investigate the spatial distribution of landslides along with the landslide susceptibility and therefore propose prevention and mitigation measures to support the spatial planning of the Belt and Road Initiative infrastructures.

In this framework the landslide susceptibility assessment at a continental scale was conducted and the procedure here discussed.

The study area considered in this analysis includes more than 70 countries, most of them from Asia and Europe. Therefore the activity is characterized by extreme heterogeneity which reflects the most relevant criticality of the project but, at the same time, the focal point of innovation too. Indeed, the absence of transboundary coordination measures forces to find new and innovative solutions from the scientific point of view.

In doing so, a Tiers based approach for landslide susceptibility mapping was adopted. From the less detailed to the highest, the analyses were conducted by successive phases. The first susceptibility evaluation is low-resolution data based on continental, Tier 1 scale approach. It delineates the priorities in the most susceptible regions which will be exploited during the successive Tiers, by local scale approach.

The results provide an overview of the whole study area according to the Tier 1 landslide susceptibility assessment. This research is extremely operative because of it is aimed to support the construction of infrastructures. Therefore, a well-known, objective, quantitative, clear and reproducible susceptibility technique was selected. The Tier 1 analysis was based on the Weights of Evidence (WoE) method. The bivariate statistical methodology allows to forecast future scenarios combining spatial factors which causes past events. To be on line with the overview and low-detail approach of the Tier 1, few landslide causative factors were used: slope angle, elevation, lithology and land cover. The statistical method is, obviously, based on a landslide inventory which represents the main gap to face with due to the heterogeneity of available datasets.

Finally the landslide susceptibility was classified into 5 classes (very low, low, moderate, high, very high) through the evaluation of the Receiver Operating Characteristic (ROC) curve. The performance of the analysis was evaluated by the AUC value ranging between 0.7-0.8. It reveals a promising prediction capacity of the methodology.

The future evolution of the research foresees the Tier 2 assessment of the most susceptible areas highlighted by the Tier 1 landslide susceptibility map to promote sustainable landslide risk mitigation measures.