An innovative tool for landslide susceptibility mapping in Kyrgyzstan, Central Asia

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Kyrgyzstan is among the most exposed countries in the world to landslide susceptibility. The high seismicity of the area, the presence of high mountain ridges and topographic relieves, the geology of the local materials and the occurrence of heavy precipitations represent the main factors responsible for slope failures. In particular, the large variability of material properties and slope conditions as well as the difficulties in forecasting heavy precipitations locally and in quantifying the level of ground shaking call for harmonized procedures for reducing the negative impact of these factors. Several studies have recently been carried out aiming at preparing landslide susceptibility and hazard maps; however, some of them – qualitative-based - suffer from the application of subjective decision rules from experts in the classification of parameters that influence the occurrence of a landslide. On the other hand, statistical methods provide objectivity over qualitative ones since they allow a numerical evaluation of landslide spatial distribution with landslide potential factors. For this reason, we will make use of a bivariate technique known as Weight-Of-Evidence method to evaluate the influence of landslide predictive factors.

The aim of this study is to identify areas in Kyrgyzstan being more prone to earthquake-triggered landslides. An innovative approach which exploits the new advances of GIS technology together with statistical concepts is presented. A range of conditioning factors and their potential impact on landslide activation is quantitatively assessed on the basis of landslide spatial distribution and seismic zonation. Results show areas which are more susceptible to landslides induced by earthquakes. Our approach can be used to fill the gap of subjectivity that typically affects already performed qualitative analysis. The resulting landslide susceptibility map represents a potentially supportive tool for disaster management and planning activities at regional level; furthermore, it can be used as a starting point for further constraining the analysis which might also consider meteorological in-fluences and for carrying out an extension to all Central Asian countries in the framework of cross-border activities.