



Landslide Susceptibility Statistical Methods: A Critical and Systematic Literature Review

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Landslide susceptibility assessment, the subject of this systematic review, is aimed at understanding the spatial probability of slope failures under a set of geomorphological and environmental conditions. It is estimated that about 375 landslides that occur globally each year are fatal, with around 4600 people killed per year. Past studies have brought out the increasing cost of landslide damages which primarily can be attributed to human occupation and increased human activities in the vulnerable environments. Many scientists, to evaluate and reduce landslide risk, have made an effort to efficiently map landslide susceptibility using different statistical methods.

In this paper, we do a critical and systematic landslide susceptibility literature review, in terms of the different statistical methods used. For each of a broad set of studies reviewed we note: (i) study geography region and areal extent, (ii) landslide types, (iii) inventory type and temporal period covered, (iv) mapping technique (v) thematic variables used (vi) statistical models, (vii) assessment of model skill, (viii) uncertainty assessment methods, (ix) validation methods. We then pulled out broad trends within our review of landslide susceptibility, particularly regarding the statistical methods. We found that the most common statistical methods used in the study of landslide susceptibility include logistic regression, artificial neural network, discriminant analysis and weight of evidence. Although most of the studies we reviewed assessed the model skill, very few assessed model uncertainty. In terms of geographic extent, the largest number of landslide susceptibility zonations were in Turkey, Korea, Spain, Italy and Malaysia. However, there are also many landslides and fatalities in other localities, particularly India, China, Philippines, Nepal and Indonesia, Guatemala, and Pakistan, where there are much fewer landslide susceptibility studies available in the peer-review literature. This raises some concern that existing studies do not always cover all the regions globally that currently experience landslides and landslide fatalities.