Rainfall-induced landslide susceptibility assessment at the Chongren area (China) using frequency ratio, certainty factor, and index of entropy

ABSTRACT

The main objective of the study was to evaluate and compare the overall performance of three methods, frequency ratio (FR), certainty factor (CF) and index of entropy (IOE), for rainfall-induced landslide susceptibility mapping at the Chongren area (China) using geographic information system and remote sensing. First, a landslide inventory map for the study area was constructed from field surveys and interpretations of aerial photographs. Second, 15 landslide-related factors such as elevation, slope, aspect, plan curvature, profile curvature, stream power index, sediment transport index, topographic wetness index, distance to faults, distance to rivers, distance to roads, landuse, NDVI, lithology and rainfall were prepared for the landslide susceptibility modelling. Using these data, three landslide susceptibility models were constructed using FR, CF and IOE. Finally, these models were validated and compared using known landslide locations and the receiver operating characteristics curve. The result shows that all the models perform well on both the training and validation data. The area under the curve showed that the goodness-of-fit with the training data is 79.12, 80.34 and 80.42% for FR, CF and IOE whereas the prediction power is 80.14, 81.58 and 81.73%, for FR, CF and IOE, respectively. The result of this study may be useful for local government management and land use planning.

Keyword: Frequency ratio; Certainty factor; Index of entropy; Landslide; GIS; Chongren