Comparative analysis of landslide inventories and susceptibility maps in Tegucigalpa, Honduras

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Tegucigalpa, the capital city of Honduras, officially known as the Municipality of the Central District (MCD), has the highest number of landslides recorded in the country. From 1987 to 2014 four landslide inventories have been elaborated in the MCD. Moreover, five landslide susceptibility studies have been carried out between 2002 and 2017. Both, inventories and susceptibility studies, have been done by different authors following varied methodologies and achieving different results.

The main objectives of this research are: 1) carry out a critical analysis of the existing landslide inventories and susceptibility maps; 2) elaborate a new validate landslide inventory; 3) verify the importance of colluvium and residual soils presence as an explanatory variable of landslide occurrence; and 4) elaborate a new susceptibility map for the MDC, that can inform effective landslide disaster risk reduction strategies.

Here we present the results after comparing the four existing landslide inventories and the new validated inventory. The new inventory, which includes 28 landslide events, has been elaborated based on aerial photointerpretation and fieldwork. The comparative performance of four variables for landslide susceptibility mapping (lithology, slope, distance to streams and colluvium-soil map) has been analysed using the method weight of evidence, including the new colluvium mapping developed by this research.

A new susceptibility map based on the colluvium mapping and statistical bivariate analysis has been prepared. Its performance to explain the spatial distribution of the validated inventory has been analysed by using the prediction curve method. The accuracy of the landslide susceptibility map based on the colluvium map is 88.64%. This value is significantly higher than 79.79% and 69.80% estimated for two previous landslide susceptibility maps, comparable in terms of size of study areas. Our study states the relevance of colluvium mapping as an input for landslide susceptibility analysis in Tegucigalpa.