ABSTRACT

Landslide spatial risk assessment in remote mountainous areas it is not always an easy task. In Least Developed Countries, these areas, whose population exhibit high social vulnerability to natural hazards, present many times important gaps of the data necessary to perform consistent susceptibility models. That is the case of the Seti river Basin situated in the Far-Western region of Nepal, where every year, landslides disturb communities during the monsoon rainy season. In this research work has been performed a general landslide susceptibility analysis for the 6400Km2 of the Seti-Basin. The lack of ground truth landslide data for the area has been solve by the use of GIS and remote-sensing techniques, which have served for the creation of an historical landslide inventory of 26350 single landslide events. This inventory has been necessary for the creation of susceptibility maps through the use of the Frequency Ratio and the Weight of Evidence statistical bivariate methods. Besides, changes in time-series of multispectral imagery has been assessed to test possible uses for automated landslide identification in these complex terrains, but also to identify dates of possible activity in the landslides inventoried. The use of this dates together with rainfall datasets has been employed to identify the more possible rainfall threshold mechanism and to calculate spatial-temporal probabilities of occurrence for the creation of landslide hazard maps and with that calculate possible expected loses in terms of population fatalities and damaged roads, crops, and buildings, in the municipalities of the Bajura district that are within the study area. In this sense new maps of land-cover, Road network, buildings and population has been created. Results shows how deforestation together with slope angles above 35 degrees act as main predisposing factors, followed by proximity to main roads and tectonic lineaments. Geology importance for the landslide occurrence is not conclusive and there is the necessity of a smaller scale geological map for this kind of analysis. The obtained susceptibility maps increase its quality when are calculated for larger scale areas, going from a 71% of predicted accuracy for the entire basin, to a 75% for two different local areas at the SW and the NE. Calculated losses indicate a maximum annual expected of 80 human fatalities, 250 buildings affected, 167 ha of crops and 6km of main roads being potentially affected by landslides in the Seti-Basin Bajura municipalities. The new exposure maps reveals how the previous available data despise the great majority of the considered exposure elements, what may be entailing a possible risk underestimation and thus, a lower perception of landslide risk in the area. Additionally a Least-Cost-Path model has been used to calculate time for population to arrive to safe areas, in order to assess its possible use for early-warning systems. Preliminary results for the model are promising but still needs to be assessed in more detail with better resolution data.