This study is an approach to assess earthquake-triggered landslides hazard using artificial neural networks (ANN). The computational method used for the training process is a back-propagation learning algorithm. It is applied to El Salvador, one of the most seismically active regions in Central America, where the last severe earthquake occurred in January 13th (Mw7.7). The first of these earthquakes triggered more the 600 landslides, included the most tragic in Las Colinas landslide, and killed 844 people. The ANN is designed and trained for developing landslide susceptibility analysis techniques at a regional scale. The GIS methodology for the earthquake-triggered landslides hazard are considered two main steps. The first one is the data analysis, and the second one is the analysis of the landslide susceptibility. The back-propagation algorithm was applied to calculate the weights between the input layer and the hidden layer, and between the hidden layer and the output layer, by modifying the number of hidden nodes and the learning rate. The validation process includes both input-output transformation by means of a cross-validation function. The activation function for a non-linear sigmoid function, which is applied to the sum of the weight of the inputs before proceeding to the next layer. The main advantage of the sigmoid function (eq. 4) and (eq. 6) is the learning rate parameter, \eta and the actual output vector of \theta.

The evaluation of susceptibility requires data input of variables for all samples training, however this is virtually impossible, so it looks for the weights that minimize the error. The back propagated through the neural network which is minimized by changing the weight of the inputs before proceeding to the next layer.

The methodology for the assessment of earthquake-triggered landslides hazard using a GIS is described in Figure 6. The input data set (Figure 7) for the development of the landslide GIS (Figure 6) is composed of diverse information: 11,000,000 geological map, land use map, elevation data, slope, land cover, lithology, and the local effect due to geology amplification (eq.9).

The vulnerability of a site is considered by a joint function of the hazard and the exposure of the site (eq.10). The vulnerability map of El Salvador is classified in four classes: low, medium, high, and very high. The overall accuracy (95.1%) and the kappa coefficient (0.9013) confusion matrix, and errors of commission and omission are reported.

The validation of the analysis was carried out by comparing the testing sites and the estimated landslide map obtained by applying the weights obtained from the ANN model. A confusion matrix (contingency matrix) is calculated to know the accuracy of a classification result, by comparing the location and class of each ground truth pixel with the corresponding location and class in the classification image. An overall accuracy (95.1%), (Sensitivity (0.9013) confusion matrix, and errors of commission and omission are reported.

**ACKNOWLEDGEMENTS**

This research has been developed within the framework of an ANDS project financed by the Spanish Ministry of Science and Education (CGL2009-07489-C03-03) and Politbur University of Madrid – Lathamists (624-503-903). Cartography data have been provided by Ministerio de Ambiente y Medio Ambiente (MARN) of the El Salvador. The authors thank these contributions.