



Combining heuristic and statistical techniques in landslide hazard assessments

Jose Cepeda (1), Barbara Schwendtner (2), Byron Quan (3), Farrokh Nadim (1), Manuel Diaz (4), and Giovanni Molina (4)

(1) Norwegian Geotechnical Institute, Oslo, Norway (jose.cepeda@ngi.no, +47 22230448), (2) Geodata AS, Oslo, Norway, (3) DNV GL, Høvik, Norway, (4) Dirección General del Observatorio Ambiental – DGOA, Ministerio del Medio Ambiente y Recursos Naturales, San Salvador, El Salvador

As a contribution to the Global Assessment Report 2013 – GAR2013, coordinated by the United Nations International Strategy for Disaster Reduction - UNISDR, a drill-down exercise for landslide hazard assessment was carried out by entering the results of both heuristic and statistical techniques into a new but simple combination rule. The data available for this evaluation included landslide inventories, both historical and event-based. In addition to the application of a heuristic method used in the previous editions of GAR, the availability of inventories motivated the use of statistical methods. The heuristic technique is largely based on the Mora & Vahrson method, which estimates hazard as the product of susceptibility and triggering factors, where classes are weighted based on expert judgment and experience. Two statistical methods were also applied: the landslide index method, which estimates weights of the classes for the susceptibility and triggering factors based on the evidence provided by the density of landslides in each class of the factors; and the weights of evidence method, which extends the previous technique to include both positive and negative evidence of landslide occurrence in the estimation of weights for the classes. One key aspect during the hazard evaluation was the decision on the methodology to be chosen for the final assessment. Instead of opting for a single methodology, it was decided to combine the results of the three implemented techniques using a combination rule based on a normalization of the results of each method. The hazard evaluation was performed for both earthquake- and rainfall-induced landslides. The country chosen for the drill-down exercise was El Salvador. The results indicate that highest hazard levels are concentrated along the central volcanic chain and at the centre of the northern mountains.