



Tsunami evacuation analysis, modelling and planning: application to the coastal area of El Salvador

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Advances in the understanding and prediction of tsunami impacts allow the development of risk reduction strategies for tsunami-prone areas. Conducting adequate tsunami risk assessments is essential, as the hazard, vulnerability and risk assessment results allow the identification of adequate, site-specific and vulnerability-oriented risk management options, with the formulation of a tsunami evacuation plan being one of the main expected results.

An evacuation plan requires the analysis of the territory and an evaluation of the relevant elements (hazard, population, evacuation routes, and shelters), the modelling of the evacuation, and the proposal of alternatives for those communities located in areas with limited opportunities for evacuation. Evacuation plans, which are developed by the responsible authorities and decision makers, would benefit from a clear and straightforward connection between the scientific and technical information from tsunami risk assessments and the subsequent risk reduction options. Scientifically-based evacuation plans would translate into benefits for the society in terms of mortality reduction.

This work presents a comprehensive framework for the formulation of tsunami evacuation plans based on tsunami vulnerability assessment and evacuation modelling. This framework considers (i) the hazard aspects (tsunami flooding characteristics and arrival time), (ii) the characteristics of the exposed area (people, shelters and road network), (iii) the current tsunami warning procedures and timing, (iv) the time needed to evacuate the population, and (v) the identification of measures to improve the evacuation process, such as the potential location for vertical evacuation shelters and alternative routes. The proposed methodological framework aims to bridge the gap between risk assessment and risk management in terms of tsunami evacuation, as it allows for an estimation of the degree of evacuation success of specific management options, as well as for the classification and prioritization of the gathered information, in order to formulate an optimal evacuation plan.

The framework has been applied to the El Salvador case study through the project “Tsunami Hazard and Risk Assessment in El Salvador”, funded by AECID during the period 2009-12, demonstrating its applicability to site-specific response times and population characteristics.