

Seismic Vulnerability Zoning using the WASPAS Model and the Geographic Information System (Case Study: Urmia City)

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Abstract

Earthquake is one of the natural disasters that due to its unpredictable time and place, causes great financial and life losses. Although earthquakes cannot be prevented, solutions such as zoning and identifying vulnerable regions can greatly mitigate their damages. The purpose of this study is to evaluate the vulnerability of various areas of Urmia City to earthquakes and produce its zoning map. In this regard, the effective factors including building materials, building quality and age, access to passages, slope, population density, number of floor, and proximity to health centers were identified and their relative importance was determined using the method of Analytic Hierarchy Process (AHP). The zoning maps were produced using GIS (Geographic Information Systems), WASPAS (Weighted Aggregated Sum Product Assessment) and WS (Weighted Sum) models. The results of AHP method showed that the building quality and material were more important to regional vulnerability than the other criteria. The calculations required for running the model were carried out in MATLAB. GIS was applied to prepare input and output data and spatial analysis. After producing the final maps, the entire region was investigated in terms of sensitivity and divided into five classes, namely very high risk, high risk, moderate risk, low risk, and very low risk. The results of the WASPAS model shows that an estimated 21% of the entire region has a very high earthquake vulnerability. The comparison of the results obtained from the WASPAS method with WS method showed that in the WASPAS method, more areas have been identified as areas with very high vulnerability.

Keywords: Earthquake, Weighting, Zoning, WASPAS, GIS

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