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Landslide susceptibility mapping by combining the three methods Fuzzy Logic, Frequency Ratio and Analytical Hierarchy Process in Dozain basin

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Abstract. Landslides are among the most important natural hazards that lead to modification of the environment. Therefore, studying of this phenomenon is so important in many areas. Because of the climate conditions, geologic, and geomorphologic characteristics of the region, the purpose of this study was landslide hazard assessment using Fuzzy Logic, frequency ratio and Analytical Hierarchy Process method in Dozein basin, Iran. At first, landslides occurred in Dozein basin were identified using aerial photos and field studies. The influenced landslide parameters that were used in this study including slope, aspect, elevation, lithology, precipitation, land cover, distance from fault, distance from road and distance from river were obtained from different sources and maps. Using these factors and the identified landslide, the fuzzy membership values were calculated by frequency ratio. Then to account for the importance of each of the factors in the landslide susceptibility, weights of each factor were determined based on questionnaire and AHP method. Finally, fuzzy map of each factor was multiplied to its weight that obtained using AHP method. At the end, for computing prediction accuracy, the produced map was verified by comparing to existing landslide locations. These results indicate that the combining the three methods Fuzzy Logic, Frequency Ratio and Analytical Hierarchy Process method are relatively good estimators of landslide susceptibility in the study area. According to landslide susceptibility map about 51% of the occurred landslide fall into the high and very high susceptibility zones of the landslide susceptibility map, but approximately 26 % of them indeed located in the low and very low susceptibility zones.

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