Mapping of Earthquake Prone Areas in Special Region of Yogyakarta by Using a Combination of Fuzzy Simple Additive Weighting (FSAW) and Fuzzy C-Mean Clustering (FCM) Methods

by Fitriana Yuli Saptaningtyas, Agus Maman A, Musthofa

ABSTRACT

This study to obtain a mapping of earthquake hazard location in the Special Region of Yogyakarta (DIY) by using a combination of Fuzzy Simple Additive Weighting (FSAW) and Fuzzy C-Mean Clustering (FCM) methods. This mapping is an effort to prepare for the earthquake so that it can reduce the risk of earthquake disaster and minimize casualties or losses in earthquake prone areas.

The factors used in mapping the earthquake-prone areas of DIY are social, physical, economic and geological vulnerability. Each factor has several sub-aspects. The data of this study were taken from the Meteorology, Climatology and Geophysics Agency (BMKG), the Central Statistics Agency (BPS) and the National Disaster Management Agency of the Special Province of Yogyakarta in 2014 to 2017. The FSAW and FCM methods are used to determine earthquake prone areas for each sub-district in DIY with high hazard, medium hazard and low hazard. The steps taken in the FSAW method are (1) fuzzification with membership functions for each sub-aspect, (2) further normalization is carried out, (3) then determine the weighting of each sub-aspect, (4) determine the classification of high hazard, moderate or low. Furthermore, for the FCM method, (1) the number of clusters is determined, (2) fuzzification is done for each sub-aspect, (3) the distance of each data to the cluster center is determined, (4) the membership level of each sub-district in each cluster is obtained.

The results of this study are obtained maps of earthquake-prone areas per district in the Special Region of Yogyakarta in the category of high, medium and low hazard areas. Based on social, economic and physical vulnerability factors, it was found that the level of earthquake vulnerability in each district in the city of Yogyakarta was at a high level of vulnerability, whereas in Bantul, Gunungkidul, Kulonprogo and Sleman districts the average level was moderate. Furthermore, based on geological factors, it was found that the level of earthquake hazard in each district in Bantul Regency and Yogyakarta City was average at high hazard level, in Sleman and Kulonprogo Districts were average at moderate hazard level and in Gunungkidul on average at low hazard level

Kata Kunci: *mapping, disaster-prone, Fuzzy Simple Additive Weighting (FSAW), Fuzzy C-Mean Clustering (FCM)*