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EARTHQUAKE VULNERABILITY ASSESSMENT (EVAS): ANALYSIS OF ENVIRONMENTAL VULNERABILITY AND SOCIAL VULNERABILITY IN RANAU AREA, SABAH, MALAYSIA

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ABSTRACT

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Earthquakes are one of the most common and widely distributed natural risks to life and property. There is a need to identify the possible risk by assessing the vulnerability of the research area. The topic on Earthquake Vulnerability Assessment (EVAs) in Malaysia is very new and received little attention from geoscientists and engineers. Taking the 5.0 Ranau Earthquake 2015 as research study, the research's main objective was to identify the social vulnerability and environment vulnerability on that area. The framework was formulated semi quantitatively through the development of database for risk elements (properties) based on the information from secondary data, literature review and fieldwork. The vulnerability parameter includes social status (injury, fatalities, safety, loss of accommodation and public awareness) and interference of environment (affected period, daily operation and diversity). Each considered parameter in the vulnerability parameter is allocated with certain index value ranges from 0 (0% damage/victims/period), 0.25 (1-25% damage/victim/period), 0.50 (26-50% damage/victims/periods), 0.75 (damage/victims/period), and 1.0 (75-100% damage/victim/periods). The value obtained from field work are calculated by using formula and are classified into five classes of vulnerability namely class 1 (<0.20): Very Low Vulnerability; Class 2 (0.21-0.40): Low Vulnerability; Class 3 (0.41-0.60): Medium Vulnerability; Class 4 (0.61-0.80): High Vulnerability; and Class 5 (>0.81): Very High Vulnerability only. Results from this study indicate that a further study is needed to the area of high to very high vulnerability only. This approach is suitable as a guideline for preliminary development in the research area and potentially to be extended with different background and environments.

KEYWORDS

Earthquake Vulnerability Assessment, secondary data, parameter, geoscientists.

1. INTRODUCTION

The aim of this paper is to investigate the social vulnerability and environment vulnerability of the research area which is Ranau, Sabah. Ranau is a rural district located in North Borneo, Sabah, Malaysia. The seismic activities in this area is considered as one of the most active in this country due the movement of a few major plates around Sabah area which are Eurasian plates, Indian-Australians plates and Philippine-Caroline-Pacific plate [1]. The movement of these plates resulted a few active faults around Sabah area. The recent Ranau Earthquake 2015 is due to movement of the active fault which is the Lobou-Lobou Fault on the area. The earthquake has caused a lot of negative implications such as it triggered another natural hazard (rockfall, mudflow and landslides) to occur, as well as building destructions, loss of life, water shortage and disturbance in daily life. It took months and some needs years to recover, however there are a few aftershocks recorded even after a few years of the Ranau Earthquake 2015. This means that this area is exposed to so many dangers in the future. It is likely to be under serious threat of the implication of the seismic activities. Hence, the earthquake vulnerability assessment is needed so that the hazard can be managed properly in the future to minimize the negative impacts.

The term 'vulnerable' comes from the Latin word which means 'to wound' or 'to be susceptible'. It is also defined as 'exposed to damage and danger; not protected from danger. A researcher defined vulnerability as the degree of loss (damage) of an element or a few elements which is unprotected/exposed to natural hazard [2]. In certain magnitudes. Vulnerability can also be defined as the degree of loss to a given element at risk, or set of such elements, resulting from an earthquake of a given magnitudes or intensity, which is usually expressed on a scale from 0 (no damage) to 10 (total loss).

2. RESEARCH AREA

The research area which is the Ranau area is located in the state of Sabah, Malaysia (Figure 1). Ranau is one of the famous tourist attraction in Sabah because of the magnificent views of Mount Kinabalu and the cool weather [3-5]. This town is growing larger which is the local communities are increasing in number, more economic activities and town development are being held here every day.

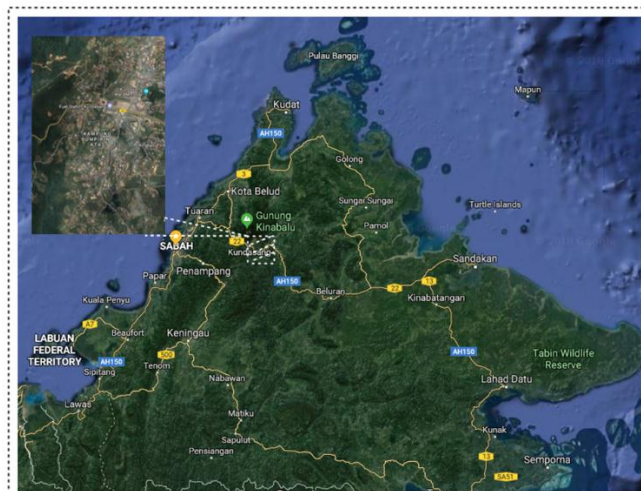


Figure 1: The location of the research area in Sabah shown in the white box. (Source: Google Map)

