RESEARCH-BASED DISASTER MITIGATION EDUCATION BASED ON THE NUSA TENGGARA CASE STUDY

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Abstrak:
Indonesia is an archipelagic country located in the Pacific ring of fire, making the Indonesian nation has many islands and is prone to earthquakes. One of the islands in Indonesia is the Nusa Tenggara archipelago. It has a Back Arch Trust due to pressure under the Australian continent, resulting in the Nusa Tenggara region being prone to earthquakes. Administratively, Nusa Tenggara comprises the Provinces of West Nusa Tenggara and East Nusa Tenggara. This research aims to analyze an area on the island of Nusa Tenggara related to its vulnerability to earthquake disasters. The method is carried out by analyzing literature studies to obtain the distribution of disasters and determine the Mitigation suggestions to be determined. Based on research results from academics who have published journals as a reference for determining policies in disaster mitigation. Based on the research and literature studies, it can be concluded that the Nusa Tenggara area is prone to earthquakes.For this reason, mitigation activities in the Nusa Tenggara Islands must be carried out continuously and sustainably so that the community understands related to Disaster Mitigation as a whole. As for the Mitigation that we suggest, it is necessary to socialize the Map of earthquake-prone areas to be used as a reference for development, Construction of earthquake-resistant houses, good cooperation between researchers and the government in the socialization of Mitigation, Using lightweight and shock-resistant building materials, mitigation education that is integrated with the curriculum in the Nusa Tenggara region.

Keywords: *Mitigation, Research, Nusa Tenggara*

INTRODUCTION

Indonesia is a country located in the Pacific ring of fire (Ismi et al., 2019) so that Indonesia has the potential to experience a high disaster(Suryaningsih & Fatmawati, 2017)(Ningtyas & Risina, 2018). Disaster is an event that threatens and disrupts life (Novarita et al., 2016) caused by both natural and/or non-natural factors such as earthquakes, tsunamis, volcanic eruptions, floods, landslides, droughts, forest fires/smoke disasters, pest outbreaks and so on., (Maknun, 2015) which resulted in casualties, environmental damage, loss of property and psychological impacts, especially earthquakes(Salsabillah & Prastowo, 2022)(Nursyabani et al., 2020). Based on seismic data, it shows that Indonesia is one of the countries that has a high level of seismicity in the world(Johan et al., 2022), more than ten times the level of seismicity in the United States(Akhmad & Maryani, 2020)

The Nusa Tenggara Islands have the Flores Arch Trust as a result of the pressure under the Australian continent which has resulted in the Nusa Tenggara region being vulnerable to earthquakes(Kusumawadi & Sulastri, 2020). The Nusa Tenggara Islands are administratively divided into 2 provinces, namely West Nusa

Tenggara (NTB) and East Nusa Tenggara (NTT). The Nusa Tenggara Islands can be divided into four tectonic units found from north to south, namely(W, 1979):

a. Rear Bow Group; located on the Flores sea
b. Inner Bow Group; composed by a group of volcanic islands including Bali, Lombok, Sumbawa, Komodo, Rinca, Flores, Adonoro, Solor, Lomblen, Pantar, Alor, Kambing and Wetar.
c. Outer Bow Group; produced by non-volcanic islands namely Dana, Raijua, Sawu, Roti, Semau and Timor.
d. Front Bow Group; which is found between the inner and outer arcs, and is part of the inner basin which consists of the Lombok and Sawu basins.
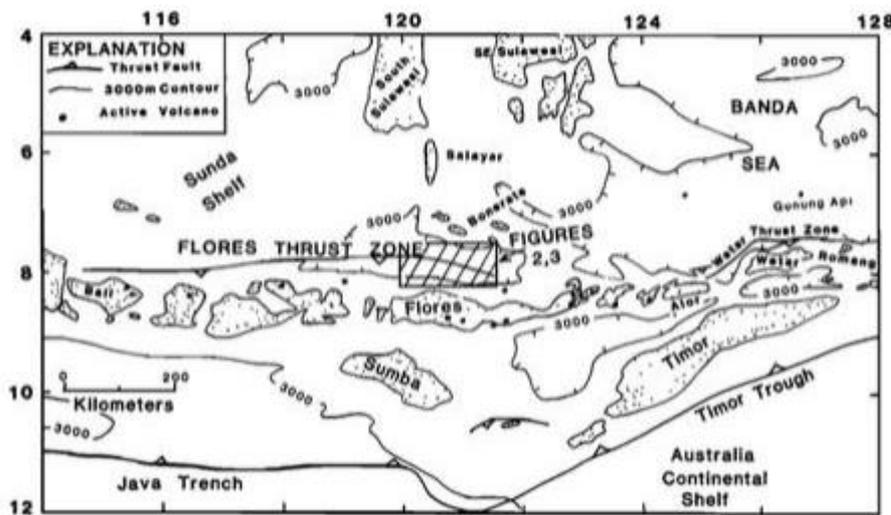

Figure 1 Two Wetar and Flores Back Arc Fault Segments(W, 1979)

In general, disaster hazards can occur anytime and anywhere with little or no warning(Rahiem & Widiastuti, 2020), so it is very important to understand disasters so that people are prepared to be prepared if a disaster occurs. One of the efforts that is considered the most strategic is through learning and training to improve the ability of disaster response communities by creating a Disaster Preparedness School (SSB) through disaster mitigation education from an early age(Angraini et al., 2019). It is time for the community to understand the importance of mitigation (understanding of disasters before a disaster occurs so as to reduce the impact of the disaster)(Maryani, 2010), namely efforts to reduce disaster risk and are trained to help themselves and others when a disaster occurs(Permana, 2022).

In this mitigation education, researchers want to increase public understanding regarding the distribution of earthquakes based on distribution maps and other threats in the Nusa Tenggara area. After this understanding is obtained, the community will later understand cities that have high earthquake intensity and the community will understand the mitigation steps that will be carried out. Earthquake mitigation socialization is very appropriate in the world of education(Setiono, 2021),

RESEARCH METHODS

The type of research that is suitable uses research and development methods (Research and Development). Development. Research conducted on increasing public understanding in understanding earthquake-prone cities in the Nusa Tenggara archipelago and its development in the form of the results of previous research into learning media and reference media for earthquake-prone areas in the Nusa Tenggara islands.

The research data this time is in the form of quantitative data based on the intensity values listed on the map that is laid out and qualitative data in the form of earthquake mapping data and analysis of other factors. Earthquake intensity analysis is the degree of damage or level of danger due to earthquakes in an area and is seen based on the effects of earthquake vibrations. The magnitude of the intensity of the earthquake depends on the size of the magnitude, the distance from the earthquake source, the geological conditions and the structure of the building. Areas close to the earthquake source generally have a high intensity compared to areas far from the earthquake source. The results of this analysis will later be used as a reference for disaster mitigation

The results of this research are the results of an analysis of the situation and threat of earthquakes in several cities in Nusa Tenggara. The results of the analysis are used to draw conclusions regarding the mitigation suggestions that need to be carried out. So that the community understands disaster mitigation for each city in Nusa Tenggara.

RESULT AND DISCUSSION

The Nusa Tenggara Islands are administratively used by 2 provinces namely West Nusa Tenggara (NTB) and East Nusa Tenggara (NTT). Based on the explanation above, it shows that the level of earthquake vulnerability in the Nusa Tenggara area is so high. At this stage the researcher will collect information on disaster vulnerability in the Nusa Tenggara islands based on the results of previous research. The graph of the results of plotting magnitude versus frequency of occurrence in the Nusa Tenggara Islands is shown in the following figure:
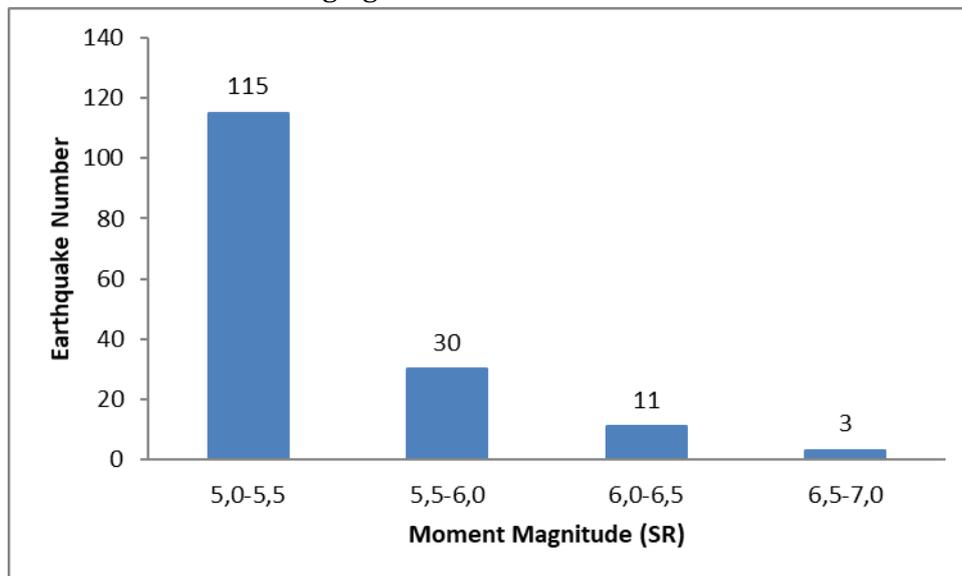

(a)
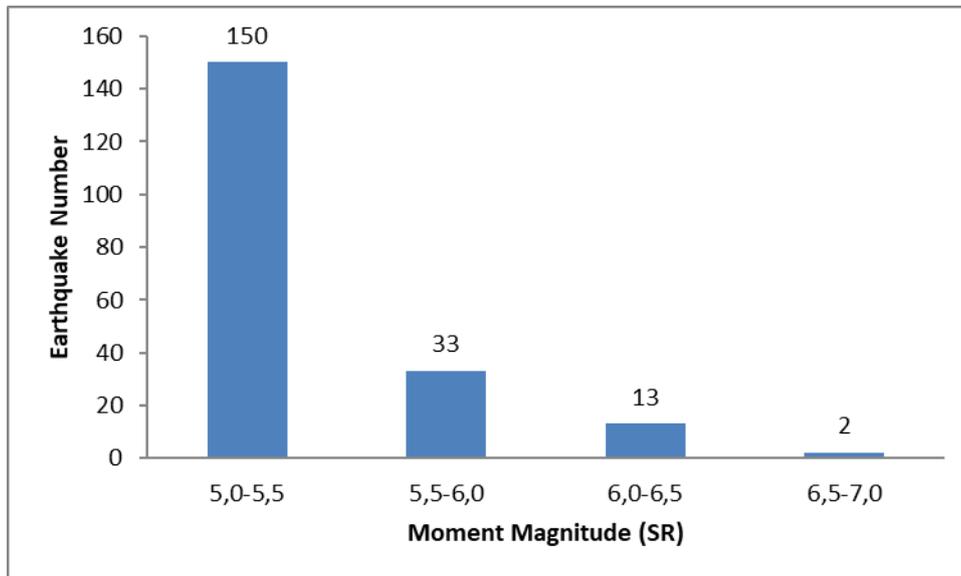
(b)

Figure 2. Graph plotting magnitude versus frequency of significant tectonic earthquakes damaging 1997-2018 (a) West Nusa Tenggara (NTB) and (b) East Nusa Tenggara (NTT) Regions

Based on previous research conducted by Dharyuuni et al., one of the indications is that an area has a large disaster risk due to the large Regional Average Seismic Hazard Index (IBSRR) value. In this case, information was obtained that West Nusa Tenggara Province (IBSRR = $0.224264066 \pm 0.028713876$). In the Province of West Nusa Tenggara, earthquakes with high intensity occurred and occurred in areas of shallow sea waters, therefore resulting in a high risk of damage, while in the Province of East Nusa Tenggara (IBSRR $0.185591848 \pm 0.028713876$). In East Nusa Tenggara Province earthquakes occurred with medium intensity and most of the earthquakes occurred in sea areas with shallow surfaces (Dewi et al., n.d.). Next, we will analyze the distribution of earthquake vulnerability in the Nusa Tenggara archipelago based on the results of previous research
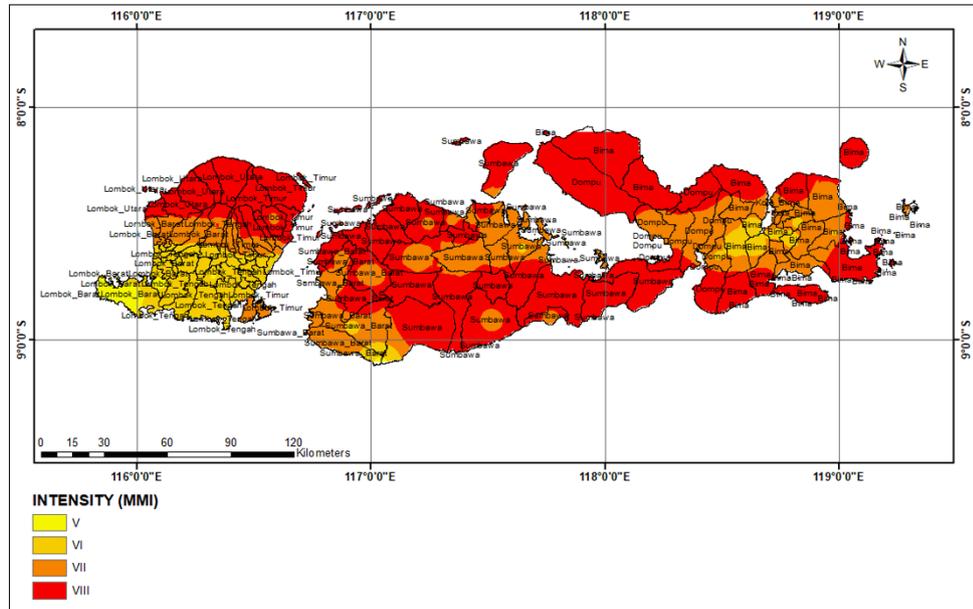
(a)
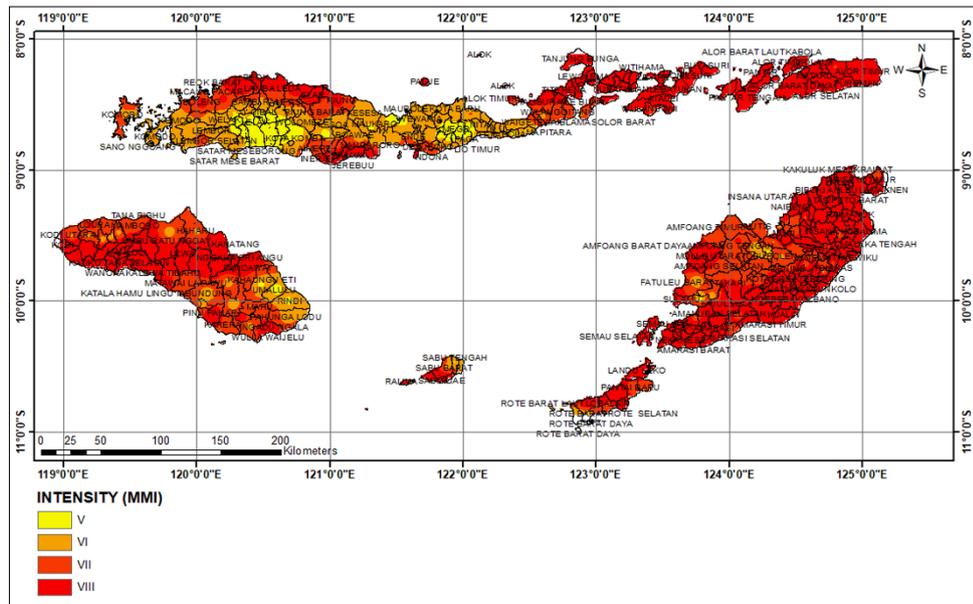
(b)

Figure 3. Earthquake intensity map for tectonic damage (a) NTB(Luthfin & Hidayati, 2022)(b) NTT (Irjan et al., 2022)

Berdasarkan gambar peta di atas dapat diperoleh informasi bahwa wilayah Nusa Tenggara Barat Based on the map image above, information can be obtained that the West Nusa Tenggara region which has the highest intensity value for areas with intensity VII-VIII is an area at high risk in the event of an earthquake. The names of cities or districts with high earthquake intensity are Sembalun,, Sambelia, Pemenang, Tanjung, Alas Barat, Pekat, Parado. Tambora, Gangga, Alas, Kayangan, Lambu, Sakra Timur, Buer, Taliwang, Poto Tano, Hu'u, Labangka, Pekat, Utan, Orong Telu, Sanggar, Masbagik, Lenangguar, Lopok, Lambu, Wera, Ambalawi, Soromandi, bayan, Montong Gading Nusa East Nusa Tenggara and so on. While the sub-districts

with high intensity values in the NTT area are the sub-districts of Wanokaka, Pantar, Laenmanen, Naibenu, Wewiku, Alor, Malaka Tengah, Raijua, Maulafa, Ende Selatan, Kupang Timur, Lebatukan, Pantar East Pantar and so on. Earthquake information obtained from this intensity distribution can be used as a reference map for disaster mitigation, so areas with high intensity that are colored red are not used as development centers. If a building is built, it must comply with the principles of earthquake-resistant buildings. Because most victims from earthquakes are caused by the collapse of heavy buildings(Rahman & Hutagalung, 2020).

Gambar 4.1 Based on seismic record data from various sources, the earthquakes that occurred on the island of Sumbawa generally belong to the classification of shallow earthquakes (focal depth < 70 km) with a magnitude > 5 on the Richter Scale so that they can cause damage to civil structures such as buildings, bridges, roads, housing up to changes ground level, even resulting in casualties.(Haryadi, 2012). For this reason, the mitigation that we suggest in the analysis of seismicity in Nusa Tenggara based on research is:

1. It is necessary to socialize the map of earthquake-prone areas/earthquake-prone areas based on the results of previous studies, so that it can be used as a reference for development.
2. Outreach to the community about the importance of earthquake resistant buildings in the Nusa Tenggara area
3. Good cooperation is needed between academics and bureaucrats like other Asian nations. So that the findings or research by academics can be used as an up-to-date mitigation reference
4. Using lightweight and supple materials, so it doesn't overload the existing structure. The building is made with a more solid structure against shocks(Haryadi, 2012)
5. Education and outreach to the public about the dangers of earthquakes and how to save themselves if an earthquake occurs are continuously provided and integrated with the curriculum
6. The government pays attention to the socio-economic life of its people because economic factors are one of the reasons why people are unable to build earthquake-resistant physical buildings.

CONCLUSION

Based on the analysis of several previous studies, it shows that the Nusa Tenggara area is an area prone to earthquakes. For this reason, mitigation activities in the Nusa Tenggara Islands must be carried out continuously and sustainably. So that the community understands as a whole related to Disaster Mitigation. As for the Mitigation that we suggest, it is necessary to socialize the Map of earthquake-prone areas to be used as a reference for development, Construction of earthquake-resistant houses, good cooperation between researchers and the government in the socialization of Mitigation, Using lightweight and shock-resistant building materials, mitigation education that is integrated with the curriculum in the Nusa Tenggara region.

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