

Disaster Management for Tourism Destination in Labuan Bajo (Case Study on Super Priority Destinations)

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Abstract

Labuan Bajo in the National Tourism Development is designated as a National Tourism Strategic Area. Has potential resources and widely recognized image. Apart from being a tourist area, Labuan Bajo is an area prone to disasters, including tsunamis, earthquakes and landslides. Therefore, a disaster hazard management approach is needed to support the government's campaign to implement tourism that is sustainable and safe from disasters. This study aims to 1) map the distribution of tourist sites in Labuan Bajo; 2) Analyze the threat of disasters in tourist sites and disaster mitigation in the tourism area of Labuan Bajo. The method used is through a Focus Group Discussion (FGD) with Tourism Stakeholders, the National Disaster Management Agency for the Labuan Bajo area, the data used are primary and secondary data and GIS analysis to produce the distribution of tourist objects in disaster-prone areas. The results of this study indicate that the supporting attractiveness of Labuan Bajo is distributed in 16 locations with the southern region having a tsunami threat covering 6 tourist sites, while the northern to southern regions have earthquake susceptibility in 7 tourist sites. The development of Labuan Bajo's super priority tourism destination is directed at disaster mitigation or based on disaster mitigation because most tourist attractions, public facilities, tourism facilities, and communities are located in disaster-prone areas.

Keywords: Tourism Management, Disaster Hazard, Labuan Bajo

INTRODUCTION

Tourism destinations in all corners of the world face problems in disaster management. Technological sophistication is not a guarantee to overcome every disaster that occurs (Amiruddin, 2020). In fact, only a few destinations have well-developed disaster management plans to deal with possible natural disasters (Faulkner, 2001), one of the reasons is the limited number of systematic studies that have been carried out in the field. The study of crises and disasters is not only about identifying the center of a disaster, the most fundamental is to identify the total range of impacts of a disaster (Lawsetal., 2007). In tourism activities, disaster studies are related to the safety and comfort of tourists. These two factors are key in managing tourist destinations. The impact of disaster events also influences tourists' decisions to make tourist trips.

(Ma, H. et al., 2020) found that natural disasters have a negative impact on the number of tourists and the tourist experience, natural disasters such as earthquakes have a greater influence on the number of tourists than man-made disasters such as terrorist attacks. Extreme natural phenomena cause a general decrease in tourist interest in traveling to disaster-affected tourist destinations (Syahrial&Badollahi, 2020; Rucińska&Lechowicz,2014).

Geographically, Indonesia as an archipelagic country has abundant tourism potential but is vulnerable to disasters. First, Indonesia's position is known as an archipelagic country which has a coastline of approximately 81,000 km, the biodiversity contained both on land and at sea. Indonesia's land area is 1,919,317 km² and the other 93,000 km² consists of inland seas (straits, bays, and other bodies of water) (William et al., 1993). Santos (2010), Indonesia which now consists of approximately 17,480 islands and 250 ethnic nations, by the philosopher Plato describes Atlantis as rich as a tropical paradise with all its beauty. These landforms and geographical characteristics make Indonesia an invaluable tourism resource to be optimized for recreational purposes, such as nature-recreational tourism and anthropogenic tourism (Gjorgievski, et al., 2013). Second, Indonesia is located at the meeting point of three major tectonic plates, namely the Eurasian Plate, the Plate.

The Indo-Australian and Pacific Plates are called the Pacific Ring of Fire, a region of high seismic and volcanic activity surrounding the Pacific Ocean. The volcanoes located along this circle of fire gave birth to the islands that formed the state of Indonesia as it is today (Priester, 2016). Indonesia's position which is between oceans and continents causes almost all of the region to have a tropical climate, with coastal plains averaging 28°C, inland and mountainous areas averaging 26°C, altitude areas up to 23°C, relative humidity ranging from 70 - 90%. Monsoons blowing from the south and east from June to September and from the northwest from December to March cause large-scale winds, typhoons and storms. These natural phenomena make Indonesia the host of natural disasters, ranging from tsunamis, volcanic eruptions, floods, earthquakes, landslides, abrasion, floods and so on (Kurniasari, 2017; Rizkiyah, et al. 2019; Nuraini, 2020).

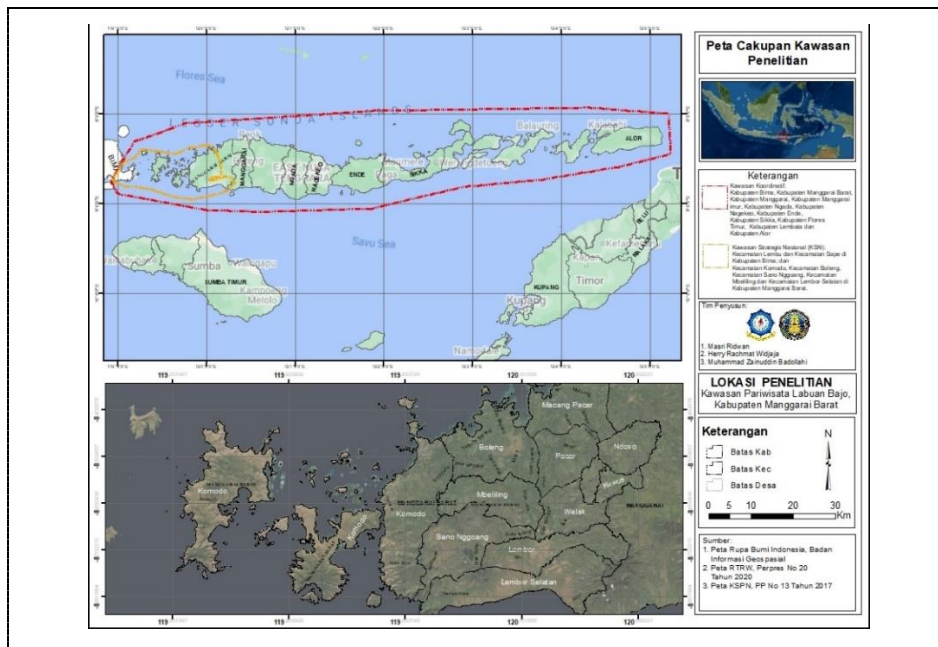
Natural disasters in the form of earthquakes, tsunamis and floods are the most dominant in Indonesia. The National Disaster Management Agency of the Republic of Indonesia reported that more than 95% were hydrometeorological disasters such as floods, landslides, and hurricanes, with many casualties caused by floods and landslides (Widjonarkoa&Wijayab, 2014). Thus, in optimizing tourism potential in Indonesia, it is worth considering natural phenomena that are thought to interfere with tourist activities.

Natural disaster events in addition to causing damage to tourism supporting facilities and infrastructure, can also cause a bad destination image, which ultimately harms destinations in an area (World Tourism and Travel Council WTTC, 2019). However, recovery time from natural disasters varies widely, from one month to 93 months (WTTC, 2019). The reactions of tourism business actors at the post-disaster stage are very diverse. Some destinations find it difficult to bounce back and attract visitors despite reconstruction and restoration (Bingjie et al., 2020). In connection with these problems, it is necessary to have preparedness and mitigation in minimizing disaster risk. So information is needed about areas or locations that are prone to disaster hazards, both earthquakes and tsunamis, which in turn can contribute to the readiness of human resources who are tourism business actors and tourists who travel in disaster-prone areas. In line with the findings (Rucińska&Lechowicz,2014) that information about disasters introduces destination locations with educated and educative images (especially information and warnings) simultaneously stimulates visitor interest.

Labuan Bajo, a tourism destination located on the western tip of the island of Flores, precisely in the West Manggarai district, East Nusa Tenggara province, was designated by the government as a priority tourism destination and then re-defined as a super priority tourism destination through Presidential Regulation Number 32 of 2018 concerning the Regional Management Authority Agency. Labuan Bajo Flores Tourism. Kompas.com media (2019) reported that 8 (eight) of the 10 (ten) tourism destinations that were declared as Priority Tourism Destinations were earthquake and tsunami prone areas, one of which was the tourism destination of Labuan Bajo. Based on data from BNPB (National Disaster Management Agency) that over the last 10 years Labuan Bajo experienced disasters dominated by extreme weather or tornadoes while earthquakes had the most impact on the population of Labuan Bajo with a potential of 256 thousand local residents. The series of disaster events in Labuan Bajo is the balance of nature. Humans do not have the ability to stop when a disaster, landslide or flood occurs. So that the most realistic effort is to minimize the impact of disasters to implement safe and comfortable tourism activities, besides the existence of educational disaster hazard information greatly affects the image of a destination.

As an effort to mitigate and prepare for tsunami and earthquake disasters in Labuan Bajo, it will be more focused if it is equipped with spatial data in the form of tsunami and earthquake risk maps in the Labuan Bajo area that can be utilized in disaster management. Bearing in mind that the indicators to assess the impact of the tourism crisis are not only through a decrease in tourist visits, visitor spending, length of stay/stay, but the main thing is how many fatalities, infrastructure damage, loss of houses, economic losses and damage to cultural sites (Laws et al., 2017). It is important to analyze the types of disasters that occurred, how to manage the crisis aspects of tourism crisis, how and when to start the recovery of tourism activities, as well as the rehabilitation of areas experiencing major crises. This study aims 1) to conduct a study on mapping the distribution of tourist attractions in Labuan Bajo 2) Labuan Bajo disaster mitigation which is oriented towards sustainability.

Study Area






Figure 1. Research Area Coverage Map, 2021

This research was conducted in Labuan Bajo. Focused on the Labuan Bajo Tourism Area, namely West Manggarai Regency because Komodo National Park is the main attraction or key attraction and the majority of supporting tourist destinations are in this Regency. Based on the coverage map in Figure 1, the Labuan Bajo Tourism Area is divided into several areas. The wider Coordinative Area covers 11 regencies, namely Bima Regency, West Manggarai Regency, Manggarai Regency, East Manggarai Regency, Ngada Regency, Nagekeo Regency, Ende Regency, Sikka Regency, East Flores Regency, Lembata Regency and Alor Regency. However, what is included in the National Strategic Area (KSN) includes 6 sub-districts in two regencies, namely: Lembu sub-district and Sape sub-district in Bima district; and Komodo District, Boleng District, Sano Nggoang District, Mbeliling District and South Lembor District in West Manggarai Regency (Ministry of PUPR, 2020).

Material

Tsunami and earthquake hazard maps and the distribution of tourist attractions are used in this study. Disaster hazard data was obtained from the BNPB portal (www.inarisk.com, 2020). Meanwhile, the location of the tourist attraction was obtained from the Department of Tourism and Culture of West Manggarai Regency, the Tourism Authority of Labuan Bajo, Flores and the results of observations in the field with the help of the Global Positioning System (GPS). First of all, the obtained disaster hazard data and tourist location points were scanned and entered into a Geographic Information System (GIS) to reconstruct the tourist sites identified as disaster hazard. All physical and social attributes are included in the form of polygons and lines, for example village boundaries, sub-district boundaries, roads and tourist location points. With overlay processing, it provides output about disaster hazards at tourist sites. The final step is to determine the form of disaster mitigation in accordance with standard operating procedures from the government, the National Disaster Management Agency, Government Regulation No. 21 on Disaster Management: Tourism Crisis Management, Ministry of Tourism. 2018).

METHODS

Research on tourism and natural disasters is an interesting issue to study. There is a growing number of studies in tourism on tourism disaster management, most of which have questioned, and recovery strategies and minimization of impacts. Research itchie(2008) A multidisciplinary approach is the most suitable alternative to find the right model in disaster management at tourist sites. This approach involves multiple disciplines such as education, communications, sociology, emergency planning, hazards and tourism. The collaboration is applied to the stages of disaster management, emergency response and recovery to normal. Thus producing an effective tourism planning. Widodo&Hastuti (2009) used a qualitative approach in identifying potential disasters obtained from historical data and documents as well as direct observation of the traces of disaster events. Meanwhile, records of tourism response to disasters were obtained from in-depth interviews with tourism managers, trading communities in tourism areas and tourists.

This research assists the Geographic Information System in analyzing slope conditions, elevation, accessibility (road conditions), distance from health service centers from tourism areas, distribution patterns of regional tourism and health care centers. Examples of slope conditions, elevations, and accessibility (road conditions) are obtained by direct observation in the field. An example of the distance of a health service center from regional tourism and the distribution pattern of tourist areas and service centers. Research on the

design of disaster information systems in tourist destinations was carried out by (Marizka&Afnarius, 2019) the disaster preparedness method by equipping tourists who come to Padang with information about which areas have been or were affected by disasters. That information must be available at all times and can be accessed from anywhere. With that information, tourists will feel safe and have carried out disaster preparedness. So that tourists are no longer afraid, the research was conducted in the city of Padang. This GIS application is implemented using programming languages such as PHP, Javascript, and B4A. The database used to store disaster data is PostgreSQL/PostGIS. Google Maps is used to visualize the data.

This study conducts a study by mapping the distribution of attractions in locations prone to natural disasters such as Tsunami and Earthquakes, so that it has directions for destination governance. Analysis of the tsunami disaster with parameters including (Okal&Synolakis, 2008): Earthquake location (X_o & Y_o in degrees); Earthquake magnitude (M in M_w); Earthquake depth (H in km); Earthquake length (L in km); Earthquake width (W in km); Strike angle (θ in degrees); Dip angle (δ in degrees); Slip/rake angle (α in degrees); Dislocation (D in meters). At the data analysis stage, Data Analysis, the simulation results will be converted into zoning data based on depth with the following zoning:

Table 1. Tsunami Warning Level Zoning

No.	Alert Level	Zoning
1.	Zone 1	inundation with elevation of 0 - 0.5 meters
2.	Zone 2	inundation with elevation of 0.5 – 3 meters
3.	Zone 3	inundation with an elevation of > 3 meters

Source: Data Processing, 2021 (Arcgis 10.5)

In making the Labuan Bajo earthquake-prone map the method used is the AHP (Analytical Hierarchy Process) method, (saaty, 1983). Data collection consists of two data sources, namely primary sources in the form of incident point data taken directly in the field based on BNPB Kab. West Manggarai. The second source is secondary data in the form of secondary data used in the research, including digital Indonesian Earth Map data (2004) from Bakosurtanal, soil type maps (2009), RTRW map data, geological map data, and Geomorphological Map of West Manggarai Regency. After all the parameters are combined, the earthquake zoning is generated, as follows:

Table 2. Building Vulnerability Class Range Analysis

No.	Vulnerability class	Score Range
1.	Low	25 – 33,3
2.	Keep	33,4 – 41,6
3.	Tall	41,7 - 50

Source: Data Processing, 2021 (Arcgis 10.5)

RESULTS**1. Mapping the Distribution of Tourist Attractions of Bajo Region**

Based on the findings in the field and data analysis, the distribution of tourist attractions in the research location was obtained. The following is the location data and the resulting map:

Table 3. Location distribution of Labuan Bajo Tourist Attractions

No	Object Name	Location		Coordinate Point	
		Location/Sub-District	District	LS	BT
1	Gili Lawa	Komodo	Komodo	8°28'11.66"S	119°33'29.61"E
2	Pulau Rinca	Pasir Panjang	Komodo	8°44'20.61"S	119°39'49.90"E
3	Pulau Komodo	Komodo	Komodo	8°35'21.75"S	119°26'23.45"E
4	Pulau Kanawa	Pasir Putih	Komodo	8°29'44.61"S	119°45'29.45"E
5	Pulau Padar	Komodo	Komodo	8°39'4.37"S	119°34'58.42"E
6	Desa Adat Wae Rebo	Desa Wae Rebo	Kab Manggarai	8°46'9.19"S	120°17'1.14"E
7	Sawah Lingko	Nantal	Kuwus	8°34'16.37"S	120°17'55.32"E
8	Pulau Kelor	Pasir Putih	Komodo	8°32'52.08"S	119°48'53.49"E
9	Goa Rangko	Tanjung Boleng	Boleng	8°25'57.59"S	119°57'50.28"E
10	Air Terjun Cunca Wulang	Cunca Wulang	Mbeliling	8°34'13.52"S	119°57'44.82"E
11	Goa Batu Cermin	Batu Cermin	Komodo	8°28'45.82"S	119°53'57.13"E
12	Pink Beach	Komodo	Komodo	8°36'4.18"S	119°31'11.16"E
13	Pulau Bidadari	Labuan Bajo	Komodo	8°28'59.69"S	119°50'20.51"E
14	Pulau Seraya	Seraya Marannu	Komodo	8°23'21.43"S	119°51'18.18"E
15	Pulau Kalong	Komodo	Komodo	8°36'47.92"S	119°29'10.61"E

16	Dano Sano Nggoang	Sano Nggoang/ waeSano	Sano Nggoang	8°42'42.71"S	119°59'24.49"E
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Source: Data processing, 2021 (Survey using GPS)



Figure 2. Warning Receiver System Equipment

Source: research documentation, 2021



Figure 3. Stairs to the Top of Padar

Source: research documentation, 2021



Figure 4. Spread of Labuan Bajo Tourist Attraction,

Source: Processed data researchers, 2021

2. Disaster Mitigation

Based on the findings in the field regarding the characteristics of the disaster that occurred and the analysis of disaster vulnerability data at tourist sites, a visualization of the tsunami and earthquake vulnerability map was obtained in Labuan Bajo and its surroundings. The study area covers West Manggarai Regency, with a focus on observing the Labuan Bajo area and its surroundings, this is because in Labuan Bajo there is Komodo Island as the main attraction for tourism activities. This research uses the area on the mainland of the island of NTT as supporting data for determining the mitigation model that is carried out. The following is the resulting map:



Figure 5. Labuan Bajo Tsunami Zoning Map and surrounding areas

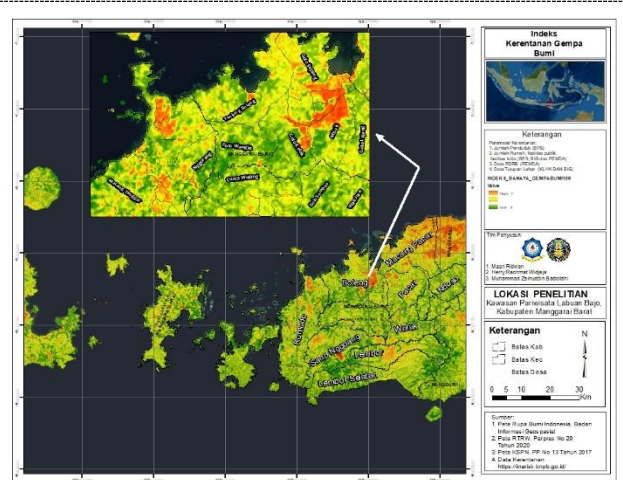
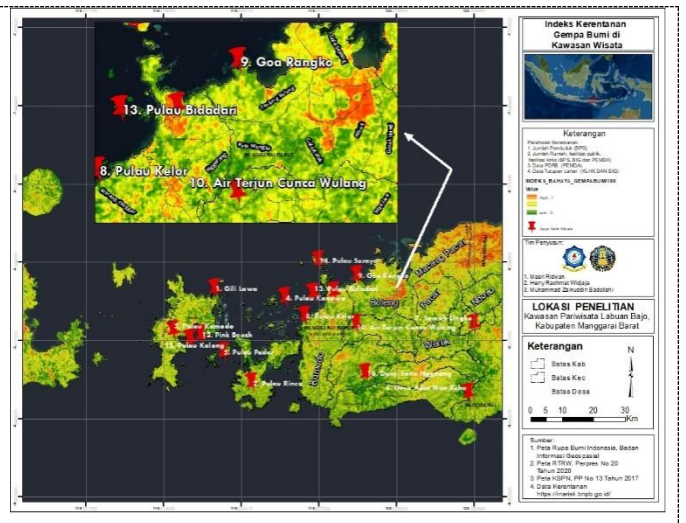
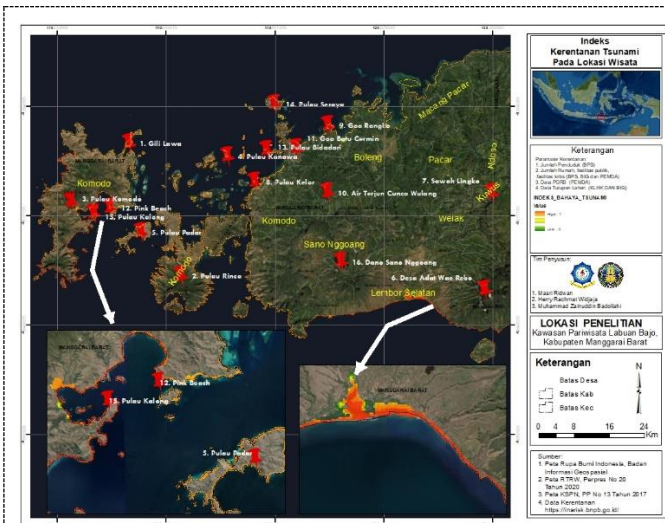


Figure 6. Map of Zoning of Labuan Bajo Earthquake and surrounding areas

Based on Figure 5, it can be seen that the vulnerability of the tsunami disaster in Labuan Bajo is centered in areas directly adjacent to the Savu Sea in the south of NTT spread over South Lembor District, Komodo District including Komodo Island, Padar Island, Rinca Island, Golo Mori Village. While Figure 6 shows high earthquake susceptibility to occur in the northern region of the mainland of the island of NTT, namely in the Mboera, Nggorang, Batu Cermin and Labuan Bajo areas and in the southern regions namely Lembor, South Lembor, Mbeling, while the islands in Labuan Bajo have moderate vulnerability.



<p>Figure 7. Tsunami Hazard Map on Labuan Bajo Tourist Attraction and surrounding areas</p>	<p>Figure 8. Earthquake Hazard Map on Labuan Bajo Tourist Attraction and surrounding areas</p>

The results of data analysis indicate that the location and characteristics of natural disaster hazards are identified as tourist attractions. Figure 7 Map of tsunami hazard vulnerability in tourist areas in Labuan bajo provides information that the “medium” to “high” classes are along the coast of Labuan Bajo including Komodo Island, Padar Island, Rinca Island Kanawa Island, Seraya Island, Gili Lawa; while tourist areas located on the mainland in West Manggarai Regency are not vulnerable to tsunami disasters such as lingko rice fields, sano lakes and so on. Figure 8. Map of high vulnerability Earthquakes in the tourist area of Labuan Bajo include the impact on the areas of Goa Rangko, Goa BatuCermin, dano Sango Nggoang, while other tourist areas do not have a high level of vulnerability, meaning that the earthquake disaster has no significant impact.

DISCUSSION

Tourism disaster management is a disaster management action to maintain and anticipate a conducive tourism ecosystem by having the capacity and resilience to threats and crises. The occurrence of a tourism disaster requires action on the preparedness system before a disaster occurs. Preparedness in this context is the understanding of all parties involved in tourism, including the community as tourism actors and the community around tourism locations. Preparedness can be carried out if the parties involved in the tourism sector understand how to take preparedness actions in the early stages of tackling tourism disasters. Based on the results of research and references to the Ministry of Tourism's Operational Standards for Crisis Management Crisis Management, a disaster management strategy is formulated in the tourist destination of Labuan Bajo which is divided into:

Structural Mitigation

Structural mitigation is an effort to minimize disasters carried out through the construction of various physical facilities and infrastructure and using technological approaches.

Non-Structural Mitigation

Non-Structural Mitigation is an effort to reduce the impact of disasters in addition to structural mitigation.

Table 4. Mitigation Model at DSP Labuan Bajo

No.	Type of disaster	Tourist Attractions	Structural Mitigation	Non-Structural Mitigation
1.	Tsunami	Komodo Island, Padar Island, Rinca Island Kanawa Island, Seraya Island,	Provision of early warning systems, provision of infrastructure and disaster mitigation facilities in Labuan Bajo Islands	<ul style="list-style-type: none"> • Preparation of Disaster Risk Assessment of West Manggarai Regency in 2018, which is contained; Disaster Conditions,

		Gili lawa	Drafting a sign system on a coastal settlement in Labuan Bajo.	Disaster Risk Assessment, Disaster Risk Assessment, Disaster Risk Policy Policy <ul style="list-style-type: none"> • Capacity building of tourism players: Association of Travel Agents, Association of Hotels and Restaurants and tourism business managers. • Conservation-based tourism activities (ecotourism). • Doing education, counseling, and community awareness
			Install evacuation lane signposts on each tourist attraction	
			Providing public relations post & Crisis center information service	
			Providing a medical treatment center	
			Provision of trash cans, use of tsunami-friendly building construction, coastal vegetation, and coastal ecosystem management	
2.	Earthquake	Wilayah Mboera, Nggorang, mirror stone and Labuan Bajo and in the southern region namely lembor, southern lembor, mbelling,	Revitization of tourism infrastructure in accordance with the characteristics of slopes and soil, such as hotels, resorts, toilets and so on "the principle of non-engineered construction (Indarto, H., Cahyo A.2015)"	
			Greening of earthquake-prone areas, along tourism routes in Labuan Bajo	

Source: data processing, 2020 (Law No. 24 of 2007; MKK Kemenpar 2018)

CONCLUSIONS

This study aims to determine the distribution of tourist attractions in Labuan Bajo. Also investigated are the characteristics of disasters at the location of tourist attractions and the efforts to overcome them. This study shows that there are 16 tourist sites with the classification of culture, nature, maritime, history and artificial. There are 6 location points in the tsunami-prone hazard zone and 7 location points in the earthquake vulnerability zone. Disaster management efforts are carried out through structural and non-structural mitigation.

Structural mitigation is directed at improving safe tourism supporting facilities and infrastructure, especially on the Komodo islands, while non-structural mitigation is directed at tourism development policies in the form of policies and improving the quality of human resources oriented towards implementing

sustainable tourism and having disaster preparedness. This study recommends that the development of the super priority tourism destination of Labuan Bajo is oriented to disaster mitigation or based on disaster mitigation because most tourist attractions, public facilities, tourism facilities, and communities are located in disaster-prone areas: the structure/physical development of tourism must also pay attention to carrying capacity. Supporting capacity-based development is related to environmental sustainability so that tourism development that is carried out does not damage owned resources such as environmental damage and the extinction of endemic animal habitats that live and grow in Labuan Bajo as well as community involvement as a non-physical factor that is in line with the basic concept of tourism development, namely the existence of community involvement (Community Based Development).

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