Management of Tourism Areas Based on Disaster Mitigation
(Case Study of Senggigi Beach)

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Abstract. Tourism is often associated with magnificence and pleasure. But behind that, tourism is a very vulnerable and fragile economic activity. One of the vulnerabilities that overshadow tourism is the occurrence of natural disasters. In Indonesia, several disasters have caused an impact on the tourism industry, such as the Lombok earthquake that took place in 2018 causing 4,636 tourists to be victims, 100,000 tourists reduced, and losses of 1.4 trillion in the tourism sector. The purpose of this study is to identify tourism area management based on disaster mitigation. This research was designed using qualitative methods. The data collection uses field observation techniques, documentation, and in-depth interviews. The determination of the island of Lombok as a research location is because this region has a variety of interesting natural tourism potentials, such as the Senggigi beach which is located on the west coast of Lombok Island. Senggigi areas have a high earthquake and tsunami vulnerability. Based on research, it is known that Senggigi Beach needs to get more attention in terms of disaster mitigation, such as the making and installation of disaster-prone maps, the addition of evacuation signs, evacuation route maps, shelters, beach belts or buildings as breakwaters, and also monitoring towers. This is useful to provide a sense of security and comfort for tourists visiting the tourist sites.

1. Introduction
Indonesia is one of the largest archipelagic countries in the world. No less than 17,508 islands with 81,000 km of coastline, so that most of Indonesia are a coastal area. Therefore, Indonesia is rich in biodiversity and marine resources. This has become the basic capital for the Indonesian nation to become a tourist destination with all its richness and biodiversity in it.

It is undeniable that tourism is one of the promising sectors. The tourism sector according to [7], is one of the major industries that will develop in the 3rd millennium, after telecommunications and transportation. The tourism sector has become a major cog for global social and economic growth.

West Nusa Tenggara Province (NTB) is one of the provinces which is famous for its underwater tourism which is still natural and charming. So, it is not surprising that this place is one of the ecotourism destination areas [20]. Many tourists are fascinated by the beauty of the beaches and gili that exist in NTB, especially on the island of Lombok.

Lombok is a small island included in the province of NTB. Lombok Island is part of the Lesser Sunda Islands or better known as Nusa Tenggara. The island is separated by the Lombok Strait from Bali to the west and the Alas Strait to the east from Sumbawa. This island has an area of 4,725 km2 with a variety of potential natural beauty, the hospitality of the population, arts, and culture. Lombok is one of the mainstay sources of increased income from the tourism sector which is mostly in the form of marine tourism [20].

For tourists, the island of Lombok is the second favorite tourist destination after the island of Bali. This is evidenced by the many tourists who continue their tour to Lombok after the tour in Bali. This can be seen from the Denpasar-Lombok flight quantity data which are always full. Not surprisingly, the number of tourists to the island of Lombok is always increasing every day [4]. Based on data of the number of tourists from the Department of Culture and Tourism of the NTB province in 2016, counting from April to June 2016 tourists who come to the island of Lombok, there are 655,100 tourists, with details of 339,343 foreign tourists and 315,757 domestic tourists. This happens because in addition to its unspoiled natural attractions, such as mountain climbing trails, the beauty of the
beach and its amazing underwater natural charm, also because of the geographical location of the island of Lombok which lies between the golden triangle trails of Indonesia's tourism consisting of Bali, Komodo and Bunaken Marine Park in North Sulawesi [15].

One of the popular beaches in Lombok is Senggigi beach, located on the west coast of the island of Lombok. The beautiful landscape of Senggigi makes tourists feel at home for long. Not surprisingly, many tourists who make this beach as an alternative tour on the island of Lombok in addition to the beautiful gili (gili tramena).

In addition to its natural beauty, there is one thing to note and especially watch out for Senggigi beach tourism. Senggigi Beach is known as one of the areas prone to natural disasters such as earthquakes, tsunamis, and tidal floods. According to [1], this happened because Indonesian territory was no exception West Nusa Tenggara included in the Ring of Fire cluster, which is a meeting of three large tectonic plates namely Indo-Australia in the south, Eurasia in the north and the Pacific in the east, which produces more than 70 active faults and dozens of subduction zones prone to earthquakes and volcanoes. Therefore, if there is a movement of one of these plates, it will cause disasters such as earthquakes.

Based on the above, it is not surprising that the Senggigi region is an area where is very vulnerable to earthquakes. One example is the large earthquake that shook this area in August 2018. Based on BNPB data 729 aftershocks have been identified with five large earthquakes in July to August with the epicenter located in North Lombok Regency, East Lombok Regency, and the region waters around Lombok Island.

Based on the results of the assessment of post-disaster damage and loss data by BNPB, a total loss of Rp. 8.2 Trillion for five districts on Lombok Island with North Lombok Regency and West Lombok Regency as areas with the worst losses [2]. Not only that, more than 555 victims died and 390,529 people were displaced, including foreign and domestic tourists [21].

The high level of development of the Senggigi coastal area which is the main object of tourism requires the public to mitigate potential disasters in the coastal area, especially in the Senggigi coastal area. Previous research on Disaster Risk Mapping in the Tourism Region of West Lombok Regency, West Nusa Tenggara shows the ineffectiveness of mitigation efforts in the coastal tourism area of West Lombok Regency. This is evidenced by the number of protective buildings that cannot survive because some buildings are destroyed. Mitigation efforts by hotels in the Senggigi Coastal Area are not well integrated. So far what has been done by the government both at BPBD and at the district government level is still limited in terms of infrastructure development to deal with disasters, especially floods.

From this explanation, it is known that the tourism sector, besides having a variety of potentials, is also very vulnerable to its main comfort and safety issues against natural disasters. If this does not receive serious attention and treatment, then tourists visiting the area will decrease due to tourists' fear of a disaster. This is not surprising because according to the World Tourism Organization [18], safety is a major factor in the consideration of tourists to choose tourist destinations. For this reason, as a geographically prone area, planning and management of tourism areas are needed that take disaster aspects into consideration. Wilasari and I Made [17] explained the need for efforts to develop safety guarantees through disaster preparedness for tourism service providers in NTB province. This needs serious attention in order to create a comfortable, safe tourist area based on disaster mitigation so that the existing tourism potential can be managed optimally with a disaster risk which can be minimized.

2. Methods

This research was conducted on the island of Lombok, precisely in Senggigi Village, Batulayar District, West Lombok Regency, West Nusa Tenggara Province. The reason for determining the island of Lombok as a research location is because the island of Lombok is famous for its beach tourism destinations, one of which is the Senggigi beach which is visited by many domestic and foreign tourists. But on the other hand, Senggigi has a high disaster vulnerability.

The research approach used in this study is qualitative with narrative design as a model. The procedure in this study focuses on analyzing public knowledge of the management of tourist areas and the results will be reported systematically. Data collection is done by field observation techniques, documentation, and in-depth interviews. Primary data collection is done by observation in the field visually (directly) as well as thorough documentation. The secondary survey was carried out by
visiting and conducting interviews with officials of related institutions such as the Department of Tourism, West Nusa Tenggara Province BPBD, and the manager of the Senggigi beach tourist cooperative in order to obtain data related to the substance/research material.

The analytical method for processing data is descriptive qualitative, namely by analyzing the physical condition of the area, the social aspects that study human resources and community knowledge about disaster mitigation, and by looking at the regulations or policies of the government or related institutions in this case the spatial planning of coastal areas as well as facilities and infrastructure which supports disaster mitigation in the Senggigi coastal area. In data analysis, researchers make comparisons between standard operational for tourism management, disaster theory, disaster management and spatial planning in coastal areas which are oriented towards disaster mitigation with field observations to be able to draw qualitative conclusions.

3. Results and Discussion

3.1 Physiography of Senggigi Beach
Senggigi Beach is physically classified as an old volcanic mountain unit, which is no longer active. The mountains are composed of layers of breksia (mainly breksia lava) which are hard and older than the layers of young volcanic mountains. Breksia is a layer of sedimentary rock which is part of the material consisting of rocks with sharp angles such as rocks that are split for road construction. If the young volcanic layer is said to originate in the Quaternary era, then this breksia layer originates from the tertiary era.

According to Van Heek in Suardana [15], these tertiary layers are some of the oldest rock layers and are found on the island of Lombok. The layer of breksia, which is on the northwest coast appears on the surface, increasingly east dips (dipping), then infiltrate under a young volcano. This breksia layer can be said to be a hard rock layer, difficult to pass on water (not permeable). Among the hard rock layers, there are also layers of clay, partly derived from weathered rocks that are nearby, and some may be the result of precipitations in previous water. In this land area, residents use it as dry gardens. In the driest month, the groundwater level in this layer is about six meters.

3.2 Disasters and Mitigation of Senggigi Beach Disasters
Senggigi is the main attraction in the district of West Lombok. This beach has a fine sandy rock texture, a wide, steep beach, and black sand grains. Besides, the small waves are the main attraction for tourists both domestic and foreign. Location of the Senggigi beach area that is not directly adjacent to the ocean but with the Lombok strait makes the waves relatively calm compared to other beaches, but even so, it does not mean the Senggigi region is free from the threat of disaster. This area of Senggigi is geologically very potentially having a back-arc fault and plate subduction earthquake [6]. According to plate tectonic theory in the subduction zone, there is a pile of potential energy that when the pressure is so large it will be able to break away resulting in seismic or better known as an earthquake [5]. More specifically the National Earthquake Study Center states that this region is very prone to earthquakes due to the presence of several earthquake sources around the island of Lombok including the Back Arc Thrust in the north, mega thrust in the south and there is a sliding fault in the section west and east.

Based on the above, coastal areas are very vulnerable to earthquakes and tsunamis. Therefore, mitigation is needed to educate the public and tourists so that they can be on guard in the event of a disaster. This is supported by [3] which states that people and tourists need to know the plan for a disaster emergency, know the existence of a disaster warning system, know of the mobilization of resources by establishing cooperation with organizations that handle earthquakes. According to Ahyana and [16], this is important because the percentage of survivors is due to Self-awareness of 35%, Family Members 31.9%, Friends / Neighbors 28.1%, People Passing 2.60%, SAR Team 1.70%, and others 0.90%. Based on this it can be seen that the most determining factor for safety when a disaster is a self-awareness. This is very possible because when someone has knowledge about disaster mitigation, they can take all safety measures and secure themselves when a disaster occurs.
This is similar to the findings in the field that when the Lombok earthquake disaster that occurred on August 2018, all the people and tourists in the Senggigi beach area tried to save themselves by spontaneously running to the hills around Senggigi beach. This was done because they were afraid that after the earthquake there would be a tsunami. From this, it can be seen that the public and tourists have been aware and know there will be a danger and potential tsunami that can occur when a large earthquake occurs.

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But if we look deeply, awareness of the existence of disasters is not balanced by knowledge about mitigation. Their knowledge of disaster mitigation is still minimal. Research Results of the National Earthquake Study Center Team in collaboration with the Center for Housing and Settlement Research and Development in 2018, stated that disaster survivors' knowledge of disaster mitigation is very minimal / not related to the earthquake and tsunami and its mitigation procedures. Evacuation is carried out in a spontaneous, untrained and sporadic. Facilities for temporary evacuation sites, evacuation routes and procedures are minimal on-site. This is compounded by the hoax news circulating about earthquake and tsunami events circulating through chain messages between them. This condition makes the survivors traumatized and worried, confused and lost confidence in the information released by the authorities due to information that is not in accordance with the conditions on the field.

The same thing was conveyed by Mr. Sanusi, one of the managers of the Senggigi Beach tourism cooperative, says that during an earthquake that shook the Senggigi region, tourists in the Senggigi beach area spontaneously ran to escape to the hilly area or residents around calling it a mountain. "All night they in the mountains sleep on the ground, and in the morning, there is food assistance from the surrounding community" said Mr. Sanusi. He also revealed that at the time of the earthquake there were no relevant authority officers directing for evacuation, only then the next day the team from the relevant service took to the field to evacuate.

Therefore, knowledge about disaster mitigation is important to be owned by the community and tourists who are in disaster-prone areas. Not only those, the facilities for evacuation route maps and direction signs for evacuation are very important for the effectiveness and supervision of rescue actions when a disaster occurs. The existence of an evacuation point map can help in the event of a disaster; the community can easily follow the direction of the attribute (arrow/sign) evacuation to a safe place from a predetermined disaster [12].

The results of observations in the field are known that along the Senggigi coast area there is still no map of disaster information available; the signs on the evacuation route, the gathering point and the place of refuge are available, but the shape of the board is not uniform in terms of size, color, writing. The information boards are still partial, the information is incomplete and at night most of the instructions are illegible. In addition, there is no written guide (manual) for citizens as information management on disaster preparedness; there are only a few hints in the form of pictures about disaster alertness at several locations on the edge of the main road. There are not many signboards in remote locations or that are somewhat remote from the main road of Senggigi Area; socialization about disasters such as in the form of simulations is rarely done, if there is done less intensive and residents tend to ignore the socialization of the BPBD; there are no regular community meetings to discuss disaster preparedness; the decision to evacuate depends on information from the hamlet head and neighboring groups around the place of residence; and the use of traditional kentongan communication tools by paying attention to certain tones as a sign of danger.

If we look at the above is certainly very unfortunate, considering that Senggigi is a famous tourist area and visited by many tourists. Evacuation signposts which should be well-read and informative are only found at certain points such as the hotel area and main road. From observations in the field, there are various exits that can lead to the main road either through the hotel area or souvenir market in the Senggigi beach area, but the tourists are certainly not aware of the various exits. Therefore, evacuation route maps are urgently needed related to disaster preparedness. This is in accordance with Domestic
Government Regulations No. 33 of 2006 concerning General Guidelines for Disaster Mitigation which states that there are four important things in disaster mitigation, namely 1) information and maps of disaster-prone areas are available for each type of disaster; 2) socialization to increase public understanding and awareness in dealing with disasters, because they live in disaster-prone areas; 3) knowing what needs to be done and avoided, as well as knowing how to save themselves if a disaster arises, and 4) setting and structuring disaster-prone areas to reduce the threat of disaster.

Some disaster-prone area arrangements can be done through disaster mitigation measures that are soft protection and hard protection. Mitigation of disasters with soft protection in the form of making coastal forests or beach belts. This beach belt becomes a stronghold of the coastal region from tidal waves, tsunamis and other disaster threats. As explained ([14]; [8]; [13]), the role of the beach belt includes:

1. As a trap to stop drifting wood, rubble and other debris,
2. As a tsunami energy damper, namely the effect of reducing the speed of water flow, flow pressure and inundation depth,
3. As a grip, which is to be a means of protection and escape for victims who are swept away by the tsunami waves by holding on to tree branches,
4. As a means of escape, by climbing trees from the ground or from a building,
5. As forming sand dune, which collects sand blown by wind and forms dune or hill

The effective plants as beach belts include mangrove, Barringtonia asiatica (bogem), Cocos nucifera (coconut), Terminalia catappa (ketapang), Calophyllum inophyllum (nyamplung), Hibiscus tiliaceus (waru) and others. Beach belts are recommended to be planted with a combination of different tree species ([9], [10], [11]), such as Pandanus tectorius (thorn pandanus), Cocos nucifera (coconut), and casuarina equisetifolia (evergreen). Vertical arrangement of vegetation such as P. odoratissimus and casuarina equisetifolia has a strong influence to reduce damage [9], but the combination of P. odoratissimus and coconus nucifera has a small effect because vertically the vegetation has dense differences [11].

Disaster mitigation with hard protection can be done through construction of the breakwater, seawall, strengthening building designs, and other infrastructure with earthquake or tsunami disaster-resistant building engineering principles and familiar / disaster-friendly spatial planning. However, this disaster mitigation is considered difficult to do in the tourism area, considering the building of houses, hotels and public facilities already exist and stood first. This is in line with the results of an interview delivered by Ahyana, that structural mitigation measures are difficult, because they have to change building infrastructure with earthquake or tsunami resistant building technical principles. Even if you could, how much money will be spent? Moreover, buildings for private use and public facilities already existed before the disaster occurred.

4. Conclusions
Area of Senggigi has a high vulnerability to earthquake and tsunami disasters. Based on observations, it is known that disaster survivors at Senggigi beach still have minimal knowledge about disaster mitigation. Not surprisingly, many disaster survivors are uneasy and finally get hoax news. This is because they do not understand knowledge about disaster mitigation with all existing procedures. In addition to information and knowledge about disaster mitigation, no less important is the provision of adequate mitigation support facilities and infrastructure. Senggigi Beach needs to get more attention in terms of disaster mitigation, such as the making and installation of disaster-prone maps, the addition of evacuation signs, evacuation route maps, shelters, beach belts or buildings as breakwaters, and also monitoring towers. Those are useful for making tourist attractions that can provide a sense of security, comfort for tourists and of course have more excellence value.

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