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# Disaster Preparedness Analysis on Small Island as a Tourist Destination

## (Case Study: Pahawang Island, Lampung Indonesia)

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### ABSTRACT

The Lampung Bay is a coastal area which has become the main destination for marine tourism in Lampung Province in recent years. After the tsunami due to the eruption of Mount Anak Krakatau in December 2018, the number of tourists to the region has decreased. The main reason for this is that there is no guarantee of safety if they visit this area. Community preparedness, early warning systems and evacuation routes and shelters on small islands where tourist destinations are very important. The research was carried out in the village of Pahawang, which is located on Pahawang Island, a small island in Pesawaran Regency, Lampung Province. This study aims to determine the extent of Pahawang village's readiness in facing disasters. The research objectives are: (1) assessing the extent of community knowledge about disasters in Pahawang Village and (2) identifying the availability of evacuation routes and shelter in Pahawang Village (3) identifying of the community's physical, social, economic resilience. This research uses descriptive qualitative research methods using a questionnaire to the public. Observation using a questionnaire aims to identify eight factors consisting of: vulnerability, natural warning signs, disaster preparedness, evacuation centers, signs of disaster, disaster response simulations, evacuation signs and sharing of disaster knowledge. The results of this study can help develop practical guidelines on disaster risk reduction for stakeholders.

**Keywords:** preparedness, disaster, tourism, Pahawang Island

### 1. INTRODUCTION

The potential of abundant marine resources and attractive for tourists also has the potential to be a threat, because it is prone to disasters. The sea and coastal area in Lampung Bay is a marine tourism area that has become a major tourist destination or destination in recent years. Local people who become tourism actors get a considerable social and economic impact with an increase in the number of tourists who come. But after the Mount Anak Krakatau tsunami in December 2018 ago, the number of tourists who came was much decreased. Because it is close to Anak Krakatau which is still active, it causes the entire coastal area of Lampung to become a tsunami and earthquake prone area, including Pahawang Island. This can already be seen when the eruption of the Anak Krakatau and the Sunda Strait tsunami in December 2018 struck several coastal areas of Banten in Java and Lampung in Sumatra, Indonesia. At least 426 people were killed and 14,059 others injured. Moreover it causes panic and insecurity for villagers and tourists which directly influences tourist visits and people's

income. Because safety is one major aspect in tourism and also one of Sapta Pesona - Seven Charms: Safe, Comfortable, Clean, Cool, Beautiful, Friendly, Memorable - as Indonesia's basic tourism slogan [1].

Pahawang Village is located in Marga Punduh sub-district, Pesawaran Regency, Lampung Province, which can be reached from Ketapang Pier in about 40 minutes. Pahawang Village consists of 6 (six) hamlets, namely Pahawang, Jelarangan, Cukuh Nyai, Suak Buah, Endorsement and Circumstances. Pahawang Village in the Pesawaran District Regional Tourism Master Plan (RIPPDA) 2017-2031, as one of the attractions and tourist destinations included in the Pahawang Regional Tourism Strategic Area (KSPD) and the surrounding islands.

The concept of Disaster Risk Management (DRM) is expected to develop resilience and prevent new post-disaster problems such as poverty, health problems, topographical problems after relocation and recovery [2] [3]. Pahawang Island is known for mangrove forests, beautiful coral reefs and long white sand beaches that have the potential to survive and become sustainable tourism assets for Lampung. It can be key to raising

awareness of environmental protection disasters and not destroying natural resources in the future of tourism, especially the physical environment and the social structure of the host community. Sustainable tourism must be part of the natural, cultural and human environment, respecting the balance of the characteristics of the coastal region [4] [5].

This study aims to determine the extent of Pahawang Village's readiness in dealing with disasters. The research objectives are: (1) assessing the extent of community knowledge about disasters in Pahawang Village and (2) identifying the availability of evacuation routes and locations of disaster protection in Pahawang Village and identifying of the community's physical, social, economic resilience.

## 2. METHODS

This study uses primary data from field observations and interviews. Interviews were conducted with respondents representing community groups in the tourism sector consisting of: tour guides, accommodation owners, boat owners, snorkelers, village officials and community leaders. The research method is a descriptive qualitative method to identify factors with a questionnaire. The questionnaire consisted of 23 (twenty three) structural questions asked to 30 respondents, there were eight factors: vulnerability, natural warning signs, disaster preparedness, evacuation centers, disaster signs, disaster response simulations, evacuation signs and sharing disaster knowledge. The study was conducted in 5 (five) hamlets, namely: Pahawang, Jelarangan, Cukuh Nyai, Asak Buah and Tetahan. Because Kalangan Hamlet is located separately and far enough from the main Pahawang, so it is not chosen as the object of research. Sampling was carried out using a purposive sampling method, with the consideration that 6 (six) people in each hamlet could represent the answers because of their wide scope.

## 3. RESULT AND DISCUSSIONS

Badan Nasional Penanggulangan Bencana (BNPB) or National Disaster Management Authority in Indonesia has a Disaster Risk Reduction Framework that called Desa Tanggap Bencana (Resilient Village Resilience) Program to be developed at the village/sub-district level, especially in disaster-prone areas. It was established with the expectations that people living in disaster prone areas will always be ready and independent in facing the threat of disaster and will immediately recover

as fast as possible in physical, socio-cultural and economic aspects [6].

Pahawang Village is one of the disaster response villages established by the District Government of Pesawaran, but until now the programs related to this matter have not been adequate. Refers to the process of preparing The Community Based Disaster Risk Reduction Management (CBDRRM) consist of supporting factors are coordination, stakeholders information sharing, risk and vulnerability, education, training, legislation, resources and early warning systems. It is an integrated activity in reducing the impact of disasters consists of preventive measures, disaster preparedness, disaster response to recovery to the continuity of community livelihood. Therefore it is necessary to create a community alert and adaptive to disasters [8], [9].

In this research activity carried out to collect information about existing conditions of evacuation route and identify the villager's knowledge capacity for the basic action in disaster preparedness management. It can be developed to improve tourism security and awareness of environmental changes including disaster mitigation. After performed field observation and in-depth interviews on disaster preparedness, then asking structured questions submitted to 30 sampling to identify the level of understanding and knowledge of the villager regarding potential disasters and the evacuation process.

### 3.1. Analysis of Evacuation Routes in Pahawang Island

The lacking of disaster preparedness in Pahawang Island are the absence of signages for potential disasters and the disaster evacuation location signages (Figure 1). It can be seen in the respondent's answers which indicate if there has not been official disaster evacuation simulation or training. Based on the results of interviews with village officials, these days the villager has independently provided information sharing by relying on community groups such as youth clubs (Karang Taruna) and night shifts for manual monitoring along the coast (Table 1). During this time the villager used the mosque microphone as a tool to inform the signs of disaster to the public largely.

### 3.2 Analysis of Community Knowledge on Disasters






Based on the result of these questions (Table 2), it can be concluded that the community has begun to recognize potential disasters in Pahawang Island are earthquake and tsunami. Nevertheless, people still have difficulty recognizing earthquake signs. Generally, the villager has quite a high level of preparedness as seen from the question about the first thing that will be done when the earthquake and tsunami occur (Disaster

Preparedness factor). It is supported by villagers knowledge about accessibility to evacuation sites and alternative evacuation locations such as schools and places of worship (mosque). The villager also seems to have gained sufficient access to information from electronic media, chatting group and meetings independently. This is also supported by the experience of previous disasters.



Figure 1 Pahawang's Evacuation Route Map

Table 1. Existing Conditions Analysis of Pahawang Village Evacuation Route

LOCATION	ANALYSIS
<b>PAHAWANG AND PENGETAHAN</b> 	Pahawang Sub-village with the highest population have 3 (three) evacuation sites. It also used by Penggetahan villagers since the location is contiguous with Pengetahan Sub-village which have the smallest population. All of evacuation sites are still unstable, in the form of land and hills. There are non permanent buildings made of wood material for women, children and elderly evacuation
<b>SUAK BUAH</b> 	The evacuation location at Suak Buah Sub-village is about 50 degrees slopes, which is the highest among other locations. However the evacuation route is already equipped with concrete road layers and makes it easier for villagers and distribution of goods. Access to the evacuation route is planned to be connected to the Jelarangan Sub-village evacuation location. There is none start gathering point here, so the villagers will go straight up to evacuation location
<b>CUKUH NYAI</b> 	Cukuh Nyai sub-village has about 20-30 degrees slopes with unstable evacuation routes in the form of soil. This location is the gently sloping area and the nearest evacuation site that can be reached than to others. In additionally, it needs to improve safety evacuation routes signage and built the start gathering point to distribute the villagers since the location cannot accommodate a lot of people.
<b>JELARANGAN</b> 	Evacuation location in Jelarangan Sub-village is about 40 degrees slopes with two evacuation route and locations. In the first location still unstable in the form of soil and difficult for villagers to ride. There are several non permanent shacks that can be used for woman, children and the elderly
	The second location already has better paths with a concrete cast road which is connected to the field as a start gathering point. The problem is most of villagers often bring their motorcycle when evacuated, that can reduce the capacity of people evacuated especially in the field and the route road. It is necessary to increase the evacuation route sign, set the evacuation rules, create a start gathering point zonation and determining the capacity of the number of people evacuated.

### 3.3. Analysis of Community Physical, Social and Economic Resilience

Community resilience to disasters can be seen from how the environmental, social and economic management in the region. The environmental problems occur because of the social and economic activities of the Pahawang Village community, as shown in Table 3. Management of various types of basic infrastructure has not been sustainable. Waste

management is carried out with the concept of not being environmentally friendly, because waste is not processed but it is collected and burned. The results of interviews with community leaders said that counseling has been conducted several times about recycling of organic and non-organic waste and management of waste banks by the government, academics and non-governmental organizations. But still there has been no impact on society.

The clean water needs of the community come from freshwater wells, but in terms of quality it has not been fulfilled as drinking water. The community gets drinking water from buying bottled water. The source of energy comes from PLTD, but operating hours are limited from 6 pm to 12 pm. Transport on the island is dominated by motorized vehicles, so it requires quite expensive fuel and air pollution.

Table 2. The Community Knowledge on Disaster in Pahawang Island

No	Questionary	Answers		Total Answer
		False	True	
<b>Vulnerability (I)</b>				
1	Earthquake	0	4	30
2	Tsunami	0	26	
<b>Nature's Warning Signs (II)</b>				
3	Earthquake	12	18	30
4	Tsunami	9	21	30
<b>Disaster Preparedness (III)</b>				
5	Earthquake	12	18	30
6	Tsunami	5	25	30
<b>Evacuation Center (IV)</b>				
7	Accessibility	8	22	30
8	Alternative Location	12	18	30
<b>Disaster Signages (V)</b>				
9	Eruption	5	25	30
10	Fire	9	21	30
11	Landslide	11	19	30
12	Flood	22	8	30
13	Tsunami	20	10	30
14	Earthquake	17	13	30
<b>Disaster Response Simulation (VI)</b>				
15	Emergency Simulation	22	8	30
<b>Evacuation Signages (VII)</b>				
16	Assembly (Gathering) Point	30	0	30
17	Evacuation Building Center	27	3	30
18	Evacuation Camp	28	2	30
19	Evacuation Route	9	21	30
20	Go to Higher Ground or Inland	16	14	30
21	Go to The Vertical Building	21	9	30
<b>Disaster Knowledge Sharing (VIII)</b>				
22	Independently (Social media, chatting group, meetings, etc)	8	22	30
23	Previous Experience	10	20	30
<b>Total Sampling</b>				30

Protection of mangroves and coral reefs has not been maximized, there are no regulations that prohibit tourists from touching coral reefs. This resulted in many damaged coral reefs. The existence of mangrove forests is also not yet an attractive tourist attraction, due to the lack of facilities. In terms of disaster mitigation, mangroves and coral reefs are needed to protect the island from tsunami. Empowerment of local communities on Pahawang Island by non-governmental

organizations has been running for a long time, from 20 years ago. Since then they have built their environment into a viable environment as a marine tourism and conservation area in Lampung. The lack of government support, especially related to policies to manage ecotourism is one of the obstacles to the realization of sustainable tourism on Pahawang Island. This is indicated by the absence of regional regulations that provide rules regarding the implementation of the three pillars of sustainable tourism, economic, social and environmental development [10]. The role of Non-Governmental Organizations (NGOs) and the community is very large, beginning with environmental conservation and now the community is starting to feel the benefits of the tourism sector, but on the other hand there are fears that tourism will threaten environmental conservation [11].

### 3.4. Recommendations

Pahawang Island as one of the marine tourism destinations in Lampung Province, on the other hand it has the potential as an area prone to tsunami and earthquake disasters. Disaster preparedness needs to be improved to create a disaster response community without eliminating the potential of tourism which has been the main economic source of the community. In order to increase community preparedness, stakeholders on Pahawang Island needs to pay attention to the following main strategies:

1. Increased community participation in Pahawang Island in building environmental resilience as disaster prone areas such as: (a) Improving the value system and mindset of the community in the management of coastal tourism that the coastal region is not only a gift but also a disaster;

**Table 3.** Environmental, Social and Economic Problems of Pahawang Island

ISSUES	IMPACT	PROBLEM SOLVING
<b>Environmental issues related to disasters</b>		
Damaged small island environment		
<ul style="list-style-type: none"> <li>- Activities are not environmentally friendly</li> <li>- Illegal logging of Mangrove</li> <li>- Littering</li> <li>- Ship oil spills</li> <li>- Fishing gear damage the environment (fish bom)</li> <li>- Houses construction along the coastline</li> </ul>	<ul style="list-style-type: none"> <li>- The decline in fish catches</li> <li>- Destroyed and damaged marine biota and coral reefs</li> <li>- Flooding during the rainy season</li> <li>- Poor soil</li> <li>- Dryness of clean water in the dry season</li> <li>- Coastal erosion and loss of natural coastal protection from the threat of rob and tsunami</li> </ul>	<ul style="list-style-type: none"> <li>- Outreach the importance of environmental conservation and waste management</li> <li>- There needs to be a village arrangement (village / island spatial plan)</li> <li>- Coastal and forest security groups formed</li> <li>- Regulations on activities around the coastal environment</li> <li>- Law enforcement</li> </ul>
<ul style="list-style-type: none"> <li>- Lack of public awareness of the importance of environmental sustainability</li> <li>- Low level of community education</li> <li>- Lack of community participation</li> </ul>	<ul style="list-style-type: none"> <li>- Disorganized waste disposal</li> <li>- Illegal logging</li> <li>- Sea pollution and abrasion</li> <li>- Welfare has declined</li> <li>- Lack of tourist visits</li> <li>- Damaged forest</li> </ul>	<ul style="list-style-type: none"> <li>- Community education and assistance</li> <li>- Mutual cooperation (gotong royong)/ community service</li> <li>- Provision of trash bins</li> <li>- Enforcement of joint rules / agreements</li> </ul>
<b>Economic and social village issues related to tourism</b>		
Handling of attractions that have not been optimal		
<ul style="list-style-type: none"> <li>- Environment (sanitation) is less supportive</li> <li>- Lack of convenient and safe transportation facilities</li> <li>- Lack of education and community participation in the field of tourism</li> <li>- Coastal Potential Damage</li> </ul>	<ul style="list-style-type: none"> <li>- The potential of existing human resources is difficult to develop</li> <li>- Many children drop out of junior and senior high school level</li> <li>- The quality of HR is relatively low</li> <li>- Many unemployed people</li> </ul>	<ul style="list-style-type: none"> <li>- Conducting tourism counseling (SAPTA PESONA)</li> <li>- Asking for support from banks / cooperatives</li> <li>- Basic infrastructure development (clean water, village roads, electricity, waste water)</li> <li>- Develop tourist attractions such as: hunting, fishing, mountain biking, mountain climbing, horse riding, etc.</li> </ul>

(b) Increasing the capacity of community understanding to be more responsive to disasters, so as to provide a sense of security for tourists; (c) Encouraging the willingness of the community for self-financing and self-help in the conservation of coral reefs and mangrove forests as a form of efforts to improve the environmental system for disaster mitigation.

2. Increasing the application of simple technology in the community in the management of environment especially in the field of environmentally friendly waste management, clean water management with 3 R (reduce, restore and recycle), development of green energy (such as solar energy sources, wind energy, etc.) , environmentally friendly transportation on the island such as: bicycle, horse riding and walking.
3. Increasing the community's economy through quality tourism practices by preserving the coastal resources of Pahawang Island, especially the ecosystems of mangrove forests, seagrass and coral reefs so as to maintain and increase tourists to come to Pahawang Island. Furthermore, it can be developed as a coastal ecotourism by promoting natural tourism, cultural tourism to be able to change aspects of the disaster into educative for tourists.

#### 4. CONCLUSIONS

The capacity of the villager's understanding of disaster preparedness is still lacking, evacuation infrastructure is less effective with limited stable evacuation routes, the absence of shelters or permanent disaster posts, none disaster evacuation signage, especially lacking of disaster knowledge sharing by government, and disaster response simulation. Generally, the community preparedness in facing disasters are less comprehensive, but the community have potential to develop into disaster adaptive independently and being disaster resilience organization in prone areas . Through the concept of The Community Based Disaster Risk Reduction (CBDRR), not only for local communities but also to ensure the sustainability of tourism assets as source of community income in Pahawang. The result from this research can help to framed a practical guide on disaster risk reduction for government, non-government agencies and community.

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