

Estimation of Communities and Tourists Willingness to Pay for Tsunami Disaster Mitigation of Marine Tourism in the Kalianda Coastal Area, South Lampung Regency

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ABSTRACT

Indonesia coastal areas have considerable natural disaster potential including in Kalianda District South Lampung Regency. Natural disasters such as earthquakes, tsunamis and volcanic activity are likely to occur in coastal areas. The disaster has an impact on economic losses in the marine tourism area. In order to mitigate tsunami disasters in the marine tourism area of Kalianda District, South Lampung Regency, 3 (three) types of tsunami mitigation are needed, namely: construction of coastal protection, installation of the Tsunami Early Warning System (TEWS) and planting of coastal vegetation. This study aims to determine the value of willingness to pay (WTP) of community and tourists in supporting the management of the three types of tsunami disaster mitigation above by using economic valuation / Contingent Valuation Method (CVM). The results of this study indicate that the WTP value of community for coastal protection management is Rp 15.547/person/month while the WTP value of tourist is Rp 12.030/one time entry. Meanwhile, for the WTP value of TEWS management is obtained Rp 12.174/person/month. WTP value for the management of coastal vegetation is Rp 12.444/person/month. The WTP calculation is based on consideration of 3 (three) factors, namely age, income, livelihood and education level. This research shows that the community and tourists are willing to pay for the management of the three types of tsunami disaster mitigation through BUMDes and entrance fees for marine tourism area. The three types of tsunami disaster mitigation can protect, provide security and calm to the community and tourists in the marine tourism area of Kalianda District, South Lampung Regency from future tsunami.

Keywords: WTP, Tsunami, Disaster mitigation, Marine tourism, Kalianda

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1. Introduction

On December 22, 2018 a tsunami occurred in the coast of South Lampung Regency, Lampung Province. This incident resulted in the death of victims and damaged buildings at most among several natural disasters that occurred in Indonesia in 2018 (BNPB, 2018). According to Surmayadi, Kartadinata, Kriswati, Prayoga, Kristianto & Irawan (2019) the tsunami that occurred in the Sunda Strait area was caused by the activities of the Anak Krakatau Mountain.

Furthermore, Yudhicara & Budiono (2008) stated that the Sunda Strait has 4 (four) potential threats of multi-natural disasters including earthquakes, volcanic eruptions, tsunamis and landslides which are very dangerous for the coastal environment. For this reason, people in the coastal environment of South Lampung Regency must have a greater level of awareness and insight of natural disaster mitigation management. This is expected able to minimize the impact of natural disasters that may occur at any time.

Apart from the impact on casualties, the economic impact of the tsunami disaster in South Lampung Regency should also receive more attention from the Government. The estimated economic loss experienced by South Lampung Regency reach hundreds of billions of rupiah, while for Kalianda District especially in the marine tourism environment, it is estimated at tens of billions of rupiah (Bappeda, 2019). These losses consist of direct benefit units, namely infrastructure and housing as well as the tourism sector, indirect benefit units that are calculated from the decline in the number of tourists, followed by the loss of social value from both health and life insurance (Soejarwo, Kodiran & Rusdi, 2019).

Realizing the high potential for natural disasters in Indonesia's coastal environment, as well as the high impact caused by the disaster, the Indonesian Government approved Law Number 24 of 2007 concerning Disaster Management. This law was issued because the Government awared of its duty and responsibility to protect all Indonesian people. The

condition of the Indonesian territory is prone to natural disasters, as well as the importance of a strong legal basis for overcoming natural disasters in Indonesia.

In accordance with the mandate of Law Number 24 of 2007, the President established the National Disaster Management Agency (BNPB). One of the action plans and efforts carried out by BNPB in tsunami disaster management in addition to prioritizing disaster risk reduction nationally and regionally, the government also provides programs to build awareness, alertness and community preparedness to deal with natural disasters (BNPB, 2017).

Natural disaster preparedness management is divided into 5 (five) main stages, namely planning, preparation, implementation, monitoring and evaluation. These efforts are expected to provide both theoretical and practical understanding to the community and tourists/interested stakeholders so that they are better prepared for disasters. According to Paramesti (2011) states that tsunami preparedness must involve many parties, especially people living in the area, so that the incurred losses can be minimized. Furthermore, according to Anam, Mutholib, Setiawan, Andini & Sefniwati (2018) stated that tsunami management is more proactive preparedness, this involves various parties including local institutions in the area.

Apart from the efforts of the government, local institutions and the community in terms of understanding both in theory and practice, another thing that can be used to predict the readiness of the community and tourists in mitigating natural disasters is by knowing the willingness to pay (WTP) of the community and tourists. According to Alves, Torrent, Ballester, R., Benavente, & Ferreira (2015), the WTP is currently used as an indicator of the commitment of the user in managing coastal areas.

According to Sadikin, Mulatsih, Pramudya & Arifin (2017) tourists are willing to pay the management fees charged in tourism entry tickets to protect ecotourism from environmental damage. The concept of WTP expresses the preference value of respondents in contributing to conservation and improvement and protection of environmental services.

WTP also provides considerations for determining policies in sustainable environmental management (Cheung & Jim, 2014). In the coastal area of Kalianda District, South Lampung Regency, WTP is used to manage the infrastructure or facilities that used in order to minimize the impact of natural disasters, especially in marine tourism areas.

Therefore, research to determine the willingness to pay (WTP) of community and tourists in managing tsunami disaster mitigation on marine tourism in the coastal environment of Kalianda, South Lampung Regency is required.

2. Material and Method

This research was conducted in Kalianda District, South Lampung Regency, Lampung Province in

August - October 2019. The data used in this study consisted of primary data and secondary data.

2.1. Data Collection Method

Primary data were collected through direct observation in the field, discussions with stakeholders, namely the Marine Affairs and Fisheries Office, Bappeda, BPBD and Tourism Office in South Lampung Regency. Stakeholders play a role as the party that implementing infrastructure development (natural and artificial) for tsunami mitigation. In addition, interviews were conducted with affected respondents, namely marine tourism businesses, coastal communities, and tourists in Kalianda District, South Lampung Regency. Determination of respondents was done by purposive sampling. The purposive sampling method is one part of the non-probability sampling method with the criteria of respondents not being carried out randomly, in other words being chosen deliberately based on the proximity of the respondent to the research objectives, because this sample is considered to have certain characteristics, which can enrich the researcher's data (Pratiwi, 2015). The total number of respondents in this study were 204 respondents consisting of people and tourists who were affected and potentially affected by the tsunami in Kalianda District, South Lampung Regency.

Secondary data is collected through data sources based on previous research and information from relevant agencies such as Marine Affairs and Fisheries Office of Lampung Province, Tourism Office of South Lampung Regency, Regional Development Planning Agency (BAPPEDA) of Lampung Province and South Lampung Regency, Regional Disaster Management Agency (BPBD) and the District of South Lampung Regency. Data collected in the form of profiles of South Lampung Regency, marine tourism profile of South Lampung Regency, reports on the number of damage, losses and victims due to the tsunami disaster and other supporting data used to obtain a real picture of conditions in the field.

2.2. Data Analysis Method

Data analysis was carried out from several components in the management of tsunami disaster mitigation, such as the calculation of WTP from the community and tourists for maintenance of coastal protection, Tsunami Early Warning System (TEWS) and coastal protection vegetation in the marine tourism area of Kalianda District which was carried out based on steps in determining the WTP (Adrianto, 2006) are as follows:

1. Create a hypothetical market

The first step in determining the WTP is to create a hypothetical market for community and tourist respondents. Hypothetical markets for community respondent is as follows: "Coastal areas are vulnerable to natural disasters tsunami if not managed properly. Coastal conservation and management carried out in this case is the prevention of major impacts that occur as a result of the tsunami natural disaster, one of which is by building a coast guard, TEWS or planting

coastal vegetation as natural protection. Therefore community participation to pay for environmental quality improvements is expected through monthly contribution that will be used as maintenance funds for coastal protection/TEWS/ coastal protection vegetation”.

Meanwhile, the hypothetical market for tourists is as follows: “Marine tourism activities can cause damage such as pollution. Apart from pollution caused by tourism, coastal areas are also vulnerable to natural disasters tsunami if not managed properly. The management and preservation of marine tourism sites that are carried out is the maintenance of cleanliness and prevention of major impacts that occur as a result of the tsunami natural disaster, one of which is by building a coast guard, TEWS or planting coastal vegetation as natural protection. Therefore, participation of tourist visitors to pay retribution is expected that will be used as maintenance funds for coastal protection/TEWS/ coastal protection vegetation.”

2. Conduct a pre-sampling questionnaire to determine the WTP value

The technique used to determine the WTP value is a pre-sampling questionnaire to the sample respondents with the aim of obtaining the maximum and minimum WTP values from the respondents for the cost of managing coastal protection, TEWS and coastal protection vegetation. Determination of the value of WTP is carried out using a structured question and answer technique where the respondent is given a choice of a range values in rupiah, then asked whether agrees or not and an open question where the respondent is free to choose the value to be paid.

3. WTP Calculation

WTP was calculated by using formula:

$$WTP = \left(\frac{a}{n}\right) \cdot e \cdot r \dots\dots\dots(1)$$

Where:

- WTP : Willingness to Pay
- a : number of respondent
- n : total respondent
- e : assumption 10% from total populasi and 100% from total tourist
- r : range of WTP (Rp)

The above formulation also calculates the value of WTP against the value of ecosystem inheritance (bequest value), namely the non-use value that represents ecosystem services including the value of existence and inheritance value which refers to public awareness of existing ecosystem services and will last for future generations (Mehvar, Filatova, Dastgheib, Steveninck, & Ranasinghe, 2017). Tsunami mitigation is also proposed by using the planting of barrier vegetation in marine tourism areas (natural disaster mitigation) where the planted vegetation is local vegetation in accordance with the characteristics of the coastal areas in Kalianda District. The cost of planting vegetation at marine tourism area is calculated by using the following formula:

$$VPC = CL \times VSP \dots\dots\dots(2)$$

3. Result and Discussion

3.1. Estimation of Willingness To Pay (WTP) For Tsunami Disaster Mitigation

Mitigation aims to reduce the impact of tsunami disaster in the future, one of which is carried out by building a coast guard, developing TEWS, and protecting coastal vegetation. It is expected can be carried out by the Government as a form of responsibility for the protection of the community and tourists in coastal areas. Based on the research results, it is known that all respondents stated that they were willing to contribute to the management of coastal protection, TEWS and the planting of coastal vegetation that would be built by the government (Figures 2, 4, and 5). Meanwhile, tourists are only willing to contribute to coastal protection management. Tourists are not yet willing to contribute to pay for the management of TEWS because they do not believe in the existing tsunami early warning system, this is because many TEWS instruments are not functioning properly. As for the management of coastal vegetation, tourists are not willing to pay because it takes a long time to grow the coastal vegetation. In more detail, the WTP calculation from the community and tourists is as follows:

3.1.1. WTP Coastal Protection Management

The results of data processing obtained 52% of respondents stated that the bad impact of the tsunami that occurred was due to the absence of a coastal protection embankment. Meanwhile, as many as 48% of respondents stated that the bad impact of the tsunami occurred due to the location of the settlement close to the coast, however, respondents stated that if there is a strong coastal protection embankment in the area, the bad impact of the tsunami can be minimized.

Furthermore, 98% of the total respondents chose a physically visible coastal protector to protect the coastal area from the tsunami disaster. Respondents stated that the coastal protection building that is physically visible from the beach can create a feeling of safety and calm for the people and tourists who are in the marine tourism area of Kalianda District. The coastal protection structure is expected to be a barrier and breakwater, especially for tsunamis. The length of the Kalianda sub-district coastline is approximately 27 km. Especially for marine tourism around 5 km, the effort to build a coast guard can be estimated based on the length of the coastline. According to the Lampung Province Bappeda, the unit cost for coastal protection construction is Rp 1.600.000/meter, so that the estimated cost of constructing a 5 km long coastline is Rp 8.000.000.000.

Post-tsunami management on the Kalianda coast is carried out by calculating the WTP for the management of coastal protection buildings aimed at people who live around marine tourism areas and tourists visiting marine tourism sites in Kalianda District. WTP analysis on coastal protection management uses several variables, namely age (Sathya & Sekar, 2012), income (Sathya & Sekar, 2012;

Harini, Ariani, Fistiningrum, & Ariestantya, 2019; Travassos, Leite, & Costa, 2017) and education level. (Sathya & Sekar 2012; Travassos et al., 2017) which has an influence on WTP (Mehvar et al., (2017).

Based on 102 community respondents, the majority of respondent ages were 20 to 56 years. Meanwhile, respondents with age above 56 years or retirement age were rarely found and only amounted to 11 people from the total respondents. This illustrates that respondents who were in the category of productive labor are quite high. The average income of the respondents was IDR 1.000.000/month, which comes from their livelihoods as fishermen, traders, entrepreneurs, laborers and farmers. As many as 45.45% of the respondents work as food, drink and souvenir traders who are around the marine tourism sites in Kalianda District. The majority of these traders were affected by the Sunda Strait tsunami which resulted in the destruction of houses which were also places for trading and their goods, resulting in loss of their livelihoods after the tsunami. Furthermore, as much as 29% of the respondents are fishermen who were also affected by the tsunami where the fishermen were damaged and lost their boats and fishing gear. With this damage and loss, the majority of fishermen have not been able to go to sea after the tsunami so that many of them have switched their livelihoods as traders, laborers, farmers or motorcycle taxis. Meanwhile 16% of the respondents work as daily laborers, unskilled laborers, and transport workers who also play a role in helping the distribution of goods for traders around marine tourism sites in Kalianda District. The tsunami that affected traders had a domino effect on workers, namely the reduction in daily work opportunities for these workers. Meanwhile, respondents with livelihoods as farmers, entrepreneurs and other livelihoods such as civil servants and lecturers ranged from 3-4%. In detail, the respondent livelihoods are shown in Figure 1.

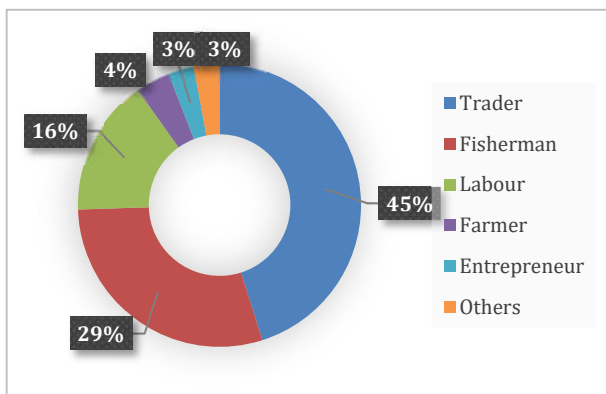


Figure 1. Respondent Livelihood

Meanwhile, the education level of community respondents is quite diverse, from elementary to high education level, with the majority of education levels being senior high school graduates/equivalent.

This shows that the level of education of the majority of people in the region has received basic education. Apart from being based on age, income and

education variables, according to Yu et al. (2018) stated that community WTP for marine conservation which functions as protection of coastal areas is influenced by knowledge of related policies, dependence on the sea and other subjective assessments of the sea

In terms of coastal protection management aimed at tsunami mitigation, the community stated that they were willing to pay between Rp. 5.000 – Rp. 250.000. Based on the results of the field survey, it is known that the highest percentage of community respondent willingness to pay for coastal protection management is 48% willing to pay Rp. 8.000. According to Yu et al (2018), the level of education has an effect on awareness of environmental conservation. Basically, with the level of community education who has received basic education, the people around the Kalianda District marine tourism site have an awareness of the importance of the existence of coastal protection in coastal areas. However, the condition of income and job availability that have not yet recovered after the tsunami caused the majority of the community to be unwilling to pay for coastal protection management with a nominal value that is too high so that almost half of the respondents are willing to pay for coastal protection management with a value of Rp 8.000. This is in accordance with Halkos (2013) which states that the income variable affects the WTP calculation scenario.

Furthermore, 16% of the respondents were willing to pay Rp 13.000 for coastal protection management. The majority of these respondents were fishermen and traders, where the majority of people with both types of livelihoods have a higher level of awareness of the importance of the existence of coastal protection to support the safety and sustainability of their livelihoods in the future. So that they were willing to pay for coastal protection management with a higher nominal value, namely Rp. 13.000. Meanwhile 17% of respondents were willing to pay Rp 18.000. The majority of these respondents made a living as entrepreneurs and traders who did not experience too much damage and losses due to the tsunami. Or have a relatively stable income after the tsunami so that the respondent was willing to pay for coastal protection management with a larger nominal value of Rp 18.000. Meanwhile, the respondent was willing to pay for the management of the coastal protection in the amount of Rp 25.000, Rp 30.000, Rp 100.000, Rp 50.000 and Rp 250.000 respectively 1%. The majority of these respondents have a livelihood as entrepreneurship and other livelihoods with high levels of income, supported by an awareness of the importance of the existence of a coastal protection so that they were willing to pay a high nominal fee for coastal protection management. The percentage of community willingness to pay for coastal protection management is shown in Figure 2.

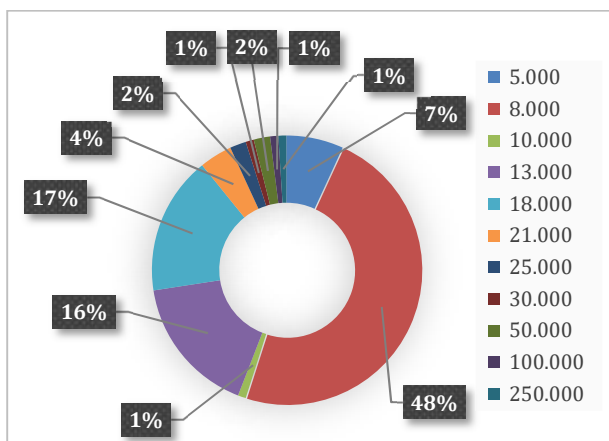


Figure 2. Willingness to Pay Community to Coastal Protection Management

Based on the calculation results of community WTP for coastal protection management, the average WTP value was Rp 15.547/person/month. Based on 2018 BPS data, the number of coastal communities in Kalianda District is 33,982 people. If it is assumed that 10% of the total number of people or 3.398 people were willing to pay, then the total WTP value of the community for coastal protection management was Rp 52.833.348/month.

Meanwhile, based on the survey results of 100 tourist respondents, it was found that the majority of respondent ages ranged from 18 to 49 years. Tourist respondents over 49 years of age or retirement age were very rare and only 2 people aged 60 and 66 from the total tourist respondents. This shows that marine tourism enthusiasts generally come from young to productive adults because the possibility of marine tourism had a high level of natural obstacles that requires physical endurance so that retirement age tourists were rarely encountered. Meanwhile, the majority of tourists come from Lampung Province areas such as Bandar Lampung, Metro, North Lampung, East Lampung, Central Lampung, other sub-districts in South Lampung and from outside Lampung Province, namely DKI Jakarta, West Java and Yogyakarta.

The majority of tourist respondent education level is senior high school/equivalent and university graduates. This shows that tourists who come to the marine tourism location in Kalianda District have a very good level of education. According to the results of research by Marzetti, Disegna, Koutrakis, Sapounidis, Marin, Martino, Roussel, Rey-Valette, & Paoli, (2015), the willingness to pay visitors to protect and manage beaches is influenced by the level of education. Where the higher the level of tourist education, the higher the analytical power, mindset and level of awareness of the tsunami disaster.

The income of tourist respondents ranged from Rp 300.000 to Rp 13.300.000/month. The average income of the respondents was Rp 2.000.000/month with livelihoods as private employees, entrepreneurs, civil servants, students and others. As many as 37% of tourists make a living as entrepreneurs with an average income of Rp 4.000.000 per month.

Meanwhile, 24% of tourists are students who have an average income of Rp 500.000 per month. The next largest number of tourists, 17% have a livelihood as private employees with an average income of Rp 2.500.000 per month. 6% of tourists who worked as civil servants with an average income of Rp 4.000.000 per month. And 16% of tourists with other occupations have an average income of Rp 900.000 per month. Details of tourist livelihoods are shown in Figure 3 below.

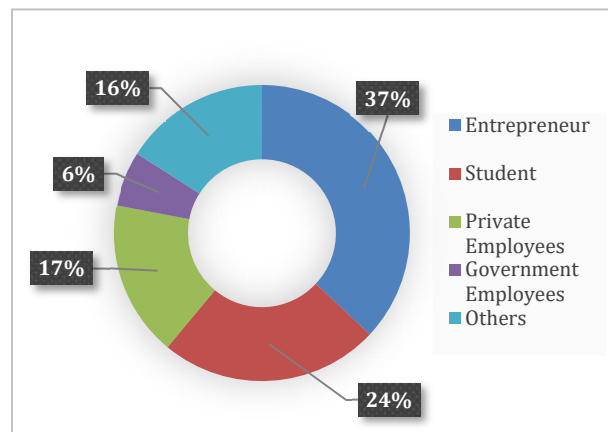


Figure 3. Tourist Livelihood

In terms of coastal protection management costs, tourists were willing to pay between Rp 5.000 - Rp 75.000. The results of the field survey show that 16% of respondents are willing to pay Rp 5.000 for coastal protection management. The majority of these respondents were students who had not, most of whom did not have their own income or still received income from their parents with an average income of Rp 500.000 per month. In addition, there were respondents who work as civil servants with relatively high income but are willing to pay low coastal protection management. This is because these tourists were not native residents in Kalianda District and do not have a high intensity of visiting these marine tourism sites, so there has not been a sense of concern for tsunami mitigation.

Meanwhile, 40% of tourist respondents were willing to pay Rp 8.000. The majority of respondent also consisted of students, entrepreneurs, civil servants and tourists with other jobs. For tourists whose income was not too high, even though these tourists had a high enough level of awareness of the importance of coastal protection existence in marine tourism areas, they did not have sufficient income to pay a high nominal cost of coastal protection management. On the other hand, tourists with high income, but because the intensity of visits to the area was not too frequent, then the awareness of tsunami mitigation was low. Therefore, almost half of the total tourist respondents were willing to pay Rp 8.000 for the management of the coastal protection.

As much as 18% of respondents were willing to pay Rp 13.000 and Rp 18.000. The majority of these respondents had a livelihood as entrepreneurs, private employees, civil servants and students. For

tourists other than students, the majority had a high enough income level and awareness of tsunami mitigation in marine tourism areas which was also high so that tourists were willing to pay for coastal protection management with a fairly high nominal value. Meanwhile, for students, although the majority had a low income level or did not have their own income, they had a high level of awareness of the importance of tsunami mitigation in marine tourism areas to support the safety and security of tourists in the future. So they were willing to pay Rp 13.000 and Rp 18.000. Furthermore, there were 1% of tourist respondents who were willing to pay Rp 30.000 and IDR 75.000 where the respondents were students with an income level that was not too high. This shows that these students had a high awareness of tsunami mitigation and the safety of future visitors in the marine tourism area of Kalianda District. So they were willing to pay a very high nominal value for coastal protection management. Willingness to pay for coastal protection management is shown in Figure 4.

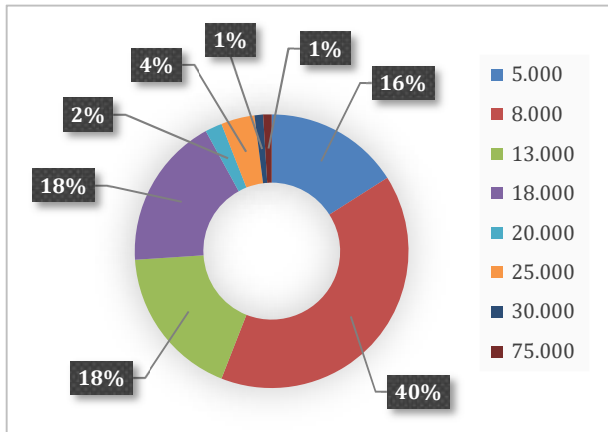


Figure 4. Willingness to Pay Tourists to Coastal Protection Management

Based on the calculation of the WTP of tourists for the management of coastal protection, the average value is Rp 12.030/person/one entry into marine tourism which will be included in the entrance ticket levy. Based on 2018 BPS data, the number of post-tsunami tourists is 1,500 people per year, so that the total WTP value of tourists for coastal protection management is Rp 18.045.000/year.

3.1.2. WTP Tsunami Early Warning System (TEWS) Management

Tsunami caused by the eruption of Mount Anak Krakatau have the potential to occur in the future, so it is necessary to install TEWS as a form of mitigation, especially in terms of the timeliness of detecting tsunami waves (Annunziato, 2015). Inexpensive Device for Sea Level Monitoring (IDSL) is a type of TEWS that has been installed on Sebesi Island, Lampung Southwest, Kalianda District. According to Annunziato (2019), the work concept of IDSL is to monitor sea level in real time 24 hours a day and 7 days/week equipped with CCTV and warning sirens. The IDSL monitors Lampung coastal areas including

Kalianda District and Banten coastal areas. The IDSL installation is based on the location where the Geospatial Information Agency (BIG) tide gauge is located. IDSL instrument fee is Rp 50.000.000/unit.

Based on the data processing result, only 2% of the coastal communities in Kalianda District proposed the development of TEWS as a solution to the tsunami early warning system. This is due to the community perception that the TEWS tool is often damaged and does not function properly so that it is not effective in providing tsunami information. In addition, TEWS does not physically protect coastal areas from tsunamis, therefore it does not create a sense of security and calm for the people living in the coastal areas of Kalianda District. Analysis of WTP in the TEWS management uses several variables, namely age, education level and income. This is consistent with Asgary, Levy, & Mehregan (2007) and Nguyen & Robinson (2015) who use these variables in determining WTP estimates for early warning management against natural disasters.

As previously discussed, the majority of community respondents were 20 to 56 years old and for respondents over 56 years of age there were only 11 out of the total respondents. Meanwhile, the people income before the tsunami ranged from Rp 200.000/month - Rp 14.500.000/month. The average income of the respondents was Rp 1.000.000/month, which comes from their livelihoods as fishermen, traders, entrepreneurs, laborers and farmers. The majority of education levels were senior high school graduates/equivalent. This shows that the level of community education in the area was quite good.

From the results of the field survey, it was found that the community WTP for TEWS management ranged from Rp 5.000 - Rp 100.000. As many as 6% of the community was willing to pay Rp 5.000 and the majority make their living as traders and day laborers.

Meanwhile 52% or more than half of the total community respondents were willing to pay Rp 8.000. The majority of these respondents were traders, laborers and fishermen. However, there were also those who work as civil servants, housewives and entrepreneurs. As many as 20% of respondents were willing to pay a higher nominal of TEWS management fee of Rp 13.000. The majority of these respondents work as fishermen and traders. However, there were also those who work as housewives and entrepreneurs. Meanwhile, 16% of community respondents were willing to pay Rp 18.000 and the majority worked as traders and fishermen, but some also worked as civil servants and housewives. Of all respondents, 1% of respondents who were willing to pay Rp 40.000 for TEWS management were respondents who work as fishermen. There was also 1% of respondents who were willing to pay a higher nominal value, namely Rp 100.000 who worked as traders (building shop owners). The reason these respondents were willing to pay a high nominal fee for TEWS management was to ensure their safety and security from future tsunamis, so they were willing to invest part of their income to pay TEWS management

fees. Willingness to pay for the management of TEWS can be seen in Figure 5 below.

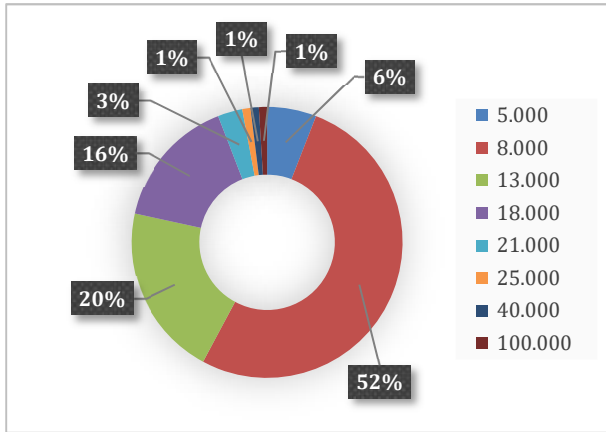


Figure 5. Willingness to Pay of TEWS Management

From the calculation result, the WTP value of TEWS management from the respondent was Rp 12.174/ person/month. Based on 2018 BPS data, the number of coastal communities in Kalianda District was 33.892 people. If it was assumed that 10% of the population was willing to pay for TEWS management, the total value of the respondent WTP for TEWS management was Rp 41.260.120/month.

3.1.3. WTP Coastal Protection Vegetation Management

The results of data processing showed that 47% of respondents agreed to the planting of coastal protection vegetation where the suitable vegetation to grow in the coastal areas of Kalianda District were mangroves, coconut trees and ketapang trees. Coastal protection vegetation generally has the ability to reduce wave energy. The ability of coastal vegetation to reduce wave energy was determined by the density and width of the vegetation (Rahman, 2013). The most effective planting distance between seedlings to reduce waves was 1x1 m (Setyawan, A. D., & Kusumo, W, 2006) where the estimated cost of mangrove and ketapang vegetation seedlings ready for planting was Rp. 10.000/seed. And the estimated cost of ready-to-plant coconut seeds was Rp. 40.000/seed. The length of the Kalianda District coastline is 27 km. The length of the coastline suitable for planting mangroves was 5 km, so the estimated cost of planting mangroves was Rp. 50.000.000. Meanwhile, the length of coastline that suitable for planting ketapang and coconut trees was 11 km respectively. So that the estimated cost of planting ketapang trees was Rp 110.000.000 and coconut was Rp 440.000.000.

Based on field results, the respondent willingness to pay for coastal protection vegetation management ranged from Rp 5.000 - Rp 100.000. Respondents who were willing to pay the smallest nominal value, namely Rp 5.000 as much as 6% and the majority of them worked as traders. Meanwhile, 52% or more than half of the total respondents were willing to pay IDR 8.000. The majority of these respondents worked as traders, fishermen and housewives. There were

18% respectively of the respondents who were willing to pay Rp 18.000 and Rp 21.000. These respondents work as traders, fishermen, laborers, farmers, housewives and civil servants. Meanwhile, of the total respondents, there were 2% of respondents who were willing to pay for the management of coastal protection vegetation with a higher nominal value, namely Rp 30.000, who worked as fishermen and traders. Furthermore, there was 1% of respondents who were willing to pay for the management of coastal protection vegetation with a very high nominal value of Rp 100.000 and make a living as traders (building shop owners). This showed that the respondents were very aware of the importance of the existence of coastal vegetation as a natural coastal protector from tsunamis in the future. Willingness to pay for management of coastal protection vegetation can be seen in Figure 6. Below.

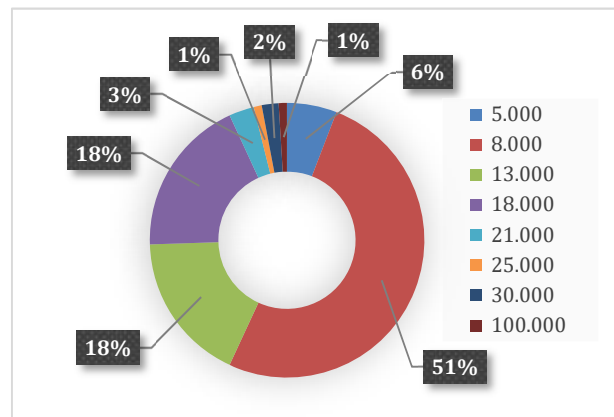


Figure 6. Willingness to Pay Coastal Protection Vegetation

3.2. WTP Fund Management Institution

The amount of the WTP value of tourists in Kalianda District will be paid into the entrance fee for marine tourism sites. Meanwhile, the amount of WTP value from the community for coastal protection management activities, TEWS and coastal protection vegetation management is recommended to be paid through BUMDes (Village-Owned Enterprises) which is engaged in social business or serving. In accordance with Government Regulation Number 72 of 2005 concerning Villages in Article 29 concerning Capital & Management as stated in Paragraph 1: BUMDes is a village business managed by the village government; Paragraph 2: BUMDes capital sources are from the village government, community savings, assistance from the central, provincial and district governments as well as other parties capital participation or cooperation on the basis of profit sharing; Paragraph 3: The management of BUMDes consists of the village government and community. So that based on the government regulation above, contributions from the community for tsunami mitigation management activities can be collected in BUMDes.

Based on the results of data collection on respondents related to community WTP for tsunami disaster management, 84% chose to pay routine fees through BUMDes, 14% chose to pay through PBB fees

(Land and Building Tax) every year, and 2% chose to pay through bills electricity (Figure 7). People who choose BUMDes to pay tsunami disaster mitigation fees stated that the use of the fees through BUMDes is more reliable.

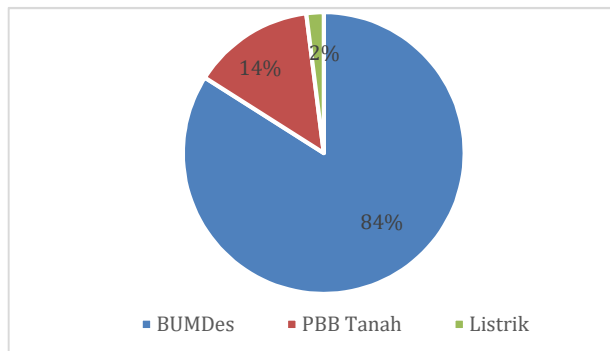


Figure 7. Option to Pay Fees for Tsunami Disaster Mitigation Management

4. Conclusion

This research shows that the community and tourists are willing to pay for the management of the three types of tsunami disaster mitigation, namely the coastal protection, TEWS and coastal protection vegetation which will be managed through BUMDes and entrance fees for marine tourism environments. The community WTP for coastal environmental management using a beach protector is Rp 15.547/person/month, while the WTP for tourists is Rp 12.030/person/one time entry. Meanwhile TEWS management WTP obtained Rp 12,174/person/month. Furthermore, WTP for the management of coastal protection vegetation is Rp 12.444/person/month. The WTP value describes the awareness, willingness of the community and tourists to minimize the risk of a tsunami disaster in the marine tourism environment. In addition, the development of the three types of tsunami disaster mitigation is expected to protect and provide a sense of security in the marine tourism environment of Kalianda District from tsunamis that may occur in the future.

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