

STUDY OF CLAIMS FOR COMPENSATION OF DAMAGE TO CORAL REEF ECOSYSTEM DUE TO VESSEL GROUNDED IN THE WATERS AREA OF CILIK ISLAND, KARIMUNJAWA SUBDISTRICT, JEPARA REGENCY, CENTRAL JAVA PROVINCE

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Abstract: The purpose of this research is to conduct a claim of compensation claim for damage to the coral reef ecosystem as a vessel grounded in the waters of Cilik island, Karimunjawa Subdistrict, Jepara Regency, Central Java Province. The research method of this study conducted using survey and case of study. The analyses used by this study was economic valuation of ecosystem services loss, cost of coral reef restoration and cost of verification and dispute resolution. The result of this study showed that the total claim of compensation amounted IDR 3,067,031,155.96 (USD 227,466.52) for compensating the area of coral reef damage 111.69 square meters, i.e. IDR 635,525,318.46 for losing of coral reef ecosystem services, IDR 2,181,505,837.50 for cost of coral reef restoration, and IDR 250,000,000.00 for verification and dispute resettlement cost. This claim of compensation delivered as an effort to force the responsibility of the vessel owner and to restore the area of coral reef damage in the future.

Keywords: compensation; vessel grounded; coral reef.

1. INTRODUCTION

The fisheries, tourism and marine transportation sectors are a main prime mover of ocean economic in Indonesia (Wahyudin, 2016). Based on Wahyudin (2015) stated that 40 percent over the world vessel through Indonesian waters to passed in and out Indian Ocean waters and South Chinese Seas or Pacific Ocean. As a biggest archipelagic country in the world, Indonesia set up their policy to manage their coastal and marine properly in order to push national growth based on this coastal and marine resources (Wahyudin & Mahipal, 2013).

Karimunjawa islands are currently also depended on this coastal and marine resources, so that this ocean sector was being promoted in this region to become their main sources development. The presence of these three sub-sectors has opened up new economic opportunities that have developed and had a double effect on the regional economy of Jepara Regency. One of the capital resources of the marine sector is the existence of coastal and marine ecosystems, including coral reef ecosystems.

The existence of coral reef ecosystems in the waters of the Karimunjawa islands has brought

significant benefits to the people of Jepara Regency, especially those located in Karimunjawa Subdistrict. The coral reef ecosystem has become a fishing ground as well as a snorkeling and diving spot. Both of these activities certainly open up economic potential opportunities for fishermen and coastal communities and in turn are able to contribute to the regional income of Jepara Regency and Central Java Province.

Cilik island's waters which are the center of the incident site are one of the fishing ground that are quite attractive to fishermen and where the vessel grounded was one of the attractions of diving. The wreckage of the Barge in the waters of Cilik Island, Karimunjawa Subdistrict, Jepara Regency, Central Java Province has caused detrimental damage to the coral reef ecosystem. Even though the total area of the affected coral reef ecosystem was only 111.69 square meters, it still has an impact on the local area in particular and in general Jepara Regency and Central Java Province.

This incident has resulted in the loss of ecosystem services that can be provided by coral reef ecosystems. This incident also had a direct impact on the loss of opportunities for fishermen to get catches around the location, so they had to find another fishing ground to catch fish and this of course affected the extraction costs of fishermen. Other impacts, of course, are related to the cost of restoring coral reef ecosystems that have been in the location for tens or hundreds of years, besides the cost of consequences that must be incurred for efforts to respond to this damage. Therefore, it is important to take into account all losses incurred by the incident, so as to obtain a detailed picture of how much loss claim must be borne by the owner of the barge. The purpose of this research is to conduct a claim of compensation claim for damage to the coral reef ecosystem as a vessel grounded in the waters of Cilik island, Karimunjawa Subdistrict, Jepara Regency, Central Java Province.

2. METHODS

The research method used in this study is a case study, by taking location in Karimunjawa Subdistrict, Jepara Regency, Central Java Province. The use of the case study method in this study was chosen as an effort to make observations in more detail about some of the phenomena that became the scope of this study. Case studies are very useful as a method for uncovering, exploring and reviewing and measuring several instruments that can strengthen the conclusions and recommendations for greater research in the future.

Data collection was carried out on 11-15 September 2017. The implementation of data and information surveys to support the process of calculating the value of damage to coral reef ecosystems in several areas of fisherman concentration, namely around fishing settlements and around tourist areas aimed at fishermen operating in waters around the scene. The data and information survey was also carried out in the tourist area around the incident to see a picture of snorkeling and diving tours to enjoy the attractions of coral reef ecosystems and will be a closer and significant comparative value for the value of tourism in a coral reef ecosystem-based tourism area.

All the data and information would be analyzed using economic valuation techniques of coral reef ecosystem services, analysis of reef ecosystem restoration costs, direct community analysis,

and cost analysis of verification and dispute resolution (Mahipal & Wahyudin, 2019). The economic valuation of ecosystem services is approached using the total economic value approach to ecosystem services based on the approach of de Groot et al. (2002). Mathematically can be denoted as follows:

$$TEV = EcolV + SV + EconV$$

Several analytical techniques used in the economic valuation of ecosystem services including: (i) *Effect on productivity* – EOP, (ii) *Contingent valuation method* – CVM; (iii) *Travel cost method* – TCM, (iv) *Replacement cost method* – RCM, and (v) *Benefit transfer method* – BTM (Adrianto et al., 2004; Adrianto, 2006; Wahyudin, 2007; Wahyudin, 2013; Wahyudin et al., 2016a; Wahyudin et al., 2016b; Wahyudin, 2017; Wahyudin et al., 2018).

Cost of recovery (restoration) can be calculated by identifying the overall costs required to carry out coral transplantation, starting from preparation of materials and human resources, making transplanted modules, mobilizing modules and human resources, decreasing modules, diving for module structuring, donor search and transplants, initial monitoring, replanting and growth monitoring, and so on until the coral reef ecosystem returns to normal (Mahipal & Wahyudin, 2019).

The direct impact of the community is usually related to fisheries and tourism activities. Analysis of the loss of these two activities can be done based on an increase in extraction costs or transportation and derivative costs due to the search for new locations for fishing ground and diving spots. This cost calculation is usually a deduction factor towards the profit that should be received due to the swelling operational costs that must be incurred (Mahipal & Wahyudin, 2019).

Losses for verification costs for coral damage and dispute resolution. These costs typically include: field verification (including provision of facilities, infrastructure, accommodation, logistics, etc.), laboratory analysis, expertise and supervision of the implementation of environmental loss payments (Mahipal & Wahyudin, 2019).

Total claims for compensation for damage to coral reef ecosystems are calculated based on overall costs incurred, i.e. (i) the value of lost coral reef ecosystem services (ESL), (ii) the cost of restoring (restoring) coral ecosystems (RIC), (iii) the value the direct impact of fisheries (DIL), and (iv) operational costs of verification and resolution of environmental disputes (TRC). Mathematically can be denoted as follows:

$$TC = ESL + RIC + DIL + TRC$$

3. RESULTS AND DISCUSSION

Results

Based on the Millennium Ecosystem Assessment - MEA (2003), ecosystem services are derived into 31 types of services. Not all types of services derived from MEA can be provided by

coral reef ecosystems. And not all types of services that are able to be provided by coral reef ecosystems can be calculated directly with some general valuation techniques that have been agreed globally. Therefore, in determining the value of these ecosystem services, benefit transfer techniques are used. Coral reef ecosystems that are used as a reference for calculation activities that have been justified with local values. The types of coral reef ecosystem services and valuation techniques used can at least be shown by Table 1 below.

Table 1 Types of goods and services provided by coral reef ecosystem, valuation techniques and the value of ecosystem services

Services of Ecosystem Functions	Goods and Services	Valuation Techniques	Values (IDR m ⁻¹ yr ⁻¹)
Provisioning services	Food	EOP	55457.98*
	Raw materials	BTM	42,460.73**
	Genetic resources	BTM	63,774.16**
	Artificial resources	BTM	364.95***
Regulating services	Erosion Control	BTM	295,708.12***
	Climate Regulation	BTM	2,292.88**
	Waste Treatment	BTM	164.05**
	Biological Control	BTM	15.20**
	Disturbance Regulation	BTM	32,793.20**
Cultural services	Inspiration for culture and art	BTM	63.92***
	Education	BTM	10,000*
	Aesthetic information	BTM	4,429.79***
	Cognitive development	CVM	49.71***
	Heritage services	BTM	24,192.97**
	Recreation	TCM	1612.43*
Supporting services	Primary productivity	BTM	31,285.84**
	Ecosystem function	BTM	3,833.27***
	Nursery function	BTM	490.80***
Value of Coral Reef Ecosystem			568,989.00

Sources: *Primary data (analysed September, 2017); **Costanza et al., 2014 (analysed September 2017); ***de Groot et al., 2002 (analysed September 2017).

Note: EOP (effect on production), BTM (benefit transfer method), TCM (travel cost method), CVM (contingent valuation method).

Coral reefs around the National Karimunjawa Park, according to experts, are predicted to require a growth period of 10 years, given the relatively good condition of the surrounding waters, so that coral growth is slightly optimal. Therefore, the ecosystem function is predicted to continue to not provide ecosystem services for 10 years, so the estimated loss of ecosystem services can reach IDR 568,989.00 per square meter. Thus, the loss of coral ecosystem services for an area of 111.69 square meters affected by the damage can be estimated at IDR 635,525,318.46.

Recovery costs are needed to accelerate the recovery process of coral reef damage to approach the initial conditions before the damage. The coral reef itself has a relatively old age even to reach the best conditions takes hundreds or even thousands of years. The expected outcome of this activity is the recovery of coral reef damage that is appropriate to the characteristics of environmental damage that

occurs. This series of recovery activities usually includes a variety of activities, including:

- (i) Identification of damage to coastal ecosystems (coral reefs) that occur
- (ii) Coordination with government and community groups concerned about the environment
- (iii) Recovery of coral reef damage
- (iv) Implementation of coral reef rehabilitation / planting activities
- (v) Monitoring the implementation of activities.

Successful recovery of damage to coral reef ecosystems will provide benefits for various parties involved, including: local governments, local communities and visitors to the area. Methods that can be used in efforts to restore damage to coral reef coastal ecosystems include planting and transplanting through the use of iron frames and nets as substrate sites and involving local communities. In addition to carrying out restoration activities, monitoring and patching of transplants are also carried out during the growing period which generally takes 10-15 years. The whole activity certainly requires no small amount of funding and requires effort that is not easy.

The cost of recovery (restoration) is calculated by identifying the overall costs required for coral transplantation, from materials and human resources preparation, transplant module modulation, module mobilization and human resources, module downgrades, module layout, donor search and transplants, preliminary monitoring, embroidery and growth monitoring, and so on until the coral reef ecosystem again as usual. This vessel grounded on coral reef 111.69 meter square in the water of Cilik island, Karimunjawa islands, Jepara Regency, Central Java Province estimated need the cost IDR 2,181,505,837.50 for restoring coral reef in the 10 year (Directorate of Law Enforcement Ministry of Environment and Forestry, 2019).

The operational costs of verification and resolution of disputes as an institutional response to the damage caused to date are estimated at around IDR 250 million (Directorate of Law Enforcement Ministry of Environment and Forestry, 2019). This value is believed to be greater if several coordination meetings and other related costs have to be carried out as an effort to resolve this environmental dispute.

Costanza et al. (1997) states that the value of ecosystem services that can be calculated can be considered as a minimum value, because the calculation techniques used are still limited, so the development of calculation science and technology is predicted to change with time and place. Therefore, based on the calculation of compensation for damage to coral reef ecosystems due to the barge incident, the minimum loss that can be claimed is IDR 3,067,031,155.96 or equivalent to USD 227,466.52 based on the assumption of a world spot price of 1 USD equal to IDR 13,483.44 (as of October 6, 2017) or in other words, with an area of damage reaching 111.69 square meters, the value of compensation claims for damage to the coral reef ecosystem due to the incident of the barge is USD 851.26 per square meter (Directorate of Law Enforcement Ministry of Environment and Forestry, 2019). Table 2 below is a summary of the total claim for damage to coral reef ecosystems due to the wreckage in the water of Cilik island, Karimunjawa islands, Jepara Regency, Central Java Province.

Table 2 Summary of total claims for compensation for damage to coral reef ecosystems due to the wrecking in the water of Cilik island, Karimunjawa islands, Jepara Regency, Central Java Province

Nr	Component Claims	Values (IDR)
1	Ecosystem services	635,525,318.46
2	Restoration	2,181,505,837.50
3	Verification and dispute resettlement cost	250,000,000.00
Total Claims		3,067,031,155.96

Discussion

As stated earlier, ecological, social and economic losses due to damage to coral reef ecosystems in the waters of Cilik Island, Karimunjawa Subdistrict, Jepara Regency, Central Java Province use a minimum scenario, so the minimum scenario becomes more appropriate to illustrate how important the value of Indonesia's coral reef ecosystems is. The value of USD 851.26 per square meter is still below the claim compensation case in the Florida Keys National Marine Sanctuary which is a court decision for damage that has occurred and is a willingness to pay forced by the court to pay to the coral destroyer, amounting to USD 7,490 per square meter.

As mentioned Wahyudin & Mahipal (2020) that the vessel grounded on coral reef in Indonesia often happened due to too many vessels from over the world and domestic using international sea lane and domestic sea lane as their transportation media. Directorate Law Enforcement Ministry of Environment and Forestry reported that more than twenty cases of vessel grounded in Indonesia, but only 12 cases have been settled, with in average value of loss IDR 0.36 million per meter squares per year and the range value of loss IDR 0.12-.83 million per meter squares per year. Those value range estimated based four classification of coral reef ecosystem services and still higher than a few of references due to the differences of calculating method, the quality of coral reef, the distances from nearest coastline, the year, and other differences coral reef social ecological system (Wahyudin & Mahipal, 2020).

As another comparison in the context of the policies that have been implemented by the US government of the State of Mariana (Nineteenth Northern Marianas Commonwealth Legislature, 2016), the damage to ecosystem damage charged to the destroyer consists of at least USD 1000 per square meter to a maximum of USD 3000 per square meter . The following are the rules for the cost of replacing damages in Mariana, including: (i) a coral reef ecosystem loss penalty of USD 1000 per square meter, (ii) additional fines for loss of coral reef ecosystems due to massive damage or more than 100 square meters in the amount of USD 1000 per square meter, and (iii) additional fines if the affected coral reef ecosystem is a conservation area and or which has a unique biodiversity of USD 1000 per square meter. So that the compensation value that must be charged to coral reef destroyers reaches USD 1000-3000 per square meter. This means that the compensation value reaches USD 851.26 per square meter for damage to coral reefs in this study location is still relevant, because Indonesian coral reefs have biodiversity and quality that is far better than those owned by the state.

4. CONCLUSION

The barge incident has caused damage to the coral reef ecosystem which is very detrimental. The results of the study showed that the damage to the coral reef ecosystem reached 111.69 square meters, so the compensation claim that should be submitted was USD 227,466.52 or IDR 3,067,031,155.96. This value is still a minimum value that can be submitted based on the results of this study. Therefore, it is recommended that national policy continue to use this minimum number as a formal claim submitted to the party that did damage to the coral reef, the owner of the Barge.

ACKNOWLEDGMENT

Thank you to the Directorate General of Law Enforcement of the Ministry of Environment and Forestry, particularly the Directorate of Environmental Dispute Resolution which has involved the author in various resolutions of environmental dispute cases in Indonesia. Very much thank you also conveyed to Muhammad Nur Arkham, Septa Riadi, Muhammad Reza Pahlevi, and Esza Cahya Dewantara, who has been assisting and supporting all the works of the authors continuously.

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