

Analysis of Environmental Degradation Management System in East Coast Pangandaran Village, West Java

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Keywords: Environmental Degradation, Management System, East Coast Pangandaran, West Java.

Abstract: This study aims to analyze the potential economic losses, environmental losses, and social losses due to pollution dynamics on the coast of Pangandaran Village, West Java. Factors assessed included capital requirements, operational costs, economic impacts (related to income and employment), potential environmental losses (coastal pollution, coral reef degradation, and coastal sedimentation), and potential coastal environmental impacts (coastal protection, coastal biota, and tourist area aesthetics). Observations and measurements were conducted along the coast of Pangandaran Village East Beach during April 2024 with a target population of the community and hotel managers, restaurant managers, and grocery stall managers. The data obtained were analyzed descriptively. The results of the study showed that most respondents expressed the need for additional capital and operational costs to improve the quality of their work. Meanwhile, potential environmental impacts such as coastal pollution and coral reef damage have become major concerns. Socially, the majority of respondents were concerned about lifestyle changes and economic changes that could affect the lives of local people.

1 INTRODUCTION

Waste is one of the things that can threaten the condition of the aquatic environment not only for marine biota but also affect the aesthetics of the coastal environment. According to Law No. 18 of 2008 concerning Waste Management, it is stated that waste is the residue of daily human activities and / or natural processes in solid form. Garbage in the waters if left and piled up continuously will cause pollution of the marine environment. Marine pollution is the entry or inclusion of living things, substances, energy, and/or other components into the marine environment by human activities so that the quality drops to a certain level that causes the marine environment to no longer comply with quality standards and/or functions.

The problem of marine debris is becoming more unstoppable by the day. This has caused tremendous damage to marine life. According to Law No. 19 of 1999 concerning the Control of Marine Pollution and / or Destruction, it is explained that

marine destruction is an action that causes direct or indirect changes to its physical and / or biological properties that exceed the standard criteria for marine damage. Pollutants including chemical particles, industrial waste, agricultural and residential waste, which enter the sea have various impacts. Discarded plastic waste floats and settles in the ocean. In addition to polluting the ocean, marine debris will eventually be consumed and poison marine animals. Take plastic waste as an example. Plastic is a synthetic organic polymer (Yuliadi, et al., 2017). The light, strong and durable character of plastic makes it widely used for making various kinds of products, especially packaging products. The mass of plastic in the ocean is estimated to accumulate up to one hundred million metric tons. This condition is very bad, and it is very difficult to be decomposed by bacteria. The source of plastic waste in the ocean also comes from fishing nets that are intentionally discarded or left on the seabed.

Pangandaran Regency is one of the districts with an average economic growth of 4.4%, exceeding the

average district economic growth in West Java Province, which is 4.06%. This indicates that tourism in Pangandaran Regency continues to grow and has the potential to become even more advanced considering that there is still a lot of potential that has not been developed. However, the increasing economic activities in the tourism area in Pangandaran Regency will have a negative impact on Pangandaran's coastal ecosystem if it is managed conventionally and unsustainably.

Pangandaran's East Coast is the most beautiful part of Pangandaran's tourist attraction. But in the block beside the Pananjung nature reserve, the once clean white sand is now littered with trash. The white sand on Pangandaran's east coast is now filled with fishing boats. In addition, there is a lot of domestic and organic waste on the coastal edge. Based on the data above, there are various types of waste scattered on Pangandaran's East Coast, ranging from recycled plastic waste, plant residues, twigs, residual plastic, paper, coconut shells, noppies and so on.

The condition of Pangandaran East Beach is filled with fishing boats and a lot of scattered garbage. Trash that pollutes Pangandaran beach not only comes from plastic waste washed up on the beach, but also from communities and supporting industries that do not comply with plastic waste handling regulations. This not only endangers marine biota but also threatens tourism potential. Beach pollution can result in a decrease in aesthetic value and discourage beachgoers. In addition, plastic waste can be converted into smaller sizes (micro plastics) that fish can eat. This can lead to humans consuming fish that have eaten micro plastics. If this situation continues, it will threaten the sustainability of marine biota, public health, and hamper the development of tourism in Pangandaran Regency.

2 RESEARCH METHOD

The research was conducted on the East Coast of Pangandaran Village from April to August 2024. The study population was the community and service managers around the East Beach.

The research sample was 10 family heads, 10 hotel service providers around the beach, 5 restaurant owners around the beach, and 5 grocery stall owners around the beach. Data were collected using observation techniques as well as other primary data sources using questionnaires. Data were analyzed using qualitative methods.

3 RESULTS AND DISCUSSION

Pangandaran Regency is a regency located in West Java Province, Indonesia. Pangandaran Regency has an area of approximately 1,011.04 km. Pangandaran Regency is bordered by Ciamis Regency to the north, Cilacap Regency (Central Java Province) to the east, the Indian Ocean to the south, and Tasikmalaya Regency to the west. Pangandaran Regency is located at the southeastern tip of West Java Province, bordering Central Java Province to the east. This regency is the result of the expansion of Ciamis Regency and has its capital in Parigi.

Pangandaran Village is one of the villages in Pangandaran Regency that borders Pananjung Village and Babakan Village. The physical condition of Pangandaran East Beach has waves that are not as big as the waves on Pananjung West Beach. This zone can also be called a fishing zone because next to the Nature Reserve there are many fishing boats that lean there and there are also fishermen who sell their catches directly near the inn.

The East Coast has abrasion barriers such as piles of rocks on the beach. According to the fishermen there, the garbage comes from the river that empties into the sea. When the garbage is in the sea, it is also tossed by the waves so that it can reach the coast. The garbage that is brought from the surrounding rivers is in the form of bamboo sticks, plastic waste and other garbage.

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3.1 Potential of Economic Losses

3.1.1 Need for Capital

Based on data obtained in the field, according to respondents, 6 people or 60% of respondents stated that they need capital to support and develop the work they are currently doing, most of these respondents said that if they were given capital they would add facilities and add equipment that would facilitate their work. A total of 4 people or 40% of respondents stated that they did not need capital for the work they were currently doing. They argue that it is better for the

capital to be diverted into skills training or empowerment that may be carried out by the government or investors who want to provide capital. Capital is needed to develop and add to the facilities owned (Lubis, 2014). This is in accordance with this study which explains that most respondents by 60% said they needed capital to add facilities that would facilitate the work they did.

3.1.2 Operational and Maintenance Costs

Based on data obtained from the field, according to respondents, 90% of respondents stated that they need operational costs in the work they do every day. According to statements from respondents, most of them said that the operational costs were used for transportation such as buying gasoline and food, in addition, some respondents said that operational costs would only be incurred if the available facilities needed maintenance or repair, and some others said that the operational costs incurred were only to pay cleaning fees paid to related parties.

10% of respondents stated that they did not need capital for the work they were currently doing, this was because the work they were doing did not require operational costs. According to these (Hidayat, 2011), states that operational costs are needed for various community needs around the Kuala Langsaport beach. These costs include transportation costs, or for preservation techniques (Hidayat, 2011). This is in accordance with this study which explains that 90% of respondents have operational costs with their respective needs. These needs include transportation costs or cleaning money.

3.2 Potential of Environmental Harm

3.2.1 Pollution

Based on data obtained in the field, 8 people or 80% of respondents stated that pollution of Pangandaran East Beach comes from the Citanduy River. The pollution of Pangandaran East Beach is caused by garbage from the river that is carried by the waves. One of the causes of pollution is Pecu Factory waste from the coconut milk factory. The pollution of East Beach is exacerbated in the event of flooding because waste from the river in the form of large logs, mattresses, bamboo, plastic waste, etc. are carried by the waves to Pangandaran East Beach.

10% of respondents stated that the pollution of East Beach comes from the sea. Meanwhile, as many as 10% of respondents stated that East Beach pollution comes from household waste from the surrounding

community. Indiscriminate waste disposal will have a direct impact on the cleanliness and health of the surrounding environment. during the rainy season, garbage will enter the water body so that the river water discharge increases, this condition results in the drifting of the garbage, the drifting garbage will be carried towards the river mouth and finally to the sea (Alfan, et al., 2021; Elyazar, et al., 2021). This is in accordance with research that explains that garbage and waste from rivers are the biggest contributing factors to pollution in the sea.

3.2.2 Coral Damage

Based on data obtained in the field, as many as 40% of respondents stated that coral reefs on the east coast still exist, but their condition is damaged. in the past, many were used as crafts, but now it is prohibited. Usually damaged coral reefs are on the coast, but those in the middle of the sea are still quite safe. Damage to coral reefs on the East Coast was caused by the bombing of Viking ships.

40% of respondents stated that the coral reefs on the East Coast were still good. Coral reefs on the East Coast that are still classified as in good condition are near the middle of the sea and near the nature reserve.

The condition of coral reefs near the nature reserve is still well maintained because it is one of the snorkeling spots. 10% of respondents stated that it was still good, but some were in a damaged condition. Meanwhile, as many as 10% of respondents stated that they did not know. Pangandaran Regency has a variety of coral reefs, such as *Goniastrea retiformis*, *G. favulus*, *G. aspera*, *G. pectinata*, *Platygyra pini*, *P. lamellina*, *Montastrea cur. lamellina*, *Montastrea curta*, *M. annuligera*, *M. magnolia stellata*, *Leptastrea transversa*, *Cyphastrea serailia*, *C. Chaldium*, *Echinopora lamellose*, *E. gemmacea*, and *E. Hirsutissima* (Yuliadi, et al., 2017). However, the existence of these coral reefs has been damaged due to the activities of fishermen, tourists, and nature. This will certainly have an impact on the economy of the Pangandaran Regency community. This is in accordance with research that in Pangandaran there are coral reefs, but their condition has been damaged mainly due to human activities.

3.2.3 Sediment Traps

Based on the data obtained in the field, 40% of respondents stated that there are sediment traps on the East Coast but only a few and their conditions need to be improved to be equalized with roads and garbage will not get stuck. 50% of respondents stated that there were no sediment traps on the East Coast. Meanwhile,

10% of respondents stated that they did not know about sediment traps. Pangandaran East Beach does not have sediment traps because Pangandaran East Beach is located in the southern sea of Java Island, which has characteristics of abrasion rates greater than sedimentation rates [6], which states that the south coast experiences more abrasion and has deeper water characteristics because it borders the Indonesian Ocean which has larger currents and waves than the Java Sea (Lestari, et al., 2023).

3.3 Potential of Social Harm

3.3.1 Change in Culture of Life

Based on the data obtained in the field, 30% of respondents stated that they agreed to changes in the culture of life such as changing the tourist village in Pangandaran Village into an Industrial City. In the data above, respondents who agreed reasoned that changing the tourist village into an industrial city could be an economic expansion because the average young generation in Pangandaran Village migrates out of town to find work. Based on the data obtained in the field, 60% of respondents stated that they did not agree with the change in the culture of life to turn Pangandaran Village into an Industrial City because there were respondents who were not too interested in becoming laborers, there were also respondents who thought that if Pangandaran Village was established as an Industrial City, pollution in the sea would increase continuously because the waste produced by the industry would definitely be flowed into the sea, and there were respondents who thought they agreed if Pangandaran Regency was made an Industrial City but not Pangandaran Village which was made an Industrial City because if Pangandaran Village was made an Industrial City it would damage the environment.

Based on data in the field, as many as 10% of respondents stated that it is good if Pangandaran Village is used as an industrial city when viewed from an economic point of view, but when viewed from an environmental point of view they disagree because it can damage the environment. This is in line with the respondents' opinion that most of them do not agree with the change in living culture that turns Pangandaran Village into an Industrial City which will certainly damage the environment and pollute the sea because the flowing waste will end up in the sea.

3.3.2 Social Jealousy

Based on data obtained in the field, as many as 70% of

respondents said they experienced social jealousy because there were differences in treatment between fishermen on the East Coast who were too criticized while on the West Coast they were not, then in the past there had also been conflicts due to social jealousy but now they are not. Based on data obtained from the field, as many as 3 people or 30% of respondents stated that they did not experience social jealousy because of the symbiotic mutualism between hotel guests and fishermen, many hotel guests buy seafood directly from fishermen.

According to research conducted by Antony [8], it is possible for fishermen to experience social jealousy due to differences in fishing catches, differences in fishing gear to differences in buying and selling prices. This is also in accordance with the research where among fishermen around the coast there is also still social jealousy.

3.4 Potential Economic Impact Analysis

3.4.1 Impact Analysis of Increased Community Income

Based on data obtained from the field, 40% of respondents stated that capital can increase income, according to them capital can increase income but there are factors that influence it such as the number of fish catches for fishermen and tourists/local people for traders. A total of 6 people or 60% of respondents stated that capital had no effect on increasing income, according to them capital had no significant effect on increasing income because the most influential factor in increasing income was the quality of human resources of the Pangandaran community. In addition, there is a government policy that burdens people who work as pedicab drivers in the pangandaran area, the policy is an increase in parking fees of Rp.1,000,000 / month, so that additional capital to pedicab drivers has no effect on increasing their income because this additional capital will only be allocated to the parking policy. In the tourism sector, this additional capital also has less significant impact on increasing income because income in the tourism sector is more dependent on the tourist factor, usually tourism sector income increases on long holidays such as Eid holidays or New Year holidays because many tourists come to vacation in Pangandaran Village.

According to research conducted by Kain (Kain, 2023), working capital has a positive and significant effect on income in the trade sector, this is in accordance with this study in which respondents who are traders say that capital has an effect on increasing

income. The capital has a negative and significant effect on fishermen's income and catches have a positive and significant effect on fishermen's income, this is in accordance with this study in which respondents with fishermen's livelihoods said that the factor of increasing fishermen's income depends on fish catches, while capital has no significant effect on increasing fishermen's income.

3.4.2 Analysis of Job Improvement in the Informal Sector

Based on data obtained from the field, as many as 30% of respondents stated that they did not know that operational costs had an effect on improving employment. 20% of respondents stated that they agreed that operational costs had an effect on improving employment, they said. 50% of respondents stated that they disagreed that operational costs had an effect on improving employment.

3.5 Potential Environmental Impacts

3.5.1 Protection of Beaches and Coastal Biota

Based on data obtained from the field, according to respondents, 60% of respondents said that the protection of beaches and coastal biota was still quite good. According to statements from respondents, the east coast of Pangandaran is still maintained because people still care about doing attitudes such as catching fish in traditional ways so that coastal biota can be well protected. In addition, the east coast is still protected because it is more natural than the west coast of Pangandaran.

Then, as many as 30% said that the protection of biota and the east coast of Pangandaran was still somewhat lacking because the government was negligent and less careful in determining the recipients of assistance in cultivation efforts, fish development, and marine natural resources so that many irresponsible actors used the opportunity to enrich themselves. Basically nature has provided an effective natural coastal protection mechanism, namely sand beaches whose sand beds function as effective wave energy destroyers and sand dunes which are sand reserves that also function as seawalls (Kain, 2023).

3.5.2 Improve Area Aesthetics

Based on data obtained from the field, according to respondents, four respondents or 40% said that the

east coast can still increase the aesthetic value of the area. The existence of sediment traps can certainly support the aesthetics of the beach. In addition, sediment traps found on the beach can also support the improvement of beach aesthetics. Then, as many as 20% said that the east coast could not increase the aesthetic value of the area. With the sediment trap, the community considered that it would make a lot of garbage accumulate and be buried there. Finally, four respondents said that they did not understand or even know about the increase in the aesthetic value of the east coast of Pangandaran. They do not understand the effect of this sediment trap to increase the aesthetic value of the pangandaran beach area. Sedimentation itself, which is meant to affect the aesthetics of the beach, is the deposition of rock material that is transported by water or wind power and deposited when the strength of the water weakens or stops (Elyazar, et al., 2021).

3.6 Potential Social Impact

3.6.1 Absorption of Labor

Based on data obtained in the field, according to respondents, as many as 100% of respondents stated that the absorption of labor or most of the people on the east coast of Pangandaran work as fishermen and traders. According to the respondents' statements, as many as 7 out of 10 people said that they did not agree if the east coast of Pangandaran would be made an industrial area and they would continue to work according to their current jobs, most of whom are fishermen and traders. The reason for the statement above is that they consider the east coast area not suitable if it is made an industrial area because it can damage the sea area around the east coast and may change the culture here. While 3 out of 10 other respondents agree if the east coast of Pangandaran is made an industrial area because it can open up new jobs so that the younger generation in Pangandaran gets better jobs.

According to research conducted by Marceilla Hidayat (Hidayat, 2011), the absorption of labor in the Meranti Islands area is mostly fishermen and fisheries cultivation. This is in accordance with this study which explains that on the east coast of Pangandaran, the average person has a job as a fisherman.

3.6.2 Marine Tourism Destinations

Based on data obtained in the field, according to respondents, 100% of respondents stated that the east coast of Pangandaran is still a marine tourism

destination, this is because there are water rides that attract tourists to come to the east coast. Although one respondent said that the east coast is the second choice for marine tourism destinations after the west coast. According to research conducted by Marceilla Hidayat (Hidayat, 2011), Pangandaran beach tourism still has the potential to become a leading tourist destination in West Java. This is in accordance with this study which explains that the east coast of Pangandaran is still a marine tourism destination.

4 CONCLUSION

The results of the study show that first, in general in the economic sector, people still need capital to facilitate their work and require daily operational and maintenance costs. Although capital is increased, the majority of respondents think that capital does not affect income increases but rather many other factors such as human resources, government policies, and tourists. In addition, the majority of respondents also said that operational costs do not affect job improvements.

Second, from the environmental field, the east coast of Pangandaran is still polluted by garbage and waste. This pollution has caused many coral reefs to die. In addition, many people are still unaware of sediment traps because the coast tends to abrasion. Although the east coast is polluted, in fact many people consider the conditions to be still good and can increase the aesthetic value of the area.

Lastly, from the social field, the majority of respondents rejected Pangandaran village as an industrial village because Pangandaran village is a tourist village. In terms of social jealousy, respondents admitted to being jealous of fishermen in the west and east of Pangandaran. So that in terms of the potential social impact on the community, almost the majority said they did not agree because if Pangandaran city was made an industrial city, it could damage the environment and the east coast of Pangandaran is still worthy of being a marine tourism destination.

ACKNOWLEDGMENTS

Thanks to the Chancellor of Jakarta State University and the Dean of the Faculty of Social Sciences and Law and the Dean's staff who helped fund the research in the field data collection aspect.

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