

UNRAVELING THE SURVIVAL STRATEGIES OF FISHING COMMUNITIES AGAINST NICKEL FACTORY WASTE IMPACTS (CASE STUDY OF FISHERMEN OF PAJUKUKANG, BANTAENG REGENCY)

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Abstract

The disposal of nickel waste poses significant challenges to the livelihoods and survival of fishermen who rely on healthy aquatic ecosystems for their sustenance. This research aims to provide an overview of the strategies employed by fishermen of Pajukukang to mitigate the adverse effects of nickel waste on their fishing activities and to ensure their survival amidst this environmental challenge. This is a qualitative study using a case study approach. In addition, data collection techniques were collected through observation, interviews, and documentation. The informants are Punggawa and Sawi. This study uses the Miles and Huberman data analysis technique, consisting of data reduction, data display, and conclusions drawing. The result of this study reveals that there are some strategies that are implmented by the fishermen to overcome the impacts of the waste such as collecting shells, selling their land and farms, fishing farther from usual area, working in a company and harvesting seaweed.

Keywords: Bantaeng, Fishermen, Nickel, Strategy

1. INTRODUCTION

One of the south coasts of Sulawesi Island with a sizable area is the Bantaeng Regency. With a beach that stretches 27.5 kilometers from east to west, it has a 395.83 km² area. The potential for marine life, particularly the growth of grass sea, is along the coast. The total area of seaweed agriculture, which stretches from the shore to the sea Flores, totals 875 hectares. A district with potential for providing raw resources for industries is Bantaeng Regency (Saleh 2019). Most of the people in Bantaeng is a fisherman due to the regency

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is nearby the sea. Geographically, fishing communities are people who live, grow and develop in coastal areas, namely a transition area between land and sea areas (Saleh 2006). Fisherman is a living community groups relying directly on seafood, either by fishing or cultivation. They generally live at the seaside, a residential area close to the activity location (Saleh 2006).

Pajukukang is a sub-district in Bantaeng Regency, South Sulawesi, Indonesia. The area of Pajukukang District is 48.9 km². The Pajukukang District is situated close to the coast. Since 1987, seaweed has been grown in Pajukukang District, Bantaeng Regency, and there is still a high demand for it now. The most recent development has taken center stage in the Pajukukang District's coastal residents' livelihood activities. For the simple reason that seaweed farming has a high selling value and a quick planting time, a great number of fisherman have changed careers to become seaweed farmers and even make it their primary source of income (Rahim dkk., 2022). Besides that, in Pajukukang, there are fisherman that is still relying on fishing as their main job.

The nickel factory in pajukukang officially operates in 2019. As we know, nickel factory at Pajukukang throws away their wastes at the seas of Pajukukang. Nickel is poisonous, hence its presence in water can have an impact on the survival of biota like fish. The presence of fish and even bodily pollution brought on by heavy metal contamination can have an impact on how safe it is to eat fish (Deni S., et al. 2016). The number of nickel mines that currently dump waste into the ocean is less than 20, but future investment in the Indonesian nickel smelter industry indicates that these projects will be the greatest in the world in terms of waste generation (Morse, 2020). Since the final product is still present after the extraction of the metal, businesses frequently select DSTD (deep-sea tailings disposal) as the most costeffective option (Morse 2020).

Nickel factory effluents can have a significant impact on fishers and the aquatic environment in which they work (Deni S., et al. 2016). Pollution caused by nickel factory waste can result in a decrease in fish populations and species diversity in these waters. Fishermen may experience decreased catches and difficulties in meeting their subsistence needs. This can have an impact on fishermen's income levels and their economic welfare.

This research aims to reveal a unique strategy for the survival of fishermen in the midst of nickel factory waste. By knowing their strategy, we can identify the fishermen ways to provide their daily needs such as their family, food, etc. This also leads to the impact of nickel factory waste towards the fishes at Pajukukang. Furthermore, the income and the number of catches of fishermen will also be discussed.

2. RESEARCH & METHODOLOGY

2.1 Type and Approach of Research Methodology

The research method used in this study is a qualitative method with a case study approach. Qualitative allows researchers or interviewers to gain a deeper understanding of the fishermen's perspectives, experiences and knowledge (Sugiyono 2016). By conducting in-depth interviews, researchers can obtain richer information about the social, economic, and cultural factors that influence the life and work of fishers. This helps in understanding how environmental policies or changes may affect them personally. Case studies allow researchers to gain rich and specific details about the experiences, practices and challenges faced by fishers. The interviewer can ask fishermen to tell specific stories or events that describe their experiences. This helps in understanding the deeper context, the factors influencing decision making, and the impact of certain environmental or policy changes on fishers.

2.2 Location of Research

This research is located Bantaeng Regency, South Sulawesi, Indonesia. Pajukukang is a coastal area that has a great sea potential. It is also a community association for fishermen at Bantaeng.

2.3 Research Subject

Subjects in this study were determined through incidental sampling. Incidental sampling is necessary to collect data from several fisherman encountered accidentally or unexpectedly. The researchers use incidental sampling because of the largescale population of fisherman which can be easily found at the location site.

2.4 Data Collection Method

2.4.1 Interview

The interview aims to achieve direct information and an overview of the strategy of fisherman as well as to describe a certain thing, situation, or condition. The data obtained is highly influenced by the situation or respondent. First, the researchers prepared questions and the necessary tools, such as cameras and tape or voice recorders. This study uses unstructured interviews to provide flexibility for both sides. Researchers can dig up information about the fishermen's strategy through open-ended questions and long responses.

2.4.2 Participant Observation

In participatory observation, researchers are involved in the daily activities of the Pajukukang Fishermen community to observe carefully and thoroughly every strategy and ways. When researchers make observations, they participate in the data sources activity. Through observation, the data obtained is more complete, accurate, and displays a reality. This study aims to describe, develop theories and hypotheses, or test theories and hypotheses. The steps in this observation consist of describing, inputting, and providing generalizable data.

2.4.3 Documentation

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Documents are records of events that could be in various forms, for example, field notes during observations, photos of fishermen, pictures of the surroundings and the sea. This documentation method is efficient as supportive evidence because the documentation can also be quoted, developed, or evaluated from previous research and journals about the fishermen in Pajukukang. It is intended that all the results of the documentation can be collected and processed.

2.5 Data Analysis Technique

2.5.1. Data Reduction

After the data about the Fishermen's strategy is collected, the raw data will be reduced in four ways, such as selection, summarizing, coding, and classifying. The purpose of data reduction itself is to provide a more accurate description and meaning of the Fishermen's strategy, making it easier for researchers to collect data by decreasing redundant data, and allow researchers to obtain the most important elements of data.

2.5.2 Data Display

A collection of information that has been reduced is presented in a concise and digestible form. The evidence shown is only representative proof that has been selected based on relevancy. The presentation of the data must show the main points of the fishermen's strategy to survive the nickel factory waste.

2.5.3 Conclusions Drawing/Verification

Conclusions will be carried out continuously during the research and data collection process in Pajukukang. The conclusion will be confirmed by increasing the data through the verification process. Initial conclusions will be weak due to the lack of data obtained. This summary will gradually become stronger as the data extends.

3. FINDINGS AND DISCUSSION

3.1 General Description of Research Location

Papan Loe Village is a village located in Pajukukang District, Bantaeng Regency, South Sulawesi. The total area of Papan Loe village is 7.35 km² (Mansyur dkk., 2024). The seaweed fishermen in Papan Loe Village are divided into two groups: the upper class 'Punggawa' and the lower class 'Sawi' (Rahim dkk., 2022). On the coast of Papan Roe village, you can see many boats, mainly fishing boats, from fishing boats to seaweed harvesting boats. At the same time, you can see how farmers harvest seaweed and collect the harvest. Harvesting seaweed in Papan Loe village is one of their jobs and income. A Punggawa is defined as someone who has his own capital, owns his own land, and has the idea of renting the labor of others to generate a profit commensurate with his work as a seaweed farmer.

The Sawi themselves are those who are short of labor. It is in the hands of those who are funded or who sell seaweed products to Punggawa at low prices. The division between upper and lower classes is also seen in the number of employees and relatives (Arief, 2019). Algae cultivation in Pajukukang District, Bantaeng province has been practiced since his 1987 and is still popular today. Recent development has become the

main livelihood for the coastal communities of the Pajukukang Regency. This can be seen from the fact that many fishermen have switched to seaweed farming for the simple reason that seaweed farming has high business value and the planting period is short, and seaweed is their main occupation. This concerns that out-of-work fishermen face many difficulties when seaweed exploitation reaches a saturation point (Ikhsans, 2013). Seaweed farmers also face the challenges of weather, equipment damage, and, most difficulty, waste from local nickel companies in their marine aquaculture around Papan Loe village.

3.2 Results Strategies

3.2.1 Collecting Shells

The strategy of a fisherman who earns money by collecting and selling shells on the beach is very important to his success. First, fishermen conduct preliminary research to determine market needs and current shellfish prices. By understanding market trends and demand, you can adjust your sales strategy and determine the right time to sell your catch. Fishermen often work cooperatively in small groups. They form teams and work together to efficiently collect seashells. In this case, employees divide tasks and share knowledge and experience to improve labor productivity and efficiency. Also, use simple tools such as baskets, buckets, and pickaxes to collect shells more efficiently. To support these strategies, fishermen often communicate and collaborate with stakeholders such as local fish markets, restaurants, and shellfish collectors (Imron 2012). They maintain good relationships with potential buyers and are looking for opportunities to sell shellfish directly. Additionally, technology such as social media and online trading platforms can be used to market and sell shellfish products to a wider audience (Dhian Anggraeni et al. 2021)

3.2.2 Selling their Land and Farms

A fisherman's strategy of selling land or livestock for income can be another way of coping with challenges and changes in the fishing industry. Fishermen often face climate change, declining fish stocks, and economic constraints that affect the sustainability of their businesses. Faced with this situation, some fishermen decided to sell all or part of their land and livestock for additional income.

3.2.3 Fishing farther from usual area

Fishermen often face difficult challenges such as industrial pollution of water bodies. An example would be if the sea area they normally use is being polluted by nickel factory activity. In these situations, fishermen need to fish further from their usual fishing grounds to find cleaner, more productive places. Finding enough fish to sell requires sailing a wider area and devoting more time and resources. This not only impacts income, but also poses greater risks and challenges. Nevertheless, the fishermen's tenacity and resilience in dealing with this situation reflects their tenacity in trying to earn a living and meet the needs of their families.

3.2.4 Working at a company

Fishermen may have to look for additional sources of income in addition to their main business. One possible option is to work for a nickel company. These companies allow fishermen to contribute their marine skills and knowledge to the company's operations. They may be part of the Coast Guard, environmental monitoring teams, or even production monitoring teams. Even if it meant quitting their job as a fisherman, working for a nickel company would give them a more stable income. Fishermen can also take advantage of

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additional services such as medical services and training opportunities. While this may not be comparable to the freedom and proximity to the ocean that fishermen have, it provides fishermen working for nickel companies with a more stable income and greater financial security increase.

3.2.5 Harvesting Seaweed

As an additional source of income, fishermen often use seaweed harvesting. We collect high-quality seaweed by making full use of knowledge and technology. Fishermen use simple tools such as knives and scissors to pluck algae from the seabed and collect algae from the surface. The harvested seaweed is sold at local markets or processed into products such as seafood, cosmetics, and organic fertilizers. Harvesting seaweed allows fishermen to take advantage of the natural richness of the ocean and generate significant additional income. In addition, fishermen generally adopt sustainable methods in growing and caring for algae, so this also helps maintain the sustainability of marine ecosystems.

3.3 Discussion Strategies

3.3.1 Collecting Shells

Fishermen often face various obstacles that prevent them from earning an income. One solution they found was doing side jobs like picking up shells on the beach. This promotion is an alternative that can provide additional income. Collecting shells on the beach requires special effort and skill. Fishermen must have knowledge of shellfish habitat, behavior and fishing methods. They mostly use simple tools such as rakes and buckets to dig out shells from sand and rocks. Despite the seemingly simple task, fishermen face many challenges.

"ini ee biasa dipake anu besi penggaruk sama ember untuk gali pasirnya toh baru di kumpul yang bagus bagus kerangna"

"um, this is usually used by an iron rake and a bucket to dig up the sand, but just collect good shells" (translated)

"Iya penghasilannya kita menurun karna anu ka pabrik itu disana jadi mau tidak mau kita harus cari pekerjaan lain"

"Yes, our income has decreased because of the factory there, so like it or not, we have to find another job" (translated)

Picking shells on the shore is hard work and faces many difficulties, but fishermen still do it as a side business to increase their income. This gives them the opportunity to generate the additional income they need for their daily needs and those of their families (Ferina, 2021). Based on Ferina (2021), fishermen often take part-time jobs shelling off the coast to supplement their family income. Collect mussels and sell them at your local market or add them to your family's diet as a protein supplement. This activity helps meet daily economic needs and provides additional opportunities for fishermen to achieve better well-being.

3.3.2 Selling their Land and Farms

Due to the impact of nickel factory waste in Pajukukang, the fishermen's economy is, of course, declining, and fishermen must do something/anticipate this because fishermen need money for their daily needs. One of the fishermen's ways is to sell their land and farms.

Though the main reason why they sold their land is the nickel factory waste, there are a few other reasons, such as economic crisis and urgent needs. Fishers can face serious financial difficulties, such as decreased fish catches, increased operating costs, or changes in the fishing industry that affect their incomes (Andari et., 2018).

Based on Andari dkk., 2018, in the state of as hard as it is now negative impact on life when they depend on the economy from rice fields or from words, their lives. On the other hand, rice farmers had difficulties meeting their needs. This situation eventually increased encouraged them to seek alternative livelihoods that can meet their economic needs she. they sold their paddy fields to the entrepreneur building a factory. They changed after the factory was established, their jobs as factory workers.

In such a situation, selling land can be a quick source of funds to meet their financial needs. Sometimes, there are emergency situations or other urgent needs where fishermen need a large amount of cash quickly. For example, they may need to pay urgent debts, medical expenses, or educational expenses. Selling land can give them quick access to the funds they need. *“Nda ada kayak kebun begitu itupun juga kebun di jual gara gara dia punya anu itu ee yang di dalam pabriknya toh”*

“No farms or lands like that and even then the land is sold because he has ee which is in the factory” (translated)

“kita juga terpaksa menjual sebagian ladangnya kita karna butuh duit untuk kehidupan sehari hari ku”

“In addition, he has no choice but to sell part of the field because he needs money for his daily life” (Translated)

3.3.3 Fishing farther from the usual area

In recent years, many fishermen have decided to venture further from the coast in search of fish. This is caused by several factors that influence the decision. First, due to the increasing disposal of waste from nickel plants in coastal waters, there are nickel companies on the coast, hindering fishermen's fishing and seaweed harvesting activities. As a result, fishermen feel the need to venture further afield to find enough fish and healthy algae to meet their needs (Gaffar, 2023).

According to Gaffar (2023), Nickel factory waste forces fishermen to go out to sea to explore more distant waters. Nickel factory waste pollutes coastal waters and depletes fish stocks. In search of sufficient catches, fishermen are forced to travel farther and face greater challenges and risks. This destroys their traditional livelihoods and negatively impacts the livelihoods of fishermen and the local economy. Serious action is needed to reduce the impact of nickel factory effluents and protect the valuable livelihoods of fishermen.

The road to further voyages is made with state-of-the-art equipment manufactured in-house. For long trips, fishermen often use boats with more powerful engines. Also, they don't use a GPS navigation system to get to their destination, but they already know how to get there. They also used nets and fishing rods suitable for catching fish at greater depths. While there are potential benefits to going out to sea, there are also some negative effects that need to be considered. First, longer voyages increase safety risks for fishermen. In the deep sea, weather conditions become unstable and waves are often high, increasing the chances of vessel accidents. In addition, the longer the voyage, the higher the costs such as

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ship fuel and equipment maintenance. This can reduce the income of fishermen, especially when catches are inadequate. They are forced to sell the land they live on because they are no longer able to continue working as usual and are attracted by rising land prices (Wagiu, 2011).

“caranya toh anu melautnya lebih jauh tapi lebih mahal biayanya bensin toh dan lain lain dan biasanya 2 liter toh pake 4 liter”

“The thing is it's farther to the sea, but it's more expensive, it costs gas, etc., but usually 2 liters will use 4 liters” (translated)

“disini dekat sini ee sudah tercemar sama limbahnya itu pabrik ka jadi mau tidak mau kita harus pergi jauh sana”

“It's already polluted with garbage here and here, it's a factory, so whether you like it or not, you have to go far” (Translated)

Overall, the fishermen's decision to move further offshore was a result of dumping nickel factory waste into coastal waters and a desire to find more fish stocks (Rahmasari, 2017). There are benefits, such as finding more fish, but there are also safety risks and negative environmental impacts to consider. It is therefore important to take sustainable approaches to fishing in more distant waters to maintain the balance of marine ecosystems and the sustainability of fishermen's livelihoods.

3.3.4 Working in a company

After being exposed to nickel factory waste, the number of catches of fishermen has decreased dramatically. Indirectly, it causes the fishermen's economy to become unstable. With that problem existing, a lot of fishermen decided to be an employee instead (Hs, 2012). Some fishermen in Pajukukang decided to do something by wandering to the city of Makassar and working for various construction companies. A job in a company, of course, has a more stable salary compared to a job as a fisherman, especially with the presence of nickel factory waste (Amini dkk., 2018). Based on Amini dkk., 2018, For some reason, fishermen join companies to meet their needs. Through this partnership, both companies will have better equipment and technology, stable funding, broader market access and business development opportunities. Joining a company also gives them legal protection and access to the resources they need to make their business more productive and sustainable. In particular, fishermen in the Pajukukang seas have difficulty going out to sea because of the pollution from nickel industrial waste.

“pernah ja ke makassar saya anu tinggal itu, pt sinar galesong, kerja pipa air bersih dari nol.”

“I've been to Makassar and I've lived there, PT Sinar Galesong, working clean water pipe from scratch.”(translated)

There are a few reasons why working in a company is better than fishing such as job stability and security and economy factors. Working for a fishing company can provide greater job stability compared to being an independent fisherman. Within a company, fishers may have clear work contracts and working hours, as well as other benefits such as health insurance and retirement benefits. Although not always the main

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reason, economic factors can also influence fishermen's decisions to work for companies. Stable salaries and other benefits offered by companies may be attractive to fishers, especially if they face difficulties running their own business.

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3.3.5 Harvesting Seaweed

Needless to say, nickel factory waste has fatal consequences for fish. Nickel waste is dumped in the sea and has a very influential effect on fish because nickel waste spreads in the ocean. the effect is that the fish are poisoned and just die in the area affected by the waste, automatically the number of fish caught by fishermen decreases and they have to overcome this. One of the strategy to overcome that problem is harvesting seaweed.

Seaweed harvesting is a way to diversify fishermen's income. By incorporating seaweed into their activities, fishers can reduce the financial risks associated with fluctuations in fish catches. Seaweed has a different growth cycle from fish, so it can provide a stable additional income outside the fishing season. Seaweed is a product that is in high demand in local and global markets. In some cases, the selling price of seaweed can generate substantial profits for fishermen (Rahim dkk., 2022).

“anu ka saya, orang jeneponto. Ada ku kasih turun rumput laut di jeneponto saya kalau tidak pergi ka cari ikan.”

“I'm from jeneponto. I put some seaweed down in jeneponto if I don't go fishing.”(translated)

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Based on Rahim dkk., 2022, Recent developments have become the focus of livelihood activities for coastal communities in the Pajukukang district. This is evident from the fact that many fishermen have changed their occupations and become nori farmers, making it their main business, simply because nori farming has a high sales value and a short planting period. This raises concerns that abandoned fishermen will find it very difficult once algal activity reaches saturation levels.

By harvesting seaweed, they can take advantage of existing business opportunities and increase their income (Ratnawati dkk., 2019). Some coastal areas have suitable conditions for seaweed cultivation. Fishermen who already have access to marine or coastal waters can utilize these resources by planting and harvesting seaweed. This enables them to make effective use of the local environment and optimize the economic potential of these resources. Seaweed also provides significant environmental benefits. Seaweed plays a role in maintaining the balance of coastal ecosystems, reducing ocean acidity, and providing habitat for various marine species. By involving themselves in seaweed cultivation, fishermen can also contribute to the preservation of the coastal environment.

“disini banyak yang panen rumput laut karena sudah pekerjaan utamanya kita disini tidak ada yang lain lagi”

“Harvesting seaweed is the main job here, and there is nothing else, so there are many people who harvest seaweed”

(Translated)

4. CONCLUSION

Based on the results of the fishermen's strategy research, it can be concluded that the fishermen has their own ways to overcome their daily problems when fishing, such as the nickel factory waste thrown at the seas of Pajukukang. Furthermore, the fishermen's current strategy are collecting shells, selling their land and farms, fishing farther from usual area, working in a company and harvesting seaweed. So far, those strategy has helped the fishermen to get the better of their situation in the midst of the nickle factory waste.

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