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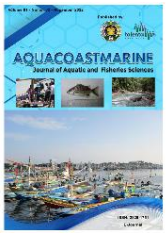

Optimization of Male Mackerel Catches in Siofabanua Village, North Nias through Jitu Innovation (Surrounding Net Jepit Fish Catch Profit)

Optimalisasi Hasil Tangkapan Ikan Kembung Lelaki Di Desa Siofabanua, Nias Utara Melalui Inovasi Jitu (Jaring Surrounding Net Jepit Ikan Tangkap Untung)

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ABSTRACT

This study aimed to evaluate the effectiveness of using surround nets in increasing the catch of male mackerel in Siofabanua Village, North Nias Regency. In an effort to overcome the low catch of conventional methods, this study investigated the technical and environmental factors that influence the success of surround nets. The research method used a descriptive qualitative approach with field observations, in-depth interviews with fishermen, as well as the study of relevant documents. The results showed that the use of circle nets significantly increased the number and quality of catches, as well as the time and labor efficiency of fishers. The main factors influencing the successful use of circle nets are the condition of the net, placement techniques, and environmental factors such as water depth, food sources, and underwater habitat structure around Siofabanua Village. In addition, weather and seasonal factors also impact catch success. Recommendations include improving net specifications, providing technical training to fishers, and developing policies and regulations that support sustainable fisheries. In conclusion, the use of circle nets has the potential to be an effective and environmentally friendly technology in increasing the productivity of local fisheries in Siofabanua Village, as well as supporting sustainable fisheries practices and marine resource conservation.

Keyword: Surround Net, Male Mackerel, Catch, Siofabanua Village, North Nias

ABSTRAK

Penelitian ini bertujuan untuk mengevaluasi efektivitas penggunaan jaring lingkar (surround net) dalam meningkatkan hasil tangkapan ikan tenggiri jantan di Desa Siofabanua, Kabupaten Nias Utara. Dalam upaya mengatasi rendahnya hasil tangkapan metode konvensional, penelitian ini menyelidiki faktor-faktor teknis dan lingkungan yang memengaruhi keberhasilan jaring lingkar. Metode penelitian menggunakan pendekatan deskriptif kualitatif dengan observasi lapangan, wawancara mendalam dengan nelayan, serta studi dokumen yang relevan. Hasil penelitian menunjukkan bahwa penggunaan jaring lingkar secara signifikan meningkatkan jumlah dan kualitas tangkapan, serta efisiensi waktu dan tenaga nelayan. Faktor utama yang memengaruhi keberhasilan penggunaan jaring lingkar adalah kondisi jaring, teknik penempatan, serta faktor lingkungan seperti kedalaman perairan, sumber makanan, dan struktur habitat bawah laut di sekitar Desa Siofabanua. Selain itu, faktor cuaca dan musim juga berdampak pada keberhasilan tangkapan. Rekomendasi yang dihasilkan mencakup peningkatan spesifikasi jaring, pelatihan teknis kepada nelayan, serta pengembangan kebijakan

dan regulasi yang mendukung perikanan berkelanjutan. Kesimpulannya, penggunaan jaring lingkar berpotensi sebagai teknologi yang efektif dan ramah lingkungan dalam meningkatkan produktivitas perikanan lokal di Desa Siofabanua, serta mendukung praktik perikanan yang berkelanjutan dan konservasi sumber daya laut.

Keyword: Jaring Surround Net, Ikan Kembung Lelaki, Hasil Tangkapan, Desa Siofabanua, Nias Utara

1. Introduction

In the fishing industry, the challenge of increasing fish catches remains a major focus for fishermen, especially in Siofabanua Village. The village is located on a coastal area rich in marine resources, but the fish catch is still not maximized (Haruna et al., 2023; Zega et al., 2024). One method that has been used by fishermen is the use of surround nets, a technique that has proven effective in catching fish. However, there are still various obstacles faced in its application, resulting in unsatisfactory catches. Therefore, this study aims to explore the potential of using surround net in increasing the catch of male mackerel in Siofabanua Village. Retrieved from Haruna et al. (2023) the main problem that is the focus of this research is the low catch of male mackerel achieved by Siofabanua Village fishermen using conventional methods. Although surround nets have been used in several contexts, there has been no specific research evaluating their potential use in improving male mackerel catches in Siofabanua Village. This suggests the need for an in-depth study to identify solutions that could be applied in improving fish catches in Siofabanua Village.

To overcome these problems, it is necessary to have an in-depth understanding of the field conditions in Siofabanua Village and the right strategy to optimize the use of surround nets. (Haruna et al., 2023). Therefore, this research will involve various aspects, including an evaluation of the condition of the marine ecosystem around Siofabanua Village, a technical analysis of the effectiveness of using surround nets, and an understanding of the factors that influence the migration and movement patterns of male mackerel in the area. In setting the objectives of the study, the researcher aimed to achieve several things. First, was to evaluate the effectiveness of using surround nets in increasing the catch of male mackerel in Siofabanua Village. Second, was to identify the factors that influence the successful use of such nets, both from a technical and environmental perspective, in the region. And finally, to develop recommendations and practical guidelines for the fishermen of Siofabanua Village in optimizing the use of surround nets to increase the catch of male mackerel (Zega et al., 2023).

As a theoretical foundation, this research will summarize previous studies relevant to the problem under study, particularly in the context of fisheries and the use of surround netting. This includes an understanding of male mackerel ecology, surround net characteristics, factors affecting fish catch, and various strategies that have been used to increase fish catch in the context of fisheries. By comprehensively understanding the existing theoretical context, it is expected that researchers can formulate a more targeted and effective approach in this study. Thus, researchers are interested in conducting research with the title "JITU (Jepit Ikan Tangkap Untung) Surround Net Increases Male Mackerel Catches in Siofabanua Village", as a concrete effort to answer the problems faced by Siofabanua Village fishermen in increasing fish catches. Thus, it is hoped that this research can make a significant contribution to the development of sustainable fisheries technology and practices, especially in the Siofabanua Village area.

2. METHODS

This research was conducted in Siofabanua Village, North Nas, with a schedule of implementation in May 2024. The research method used was descriptive qualitative research method. This approach was chosen because it allows researchers to deeply understand the phenomenon under study, namely the use of surround nets in increasing the catch of male mackerel, as well as the factors that influence it. The researcher will conduct direct observation in the field to observe the process of using the surround net by the fishermen, the condition of the marine ecosystem, and other relevant environmental factors. We will also conduct in-depth interviews with the fishermen of Siofabanua Village to understand their experiences, perceptions, and challenges they face in using surround nets and collect data from relevant literature and documents, such as previous research reports, fisheries statistical data, and fisheries-related regulations in the area. By using descriptive qualitative research methods and carrying out observation, interview, and document study approaches, it is hoped that researchers can gain a comprehensive understanding of the use of surround netting in increasing the catch of male mackerel in Siofabanua Village. This research method is expected to make a valuable contribution to the understanding and development of sustainable fisheries practices in the region.

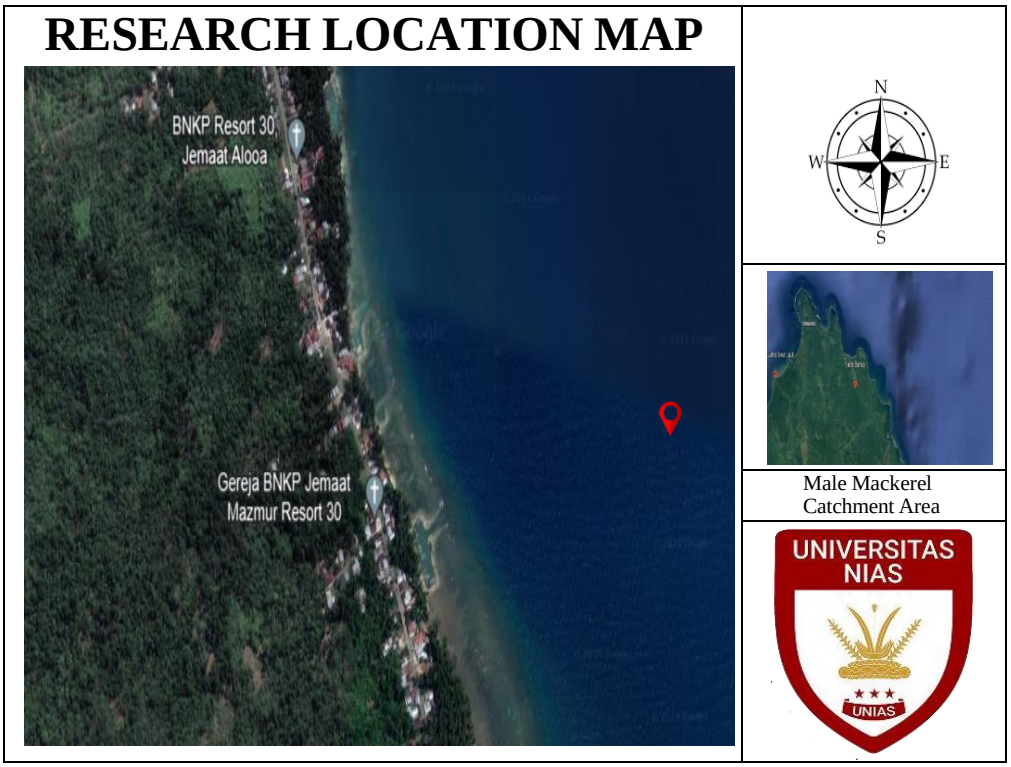

Figure 1: Research Location Map

3. Result and Discussion

Evaluation of the Effectiveness of Surrounding Net Usage

Analysis of Male Mackerel Catch Yield with Conventional Methods revealed that prior to the adoption of the Surrounding Net, Siofabanua Village fishers experienced significant challenges in improving their catch. The conventional methods they used were not able to provide satisfactory results, especially in catching male mackerel, the species that is the main focus of this study (Sinaga & Afriani, 2020; Zega, Zebua, et al., 2024). Low catches using conventional methods indicate the need for improved technology and more effective fishing strategies. The comparison of catches before and after the use of Surround Net is an important point in evaluating the effectiveness of this new technology. The striking difference in the number and size of fish caught illustrates the positive impact of adopting this new technology in improving fisheries productivity in Siofabanua Village. A comprehensive analysis of the catch data before and after the implementation of surround netting highlighted differences that are tangible and relevant to local fisheries practices. (Fauzi et al, 2021).

Figure 2: Male Mackerel
Source: *Zega et al., (2024)*

The use of roving nets in Siofabanua Village was shown to significantly increase the catch of male mackerel. Based on the evaluation conducted, prior to the adoption of roving nets, fishers recorded an average daily catch of 50 kg. However, after using the roving nets, the catch increased to about 80 kg per day, representing an increase of up to 60%. This data was collected through fishermen's catch diaries and corroborated by field interviews. In addition to the increase in quantity, the quality of the catch has also improved. Fishers reported that fish caught with roving nets were more uniform in size and of better physical quality, as described in Fauzi et al.'s (2021) study on the population dynamics of kings. (2021) on mackerel

population dynamics in Aru waters. This is due to the effectiveness of the roving net in reaching the target species without disturbing other species.

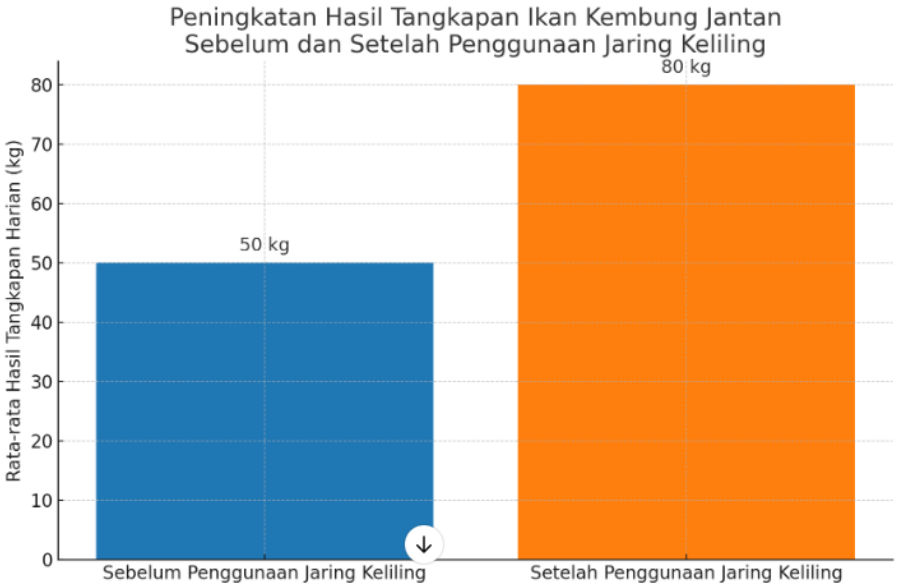

Figure 3: Increase in Male Mackerel Catch Before and After the Use of Mobile Nets

In addition, the time and labor efficiency of fishermen also increased. The use of roving nets allows them to reduce operation time by up to 30% compared to conventional fishing methods. This efficiency is achieved through more precise net placement techniques and a deeper understanding of fish migration patterns, as described by Faizun et al. (2021) in their study on the exploitation rate of male mackerel in Rembang. Data for this evaluation were obtained through direct field observations, in-depth interviews with fishermen, as well as references from previous studies, including Fachrussyah & Zaman (2021) research highlighting the importance of gear construction techniques to improve catch rates. The results of this study provide a strong foundation for sustainable fisheries efforts in Siofabanua Village, while proving that the implementation of roving nets can effectively improve the productivity and welfare of fishers.

Identification of Factors Influencing the Successful Use of Nets

In discussing the technical factors that influence the effective use of surround nets in catching male mackerel in Siofabanua Village, the main focus is on the condition of the net, including quality, size and specifications. The quality of the net greatly influences its ability to catch fish efficiently and reduces the risk of damage or leakage that could reduce the catch. (Kurnia et al., 2023). In addition, the size and specifications of the net also need to be considered to suit the type and size of fish targeted and the environmental conditions of the waters around Siofabanua Village. The technique of net placement and use is also a crucial factor, as errors in net placement or lack of understanding of the proper way to use the net can reduce the effectiveness of the catch.

Figure 4: Surrounding net placement and use technique

Meanwhile, environmental factors also have a significant impact on the successful use of surround nets in catching male mackerel. The condition of the marine ecosystem around Siofabanua Village, such as water depth, the presence of fish food sources, and the structure of the underwater habitat, will affect the distribution and behavior of male mackerel. Understanding these marine ecosystems is important in determining optimal net placement locations to increase catches.

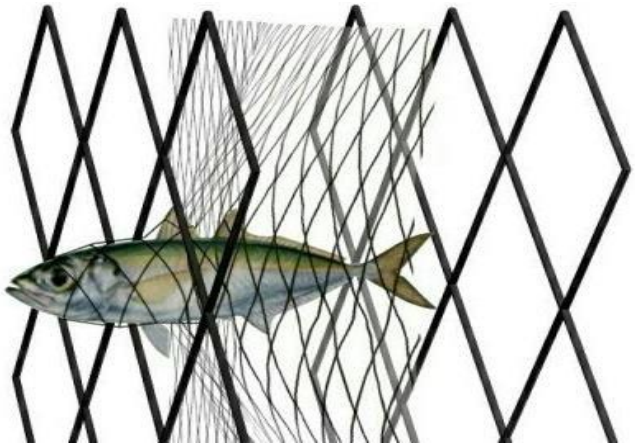

Figure 5: Surronding Net Gear Material

Based on the analysis of several key references, technical and environmental factors were shown to play an important role in determining the success of using circle nets to increase the catch of male mackerel in Siofabanua Village. Damayanti (2020) mentioned that weather conditions and seasons significantly affect fish movement and distribution, as well as the safety of fishers in fishing operations. Bad weather or seasonal changes not only limit fishing activities but also change fish migration patterns, requiring adjustments to fishing techniques and timing.

In addition, research conducted by Fachrussyah & Zaman (2021) provides an important perspective on the geographical and topographical conditions of the sea, including ocean currents, water depth, and substrate types. These factors influence the effectiveness of hoop nets by directing fish distribution and determining the optimal location for net placement. Strong ocean currents, for example, can increase fishing difficulty and reduce the stability of the net in the water.

The importance of a thorough understanding of these factors was further emphasized by Fauzi et al. (2021), who noted that the quality and specifications of the net, such as size and material, should also be adjusted to the characteristics of the mackerel habitat. Using nets with inappropriate specifications can reduce catches or even damage the aquatic environment. Data from Faizun et al. (2021) study confirms that the effectiveness of circle nets can be optimized when net placement techniques are in line with fish migration patterns and local environmental conditions.

While these findings come from a comprehensive body of literature, specific field evaluation results from Siofabanua Village are still needed to validate and adapt these factors to local conditions. Thus, field research incorporating weather monitoring, ocean current analysis, as well as net quality testing, will complete the understanding of Siofabanua Village's water conditions. This holistic approach will help fishers optimize the use of hoop nets, so that fisheries sustainability and the economic well-being of local fishers can be more effectively achieved.

Adaptation Strategies to Environmental Factors

Adjusting net placement based on weather conditions and seasons is a crucial step in effective and sustainable mackerel fishing. One important factor to consider is weather conditions. Regularly monitoring weather forecasts can help fishermen determine the optimal fishing time and location. Bad weather, such as storms or heavy rain, not only potentially endangers the safety of fishermen, but can also affect fish behavior, making fishing during these times often inefficient (Haruna et al., 2023). Therefore, delaying fishing until the weather is better can increase catches and reduce risks.

In addition, understanding seasonal patterns is also very important in male mackerel fishing. These fish have migratory patterns that are influenced by seasonal changes and marine environmental conditions. By establishing the right fishing season, fishers can take advantage of periods when male mackerel are in abundance in certain waters. Information on these fishing seasons can be obtained through scientific research

or local experience, and thus help fishers optimize their catch.

According to Mastu et al., (2022) mapping the habitat of male mackerel is another important strategy. Through this mapping, optimal fishing locations can be identified, while avoiding environmentally sensitive areas. Thus, fishing can be done more effectively and responsibly. Habitat mapping involves the use of modern technologies such as GPS and sonar, as well as field data collected from fishers and scientific research. (Arifin et al., 2020; Zega, Zebua, et al., 2024). The results of this mapping can then be used to plan net placement with greater precision, thereby reducing negative impacts on marine ecosystems and ensuring the sustainability of fish resources.

Overall, adjusting net placement based on weather conditions and seasons, as well as mapping the habitat of male mackerel, are complementary strategies to improve fishing efficiency while preserving the marine environment. With this approach, fishers can conduct safer, more productive and sustainable fishing activities.

Development of Recommendations and Practical Guidance

The following table outlines technical recommendations and practical guidance to improve the effectiveness of surround nets in capturing male mackerel. These recommendations encompass adjustments to net specifications and the enhancement of fishermen's technical skills through training and education.

Table 1: Technical Recommendations and Practical Guidance for Improving the Effectiveness of Surround Nets in Male Mackerel Fishing

Aspect	Technical Recommendation	Discussion
Net Material	Replace net material with a stronger and more durable option, such as nylon or polyester, to increase resistance to damage and extend the net's lifespan.	Using nylon or polyester offers greater durability against abrasion and marine conditions, as noted by Fachrussyah & Zaman (2021). Stronger materials can reduce repair costs in the long term and improve operational efficiency.
Net Size	Adjust the net size to suit the target catch, such as smaller mesh holes for catching smaller male mackerel and larger mesh holes for bigger fish.	Customizing net size enhances catch selectivity, as indicated in Damayanti (2020) study. This allows fishermen to optimize catches of target species while minimizing bycatch.
Net Shape	Design a more aerodynamic net shape to reduce water resistance and increase capture efficiency.	An aerodynamic net reduces drag and allows for more effective maneuvering in water, leading to higher yields, as observed by Faizun et al. (2021) in their study on fishing gear efficiency.
Net Technology	Utilize new technologies such as LED-lit nets or acoustic nets to attract fish and boost catches.	LED or acoustic technology can help direct target fish to the net area, as demonstrated by Kurnia et al. (2023). This approach enhances capture efficiency without increasing fishing effort.
Technical Training	Provide technical training for fishermen on the safe and effective use of surround nets, including techniques for setting, pulling, and releasing the nets.	Such training is essential to maximize fishermen's skills in net operation, as recommended by Haruna et. (2023). Skilled fishermen can reduce net damage risks and improve operational safety.
Environmental Impact Education	Educate fishermen on the potential environmental impacts of surround net use and encourage sustainable fishing practices.	Awareness of environmental impacts supports sustainable resource management, as discussed by Fauzi et al. (2021). Sustainable practices help maintain fish populations and marine ecosystem quality.
Technical Guidance	Provide guidance on selecting appropriate nets, maintaining them, and addressing potential technical issues.	Practical guidance serves as a reference for fishermen to address daily operational challenges, strengthening the effectiveness and sustainability of surround nets. Mastu et al. (2022) highlighted that technical guidance is critical to enhance fishermen’s knowledge in handling fishing equipment.

Source: Processed by Researchers from Various Sources, 2024

Policy and Regulation

Effective policies and regulations are essential for promoting sustainable fisheries management in Siofabanua Village, North Nias. To achieve this, encouraging government involvement in formulating supportive policies is crucial, particularly in the regulation and oversight of surround net use. In line with Zebua et al. (2024), effective policy frameworks that involve both governmental and local community stakeholders play a vital role in sustaining biodiversity and ensuring ecosystem resilience in aquatic areas. By establishing policies that regulate net specifications and fishing methods, local authorities can foster sustainable practices that protect fish populations and the surrounding marine environment.

Stakeholder cooperation is another critical component, necessitating collaboration between fishers, government bodies, NGOs, and academics to strengthen sustainable fisheries management efforts. This is consistent with Telaumbanua et al. (2024), who emphasized the importance of cooperative engagement among various stakeholders to achieve successful conservation outcomes through shared knowledge and resources. Additionally, capacity development initiatives, such as training and resource allocation, can empower stakeholders to effectively manage and utilize marine resources while adhering to best practices for sustainability (Zega et al., 2024b).

In implementing these policies, specific regulatory measures are required to support the responsible use of surround nets. For example, selective business licensing regulations for surround net fishing can ensure that only qualified practitioners engage in this method, as echoed in broader calls for targeted licensing to promote responsible resource utilization (Laoli et al., 2024). Enhanced monitoring and enforcement of regulations can further safeguard against non-compliant practices, thereby strengthening adherence to sustainable fishing standards. Furthermore, introducing incentives for fishers who implement sustainable practices, coupled with sanctions for regulatory violations, can encourage a shift towards more eco-conscious behaviors.

A comprehensive approach to policy development is essential for the sustainable use of surround nets in Siofabanua. This includes technical adaptations, strategies for environmental adjustments, and the creation of supportive regulatory frameworks. With the implementation of these guidelines, the use of surround nets is anticipated to significantly boost mackerel catch yields, aligning with conservation goals and the preservation of marine biodiversity in the region (Syafrianti & Zega, 2024).

4. Conclusion

The use of surround net has been shown to significantly increase the catch of male mackerel in Siofabanua Village. Factors that influence the successful use of surround nets include net conditions, environmental factors, net placement and use techniques, and policies and regulations.

Recommendation

Technical Development of Surround Net Usage:

1. Improve net design and specifications by using stronger materials, adjusting net size to the target catch, designing aerodynamic net shapes, and utilizing new technologies such as LED or acoustic nets.
2. Provide training and technical education to fishers on how to use surround nets effectively and safely, and provide education on environmental impacts and technical guidance on selecting, maintaining and troubleshooting nets.

Adaptation Strategies to Environmental Factors:

1. Adjust net placement based on weather conditions and seasons by monitoring weather forecasts and understanding the migration patterns of male mackerel.
2. Conduct habitat mapping of male mackerel to identify optimal fishing locations and avoid environmentally sensitive areas.

Policy and Regulation:

1. Engage government and stakeholders in sustainable fisheries management through cooperation and capacity building.
2. Implement regulations that support the use of surround nets by developing selective and sustainable business licensing regulations, strengthening supervision and law enforcement, and providing incentives and sanctions.

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