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ECOLOGICAL AND ECONOMIC BENEFITS OF MANGROVES FOR THE SEA PEOPLE IN INDRAGIRI HILIR

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Abstrak

Penelitian ini bertujuan untuk mengkaji manfaat ekologis dan ekonomis dari hutan mangrove bagi Orang Laut di Indragiri Hilir, Provinsi Riau. Metode yang digunakan adalah metode kualitatif dengan teknik observasi lapangan dan studi literatur. Lokasi penelitian berada di Desa Tanjung Pasir, Kecamatan Tanah Merah, yang dikenal dengan kawasan hutan mangrove yang luas dan beragam. Orang Laut, yang mayoritas berprofesi sebagai nelayan, memiliki ketergantungan yang tinggi terhadap hutan mangrove, baik dari segi ekonomi maupun ekologi. Dari segi ekologis, hutan mangrove berperan penting dalam menjaga kestabilan lingkungan, melindungi garis pantai dari abrasi, dan menyediakan habitat bagi berbagai spesies ikan dan biota laut lainnya yang menjadi sumber penghidupan utama bagi nelayan. Sementara dari segi ekonomis, hutan mangrove menyediakan bahan baku untuk berbagai produk, seperti kayu bakar dan obat-obatan tradisional, serta menjadi kawasan wisata alam yang potensial untuk dikembangkan lebih lanjut. Hasil penelitian menunjukkan bahwa masyarakat Orang Laut memiliki pengetahuan tradisional yang kaya terkait dengan pengelolaan hutan mangrove. Mereka telah mengembangkan praktik-praktik berkelanjutan untuk memanfaatkan sumber daya hutan mangrove tanpa merusak ekosistem. Dukungan dan pelestarian hutan mangrove sangat penting untuk kesejahteraan jangka panjang komunitas ini. Oleh karena itu, kebijakan yang mendukung konservasi dan pemanfaatan berkelanjutan hutan mangrove sangat diperlukan untuk mempertahankan keseimbangan ekologis dan meningkatkan taraf hidup masyarakat setempat.

Kata kunci: *hutan mangrove, orang laut, manfaat ekologis, manfaat ekonomis, indragiri hilir.*

ABSTRACT

This study aims to examine the ecological and economic benefits of mangrove forests for the Sea People in Indragiri Hilir, Riau Province. The method used is qualitative with field observation and literature study techniques. The research location is in Tanjung Pasir Village, Tanah Merah District, which is known for its extensive and diverse mangrove forest areas. The Sea People, who are predominantly fishermen, have a high dependence on mangrove forests, both economically and ecologically. Ecologically, mangrove forests play an important role in maintaining environmental stability, protecting coastlines from erosion, and providing habitats for various species of fish and other marine biota that are the main sources of livelihood for fishermen. Economically, mangrove forests provide raw materials for various products, such as firewood and traditional medicines, and have the potential to be developed further as natural tourism areas. The results of the study show that the Sea People have rich traditional knowledge related to mangrove forest management. They have developed sustainable practices to utilize mangrove forest resources without damaging the ecosystem. Support and preservation of mangrove forests are very important for the long-term welfare of this community. Therefore, policies that support the conservation and sustainable use of mangrove forests are essential to maintain ecological balance and improve the living standards of the local community.

Keywords : mangrove forests, sea people, ecological benefits, economic benefits, indragiri hilir.

INTRODUCTION

Mangrove forests are coastal ecosystems that play a crucial role in maintaining environmental balance and supporting the livelihoods of coastal communities. In Indonesia, which has the third-longest coastline in the world, mangrove forests are widespread and provide various ecological and economic benefits (Agungguratno & Darwanto, 2016). One area with extensive mangrove forests is Indragiri Hilir Regency in Riau Province. Tanjung Pasir Village, located in Tanah Merah District, is one of the villages with a significant mangrove forest area. The Sea People, who inhabit this area, primarily work as fishermen. Their dependence on mangrove forests is high because these forests provide various resources that support their livelihoods. Ecologically, mangrove forests act as natural buffers that protect shorelines from erosion, provide habitats for various species of fish and other marine biota, and function as balancers of coastal ecosystems (UNEP, 2014). These benefits are crucial for the Sea People, who rely on marine products as their main source of livelihood.

Economically, mangrove forests make a significant contribution by providing raw materials for various products such as firewood, building materials, and traditional medicines. Additionally, the mangrove forest area has great potential to be developed as a natural tourism destination, which could increase income sources for

the local community. This potential has not been fully exploited, leaving many opportunities to be explored to enhance the economic well-being of the community (Desjardins, 2007). The Sea People have developed rich traditional knowledge in managing mangrove forests sustainably. They understand the importance of maintaining ecosystem balance to ensure the continuity of the natural resources they depend on. However, pressures from human activities and climate change pose challenges to the conservation of mangrove forests. Therefore, more intensive conservation efforts and policies supporting the sustainable use of mangrove forests are needed. The traditional knowledge and local practices of the Sea People in managing mangrove forests need to be integrated with scientific approaches and government policies to create a holistic and sustainable management strategy. Collaboration between local communities, the government, and non-governmental organizations is crucial to formulate effective conservation measures. Educational and capacity-building programs are also needed to raise community awareness about the importance of mangrove conservation and sustainable utilization practices (Warningsih, Efizon, Aulia, & Deviasari, 2022).

Globally, mangrove forests are recognized as one of the most productive and biodiverse ecosystems. Mangroves have a unique ability to absorb large amounts of carbon dioxide, playing an important role in climate change mitigation (Rahmawati, Arif, Rahayu, & Akbardiansyah, 2023). The existence and preservation of mangrove forests are not only vital for local communities like the Sea People but also have broader implications for global efforts to address the climate crisis. Preserving mangrove forests means contributing to carbon emission reduction and global environmental protection. At the national level, Indonesia has taken significant steps to preserve mangrove forests through various policies and rehabilitation programs. However, implementation on the ground often faces various challenges, including resource limitations, lack of coordination between agencies, and socio-economic challenges of local communities (Febrian, Qurniati, & Yuwono, 2021). This research aims to align national policies with local practices that have proven effective in mangrove forest management, making these policies more responsive and adaptive to local conditions.

The Sea People, with their wealth of traditional knowledge, has great potential to play an active role in mangrove conservation programs. They are not only beneficiaries but also key implementers in maintaining and sustainably utilizing mangrove forests. Empowering the community through participatory and collaborative programs can strengthen their capacity to manage natural resources. Environmental education and skills training are also important to ensure that the benefits of mangrove forests can be sustainably enjoyed by future generations (Acharya, 2002). The social and cultural aspects of the Sea People need to be considered in mangrove conservation efforts. Their traditions and customs that respect nature and the environment can provide a strong foundation for developing conservation programs. Involving traditional leaders and community leaders in the decision-making process can enhance the success of these programs. With an inclusive and community-based approach, it is hoped that mangrove conservation efforts can be more effective and sustainable (Ganda, Damayani, Luthfia, & Harefa, 2023).

This research aims to produce comprehensive and evidence-based policy recommendations to support sustainable mangrove forest management. It is hoped

that the results of this research can make a tangible contribution to formulating national and local strategies for preserving mangrove forests and improving the well-being of coastal communities, particularly the Sea People. Thus, this research not only has academic value but also practical benefits for natural resource management in Indonesia.

METHOD

This research employs a qualitative approach to gain an in-depth understanding of the ecological and economic benefits of mangrove forests for the Sea People in Indragiri Hilir, Riau Province. A qualitative method is chosen as it allows researchers to comprehensively explore the perceptions, experiences, and knowledge of the local community. Techniques used in this research include field observations, in-depth interviews, and literature review. Field observations are conducted in Tanjung Pasir Village, Tanah Merah District, which is the main location of the research. These observations aim to understand the actual conditions of the mangrove forests and how the Sea People interacts with and utilizes them. The researcher observes various aspects, including the condition of the mangrove ecosystem, the community's economic activities, and management practices carried out by the local population. These observations also include visual documentation such as photos and videos to support the research findings. In-depth interviews are conducted with various key informants, including community leaders, fishermen, mangrove farmers, and traditional leaders of the Sea People. These interviews aim to gather qualitative data on traditional knowledge, mangrove forest management practices, and the community's views on the ecological and economic benefits of mangrove forests. The interview technique used is semi-structured, allowing flexibility in exploring topics relevant to the research. All interviews are recorded and transcribed for further analysis.

A literature review is conducted to obtain theoretical foundations and context relevant to the research topic. The researcher reviews various sources, including books, scientific articles, government reports, and policy documents related to mangrove forests, the Sea People, and natural resource management. This literature review helps in understanding key concepts and provides a reference framework for analyzing field data. Data obtained from field observations, in-depth interviews, and literature review are analyzed using thematic analysis techniques. This analysis involves coding data to identify major emerging themes and understanding the patterns and relationships between these themes. The results of this analysis are then used to answer the research questions and formulate policy recommendations.

To ensure the validity and reliability of the data, the researcher uses triangulation techniques by combining various data sources and data collection methods. Additionally, the researcher conducts member checking by seeking feedback from informants on the preliminary findings of the research. This is done to ensure that the interpretation of the data aligns with the perspective of the local community. This research considers ethical aspects by ensuring that all participants give their consent voluntarily and with a full understanding of the research objectives. The researcher also maintains the confidentiality of participants' identities and uses the data anonymously in the research report. All research procedures are approved by the relevant ethics committee. With a comprehensive and ethical approach, this research is expected to provide deep insights into the benefits of

mangrove forests for the Sea People and make a meaningful contribution to the sustainable management of natural resources in Indragiri Hilir Regency.

RESULTS AND DISCUSSION

Ecological Benefits of Mangrove Forests for the Sea People

Mangroves are one of the crucial coastal ecosystems that play a vital role in protecting shorelines from erosion and seawater intrusion. The robust roots and dense vegetation of mangroves act as natural buffers capable of stabilizing the soil along the coastline. Mangrove roots can penetrate deep soil layers and spread extensively beneath the surface (Jie Su, Friess, & Gasparatos, 2021). These roots form a complex and sturdy network that effectively binds soil particles and surrounding sediments. This not only reduces soil erosion by water and sea waves but also helps prevent soil leaching from the coast into the sea (Karimah, 2017).

The dense vegetation of mangroves, such as tree canopies and shrubs, also provides additional protection against coastal erosion. The dense leaves and branches help reduce the energy of sea waves reaching the shore, thereby diminishing the destructive force of abrasion. Moreover, mangrove vegetation also slows down tidal water flow, allowing for the sedimentation and deposition of silt and sand particles around the mangrove roots. This process helps build and expand vulnerable coastal areas, which in turn increases the stability of the coastline (Julaikha & Sumiyati, 2017).

Figure 1
Results of Mangrove Rehabilitation in Tanjung Pasir Village

The complex physical structure of mangroves, such as dense roots, layered root networks, and thick branches, creates various distinct microhabitats. This enables different species to find suitable living spaces according to their needs. For instance, some fish species use mangrove roots as hiding and breeding places, while others use fallen leaves as a source of food and shelter.

The unique environmental conditions within the mangrove ecosystem also support biodiversity. Conditions such as varying water salinity, fluctuating oxygen levels, and the presence of nutrient-rich mud and substrates create an environment suitable for various types of organisms. Species living in mangroves have evolved to overcome the unique challenges of this environment, such as the ability to survive in changing water conditions or cope with oxygen deficiency (Soedarmo, 2018).

Figure 2
Livelihoods of the Sea People

The presence of mangroves is a critical resource for the traditional livelihood of Duanu fishermen in Indragiri. Mangroves provide various essential benefits for their fishing activities, particularly by providing breeding grounds for various fish species and other marine organisms. Mangroves offer an ideal environment for small fish and larvae, serving as a shelter from predators and unfavorable environments (Ronnback, 1999). The intricate and layered mangrove roots create hidden networks beneath the water surface, providing shelter for fish larvae and other marine organisms. This environment also offers rich and abundant nutrients, supporting optimal growth and development for various species (Sarhan & Tawfik, 2018). Additionally, mangroves provide breeding grounds for various types of shrimp, crabs, and mollusks, which are the main food sources for fish and other marine organisms.

For Duanu fishermen, the presence of mangroves is highly significant as the fish breeding within them are primary targets in their fishing activities. Mangroves are a reliable resource for fishermen, enabling them to rely on abundant catches from mangrove areas to meet their livelihood needs. Furthermore, the proximity of mangroves to fishermen's settlements facilitates easy access for fishing activities, thereby enhancing efficiency and productivity in their livelihoods (Karminarsih, 2007).

Economic Benefits of Mangrove Forests for the Sea People

Figure 3
The Condition of Mangroves in Tanjung Pasir Village

The direct utilization of mangrove forests as a source of firewood and building materials plays a crucial role in the daily lives of the Sea People in Indragiri. Mangrove wood serves as the primary source of energy, especially for cooking and heating homes in often remote coastal areas (Maulidah, Iskandar, & Gunawan, 2023). With easy access to an abundant supply of mangrove wood in their surroundings, the Sea People rely on this wood as their main fuel due to its ease of combustion and strong heat output. Besides being an energy source, mangrove wood is also an essential building material for constructing houses, boats, and other infrastructure in coastal villages. Mangrove wood is highly resistant to moisture and pests, and its strength makes it suitable for building the traditional houses and boats (Setiawan, 2013). The houses in Duanu villages often use mangrove wood for their frames, walls, and roofs because of its durability against harsh coastal conditions, such as strong winds and seawater.

In addition to houses, boats are the primary means of transportation for Duanu fishermen in their fishing activities. Mangrove wood is frequently used as the main material in boat construction due to its buoyancy and durability against seawater (Wilson & Elebe, 2023). Other infrastructures, such as bridges, piers, and storage facilities for fishing equipment, are also often built using mangrove wood because of its abundant availability in coastal areas. Mangroves play a crucial role in providing materials for making traditional fishing gear for Duanu fishermen in Indragiri. Mangrove wood, with its unique strength and flexibility, is often used to create various fishing tools, such as traps, nets, and boat frames (Wahyudi, 2015).Traps, one of the most commonly used fishing tools, are often made from intertwined mangrove branches. These traps are then placed in strategic waters, such as river mouths or dense mangrove roots, to catch fish moving or seeking shelter. With easily accessible and affordable raw materials, Duanu fishermen can produce traps in large quantities, increasing their chances of a bountiful catch.

In addition to traps, nets are also vital fishing tools for Duanu fishermen. Mangrove wood is used to make the net frames, which are then equipped with strong ropes or mesh netting. These nets are placed in strategic locations in mangrove waters or open sea to catch passing fish. By using mangrove wood as the main material, fishermen can create strong and durable nets, thereby enhancing their fishing effectiveness and efficiency (Wahyuni, Zulhafandi, Hendris, & Jarin, 2021). Mangrove wood is also used to construct the frames of traditional boats used by Duanu fishermen. These boats are often built with simple yet efficient designs, using mangrove wood for the frame and main structure. With sturdy and long-lasting boats, fishermen can explore wider waters and catch larger quantities of fish (Pribadiningtyas, Said, & Rozikin, 2017).

Some forest farmer groups (KTH) in the Duanu community have developed non-timber products from mangroves to diversify their economy and increase local income. One such product is mangrove liquid soap, made from natural ingredients sourced from mangroves, such as essential oils, plant extracts, and other additives. This mangrove liquid soap offers unique aromas and beneficial properties for skin health, making it potentially well-received in local and regional markets. Mangrove snail floss (abon siput/keong bakau) is another innovative product developed by KTH in the Duanu community. This floss is made from the meat of snails or mangrove snails harvested from mangrove waters, then processed into floss with added spices

and seasonings. Mangrove snail floss boasts a distinctive taste and high nutritional content, making it a potentially popular product in local and regional markets.

The economic potential of non-timber products like mangrove liquid soap and mangrove snail floss is substantial in enhancing local income and economic diversification. By utilizing the abundant natural resources around them, KTH can produce high-value products that are competitive in both local and regional markets (Sekhampu, 2012). Furthermore, developing these non-timber products opens opportunities for developing creative industries and mangrove-based tourism, providing long-term economic benefits for the local community.

Challenges in the Utilization and Conservation of Mangrove Forests

Figure 4
Damage to Mangroves Due to Seawater Intrusion

Uncontrolled logging activities pose a serious threat to the mangrove ecosystem and the traditional livelihoods of coastal communities, particularly the fishermen of the Sea People. Large-scale mangrove wood harvesting damages the mangrove ecosystem in various ways. Firstly, uncontrolled logging reduces the number of mangrove trees that serve as natural buffers against seawater and coastal erosion, increasing the risk of seawater intrusion into inland areas. This impacts the availability of habitats and resources for fish and other marine organisms, which are typically the primary livelihood source for fishermen (Ritohardoyo & Ardi, 2014). With the reduction of mangrove vegetation, the forest's role in preventing soil erosion is also compromised. Mangrove roots, which usually help stabilize the soil along the coastline and reduce the risk of coastal abrasion, are lost. Without mangrove vegetation, the coastal soil becomes more susceptible to erosion, threatening coastal infrastructure and community settlements.

In the livelihood of fishermen, damage to the mangrove ecosystem can have significant impacts. Fishermen rely on the presence of mangroves as a crucial resource for their fish catch. Mangroves provide essential habitats for fish and various marine organisms and serve as ideal breeding grounds for many fish species. Damage to the mangrove ecosystem can lead to a drastic decline in the quantity and quality of fish catch, threatening the sustainability of fishermen's livelihoods (Tjahjono, Adi Intyas, & Fattah, 2022). Mangrove rehabilitation efforts have been one of the key responses to the damage caused by various factors, including uncontrolled logging. These rehabilitation programs typically involve replanting mangrove seedlings in areas affected by damage or ecosystem degradation. This step is

expected to restore the ecological functions of mangrove forests and provide habitats for various species that depend on them (Sukojo & Arindi, 2019).

Despite these rehabilitation efforts, there are often challenges that hinder the success and sustainability of these programs. One major challenge is the lack of adequate maintenance and supervision after the mangrove seedlings are planted. Once planted, regular maintenance such as watering, fertilizing, and pruning is necessary to ensure optimal growth. However, the lack of human resources, funding, and adequate infrastructure often makes consistent maintenance difficult (Fadhila, Saputra, & Wijayanto, 2015).

Economic challenges, such as the decline in fish catch, are serious problems faced by coastal communities, including the Sea People in the Indragiri region. The decrease in fish catch can be caused by various factors, such as overfishing, environmental degradation, climate change, or changes in fish migration patterns. As a result, income from fishing declines, and some community members may feel pressured to seek more stable alternative livelihoods (Salem & Mercer, 2012).

One alternative that some community members might choose is to switch professions to mangrove woodcutters. Mangrove logging can seem promising for those facing economic difficulties, as it can provide a relatively more stable income than the uncertain fish catch (Nanlohy & Masniar, 2019). However, this shift in profession threatens the sustainability of mangrove forests and the livelihoods of fishermen. Uncontrolled mangrove logging can significantly damage the mangrove ecosystem. The loss of mangrove forests threatens habitats for various fish species and other marine organisms. Additionally, damage to the mangrove ecosystem can increase the risk of seawater intrusion and coastal erosion, threatening the sustainability of coastal settlements (Rahim & Baderan, 2017).

To address these challenges, concrete steps need to be taken. One approach is to raise community awareness about the importance of mangrove forest sustainability and the negative impacts of uncontrolled logging activities. Alternative livelihood programs or economic diversification can be introduced, providing other options for those affected by the decline in fish catch. This can include skills training, micro-enterprise development, or the promotion of sustainable tourism. In this way, the community can maintain the sustainability of mangrove forests while still securing a viable and stable livelihood (Balsiger, 2017).

CONCLUSION

Mangrove forests play a crucial role in the survival and well-being of the Sea People in Indragiri. Besides providing ecological benefits such as protecting the coastline from erosion and offering habitats for various species, mangroves are also a vital economic resource for the local community. However, challenges such as uncontrolled logging activities and declining fish catches threaten the sustainability of the mangrove ecosystem and the traditional livelihoods of fishermen. Therefore, the protection, conservation, and sustainable management of mangrove forests are essential. Collaborative efforts between the government, NGOs, and the local community are also necessary to address these challenges and ensure the sustainability of the mangrove ecosystem and the well-being of the dependent community.

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