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Development of Mangrove Forest Areas as a Central Area for Coastal Ecosystem Restoration and Development (PRPEP) and Tourist Attractions in Silo Baru Village, Silau Laut District, Asahan Regency

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ABSTRACT

This study aims to examine the Development of Mangrove Forest Areas as a Central Area for Coastal Ecosystem Restoration and Development (PRPEP) and tourist attractions in Silo Baru Village, Silau Laut District, Asahan Regency. This study uses a qualitative approach, which aims to understand the phenomenon of mangrove forest area development in Silo Baru Village. This type of research is qualitative descriptive, which focuses on the presentation of conditions, strategies, and impacts of mangrove forest area development. The location of the research is Silo Baru Village, Silau Laut District, Asahan Regency, North Sumatra. Data Analysis Techniques The data that has been collected is analyzed using thematic analysis methods. Data collection techniques such as interviews, participatory observations, and documentation will provide a comprehensive picture of social interaction, community participation, and the challenges and development potential of the region. The results of the PRPEP Development research in Silo Baru Village have succeeded in restoring the mangrove ecosystem that was previously degraded. Restoration efforts through mangrove replanting, coastal land rehabilitation, and sustainable ecosystem management contribute to the restoration of biodiversity, including the return of typical flora and fauna species in coastal areas. The development of mangrove areas as ecotourism destinations also has a significant economic impact on the local community. Through ecotourism, people get new income opportunities from various sectors, such as tour guide services, homestay management, food stalls, and souvenir sales.

Keywords : Development of Mangrove Forest Area, Restoration Center Area, Coastal Ecosystem Development (PRPEP) and Silo Baru Village, Silau Laut District, Asahan Regency

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1. INTRODUCTION

Mangrove forest areas have an important role in maintaining the balance of coastal ecosystems. Mangrove forests function as a barrier to coastal abrasion, habitats for various species of flora and fauna, and carbon sinks. However, in recent decades, mangrove forest areas in Indonesia, including in Silo Baru Village, Silau Laut District, Asahan Regency, have been degraded due to various factors such as land clearing for ponds, land conversion, and illegal logging. This leads to a decline in ecological function that negatively impacts the coastal environment and local communities. As an effort to restore the mangrove ecosystem, the government and the community took an initiative in the form of the establishment of the Coastal Ecosystem Restoration and Development Center Area (PRPEP) in Silo Baru Village. The PRPEP area aims to restore the ecological function of mangrove forests while developing the potential of the area as a natural tourism destination. With the existence of PRPEP, it is hoped that there will be a balance between environmental conservation efforts and community economic empowerment through coastal ecosystem-based tourism. Silo Baru Village has great potential to be developed into a coastal ecosystem-based tourist area considering the richness of flora and fauna in mangrove forests and beautiful natural scenery. This development is expected to provide economic benefits for the local community as well as become a model for sustainable coastal area management in Asahan Regency.

Silo Baru Village is a village in Silau Laut District, Asahan Regency, North Sumatra. There are 11 villages in Silo Baru Village, 4 of which are near the Strait of Malacca. Silo Baru Village has the potential for large and very diverse natural resources such as a mangrove forest area of ± 450 ha (Gunawan, et al

2022). The people of Silo Baru Village generally use mangroves for their daily needs. Some of them are used as firewood, building materials, materials for making fishing boats, as well as a place for biota such as crabs, shellfish, and snails, etc. This causes biological pressure on the mangrove area of Silo Baru village, where the life of marine life in this area, such as fish larvae, shellfish, shellfish and other marine life is threatened due to the growth of mangrove forests as seedbeds, feeding areas and reproduction areas (oviposition areas) of these organisms. Mangroves are a form of forest ecosystem that has a unique and different, mangroves inhabit the international zone, beaches and small islands (Halidah, 2014). Natural resources in coastal areas that play a role in maintaining the productivity of coastal waters and supporting the livelihoods of the surrounding communities are mangroves (Handayani, 2018). In addition, mangroves also have an important role in maintaining the quality of fisheries, agriculture and residential ecosystems behind coastal green zones (Bagen, 2001 in Handayani, 2018).

The biological function of mangrove forests is a place to grow, a place to forage and lay eggs (spawing ground) for marine and terrestrial organisms. Meanwhile, the economic function of mangroves is as textile materials, medicines, food, building materials (plates) and fuel (wood) (Rahmawati, 2006). Samosir & Restu, 2016 states that mangroves play a very important role in maintaining stable conditions on land and in the sea. In marine waters, mangroves play a role in encouraging the turnover of the food chain, whether directly or indirectly.

Figure 1.1 Simultaneous Planting of Mangroves

Silo Baru Village, February 12, 2024 Simultaneous Tree Planting Throughout Indonesia in North Sumatra Province has been carried out twice, first on December 30, 2023 at the Retreat Center of the Batak Karo Protestant Church (GBKP) in Sibolangit Village, Sibolangit District, Deli Serdang Regency and at the location of KTH Lestari, then the second on January 13, 2024 at UPSA KTH Sipolha Horison, Sipolha Horison Village, Pematang Sidamanik District, Simalungun Regency. This time, the third planting activity was carried out again on Wednesday, February 7, 2024 in Silo Baru Village, Silau Laut District, Asahan Regency. This planting is also a series of commemorations of World Wetlands Day 2024, which is usually commemorated every February 2 every year. The simultaneous planting location was chosen in the coastal area with an area of about 0.8 hectares, and the seedlings planted were 330 mangrove species (*Rhizophora, Sp*), coming from the nursery of the Asahan Barumun Watershed and Protected Forest Management Center (BPDAS-HL).

PRPEP is a KKP program aimed at natural restoration as well as functioning as a limited tourist destination. He argued that mangroves not only have visual value, but also store educational and economic value. We hope this can be the main destination for tourist visits for the people of Asahan. It is a center for environmental education, mangrove education for all people because this mangrove not only presents scenery, but also the potential that can be managed as a basic food ingredient such as dodol syrup and others. The development of mangrove forests in Asahan Regency is also supported by the Regional Government (Pemda) of Asahan Regency. In addition to KKP assistance, the area around tracking will be transformed by the Asahan Regency Government together with the community into a mangrove forest tourism complete with culinary by carrying the concept of ecotourism that prioritizes aspects of nature conservation, socio-cultural and economic empowerment of the local community.

Figure 1.2

The construction of mangrove nurseries will be a source of ready-to-plant mangrove seed stock so that mangrove planting activities for ecosystem restoration can continue to be carried out without constraints on the availability of seedlings. In addition, the community can also take advantage by selling the ready-to-plant seeds to Bumdes (Village-Owned Enterprises) or other parties in need. The large potential of mangrove forests in Silo Baru Village, Silau Laut District, Asahan Regency has resulted in many communities utilizing mangrove forest resources to meet human needs. The lack of public understanding of the importance of mangrove forests has triggered the conversion of mangrove forests into plantations, agriculture, plantations, settlements, illegal logins which are increasing due to the magnitude of socio-economic influence that can generate added value for the community. However, on the other hand, the preservation of mangroves can be threatened due to environmental damage and losses to the socio-economic condition of the population if there is continuous conversion of mangrove land.

One of the mangrove forest areas that has been damaged due to land conversion is the coastal area of Asahan Regency. According to BAPPEDA data in 2017, the area of mangrove forests is only 5,565,730 hectares spread across four sub-districts, one of which is in Silau Laut District. Based on 2011 data, Silau Laut District has a mangrove forest area of 1019.85 Ha, only found in Silo Baru Village. Along with the passage of time and the development of increasingly rapid development, the destruction of mangrove forests is also increasing. Based on 2020 data, there was a reduction in the area of mangrove forests by 803 hectares, dominated by the addition of coconut plantations and oil palm plantations as well as residential settlements that occurred approximately in the last 9 years. The decline in the area of mangrove ecosystems has an impact on the degradation or change of mangrove forest areas is quite high, forests are no longer able to protect beaches from sea waves, and are also unable to withstand the wind or withstand

the speed of coastal erosion by current erosion. In addition, it also results in the destruction of biota such as shrimp, crabs, and fish in the mangrove forest area.

2. RESEARCH METHOD/MATERIAL AND METHOD/LETERATURE REVIEW

Definition of Mangrove Forest

Mangrove forests are forest ecosystems found in coastal areas, especially in areas affected by sea tides. Mangroves have an important role in maintaining the balance of the coastal environment due to their ability to stabilize the soil, prevent erosion, and provide habitat for various types of flora and fauna. According to Field (2015), mangroves are "coastal vegetation that grows in tidal areas that have special characteristics in terms of adaptation to saltwater environmental conditions." In addition, Tomlinson (2016) defines mangrove forests as ecosystems consisting of trees and plants that are able to survive in environments that experience fluctuations in salinity, oxygen, and water availability. The development of mangrove forest areas in Silo Baru Village, Silau Laut District, Asahan Regency as a Center for Coastal Ecosystem Restoration and Development (PRPEP) and tourist attractions has great potential to improve economic and ecological welfare. The success of this project depends on the synergy between conservation efforts, ecosystem restoration, and empowerment of local communities in sustainable tourism management.

Development of Mangrove Forests as a Central Area for Coastal Ecosystem Restoration and Development (PRPEP)

The restoration of mangrove ecosystems aims to restore their ecological function after suffering damage due to various human activities, such as the conversion of land into ponds, agriculture, and coastal development. According to Lewis (2015), effective mangrove restoration must pay attention to natural hydrological conditions so that plants can survive and develop optimally. In addition to its ecological function, mangrove forests also have the potential to be ecotourism destinations that can improve the welfare of the surrounding community. Ceballos-Lascurain (2016) stated that ecotourism is a tourism activity that is responsible for the environment, as well as contributing to the preservation of nature and the welfare of local communities. The success of the development of mangrove areas as PRPEP and tourist destinations cannot be separated from collaboration between the government, the community, and non-governmental institutions. Ostrom (2019) stated that community participation in natural resource management is the key to sustainability. The government needs to provide supportive regulations, while the community must be actively involved in preserving mangrove forests.

Research Method

This study uses a qualitative approach, which aims to understand the phenomenon of mangrove forest area development in Silo Baru Village, Silau Laut District, Asahan Regency, as a Center for Coastal Ecosystem Restoration and Development (PRPEP) as well as a tourist attraction. According to Creswell (2014), qualitative research aims to explore and understand the meanings that arise from social problems or human behavior through direct interaction with the research subject and the environment. This type of research is qualitative descriptive, which focuses on the presentation of conditions, strategies, and impacts of mangrove forest area development. Qualitative descriptive research allows researchers to obtain a comprehensive picture of the phenomenon being studied through the collection of in-depth empirical data. According to Bogdan and Taylor (2015), qualitative research seeks to understand social phenomena from the perspective of participants.

The location of the research is Silo Baru Village, Silau Laut District, Asahan Regency, North Sumatra. This village was chosen as the research location because it has a mangrove forest area that is being developed as a Center for Coastal Ecosystem Restoration and Development (PRPEP) and natural tourist attractions. To obtain accurate and comprehensive data, several data collection techniques are used in this study: These techniques are used to extract information directly from the research subjects, such as local communities, area managers, tourists, and government officials. The in-depth interviews allow researchers to understand the views, experiences, and participation of subjects in the process of restoration and ecotourism development in mangrove forest areas. Participatory observation is carried out by researchers participating in daily activities in mangrove forest areas, such as restoration activities, tourism management, or community interaction with visitors. This technique helps researchers understand the social context and dynamics that occur in the field directly.

Data Analysis Techniques The data that has been collected is analyzed using thematic analysis methods. The stages of this analysis include: Data Reduction At this stage, the raw data obtained from interviews, observations, and documentation are sorted and simplified to identify information relevant to the research objectives. Coding and Categorization After data reduction, researchers do coding, namely

identifying important themes in the data and categorizing them based on the similarity of concepts or phenomena. Drawing conclusions The last stage is drawing conclusions from the data that has been analyzed. The researcher formulates conclusions based on existing findings and relates them to relevant theories and literature.
The qualitative research method used in this study makes it possible to explore in-depth information about the development of mangrove forest areas in Silo Baru Village as PRPEP and tourist destinations. Data collection techniques such as interviews, participatory observations, and documentation will provide a comprehensive picture of social interaction, community participation, and the challenges and development potential of the region.

3. RESULTS AND DISCUSSION (10 PT)

Development of mangrove forest areas in Silo Baru Village as a Central Area for Coastal Ecosystem Restoration and Development (PRPEP)

The development of mangrove forests in Silo Baru Village as PRPEP has gone through several important stages involving the local government, local communities, and non-governmental organizations (NGOs). In this process, community participation is a key factor for the success of restoration and ecotourism development. Mangrove Ecosystem Restoration The initial stage of PRPEP development in Silo Baru Village is restoration activities, which include replanting mangrove trees on land that has been damaged due to land conversion into ponds and other illegal activities. Based on interviews with community leaders, this restoration is carried out in stages by involving local residents in planting mangrove seedlings. This is in line with the theory put forward by Lewis (2015), which states that the success of mangrove restoration is highly dependent on the involvement of local communities and the good management of hydrological conditions. In addition to replanting, regular monitoring is also carried out to ensure optimal mangrove growth and coastal ecosystem recovery.
Based on the observation results, the restored mangrove area shows an increase in biodiversity with the return of several previously lost fauna species, such as crabs, waterfowl, and fish. Development of Ecotourism Infrastructure After restoration activities, the development of tourism infrastructure is a priority. In Silo Baru Village, the village government together with local NGOs built a wooden bridge that allows tourists to walk across the mangrove area without damaging the ecosystem. The bridge is also equipped with a viewing area for observing birds and other fauna. This development is in line with the ecotourism principles expressed by Ceballos-Lascurain, who emphasized that ecotourism must be carried out responsibly and focus on environmental conservation. The area manager also provides tourist boats that are used to explore the river around the mangroves. Tourists can enjoy the natural scenery while learning about the importance of mangrove forests in maintaining coastal ecosystems. The existence of this educational tourism has attracted the interest of schools in the surrounding area to make mangrove forests a place for field learning about the environment.
The Role of Local Communities in the Development of PRPEP and Ecotourism The participation of local communities in mangrove forest management is very important for the sustainability of PRPEP and ecotourism in Silo Baru Village. Based on the results of the interviews, the local community is involved in various activities, such as planting mangrove seedlings, managing tourist facilities, and becoming local tour guides. According to Ostrom, community involvement in natural resource management is one of the keys to the success of sustainable management. The community also gets direct economic benefits from the development of this ecotourism. Some residents have opened small businesses such as food stalls and souvenir shops that sell handicraft products based on local resources. This is in line with Goodwin's view that well-managed ecotourism can improve the welfare of local communities through job creation and increased income.
Although the development of mangrove forest areas in Silo Baru Village has provided many benefits, there are still several challenges that need to be overcome to ensure the sustainability of this program. Ecosystem Damage due to Human Activities One of the biggest challenges is the destruction of mangrove forests caused by human activities, such as the conversion of land into ponds and illegal logging. Based on the observation results, some mangrove areas are still degraded, especially in areas farther from the restoration center. This shows the need for stricter supervision and stricter regulations from the government to protect the area. Limited Funds and Facilities The development of tourism infrastructure in Silo Baru Village is also constrained by limited funds. Existing tourist facilities are still limited and need to be repaired and expanded to increase tourist attraction. Local governments and local communities are seeking support from the private sector and international institutions to secure

additional funding. Biodiversity Conservation The maintenance of biodiversity in the mangrove forest area of Silo Baru Village is also still a challenge. Based on interviews with area managers, species monitoring and waste management from tourism activities need to be improved so as not to damage the balance of the ecosystem.

Impact of PRPEP development on the environment and local communities

The development of the Coastal Ecosystem Restoration and Development Center (PRPEP) in Silo Baru Village, Silau Laut District, Asahan Regency, has various impacts on both the environment and the local community. This program not only focuses on the restoration aspect of mangrove ecosystems, but also involves improving the economic welfare of the community through ecotourism and sustainable management of natural resources. Coastal Ecosystem Restoration The development of PRPEP significantly contributes to the restoration of coastal ecosystems in the mangrove forest area of Silo Baru Village. Prior to the restoration program, mangrove forests in this area had been damaged by illegal logging and land conversion into ponds. After restoration efforts, such as replanting mangrove trees, the ecosystem began to recover. Based on the observation results, there is an increase in biodiversity, with the reappearance of various fauna species such as mangrove crabs, fish, and waterfowl. Mangrove forest restoration also has an impact on shoreline stabilization and reduces the risk of abrasion. Mangroves function as a natural barrier against waves and winds that can damage beaches.

Reducing Carbon Emissions Mangrove forests are known as one of the ecosystems that have a large capacity to absorb and store carbon (carbon sequestration). Through mangrove restoration in Silo Baru Village, there has been an increase in the number of trees that can play a role in reducing carbon dioxide emissions. According to Donato et al. (2011), mangrove forests have a high potential to absorb carbon from the atmosphere, thus contributing to climate change mitigation. Thus, the development of PRPEP also has a positive impact globally in terms of reducing carbon emissions. Improving Water Quality Mangrove forests act as natural filters that can absorb pollutants and organic waste from the waters, thereby helping to maintain water quality around the ecosystem. Based on field observations, the water quality in the waters around the mangroves of Silo Baru Village showed an improvement after restoration activities. Water becomes clearer and healthier, which supports the survival of marine species and the use by communities for fishing activities.

Impact on local communities, improvement of the local economy, development of mangrove areas as PRPEP also have an impact on the local economy through the development of ecotourism. The local community is actively involved in tourism management, such as being a tour guide, parking manager, to opening small businesses around the tourist area, such as food stalls and souvenir sales. The results of interviews with local residents show that ecotourism in mangrove areas has provided a new source of income for the community, improving their welfare. In addition, some residents who previously worked as pond farmers are now switching to the tourism sector, which is considered more sustainable and has a lower environmental impact. Income from the tourism sector also allows the community to improve village infrastructure, such as access roads to tourist areas and other public facilities. Increasing Environmental Awareness Through the PRPEP program, the people of Silo Baru Village are increasingly aware of the importance of preserving the environment. Active involvement in mangrove restoration and management activities improves their understanding of the ecological functions of mangroves, such as protecting the coast from abrasion, providing habitat for marine species, and absorbing pollutants. Based on the results of the interviews, the community admitted that they are more responsible in maintaining the cleanliness and integrity of the mangrove ecosystem because they are aware of its impact on their own welfare.

Strengthening Community Capacity and Skills The PRPEP program in Silo Baru Village also has an impact on strengthening community capacity and skills. Through various trainings provided by the government and related NGOs, the community gained knowledge about mangrove ecosystem management, mangrove cultivation techniques, and skills in managing ecotourism. This training not only strengthens the technical capacity of the community, but also provides an opportunity to improve entrepreneurial skills, such as small business management and marketing of local products. For example, some village community groups are now starting to produce souvenirs made from natural materials around the mangrove forest, such as handicrafts from fallen mangrove roots or stems. These products are then sold to visiting tourists, providing additional income for their families. Social Welfare In addition to the economic impact, the PRPEP program also has an impact on the social welfare of the community. The existence of ecotourism has increased social interaction between villagers and tourists, creating a sense of pride in their local identity and natural resources. The community feels involved in maintaining and

promoting their village as a sustainable tourist destination. This interaction also has a positive impact in the form of knowledge and cultural exchange between the local community and visitors from outside the region. The community becomes more open to new ideas, which ultimately helps to increase innovation in ecotourism management and environmental conservation.

Potential development of mangrove forest areas as tourist attractions based on coastal ecosystems in Silo Baru Village

The mangrove forest area in Silo Baru Village, Silau Laut District, Asahan Regency, has great potential to be developed as a tourist destination based on the coastal ecosystem. With a rich mangrove ecosystem and restoration efforts that have been undertaken through the Center for Coastal Ecosystem Restoration and Development (PRPEP), the region offers a range of opportunities to become a sustainable ecotourism destination. This development not only has a positive impact on environmental sustainability, but can also improve the economy of the local community. Uniqueness and Diversity of Mangrove Ecosystem The mangrove area of Silo Baru Village has rich biodiversity, making it an important asset in the development of ecosystem-based tourism. The existing mangrove ecosystem provides habitat for various types of flora and fauna, such as mangrove trees, crabs, fish, waterfowl, and various other marine animal species. The biodiversity in this area is the main attraction for tourists who are interested in nature and ecotourism. Bird observation, exploration of coastal fauna diversity, and educational tours about the function of mangrove ecosystems can be excellent activities that attract local and foreign tourists.

Potential for Education-Based Ecotourism Development One of the main potentials in the development of the mangrove forest area in Silo Baru Village is education-based tourism. Mangrove forests can be used as a place to learn for students, students, and the general public about the importance of maintaining coastal ecosystems and the role of mangroves in climate change mitigation. Environmental Education Tour This activity includes a tour guided by a local guide who is knowledgeable about the mangrove ecosystem. They can explain the role of mangroves in maintaining biodiversity and protecting coastlines from abrasion. Mangrove Planting Training Tourists can be involved in mangrove tree planting activities as part of the ecotourism experience. It not only raises environmental awareness but also makes a real contribution to ecosystem restoration. The Regional Research and Study visit can also attract scientific visits from educational and research institutions, both local and international, who want to learn about the dynamics of coastal ecosystems and ongoing mangrove restoration programs.

The development of tourist facilities that support the comfort of visitors without damaging the mangrove ecosystem is one of the important aspects in realizing the potential of ecotourism in Silo Baru Village. Some of the facilities that can be developed include: Mangrove Tourism Trail (Boardwalk) The construction of a wooden path (boardwalk) that crosses the mangrove area allows visitors to explore the forest without damaging the vegetation and ecosystem. This path can also be used for bird and other fauna observation activities. Boardwalks must be designed in such a way that they are environmentally friendly and minimize disturbance to flora and fauna. Observation Towers The construction of observation towers at strategic points allows tourists to enjoy the view of mangrove forests and coastal ecosystems more widely. In addition, this tower can also be used for bird watching and nature photography. Tourism Information Center An information center that provides educational materials about mangroves, biodiversity, and the impact of climate change can enhance the tourist experience while deepening their understanding of the importance of this ecosystem. The development of the mangrove area of Silo Baru Village as an ecotourism destination has significant economic potential. Well-managed ecotourism can be an alternative source of income for communities that previously relied on ponds or fisheries. Based on interviews with locals, ecotourism has had a positive economic impact, with an increase in tourist visits encouraging the opening of local businesses.

4. CONCLUSION (10 PT)

Based on the results of the research on the development of mangrove forest areas as a Center for Coastal Ecosystem Restoration and Development (PRPEP) and tourist attractions in Silo Baru Village, Silau Laut District, Asahan Regency, the following can be concluded:

Coastal ecosystem restoration PRPEP development in Silo Baru Village has succeeded in restoring mangrove ecosystems that were previously degraded. Restoration efforts through mangrove replanting, coastal land rehabilitation, and sustainable ecosystem management contribute to the restoration of biodiversity, including the return of typical flora and fauna species in coastal areas. This success shows

that mangrove restoration has a positive impact on shoreline stabilization, climate change mitigation through carbon sequestration, and improving water quality around ecosystems.

Improving the community's economy The development of mangrove areas as ecotourism destinations also has a significant economic impact on local communities. Through ecotourism, people get new income opportunities from various sectors, such as tour guide services, homestay management, food stalls, and souvenir sales. This mangrove-based ecotourism is a more environmentally friendly income alternative compared to previous economic activities, such as illegal logging and land conversion into ponds. Community involvement in ecotourism management also increases their sense of ownership and responsibility for the sustainability of mangrove areas.

The PRPEP program in Silo Baru Village has succeeded in increasing public awareness of the importance of maintaining coastal ecosystems and mangrove forests. Through various mangrove planting trainings and activities, the community has become more aware of the ecological role of mangroves in protecting the coast and preventing natural disasters such as abrasion and floods. The active participation of the community in this conservation activity reflects a positive change in mindset and behavior towards the environment.

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