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### **SUSTAINABLE COASTAL NATURAL RESOURCES UTILIZATION MODEL (CASE STUDY OF SEI NAGALAWAN VILLAGE, PERBAUNGAN DISTRICT, SERDANG BEDAGAI REGENCY, NORTH SUMATRA PROVINCE)**

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#### **ABSTRACT**

This paper aims to analyze how the fisher community in Nagalawan Village, Perbaungan District, Serdang Bedagai Regency utilizes coastal and marine natural resources, which is reviewed in terms of social, economic, cultural institutions. This research used qualitative approach, conducted in Sei Nagalawan Village, Perbaungan District, Serdang Bedagai Regency. Data collection techniques used in - depth interviews and FGD. Data analysis used descriptive and qualitative techniques. The results showed that the fisher community of Sei Nagalawan Village actively utilizes coastal natural resources to increase income by forming institutional fishing groups. The model of utilization of natural resources by fisher communities is divided into three, namely the utilization of coastal resources by capturing marine biota by diversifying fishing equipment, utilization of coastal areas into tourist attractions, and utilization of mangroves planted in coastal areas to be used as food and beverages. Ecologically, economically and socially, the utilization of coastal and marine natural resources by Sei Nagalawan fishers is carried out sustainably.

## BACKGROUND

The waters of North Sumatra are very rich in marine potential, which, according to data from Bappeda (Provincial Revenue Agency) of North Sumatra, has a coastline stretches 545 Km in the east coast. The fishes inhabiting the east coast waters encompass pelagic fish 126,500 tons/year, demersal fish 110,000 tons / year, coral fish 6,800 tons / year, and shrimp 20,000 tons / year. (Bappeda of North Sumatra and PKSPLIPB (Centre for Coastal and Marine Resources Studies) in Zebua, 2020). One of the coastal areas on the east coast of North Sumatra is Serdang Bedagai Regency, sitting an area of 1,900.22 km<sup>2</sup> with a population of 608,691 people. Serdang Bedagai Regency consists of 17 sub - districts, 5 of which are on the coast (BPS (Central Bureau of Statistics of Serdang Bedagai Regency, 2015). This causes most people settle in the coastal areas and live as fishers.

Coastal areas have complex challenges. Generally, coastal communities rely only on the utilization of coastal and marine natural resources, the result of which is small - scale fishers are still on the poverty and backwardness lines. Research in Bangladesh shows that despite being the livelihood of 11% of the total population of Bangladesh, fishers are one of the most vulnerable communities there. In addition to poverty, fishers are also less educated as revealed by Alencar and Maia (2011) that concerning education, Brazil is the home to 56,218 illiterate fishers and 523,841 fishers of incomplete elementary school background, which is a major part of Brazilian fishers (83.6%). The low education level may be the source of the difficulty of enforcing fisheries policies, and it also allows people access to this activity, thus encouraging the paradigm of fisheries to poverty.

One of the most important ecosystems in coastal and marine areas is mangrove ecosystems. Mangrove ecosystems in North Sumatra are generally found on the coast of Langkat, Deli Serdang, Serdang Bedagai, Batubara, Asahan, Tanjung Balai, and Labuhan Batu. The research conducted by Basyuni et al. (2018), on mangrove ecosystem rehabilitation that has been done shows that there must be an integrated work by the government, universities, NGOs, and local communities to rehabilitate mangrove ecosystems. This confirms the research conducted by Wirongrong et al. (2013) which states villagers are planning a group to protect and conserve mangrove forests, which a government agency supports. Villagers' views about the benefits of mangrove forests can be grouped as both direct and indirect.

The function of mangrove ecosystems is crucial to shellfish spawning grounds that impact the lives of fishers, as stated by MacKenzie (2001) that by preserving the mangrove swamps intact, increasing their sizes where possible, and controlling cockle predators would lead to an increase in cockle abundance and harvests. Fishes that prey on juvenile cockles might be seined along the edges of swamps before the tide rises and they swim into the swamps to feed. Transplanting mangrove seedlings to suitable areas might increase the size of those habitats. The numbers of fishers may increase in the future, because most adults now have several children. If new fishers are tempted to harvest small, immature cockles and stocks are not increased, minimum size rules for harvestable cockles could be implemented and enforced to ensure adequate spawning. Similarly, the results of the study stated that there is a link between fishing poverty and pressure on mangrove ecosystems. It is concluded that pressures on the mangrove fisheries will continue to increase and that

management strategies will need to take into account the complex occupational structures and poverty of the mangrove fishers and of most of the rural population, in order to develop socially and ecologically sustainable approaches. (Glaser, and Grasso, 1998).

The utilization of fishery resources on the coast and sea is currently a critical issue to note due to the exploitation of coastal and marine resources increasingly leads to the use of environmentally unfriendly fishing equipment, for example the use of tiger trawlers. This will have an impact on the income of fishing communities that depend on the utilization of fishery resources potentials contained in the ocean. The potential of diverse marine waters and the ability of fishers to vary due to barriers to knowledge and mastery of technology; thus, it is necessary to discover other alternatives in the utilization of coastal areas to optimally to utilize coastal areas to improve the welfare and sustainability of coastal environment.

The richness of Serdang Bedagai's coastal and marine natural resources is increasingly damaged, polluted by land activities such as sedimentation, pollution from industrial and domestic waste, and marine activities. Another thing that damages coastal and marine ecosystems is the use of trawlers that cause the availability of increasingly rare fish. The use of trawling tools causes social conflicts related to the utilization of natural resources (resource conflicts). The problem of coastal and marine conflict is the conflict between traditional fishers and trawling owners (Marbun and Krishnayanti, 2002).

Based on the above issues, it is necessary to research whether there is a model of sustainable coastal resource utilization in the coastal area of Serdang Bedagai Regency, North Sumatra, especially in Sei Nagalawan Village, Perbaungan District. The formulation of this research problem is: How do the fishing communities in Nagalawan Village, Serdang Bedagai District utilize sustainable coastal and marine natural resources?

## **2. Literature Review**

### **Coastal Conditions**

Dahuri, et al. (2001) defines coastal areas as a transitional region between land and ocean, where the boundary to land is the arbitrary distance from the highest average tide and the boundary to the sea is the jurisdiction of the province or state of a country. Coastal areas are transitional areas between land and marine waters. Ghofar (2004) states that naturally this area is often referred to as nutrient trap. However, if this area suffers from mass destruction of the environment due to pollution then this area is also referred to as a pollutants trap area. Thus, it is understandable that various biological resources and environments in coastal areas are relatively more vulnerable to damage, compared to other regions or ecosystems. Of all the types of existing ecosystems, usually coastal ones are those with the most severe environmental pressures. Meanwhile, Fanning and Burbidge (2010) simply defined that coastal areas are where the land meets the ocean. The latter definition of coastal areas suggests the importance of incorporating the perspective of coastal social - ecological systems that coastal areas are home to more than 500 million people and one of the most productive and diverse ecosystems in the world. Coastal social - ecological systems can be managed sustainably by creating concepts and

understanding the complex dynamics (interactions, feedback) of coastal social - ecological systems (Hossain, 2020; Shabbir et al., 2019).

### **Sustainable Development**

According to the Brundtland Report (1987), sustainable development is a development that meets the needs of today's generation without compromising the ability of future generations to satisfy their needs. One challenge to face is how to fix environmental destruction without sacrificing the needs of economic development and social justice. According to Salim (1992), sustainable development is a building process that optimizes the benefits of natural resources of human resources, by synchronizing natural resources with humans in development. Sustainable development is then developed in the state of coastal community - based resource management. Community - based management is the best opportunity for sustainable resource decision making (Loucks, 1995; Shahid et al., 2019; Usak et al., 2019).

### **Fishing**

Hanson (1984) in Aminah (2014) stated that coastal communities often have a lower chance of accessing basic needs such as education, health, and fulfillment of basic needs such as education, health and fulfillment of business production facilities so that sometimes the socioeconomic conditions are relatively low. As a group, the coastal community covers the following characteristics: (1) coexisting humans, (2) interacting and working together for a long time, (3) being aware as a unity, (4) being aware as a system of coexisting. Meanwhile, Hamta (2016) stated that fishers are people who actively conduct business activities and fishing work in the sea. The economic activities of fishing households consist of: (a) production of marine and non – marine goods; (b) the outpouring of work of all house members, household income, and expenditures on both food and non-food.

### **Research Methods**

The research approach was carried out qualitatively in Sei Nagalawan Village, Perbaungan District, Serdang Bedagai Regency. The research informant is the head of a family of fishers who have settles and earned their livelihood as fishers in the village for minimally 10 years and also mastered the research issues to be asked. In addition to the fishers, community leaders, managers of NGOs (Non - Government Organizations) who have carried out activities in the coastal area of Serdang Bedagai Regency related to the management of coastal areas. Data collection techniques include in-depth interviews and FGD. The research used a qualitative - descriptive analysis that begins with the process of data reduction, namely the selection process, attention centering and simplification, abstraction, and transformation of rough data that arises from records (Miles and Hubermasn, 1992; Siddiqi et al., 2019). Those processes were carried out during the research in the field by doing fieldnotes; the data obtained were also maximized by ensuring that the data obtained conform the theme of the research.

### **Research Results**

The fishing communities on site have been socialized or informed of the protection of coastal areas, specifically about the protection of coastal areas from government

agencies and some from NGOs and their own internals. The parties concerned are the Forestry Office, Fisheries Office, Ministry of Environment, and Non - Government Organization (KIARA). To effectively use coastal and marine natural resources, fishers from Sei Nagalawan Village formed such fishing groups as Muara Baimbai, Cahaya Pagi, Kakap Putih and Tenggara, and Muara Tanjung. These fishing groups have allowed fishers from Sei Nagalawan Village to be more productive while still protecting the environment in utilizing coastal and marine natural resources. This conforms to the research conducted by Ermayanti (2015) which states that social institutions may contribute positively to fishers' daily lives. In this context, the social institutions of fisheries may address the above problems. The strengthening the social groups of fishers through social institutions is crucial and absolutely necessary for the fishers to compete in doing their fishery business activities and improve their welfare. Similarly, the research conducted by Aidil et al. (2016) that strengthens that the strategy of solving socioeconomic problems faced by fishers viable through efforts to strengthen institutional (community groups and fishers) and local wisdom, environmental and cultural sustainability, and community empowerment. This conforms to the research conducted by Hidayat (2013) which suggests that fishing institutions have a strategic dimension both in empowering fishing communities to conduct sustainable marine development and to improve their independence and welfare.

The model of utilization of natural resources by the fishing community is divided into three, namely the utilization of coastal resources by capturing marine biota by diversifying fishing equipment and the variety of livelihoods, utilization of coastal areas into tourist attractions, and the utilization of mangroves planted in coastal areas to be used as food and beverages. Ecologically, economically and socially, the utilization of coastal and marine natural resources by Sei Nagalawan fishers is carried out sustainably. This conforms to research conducted by Laladhas and Oommen (2017) which stated that traditional Kerala fishers rely on traditional knowledge (*kanicham*) to identify the location of coral reefs where fish gather, and practice sustainable natural resource management. Sustainable utilization of coastal resources certainly requires strategic planning as Richmond (2019) does about engaging fishing communities in a bottom - up strategic planning process called "fishing community sustainability planning" by explaining implementation efforts at four California ports: Morro Bay, Monterey, Shelter Cove, and Eureka. FCSP planning is one of the tools that fishing communities must consider as they strive to address threats and plan their long - term survival. Sei Nagalawan Village Fishers have been planning supported by NGO stakeholders, universities, and the local government of Serdang Bedagai Regency.

### **Utilization of Coastal and Marine Resources with Diversification of Fishing Gears and Varieties of Livelihoods.**

Fishers in Sei Nagalawan Village work multiple jobs to satisfy their basic and other household needs. Fishers in Sei Nagalawan village have at least four fishing equipment, namely cuttlefish fishing equipment, fishing nets, shrimp nets, and crab nets. Most fishers catch shrimp, cuttlefish and crabs on seasonal basis. In the absence of the three fishing gears, the fishers catch fish, instead. Thus, actually fishers catch any marine stuff when they are at sea, not necessarily shrimp, crabs, or

cuttlefish. This partly conforms to the strategy carried out by fishers of Moro Karimun Island in dealing with climate change, namely adaptations made by fishing fishers fishing Moro Karimun Island in response to indications of climate change, namely by diversifying fishing equipment (Rindayati. 2013; Ul-Hameed et al., 2019).

Furthermore, the fishers in sei Nagalawan coastal village chose to work double jobs as fishers and farmers. Fishers who own agricultural land / rice fields, farming by hiring others, while some others manage their own rice fields. They cultivate their rice fields after they return from the sea. It means they go to sea first and then do the other work afterwards. They claim that their second profession as farmers help them a lot. When fish catches decrease, the rice harvest help them, for example, to add more and repair their fishing equipment, which needs more money. This conforms to the research conducted by Rondonuwu (2019) which states that to improve their welfare, fishers diversify their jobs into motorcycle taxi drivers, farmers, construction workers, or food stall owners. A similar research was conducted by Salmi (2005) on fishers in Archipelago Sea Region, SW Finland who also adopted pluriactivity and which further provides the basis for fishing adaptation.

## **Utilization of Coastal Areas as Tourist Attractions**

### **Mangrove Ecotourism**

Mangroves that thrive in Sei Nagalawan Village are those that grow from cultivation through human intervention. The community in Sei Nagalawan village gains such knowledge of mangroves through participants of the previous mangrove management activities held by NGOs rather than from formal education at school. The knowledge gained is constantly practiced in the field by planting mangroves on the coast and along the river flow whose mangroves are damaged by abrasion and illegal logging whose wood is made into charcoal. Mangrove seedlings are planted continuously by the community in Sei Nagalawan Village which then increasingly develops into a mangrove forest area from which mangrove ecotourism begins. A dominant mangrove growing in the area of Sei Nagalawan Village is Jeruju (*Acanthus Illicifolius*), Nipah (*Nypa Fruticans*), thatch – shaped nipah (*Metroxylon spp*), Siapi-api Hitam (*Avicennia Alba*), and Perepat (*Sonneratia Alba*).

Kampoeng Nipah mangrove tourism is managed by a cooperative called Muara Baimbai. This conforms to the research conducted by Treephan and Visuthismajarn. (2019) which develops the potential of ecotourism resources to develop community - based tourism practices in Ban Hua Thang, Satun Province, Thailand. The results showed that the Ban Hua Thang community had a variety of potential ecotourism resources, especially lush mangrove forests, which are home to a wide variety of wildlife species. The residents of Ban Hua Thang formed a close relationship and had a strong cultural identity, allowing easy cooperation in community initiatives. This study recommends promoting potential tourism development among community members to present possible benefits to local communities. The research also encourages the participation of external organizations to help fund and support community - based tourism initiatives in Ban Hua Thang. The local mangrove forest is a real selling point of the area and there is considerable potential to develop the site as a center of knowledge and ecotourism appeal. The real connection between the lifestyle of the community and the local environment can be the basis of tourist activities, which may include shellfish collecting, crab hunting, canoeing, swimming, potion gathering, and cooking. For the tourism initiative in Ban Hua

Thang to succeed, the locals must work together, and all must contribute to the marketing image of Ban Hua Thang as a traditional and environmentally friendly tourism destination.

The manager of Kampoeng Nipah mangrove ecotourism offers mangrove education tourism through a guide who provides knowledge about mangroves, offering mangrove tree planting programs for visitors who want to experience on – site mangrove planting in the designated area. They work with several travel agencies that offer Kampoeng Nipah mangrove ecotourism as one of the tourist destinations. In addition, it is recommended that tourism be promoted through the internet and social media as was discussed in the research conducted by Basyuni et al. (2016) which suggests that to promote a newly established mangrove ecotourism requires the internet or social media. Likewise, Salam (2000) states that nature - based tourism is increasing all over the world, for example the mangrove forest in Sundarbans, a world heritage site, that is designated as a ecotourism destination to increase the local population's income. There are also family vacation packages, workshops, seminars, trainings, and more. A camping ground tour package, which is spending the night in the mangrove ecotourism area without having to stay in homestays or people's homes. In addition, a mangrove tour package offering to tour and explore the mangrove forest. Lastly, there is a culinary tour package that offers culinary of fishing catches and mangrove processed products. Usually, the most ordered culinary are fried squid, mangrove crab in oyster sauce, mussels, shrimp, and other seafood menus. This conforms to the results of research conducted by Joandani et. al. (2019) which stated that the factors that influence the development of mangrove ecotourism in Pasar Banggi Village are the diversity of mangrove species, the quality of human resources in handling tourists, the availability of quality of human resources for ecotourism in conservation efforts, policies from local governments related to regulations and legislation on mangrove forest ecotourism in Banggi Market Village, socio-economic conditions of the community, and supporting infrastructure. In line with the above, a research conducted by Ayob (2009) on ecotourism of Langkawi mangrove forest along the estuary of Kilim River stated that a significant contribution to tourist satisfaction consists of marketing practices (42.1 percent), business ethics (23.9 percent), environmental management (14.5 percent), and management systems / business operations (7.8 percent).

### **Romance Bay (Romantic Beach) Area**

This tourist attraction is located right next to the mangrove tourism attraction Kampoeng Nipah. Romance Bay tourism attraction takes the concept of a romantic beach. The target of visitors to Romance Bay attractions are young people longing for a tourist attraction that offers a romantic atmosphere as desired by today's young people. This tourism area is managed by Maju Bersama group, facilitated by NGO Sumatera Woman Foundation. The beach was transformed instantly into a romantic beach by building huts around which were planted with mangroves and ornaments of mosquito nets tied on both sides. In addition, there are several spots for young people with pots, can be used to make prewedding photos. The existence of Romance Bay tourism area in Nagalawan Village shows that local people have anticipated and competed to create a beach tourism area according to the needs of tourists. This conforms to the research conducted by Rebollo and Castinera (2010) which states that coastal tourism presents uncertainty about competitiveness, so it is necessary to adapt to the trends in the tourism market. Therefore, it is necessary to

restructure and manage advanced tourism to maintain competitiveness in the context of sustainable tourism development.

### **Utilization of Mangroves as Food Materials**

Mangroves have many benefits and uses. One of the benefits is as a source of food. Mangroves may be used as a basic ingredient of food, such as acanthus crackers, mangrove syrup, and mangrove tea. The utilization of mangroves is carried out by the female members of of Muara Baimbai cooperative. This conforms to the research conducted by Hinokidani et al. (2020) which states that mangroves - based herbal medicine has been known in some countries, and the plant ingredients are often consumed as tea through the infusion of dry mangroves soaked in boiling water. Infusions from mangroves are believed to be effective agents to treat and/or prevent infections, and diseases. Some kinds of mangroves have attracted attention as a functional food source in recent years. This study concluded that some kinds of mangroves, especially *K. obovata*, have functional food potential. Processed products are sold in the mangrove ecotourism place. This conforms to the research conducted by Istiqomah (2018) which states that the industrialization of mangroves prioritizes leaves, flowers, skins, sap, and fruit or hypocotyl over wood. There is also the potential for increased revenue through the development of partnership patterns with food, beverage, cosmetics, and pharmaceutical industries. A research conducted by Vinoth et al. (2019) states that mangroves have been used in medical treatments in folklores, and extracts from mangrove species have been proven effective in inhibitory activities against human pathogens, animals, and plants. Mangroves are also related to pharmacological, medical, traditional, and bioactive compound production activities.

This activity in mangrove tourist attractions is not only aimed at helping the economy of the community, especially fishers, but also aims to protect the coastal ecosystem with the planting of mangroves in coastal areas. The beginning of the formation of this tourism attraction also begins with mangrove planting, then people start to see the potential of auspicious tourism with the mangrove. In addition, mangroves also benefit fishers by allowing them to get fish easier. This conforms to Lee and Kwok's research (2002) which showed that through processes such as modification of physical habitat structure and / or provision of trophic sources with different qualities and quantity, certain species of mangroves have provided a significant influence to the population biology of two sesarmine crabs, namely *perisesarma bidens* and *parasesarma affinis*. When planting mangroves, people believe that one tree they plant will allow them to earn a better living and more. A research conducted by Akber, et al. (2018) shows that the mangroves of Sundarbans, Bangladesh are able to protect houses from storms. Mangroves are also very important to reduce the impact of tsunamis in Sri Lanka (Mamiit and Wijayaweera, 2006).

Mangroves also play an important role in maintaining the availability of fish. This conforms to the research conducted by Subekti (2012) which states that mangrove forest areas are nursery grounds, feeding grounds, and spawning grounds of various types of fish, shrimp, and other marine biota as well as producing a large amount of detritus for plankton which is the main food source of marine biota. The research conducted by Carrasquilla-Henao et al. (2109) states that mangroves, one of the main coastal ecosystems in the tropics and subtropics, are an important habitat for fish and crustaceans, as well as providing a number of ecosystem services for



humans. Mangrove is a critical habitat of fishery resources because it serves as a nursery, food source and reproductive area; if these resources are threatened if there will be no mangroves.

Mangrove ecotourism development in Sei Nagalawan Village has been able to improve the economics of fishing communities without having to damage the environment. This conforms to the research conducted by Nur et al. (2020) which states that the development of mangrove forest ecotourism in Kaliwlingi Village, Brebes Regency with various innovations are proven to reduce poverty and improve the welfare of local communities. Similarly, the research conducted by Hussain and Badola (2010) shows that the services provided by mangrove forests are very important for coastal communities because they improve the resilience and sustainability of the local economics. So did research conducted by Cairo et al. (2009) demonstrating the economic value of mangrove forest services in Kenya. Furthermore, the research conducted by Zaiton et al. (2019) in Kuala Perlis stated that mangrove ecosystems provide a variety of services that benefit the community and economics in general. Local communities rely heavily on mangrove ecosystems especially for food sources, firewood, charcoal, wood, etc. Mangrove forests are important for fishers to conserve Kuala Perlis's abundant seafood supply. The model of utilization of coastal and marine resources carried out by the Sei Nagalawan Village fishing community, ranging from diversification of fishing gears, variety of livelihoods, ecotourism of mangrove forests, and making mangrove plants as food and beverages shows that ecological, economic, and social utilization of coastal and marine natural resources by Sei Nagalawan fishers is carried out sustainably.

## Conclusion

Based on the results of research that has been described and analyzed on the model of sustainable utilization of coastal natural resources in Sei Nagalawan Village, Perbaungan District, Serdang Bedagai Regency of North Sumatra Province, it can be concluded that:

1. Sei Nagalawan village community actively utilizes coastal natural resources to support the economics of the community both personally and in groups.
2. Sei Nagalawan village community forms and manages the village level social group as a medium in utilizing coastal natural resources.
3. The Sei Nagalawan village fisher community diversifies their fishing gears based on seasons, namely crab, shrimp, cuttlefish, and fish fishing and adds to their livelihood by farming.
4. Diversifying the utilization of coastal resources carried out by other Sei Nagalawan Village fishing communities is making mangrove ecotourism, romance beach tourism, and processing mangroves into food and beverages.

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