SILVOFISHERY DEVELOPMENT TO INCREASE FISHERIES PRODUCTION AND MANGROVE ECOSYSTEM RECOVERY ON THE EAST COAST OF NORTH SUMATERA

Bambang Hendra Siswoyo*[1], Siti Mardiana[2], Sabrina[3]

Post-Graduate Program in Agricultural Sciences, Medan Area University
North Sumatra Indonesia, Jalan Setia Budi No. 79B/Jalan Sei Serayu no. 70 A.

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***Correspondence Address:**
bambang.hs@dharmawangsa.ac.id

Abstract: The purpose of this study is to determine the results of fish production in silvofisheri ponds and non-silvofishery research methods used are descriptive analysis. From the results of the study,milkfish production produced in silvofishery ponds (66.12 g / m2) was higher than *non-silvofishery ponds (28.37 g / m2*). The income of farmers from silvofishery ponds (Rp *477,000,-) is higher than* non-silvofishery ponds (Rp 366,000,-). In general, the condition of silvofishery and *non-silvofishery* pond water parameters that affect production and income is temperature and TSS. In the two ponds, if the temperature and TSS increase, it will increase production and income. Silvofishery contributes to optimal production and can minimize aquaculture production costs and can increase sustainable fish consumption and mangrove ecosystem conservation efforts.

INTRODUCTION

The increase in Indonesia's population, which reaches 268.6 million people, certainly requires large resources to ensure survival, especially the need for food. The same is the case with North Sumatra. The high demand for large food resources requires the utilization of the potential of existing natural resources to meet these food needs. One of the potential natural resources owned by North Sumatra is coastal and marine resources where these resources have strategic value, especially in providing food resources for the community by utilizing the potential of mangrove ecosystems through silvofishery (Woro Kusumaningtyas Perwitasari et al, 2021).

Sustainable development is to ensure equity and social justice. Equality and social justice must be enjoyed by all levels of society, both those who live in urban areas and those who live in rural areas. In relation to rural development and urban development,

inequality will cause rural areas to become weak due to excessive depletion in rural areas (Sri Fatkhiati et al, 2015).

The development of coastal areas in North Sumatra that has been taken to date has not produced better results, even the gap is getting wider between the poor and rich, the infrastructure gap between cities and villages, the economic institutional gap between villages and cities, the gap in access to technology, this gap is not able to break the cycle of poverty (Ramli, 2017).

Coastal areas and sandy seas are open ecosystems that are continuously affected by tides, waves, which expose sediment texture and fauna composition to potential sources of anthropogenic hazards (Sabrina Lo Brutto, et al, 2021).

Mangrove forest damage is generally caused by surrounding communities who convert mangrove forests into residential land and aquaculture land without paying attention to the balance of the mangrove forest itself (Yudhi Amrial et al, 2015)

Damage to mangrove ecosystems is the main cause of biodiversity changes in coastal areas, causing impacts on local ecosystems, human health and socio-economics (Murat Bileceno˘glu and Melih Ertan Çınar, 2021).

The use of mangroves for silvofishery can bring benefits to the surrounding community, so it needs to be developed so that the results are optimal and sustainable (Iin Sumbada Sulistyorini, et al, 2017)

Silvofishery is a traditional technology farming system that combines fisheries with mangrove planting, followed by the concept of introducing a management system by minimizing inputs and reducing impacts on the environment (Antonius P. Rumengan, 2019).

Silvofishery is an integrated business concept between mangrove forests and aquaculture, namely aquaculture in ponds is a prospective alternative business and is in line with blue economy principles (Woro Kusumaningtyas Perwitasari, 2021). Integration in the conservation and utilization of mangrove forest resources provides opportunities to maintain good forest area conditions, besides that brackish water cultivation can produce economic value.

In order to realize the vision and mission of the nation and support the nawacita mandated by the president, the ministry of maritime affairs and fisheries continues to encourage the growth of the marine and fisheries sector with various policies. Policy

translates into a mission of three pillars of sovereignty, sustainability and prosperity. Independence in managing and utilizing marine and fishery resources by strengthening national capacity to carry out law enforcement at sea to realize economic sovereignty (Suhaidi, et al, 2018).

RESEARCH METHODS

The method that the author uses in this paper is the descriptive method of analysis. This method is a method that serves to describe or describe the object under study, through data that has been collected by conducting analysis and making conclusions that apply to the public. The data used were obtained by searching *literature and* reviewing previous studies related to fisheries development policies such as research results, laws and regulations and other literature that supports the purpose of this writing. Literature studies are carried out by studying, journals, scientific essays, *websites* and documents related to these problems.

RESULTS AND DISCUSSION

Milkfish Production

Milkfish production in silvofishery *and* non-silvofishery *ponds* shows differences. Milkfish production in silvofishery ponds *is higher than milkfish production in* non-silvofishery ponds. The production of milkfish both using a silvofishery system and not using a silvofishery system can be calculated in table 1.

Table 1. Milkfish production

No		Jlh tebar	Jlh panen	Broad	Where	Wt	Production
1	Silvofishery	500	300	900	450	60000	66.12
2	Nonsilvofishery	1200	720	2500	1080	72000	28.37

The average weight of fish at harvest in silvofishery and *non-silvofishery* ponds is 200 and 100 g/head, respectively. Milkfish production in *silvofishery ponds is much higher (66.12 g/m2) compared to* non-silvofishery ponds (28.37 g/m2). Fish and crustaceans that enter (apart from the expected milkfish yield) are more abundant *in silvofishery ponds than in* non-silvofishery *ponds* . This shows that the presence of mangroves can increase milkfish production because *silvofishery* ponds will produce litter

as a source of food for fish after undergoing a decomposition process by bacteria, a place to shelter for the fish themselves, as well as a place to forage, foster areas, and spawn other wild animals. In accordance with Saru's statement (2008) that biologically, mangroves function as a source of nutrients, spawning areas, and areas for the enlargement or care of various types of fish, shrimp, shellfish, and other types. According to Supriharyono (2000), mangrove forests have high productivity. High organic matter in *silvofishery* ponds allows mangroves to be used as *spawning grounds,* feeding grounds*, and* nursery grounds for certain types of organisms. Food sources come from mangrove litter that falls into the waters, then decomposed by bacteria and fungi into dissolved nutrients that can be used directly by phytoplankton, then phytoplankton is used by zooplankton as food and zooplankton is used by fish larvae and crustaceans as natural food, so that a food chain is formed. Production in *non-silvofishery* ponds is lower allegedly because of insufficient natural feed available. In addition, the content of DO in *non-silvofishery* ponds ranges from 3 mg / l, causing stunted fish growth. This statement is in accordance with Kordi (2009) the content of DO below 4 mg / l causes the appetite of fish to begin to decline so that their growth is inhibited but the fish is still able to survive. Research conducted by Sadi (2006) states that the wider the mangrove in the pond, the greater the production obtained. The ratio of mangrove area is 80%, 70%, 50%, and without mangroves, milkfish and tiger shrimp production is higher in ponds with 80% mangroves, while in *non-silvofishery* ponds shrimp yields are not obtained. If the pond area is the same and stocking is carried out in the same amount, then production in *silvofishery ponds is twice as high as* in non-silvofishery ponds . This will also increase the income of farmers who cultivate in silvofishery ponds, *the yield is three times the income of farmers* in non-silvofishery ponds, because the production and selling price of fish in *silvofishery* ponds is higher. On *silvofishery* ponds, income is also generated from wild catches. According to Halidah *et al.* (2008), the existence of mangroves can produce fish catches by 30%, crabs by 27%, shellfish by 23%, fry by 50%, and nener by 40%.

CONCLUSION

Based on the research that has been carried out, the following conclusions were obtained: 1. Milkfish production in mangrove ponds is higher than non-mangrove ponds

because mangroves will produce litter as a source of food for fish, a place to shelter the fish itself, foster care areas, and spawn other wild animals. 2. The income of farmers in mangrove ponds is higher than the income of farmers in non-mangrove ponds because the income of mangrove ponds is also obtained from additional products in the form of shrimp and wild fish

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