

STRATEGIES IN DEVELOPING FRESHWATER FISH FARMING TO PREVENT STUNTING

Franchy Ch. Liufeto¹, Upik S. Rosnah², Damianus Adhar³

¹ Faculty of Animal Husbandry, Marine, and Fisheries, Universitas Nusa Cendana, Kupang, East Nusa Tenggara, Indonesia

^{2,3} Faculty of Agriculture, Universitas Nusa Cendana, Kupang, East Nusa Tenggara, Indonesia

¹ franchy.liufeto@staf.undana.ac.id ² upikrosnah@staf.undana.ac.id ³ damianus.adar@staf.undana.ac.id

PAPER INFO	ABSTRACT
Received: January 2023 Revised: January 2023 Approved: January 2023	Background: Timor Tengah Selatan is home to some of the most common malnutrition problems in Indonesia. The high rate of stunting in Timor Tengah Selatan is caused by food availability, climate and lack of knowledge about stunting itself. Additionally, the rural nature of the region, its high water demand, poor road infrastructure, and lack of visibility for health workers are significant factors. Therefore, there is a need for efforts to achieve success in fighting stunting, one of which is the strategy of developing freshwater fish farming to overcome stunting in Timor Tengah Selatan. Aim: The research would like to analyze strategies in developing freshwater fish farming to prevent stunting in Timor Tengah Selatan. Method: This research is a type of qualitative descriptive research, while data collection techniques are carried out by exploring journals and other information relevant to the study. Findings: The results of the study show that the strategy for developing freshwater fish farming to overcome stunting in Timor Tengah Selatan is by increasing business and creating additional income for the community as well as encouraging the development of freshwater aquaculture to replace the decline in marine fish during difficult times. It will improve the economy of the region which is also supported by an increase in fishermen's income.
KEYWORDS	<i>aquaculture, freshwater fish, stunting</i>
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INTRODUCTION

Indonesia is the largest country in the world with islands, or islands surrounding the mainland. The country has approximately 17,504 islands with 16,671 registered with the United Nations. Indonesia's water area is 6.4 million square kilometers, which includes a territorial sea area of 0.29 million square kilometers, inland waters and archipelagic waters of 3.11 million square kilometers, and Indonesia's EEZ of 3.0 million square kilometers (Geospatial Information Agency and the Indonesian Navy Hydrographic and Oceanographic Center, 2018). In addition, Indonesia has an additional zone of 0.27 million square kilometers of water adjacent to inland waters, 2.8 million square kilometers of continental shelf and 108,000 kilometers of coastline (which is also part of the Navy's Hydrographic and Oceanographic Center) (Geospatial Information Agency and the Indonesian Navy Hydrographic and Oceanographic Center, 2018).

Indonesia is the largest maritime country in the world (Asrini, 2019). The country has great and diverse natural wealth due to the availability of renewable resources such as coral reefs, seagrass beds, fisheries, and seaweed (Shafira & Anwar, 2021). In addition, Indonesia has

non-renewable natural resources such as petroleum, natural gas, tin, and iron ore. However, they also have other minerals and sources of biotechnology products. Indonesia's natural resources can be seen as one of the basic assets that must be managed properly to improve the welfare and prosperity of its people (Rudianto et al., 2022). They include natural energy sources such as tides, waves, wind, Marine Thermal Energy Conversion or OTEC, and small islands for tourism, transportation, environmental services and biodiversity sources.

Fish resources in the seas around Indonesia cover 37% of the world's fish species. These fish have a high economic value, such as tuna, shrimp, lobster, reef fish, ornamental fish, seaweed and other shellfish. In addition, fish farming has increased since the 1980s (Aliah, 2017). This increase involves developing marine farms for catfish, carp, catfish, tilapia and whitefish. They are also cultivated in freshwater facilities such as ponds. Outside the pond, there are fishing activities and fishing methods that can be used for other purposes, including fertilizing or hiding from predators.

The potential of aquaculture in Indonesia is very large. There is a gap of 17.9 million hectares between when potential fishing grounds are available and when utilized (Sukamto, 2017). This space can be filled with marine, brackish or freshwater cultivation. However, freshwater and brackish water cultivation only reaches 16.5% of the potential of state space while marine aquaculture reaches 67.7% (Biro Kerja Sama dan Humas Sekretariat Jenderal Kementerian Kelautan dan Perikanan, 2015). In addition, only 2.7% of fishery land in Indonesia has been used to cultivate ponds or lakes and that is only marine aquaculture (Geospatial Information Agency and the Indonesian Navy Hydrographic and Oceanographic Center, 2018). In 2018, Indonesia's fishery exports reached \$9.11 billion. If you add the added value of non-oil and gas exports, this figure increases to US\$ 10.8 billion. Adding additional value from the aquaculture subsector brings this figure to \$11.7 billion to 1.13% of their total value. This figure also represents 37.71% of Indonesia's total non-oil and gas exports in 2018 (Badan Pusat Statistik, 2019).

The significant economic contribution made by fisheries development can be seen as a major issue. Indonesia's fishing industry has great potential, but it has not been optimally utilized. That way, the development of the fishing industry as a new source of growth is very likely. This is due to the huge potential of Indonesia's fish resources, many fish are available for commercial sale, fish provide raw materials for the household industry and animal protein, and many fish species have advantages over their competitors in the international market (Iryani, 2019). In addition, the fisheries sector allows people to work while obtaining ik an catch, something that is not possible for other types of work to do (Nadjib, 2016).

Indonesia is a country with considerable fishery and agricultural potential. Evenso, the nutrition m thecommunity is not adequately handled. The high stunting rate is proof of this. The Ministry of Health in 2016 reported that 29% of children aged 1 to 2 years were stunted. The World Health Organization states that the prevalence of short toddlers is a problem. This must be addressed immediately because more than 20% of stunted children are at risk of morbidity, death, and suboptimal brain development (de Onis & Branca, 2016; Mitra, 2015). This causes toddlers to miss motor development and mental growth (Mitra, 2015; Sudfeld et al., 2015).

The national development priority listed in the 2015-2019 plan is stunting prevention. One of the government's programs in tackling stunting is increasing fish farming to increase national

fish consumption. This is one of several efforts aimed at overcoming stunting which has become a government program.

The National Population and Family Planning Agency (BKKBN) revealed that the district with the highest prevalence of stunting toddlers in Indonesia is South Timor Tengah Regency (TTS), East Nusa Tenggara (NTT) (Annur, 2023). The prevalence of stunting in South Timor Tengah Regency based on the 2021 Indonesian Nutritional Status Study (SSGI) reached 48.3%. It is the highest in Indonesia among 246 regencies/cities in 12 priority provinces for handling stunting toddlers.

Nationally, South Timor Regency is the number one peak for the prevalence of stunting toddlers among 246 districts/cities in 12 priority provinces. In addition to being ranked as the highest prevalence of stunting toddlers in Indonesia, the 48.3% stunting prevalence rate in South Central Timor Regency even surpassed double the stunting prevalence tolerance rate issued by the WHO World Health Organization (Sudiyana, 2022). The 15 districts that are categorized as red stunting prevalence in NTT include South Timor Tengah, North Timor Tengah, Alor, Southwest Sumba, West Sumba, Central Sumba, Sabu Raijua, Manggarai, West Manggarai, East Manggarai, Lembata, Kupang Regency, Malacca, Belu, and Rote Ndao (Muhammad, 2022).

Based on this data, the government and the private sector are focusing on areas that are very vulnerable to food, namely South Central Timor Regency, East Nusa Tenggara and alleviating stunting problems. To prevent stunting, more coordinated efforts are needed to help the NTT provincial government combat the high stunting rate. This high stunting rate requires additional interventions to provide decent food. Assistance from other parties, including the provincial government, is needed to support the creation of freshwater fish ponds in NTT that are needed to maintain the health of the local population.

METHOD

The scope of research carried out over the past 5 years involves a detailed study of a specific population or region that focuses on the characteristics and facts of the object. This process is called descriptive research, which aims to make something systematic, factual and accurate. The results of this type of research can prove beneficial for any region interested in implementing fish farming or aquaculture. Data collection methods include interviews, literature reviews and data analysis used to study aquaculture profiles. This study uses existing secondary data such as the number of fish farmers, land area and cultivation production. The new research data were analyzed through SWOT analysis and quantitative analysis.

RESULTS AND DISCUSSION

Profile of Freshwater Fish Farming in South Central Timor Regency

South Central Timor Regency has enormous potential in the marine and fisheries sector. Existing potentials include cultivation and capture potential. Fish resources are one of the economic resources so that fish resources are the capital of development.

For the development of fisheries, especially the marine sector along the southern coast of the Timor Sea according to the GEMALA program, the development center is on Kolbano Beach. This is one of the opportunities that must be utilized because in the future programs from the central and provincial levels will be directed to the South Coast, this is because on the

North Coast of the Timor Sea there have been overfishing. For the development of freshwater cultivation, South Central Timor Regency is located in a very ideal location for fish farming development because it is located in the Noelmina watershed and Benanain watershed where the availability of fresh water throughout the year, besides that it also has potential land that can be developed around 1000 ha, which has been used for the construction of 311.7 ha ponds spread across 166 villages and 31 districts.

For the development of brackish water cultivation, according to the mapping results of the Lapan Team in 1990, there are around 10,529 ha of potential land located in Tanjung Ela that can be used for milkfish and shrimp cultivation activities, while for the development of capture fisheries, South Central Timor Regency has a coastline of 101.86 km which stretches from Bena Village, South Amanuban District to Baus Village, Boking District, which is used for the empowerment of small fishermen. To be able to take advantage of the existing potential requires commitment from all parties, both government, private and community with proper planning and in a sustainable manner, the welfare of the TTS community, especially fishermen and freshwater fish farmers, will be achieved.

Water Quality

Water quality measurements are carried out in the South Timor Tengah region and its surroundings. These measurements involve pH, oxygen levels, temperature and dissolved oxygen levels of water. The water temperature at the study site ranged from 24 o C to 31°C. In addition, these measurements meet fish farming requirements for temperature and DO. Yahuli et al. (2014) state that temperatures between 23°C and 32°C are ideal temperature ranges for fish farming. The oxygen level in the pool should vary between 5.0 and 7.11 ppm. Worang et al. (2018) states that the highest DO in carp farming is 4 which is high enough to support tilapia and carp.

Rangkuti (2001) compared external and internal factors when comparing pH measurements at the study site. Both forces and threats are mitigated by the growth of aquatic biota. On the other hand, gains such as Strength and Opportunity increase with this growth. He underlined that the advantages and disadvantages of a subject must be considered in conducting a SWOT analysis. In addition, opportunities and threats should be weighed to make a more accurate SWOT analysis. Both external factors such as opportunities and threats as well as internal factors such as strengths and weaknesses should be considered in a SWOT analysis

Identification of Internal Factors

Strength

The strengths possessed by freshwater fish farming businesses can be identified, including:

- 1) **Business Location and Water Quality:** Fish farmers' homes and fish markets are close to this farming business. Therefore, it is easy to develop fish farming in South East Timor Regency and surrounding areas. One of the requirements for carp and tilapia farming is clean water found in TTS waters. This strength is one of the many advantages of developing fish farming
- 2) **Local Government Support:** The South Central Timor Regency has natural potential that can be utilized as freshwater fish cultivation in addition to the abundance of marine products. The TTS district government has just worked on four sites for freshwater fish

development including consumption and breeding fish production. The four locations are spread across four Fish Fry Halls (BBI) in four villages, namely Kaetupa Local BBI in Noenbila Village, Oeklofo and Oeklani in Oenlasi Village, and Bangs in Tuafanu Village. From the four locations, it is estimated that it will be able to produce consumable fish and fry but until this sixth month our income has reached Rp 127.229,000 (58.89%) of the targeted PAD target of IDR 216,0000,0000.

- 3) Human Resources: In 2020, BPS reported that 245 people were employed by fish farmers in the South East Timor region and beyond. This amount is the amount of human resources that can be maximized with optimal skills.

Debilitation

- 1) Less Seed Availability: Since fish farmers in TTS do not have sufficient seed production, they must purchase or order fish fry from outside the TTS area. This is one of the drawbacks of development projects in the TTS region and the lack of a site for hatchery.
- 2) Lack of Human Resources: Since most people living in TTS object to fish farming, the shortage of manpower makes this not easy to do.

Identification of External Factors

Chance

- 1) High Fish Selling Point: People want to buy tilapia because they are looking for products that are in great demand. Goldfish is also popular because it is a must-have staple food.
- 2) Big Business Opportunity: Opening a new restaurant on the street and the high selling price of fish farming products provide a huge business opportunity. In addition, the market share of fish farming products in the South East Timor region creates huge business opportunities. By developing freshwater fish farming in the area, this is one of the opportunities to create more business.
- 3) Restaurant Business: The TTS region employs fish farmers as a source of income thanks to the opening of restaurants around the TTS area. It enhances the local fish industry and helps consumers access their seasonal offerings.
- 4) Government Policy: Regional autonomy provides ample space for regions to develop their potential. This is done through the establishment of a cultivation business; The government supplies equipment and seeds for this business.

Threat

Businesses face a number of symptoms that indicate a possible threat to their success. However, these threats cannot be controlled by businesses and can negatively impact their success. If the threat is not addressed, it could create problems for the business now and in the future.

- 1) Climatic factors and horticultural crops: Business success requires a climate with stable stability. During the rainy season, streams and ponds overflow with water that carries litter and inundates the banks of ponds. The use of pesticides and gold mines in the region can negatively affect environmental water quality. This can lead to reduced

production and even death when garbage is brought in by flooding. Different types of organisms can grow thanks to these stimuli if exposed to chemicals or mines.

- 2) Security: Fish theft often occurs at night because fish farming has no security.

Freshwater Fish Farming Development Strategy in the Central Timor Strait Region

Fish farmers can use the SWOT matrix to plan their strategy of providing a competitive business in the face of future competition.

Strategists S – O (Strengths – Opportunities)

This plan leverages the strengths and opportunities available. Consider incorporating these ideas into your plan:

- 1) Consideration that high consumer preferences, favorable water quality and aged fish populations support the implementation of this strategy. This leads to an increase in the production capacity of fish farmed in fresh water.
- 2) In order for fish farmers to increase their profits, improving and maintaining product quality is an important part of their marketing strategy. This is because consumer demand for fish is high and supported by a strong productive age because they eat more than they needn

Strategi W – O (Weakness–Opportunities)

This approach leverages existing benefits to address inherent deficits. Many strategies can be applied because of the many opportunities that already exist:

- 1) In order to solve the shortage of seeds in the hatchery hall, many farmers have switched to planting rice. This led to the creation of more freshwater fish farming centers in the TTS area. These centers use high-quality broodstock and seeds. In addition, these centers enhance nearby People's Hatcheries by providing superior seeds and broodstock.
- 2) This strategy aims to equip freshwater fish farmers with skills in raising and cultivating their own feed. This is due to the perceived shortage of human resources for agriculture

Strategi W – O (Weakness–Opportunities)

This approach fights danger with the power it harnesses. Techniques used in this mode include:

- 1) People who have fish ponds need to maintain the safety of the pond and prevent fish theft to continue going to sea. Effective strategies include finding ways to overcome the threat of pollution by paying attention to environmental conditions such as seasonality. Fish farmers can lower their productivity to protect fish from the growth of pathogens. This allows farmers to discuss environmental pollution with each other and learn how it impacts fish farming.
- 2) During the rainy season, people refrain from planting seeds near the water for two reasons. First, the threat of environmental pollution so far due to waste carried by water from land to fish farming areas. The second reason is the risk of flooding

Strategi W – T (Weakness – Threats)

To overcome threats and reduce weaknesses, this tactic should be implemented immediately. Some solutions can be implemented by making a knowledge base on fish hatchery practices necessary for fish farmers. Hatcheries lack seeds, which makes it difficult for them to reproduce. The threat of the season can provoke flooding and environmental pollution. This threatens the amount that fish farmers can produce which is why weather considerations are important for fish farmers.

CONCLUSION

The South Central Timor Regency has natural potential that can be used as freshwater fish cultivation in addition to the abundance of marine products. The TTS district government has just worked on four sites for freshwater fish development including consumption and breeding fish production. The four locations are spread across four Fish Fry Halls (BBI) in four villages, namely Kaetupa Local BBI in Noenbila Village, Oeklofo and Oeklani in Oenlasi Village, and Bangs in Tuafanu Village. Of the four locations, it is estimated that it will be able to produce consumable fish and fry but until this sixth month our income has reached Rp 127,229,000 (58.89%) of the targeted PAD target of Rp 216,000,000.

The government and the private sector are focusing on areas that are very vulnerable to food, namely South Central Timor Regency, East Nusa Tenggara and alleviating stunting problems. To prevent stunting, more coordinated efforts are needed to help the NTT provincial government combat the high rate of stunting through the development of freshwater fish farming. In addition, theoretically, the researchers suggest that future research can discuss more factors in developing freshwater fish farming, as well as other ways to prevent stunting.

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