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# Entrepreneurial Development Potential: Tilapia Cultivation Using Jetted Pond

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**A b s t r a c t**

In line with the increase in population, the need for food in Indonesia will also increase. Fisheries are one of the important sectors that can support food security and the Indonesian economy. Fishery is considered to have a more stable economic value than agriculture. Freshwater fish cultivation can be developed as an effort to advance the village economy while meeting food needs. This study aims to identify the level of community knowledge about good fish farming and provide assistance in the implementation of fast-water ponds for the development of tilapia aquaculture. Assistance to the community is carried out through direct counseling by inviting speakers from related agencies. Identification of community knowledge is carried out by providing a questionnaire during mentoring, while the jetted pool is made based on an ideal design for tilapia aquaculture taking into account the geographical conditions of the village. Freshwater fish, especially tilapia, are expected to be the superior product of Tanggulun Village so that it can encourage the economic progress of the village and the community.

*Keywords : Freshwater fish; Cultivation; Jetted pond*



## Introduction

Indonesia is the largest archipelagic country in the world, with more than 17,000 islands. Indonesia's territory has more extensive waters than land. Based on the salt content, Indonesian waters can be divided into three categories: seawater, brackish water, and freshwater. Freshwater waters can be divided into several types of ecosystems, such as lakes, rivers, reservoirs, rice fields, swamps, and others. Each type of ecosystem has different characteristics based on its location; for example, highland rivers have different characteristics from rivers in the lowlands. The diverse characteristics of ecosystems produce diverse types of fishery products (Nuryasri *et al*., 2015). The value of the economic benefits of water is one way to formulate the extent to which cooperation in managing water resources across regions can be developed (Burhanudin *et al*., 2021).

With its vast water area, Indonesia has enormous potential in the maritime sector, especially in fisheries and fishery products. The fisheries sector has a role as a provider of protein-rich food sources for the community, namely fish. The production of the fisheries sector can be divided into two categories: (1) capture fisheries, which are carried out in seas, rivers, swamps, and lakes; and (2) aquaculture, which is carried out in ponds, rice fields, fish ponds, river banks, lake shores, and ocean banks (Atmaja *et al*., 2022). In capture fisheries, fish production is carried out by catching fish from the wild without going through the rearing process. Meanwhile, in aquaculture, fish are produced through a rearing process in a controlled place and environment (Pomuri Ciputra *et al*., 2020).

The development of the fisheries sector as one part of the national development plan aims to encourage all fisheries activities to be carried out independently by the Indonesian people, starting from the production process and processing to marketing (Rahayu, 2011). Basically, the fisheries sector can support increasing economic value added through the development of freshwater fish cultivation. Apart from being able to increase food security, the potential of the fisheries sector is also increasingly attractive as the hospitality business (hotels, restaurants, catering) develops. However, the fisheries sector has not yet become a main item on the list of regional development priorities, one of which is in the Regional Medium Term Development Plan (RPJMD) for Garut Regency for 2019–2024.

Tanggulun Village is one of the villages in Garut Regency, West Java, at an altitude of between 500-700 meters above sea level. Based on hydrology, the river flows in the Tanggulun Village area form a river watershed (DAS). A river watershed is an ecosystem unit where living organisms and the environment interact dynamically and its constituent components are interdependent. Freshwater aquatic resources have the potential for fish cultivation, including fish cultivation techniques in fast-water ponds, still-water ponds, and cages (Dwi Nugroho *et al*., 2017). Fish cultivation using fast-water ponds is carried out in ponds where the water flows continuously in certain amounts. Cultivating fish using this technique utilizes relatively fast water flows to support the growth of the fish being kept (Saleh *et al*., 2020). The strong flow of water will increase the oxygen content in the pond so that fish do not smell like mud and grow optimally.

Based on hydrological conditions, Tanggulun Village has prospects for utilizing freshwater resources such as rivers. The river is currently only used as a source of drinking water and irrigation for rice fields. Previously, fish cultivation had been carried out by village communities, but with limited knowledge and abilities, so the results were not optimal. This is characterized by the construction of ponds that do not comply with standards; the processes of breeding, feeding, and harvesting have not been carried out optimally, which has resulted in the fish farming business becoming less profitable and considered difficult by the village community.

Lack of public knowledge about how to cultivate fish properly is the main cause of community failure in cultivating fish. Apart from that, the lack of maximum support from village officials also means that the people of Tanggulun Village do not have adequate knowledge regarding good fish cultivation. This research aims to identify and increase public knowledge regarding good fish cultivation methods and develop tilapia cultivation businesses using fast-water ponds. Cultivating freshwater fish can become a superior product in Tanggulun Village, thus encouraging the economic progress of the community and village.

## Research Method

This research was conducted in March 2021 in the Tanggulun Village area, Kadungora District, Garut Regency, West Java. This research is divided into two main parts, as shown in Figure 1, namely identifying community knowledge regarding fish cultivation and developing fast-water ponds for fish cultivation. The stages for identifying community knowledge related to freshwater fish cultivation are carried out through a pretest, counseling on good fish cultivation methods, and a post-test. Questionnaires were given to the community before and after the extension was carried out to determine the extent of the community's knowledge and the influence of the extension that had been carried out. Meanwhile, counseling is carried out by providing materials to the community by

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agencies from the West Java Province Maritime and Fisheries Service. The questionnaire used for the pretest and posttest contained questions regarding fish farming to determine the level of participants' knowledge of the counseling material.

Apart from counseling, assistance was also provided in developing fast-water ponds for fish farming community groups in Tanggulun village. The process of developing a fast-water pond begins with analyzing the contour of the land and the layout of the fish pond, followed by determining the type of embankment for the fish pond and then designing the water channel and Kemalir. The fast-water pond was developed under the characteristics of tilapia cultivation by taking into account the geographical conditions of Tanggulun Village.

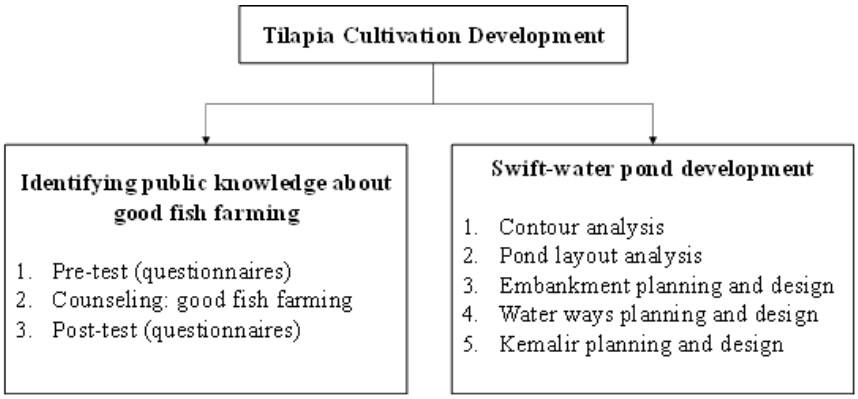


*Figure 1. Research Method*

## Results & Discussion

Tanggulun Village is a village with an area of 248 ha, consisting of 128 ha of rice fields and 120 ha of land. Most of the land in Tanggulun Village is used productively as agricultural land, which shows that Tanggulun Village has sufficient natural resources. Meanwhile, for human resources, according to 2015 population data, there were 12,382 people with 1,559 family heads spread across 19 villages in 3 Kapunduhan areas, 9 RWs, and 26 RTs. The livelihoods of the Tanggulun Village community consist of 65.95% farmers, 22.36% traders/entrepreneurs, 5.29% civil/private employees, 3.62% ABR, and 2.78% retirees.

The extension program was carried out involving 50 Tanggulun Village residents who are part of the fish farming community group. The extension brought in two main resource persons: the Head of the Fish Cultivation, Processing, and Marketing of Fishery Products from the West Java Province Maritime and Fisheries Service and a fish cultivation practitioner from Sukabumi. Apart from delivering material and practices regarding good fish cultivation, this counseling also carried out a pretest and posttest to assess the extent of knowledge of the Tanggulun Village community regarding good fish cultivation methods before and after assistance. Table 1 shows the level of community knowledge before attending counseling.

**Table 1.**
**Pretest Results of Counseling Participants Regarding Good Fish Farming**

| Level of Knowledge | Total | Percentage (%) |
|---|---|---|
| Good | 10 | 32 |
| Poor | 21 | 68 |
| Total | 31 | 100 |

In Table 1, it can be seen that the knowledge of the Tanggulun Village community regarding good fish cultivation methods before participating in mentoring is still relatively low because 68% of respondents received "Poor" results, and only 32% of respondents already had "Good" knowledge about good fish farming. The pretest is then continued with counseling and ends with a posttest. Table 2 shows the post-test results of the counseling participants.

**Table 2.**
**Posttest Results of Counseling Participants Regarding Good Fish Farming**

| Level of Knowledge | Total | Percentage (%) |
|---|---|---|
| Good | 29 | 94 |
| Poor | 2 | 6 |
| Total | 31 | 100 |

Table 2 shows that after counseling, there is an increase in public knowledge regarding good fish farming methods. The increase in knowledge is shown by the number of respondents who got a "Good" score of 94% and 6% for a "Poor " score. This is very different from the previous pretest results, where only 32% of respondents got a "Good" score.

After counseling, the next step is assistance in developing ponds for fish cultivation. Before deciding the type of pond to be developed, the process that is required first is to determine the type of fish that will be cultivated. Tanggulun village is located 500-700 meters above sea level. Based on geographical conditions, Tanggulun village is in the highlands with a cool climate. Several types of fish suitable for the highlands include tilapia, catfish, and gourami. It was then determined that the freshwater product that suited the geographical conditions and community of Tanggulun village was tilapia. Therefore, it was decided to develop a type of fast-water pond that is suitable for tilapia cultivation.

The process of developing a fast-water pond for tilapia cultivation consists of five steps. The first one is analyzing the contour of the land. The pond will be built on flat land, so the pond excavation needs to be done on all sides. If the pond is built on sloping land, then the excavation will only be done on one side of the pond. The second one is analyzing the layout of the fish ponds. The fish ponds will be made with a parallel irrigation system where each pond will receive water intake from the water source directly so that the water quality can be maintained and not polluted. The third one is building a fish pond embankment that functions to retain water and act as a barrier for the fish pond. The embankment will be built using walls so that it is watertight (does not seep), strong enough to withstand the weight of water, not easily eroded, and does not leak. The fourth one is making water channels. Two types of water channels will be made, including water inlets and water outlets. The distance between the inlet and outlet water channels must be as far as possible and crossed so that the incoming water does not immediately flow out but instead replaces the old water first. The water inlet is made with PVC pipe, laid across and through the embankment. The height of the pipe is higher than the water level of the horizontal pool and is fitted with a net so that no animals can get in and out of the pool. There are two types of outlets, namely circulating water outlets and sewer outlets. Circulating water channels are made on the surface of the pond, and pipes for harvesting water are made at the bottom of the pond. The pipe is made on the surface and installed across the embankment. The part facing the pool is lower than the part outside the pool. Meanwhile, the drain channel is made at the bottom of the lowest pool, usually in Kemalir channels. At the end of the pipe in the pool, there is a valve that can be opened and closed. The last one is making a Kemalir channel. It is a ditch at the bottom of the pond, with a depth of around 20-30 cm. Kemalir functions to help with harvesting,

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accommodate food waste, settle dangerous mud, and regulate bottom water flow. The amount of Kemalir is adjusted to the water outlet, as shown in Figure 2.


*Figure 2. Pond Making Process*

## Conclusions

The level of knowledge regarding good fish cultivation methods possessed by the people of Tanggulun Village is still relatively low. This can be seen from the results of observations and pretests that were carried out before the counseling. It can be concluded that one of the causes of failure in fish cultivation carried out by residents so far is a lack of knowledge of good fish cultivation methods. Through good fish cultivation education involving the government and practitioners, the community's knowledge and understanding increase, as shown by the results of the posttest carried out. The counseling then continued with assistance in developing fast-water ponds, which are used as a medium for cultivating tilapia. Tilapia fish were selected by taking into account geographical conditions and the interests of the Tanggulun village community. It is hoped that tilapia cultivation can become a superior product in Tanggulun Village so that it can encourage the economic progress of the community and village. Research can be developed with a focus on marketing the results of tilapia cultivation to the market.

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## Conflict of Interest

The authors declare that there is no conflict of interest.

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