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Intensification of catfish cultivation at Pokdakan Baraya in Kotabatu Village, Bogor Regency

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Abstract: Kotabatu Village, located in Bogor District, is home to several Fish Cultivator Groups (Pokdakan), one of which is Pokdakan Baraya, focused on cultivating catfish. Based on a focus group discussion conducted by the Pakuan University Implementation Team, Pokdakan Baraya faces challenges related to low income, high production costs, and the risks involved in traditional fish farming practices. In response, the team proposed the introduction of the Biofloc system for fish cultivation. The service methods included a comprehensive survey to assess the conditions and needs of the target community, followed by focus group discussions (FGD). The next phase involved outreach by the Pakuan University service team, employing knowledge-sharing methods, case studies, and training on the biofloc technology. To evaluate the impact, regular monitoring and evaluation processes were implemented, which included counseling, pond construction, seed distribution, nursery establishment, and intensive catfish rearing using the biofloc system. As a result of the biofloc system's adoption, pond productivity increased by 1.8%, and the harvest time was reduced by 15 days. Additionally, the knowledge of Pokdakan Baraya members regarding fish cultivation technology grew by 60%, and their income saw an 81% increase from the sale of the catfish. The successful implementation of this system demonstrates significant improvements in the efficiency, productivity, and economic stability of the community.

Keywords: Baraya pokdakan, catfish cultivation, biofloc pond, Kotabatu village

1. INTRODUCTION

According to the 2022 Minister of Maritime Affairs and Fisheries Regulation, Pokdakan is an organized group of fish cultivators with an established structure and rules, directly involved in fish cultivation activities. Kotabatu village in the Bogor district is home to several such groups, including Pokdakan Baraya, which specializes in catfish farming. Initially, this group sourced their fish seeds from other cultivators but later transitioned to obtaining certified superior seeds from the Fisheries Service, enhancing their cultivation efforts. One of the major challenges they face is the rising cost of feed, which significantly impacts their profitability,

as nearly 50% of the operational costs go toward feed (Hasanah et al., 2022). Therefore, the need for alternative feed solutions that provide both quality and quantity is pressing.

The Baraya Fish Cultivation Group needed help providing feed at the fish cultivation enlargement stage. The price of the feed used in pellets continues to increase. Currently, the cost of fish feed can reach IDR 220,000 / 20 kg. The increase in the price of pelleted feed as the main feed ingredient reduces the profits of fish farmers. This is because almost 50% of the costs of developing fisheries businesses are spent on feeding itself (Hasan et al., 2012). Apart from that, the presence of fish food in sufficient quantities and of good quality will significantly determine the quality and production of farmed fish. The fish feed needed is good quality feed, including ± 29-30% protein (Wulanningrum et al., 2019). So alternative solutions are urgently needed regarding providing feed in sufficient quantity and quality. Apart from that, the presence of fish food in adequate amounts and of good quality will significantly determine the quality and production of farmed fish. The fish feed needed is good quality feed, including ± 29-30% protein (Dewantoro et al., 2019). So alternative solutions are urgently needed regarding providing feed in sufficient quantity and quality (Macusi et al., 2023).

Based on the problems in Pokdakan Baraya, it is necessary to implement alternative, more efficient fish cultivation methods, one of which is applying intensive catfish cultivation technology with biofloc (Matishov et al., 2025). This system has been proven to increase fish production and feed efficiency. That way, production costs are reduced, and the time required is relatively shorter when compared to conventional cultivation. Innovative, modern, and productive rearing of catfish is through the biofloc system because it can reduce production costs (Faridah et al., 2019; Sudaryati et al., 2017). According to Yu et al. (2023), the biofloc system can be carried out without water changes, and the ecological control is in the form of conditioned biofloc bacteria, does not depend on sunlight, uses organic materials, and has complete and vital aeration. The specialty of the biofloc pond system is that the cultivation time is relatively short, relatively low capital, environmentally friendly, and saves water and feed use (Das et al., 2018).

The objectives of this service activity are: Increasing the knowledge of fish farmers, especially Pokdakan Baraya, Kotabatu Village, regarding intensive catfish cultivation techniques, increasing profits for fish farmers

through efficient production costs and increasing land productivity, increasing the income of families/supported groups, and can be used as a sustainable program involving students.

2. METHOD

The method used in this community service activity involved a combination of surveys, focus group discussions (FGD), training, and practical demonstrations. The aim was to empower the local community and increase their participation in the project. The steps were as follows:

1. **Survey and Initial Interaction**

   The first step was conducting a survey to gather information on the existing conditions of the fish farming practices in Pokdakan Baraya, Kotabatu Village. This included identifying the key challenges faced by the community, such as rising feed costs and low income. The survey also served as an introduction to the project and helped to socialize the upcoming activities.

2. **Focus Group Discussion (FGD)**

   After the survey, a series of FGDs were held with the members of Pokdakan Baraya. These discussions aimed to assess their understanding of existing fish farming methods, the challenges they faced, and their willingness to adopt new practices. The insights from the FGDs helped shape the intervention strategies for the project.

3. **Training and Technology Introduction**

   Once the survey and FGDs were completed, the implementation team organized a series of training sessions for the farmers. The training covered the principles of intensive catfish cultivation using the biofloc system, including its benefits, the required materials, and the steps involved in setting up and managing the biofloc ponds. The training was hands-on, with live demonstrations to ensure effective knowledge transfer.

4. **Biofloc Pond Setup and Simulation**

The next phase involved the actual setup of biofloc ponds. The community was actively involved in mapping the location and constructing the ponds, ensuring they had practical experience. Biofloc development was initiated by introducing organic feed and molasses into the ponds, followed by aeration for ten days. During this time, the farmers were guided in monitoring the conditions and ensuring the growth of biofloc to support the fish.

5. **Ongoing Monitoring and Evaluation**

To ensure the long-term success of the intervention, regular monitoring and evaluation were carried out. This included assessing the pond's performance, conducting follow-up training, and providing continuous support to the farmers. The goal was to ensure that the knowledge gained was applied effectively, leading to increased productivity and reduced costs.

6. **Harvest and Performance Evaluation**

Finally, the project evaluated the performance of the biofloc system by conducting a harvest. The farmers successfully harvested catfish from the newly established biofloc ponds, demonstrating a significant improvement in both productivity and income. The final evaluation showed an increase in pond productivity by 1.8% and a reduction in harvest time by 15 days compared to traditional methods.

3. RESULT AND DISCUSSION

3.1 Location Survey

The location survey was conducted by the implementing team, which consisted of the project leader and team members from Pakuan University. This survey took place at the start of the community service activities, specifically in Kotabatu Village, Ciomas Sub-District, Bogor District (see Figure 1). The purpose of the survey was to assess the suitability of the site for pond construction and to gather important information such as:

- **Position and Size of the Pond**

The team, along with members of the local Pokdakan Baraya group, surveyed the area to determine the best locations for constructing the ponds. The chosen pond size was 2m x 4m with a depth of 1.5 meters, and four units of such ponds were planned.

- **Energy Requirements and Costs**

  The team evaluated the energy requirements for operating the biofloc system and estimated the costs of constructing the ponds. This step also helped in assessing the availability of local resources to support the construction.

- **Equipment Requirements**

  The survey also helped identify the necessary equipment, such as HDPE plastic for lining the embankments and pond bottoms, to ensure the ponds would be durable and functional.

Local workers, familiar with the area, assisted in assessing the terrain and evaluating the materials needed for the pond construction. Their input was crucial in making sure that the planned ponds could be constructed within the available resources and site conditions.

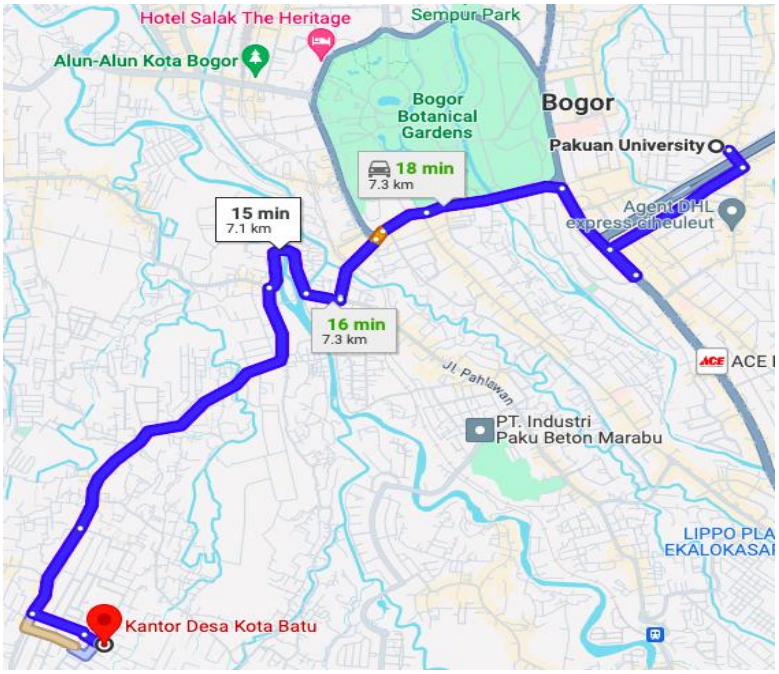

Figure 1. Kotabatu Village

3.2 **Pool Construction**

The pond construction process began with mapping the location for the pilot ponds. This step took eight days and involved a collaborative effort with six workers from the Baraya fish cultivator group. The construction process included the following key points:

- **Mapping the Pond Location:** The team carefully selected and mapped the location for each pond, considering factors like water flow, sunlight exposure, and accessibility.
- **Size and Materials:** Each pond unit was designed to be 2m x 4m with a depth of 1.5 meters. The total area required for each pond was 12m², and each unit was lined with HDPE plastic to ensure durability and water retention.

Figures 2, 3, and 4 illustrate the mapping and construction phases of the ponds.

Figure 2. Mapping the location of fish ponds

Figure 3. Making a fish pond

Figure 4. Fish pond design

Figure 5. Biofloc formation process

3.3 Nursery and rearing of catfish

Before stocking the catfish into the ponds, biofloc is first grown in the rearing pond to provide natural food, which accelerates the growth of the catfish. The biofloc development process involved:

- **Biofloc Formation:** To start the biofloc process, 5 kg of leftover feed and 5 kg of molasses were spread into each pond. The ponds were aerated for ten days, allowing biofloc to develop. After ten days, the biofloc was fully formed and ready for the catfish to be stocked into the pond (see Figure 5).
- **Nursery Phase:** The catfish seeds, initially between 3-5 cm, were raised in the nursery for 15 days until they grew to 5-7 cm. During this phase, the density of the catfish seeds was 1,500 per pond. The goal of this nursery phase was to ensure uniform size among the catfish to reduce cannibalism. The nursery phase is expected to improve the survival rate of the fish.
- **Rearing Phase:** After 15 days in the nursery, the catfish fry were transferred to the prepared rearing ponds. During this phase, commercial feed with a protein content of 30% was provided daily to support the catfish's growth. This enlargement phase continued for 40-60 days, after which the fish were ready for harvest.

3.4 Final Harvest

The harvesting process was conducted in two stages:

1. **Sorting:** The first step involved sorting the catfish by size, focusing on those larger than 100 grams.

2. **Final Harvest:** The final harvest was carried out across four ponds, producing a total of 251.1 kg of catfish. These were sold for a total value of IDR 8,035,200 (at a selling price of Rp. 32,000 per kilogram).

Comparison with Conventional Methods: A key question regarding the use of biofloc technology is whether the size and quality of the catfish at harvest match those produced by traditional methods (without biofloc). In this case, the biofloc system resulted in faster growth, with the harvest occurring 15 days earlier compared to conventional methods. Furthermore, the biofloc system contributed to a more efficient feed conversion and healthier fish, which potentially enhances the overall quality of the catfish. The results indicate that while the size of the catfish was comparable to that of traditionally farmed fish, the biofloc system's impact on feed efficiency and shorter growing period demonstrated significant advantages. This improvement in yield, quality, and economic value highlights the effectiveness of the biofloc technology in producing high-quality catfish with better resource efficiency.

Table 1. Comparison of Cultivation Pond Performance Before and After Technology Application

Parameter	Before	After
Solid stocking	90 heads/m2	90 heads/m2
Yields	138.5 Kgs	251.1 kg
Harvest age	60 days	45 days
Sale value	Rp. 4,432,000	Rp. 8,035,200

3.5 Sustainability After Program Completion

The sustainability of the catfish cultivation program using the biofloc system is a key consideration for its long-term success. Several strategies have been put in place to ensure that the benefits of the program continue even after its completion:

1. **Knowledge Transfer and Training:**

   The members of Pokdakan Baraya have received comprehensive training on the biofloc system. Continued education and the possibility of refresher courses will ensure that the community is well-equipped to maintain and expand the use of biofloc technology.

2. **Monitoring and Evaluation:**

   After the program's implementation, regular monitoring will be conducted to assess the performance of the biofloc system and pond productivity. This will include follow-up visits by the implementation team to ensure that the practices are being adhered to and improvements are made based on field observations.

3. **Capacity Building for Local Leaders:**

   To strengthen the community's independence, local leaders will be trained to serve as mentors and facilitators for new and existing fish cultivators. These leaders will be crucial in guiding the community toward sustainable practices and ensuring that knowledge is passed down within the group.

4. **Establishment of a Financial Support System:**

   The Pokdakan Baraya group is encouraged to form partnerships with local agricultural financial institutions. This will allow the farmers to access the capital needed for expansion or improvements in their aquaculture operations. Financial sustainability will enable farmers to reinvest and maintain their biofloc systems independently.

5. **Community Engagement and Support Networks:**

   Continuous engagement within the community, through regular meetings and discussions, will ensure that challenges are addressed promptly and solutions are collectively developed. Additionally, collaboration with local government agencies and NGOs will help secure the necessary support and resources for future growth.

By focusing on education, monitoring, and community involvement, the program aims to create a self-sustaining model that will enable Pokdakan Baraya to continue to thrive and expand, benefiting both the farmers and the broader community for years to come.

4. CONCLUSION

Community service activities in Kotabatu Village, Ciomas District, and Bogor Regency have shown measurable success. The implementation of intensive catfish cultivation technology has yielded significant improvements across various areas:

1. Knowledge Enhancement:

   The fish farmers' understanding of biofloc-based fish cultivation has increased by 60%, as evidenced by pre- and post-training assessments. This increase in knowledge directly correlates with improved fish farming practices.

2. Economic Impact:

   Pond productivity saw an increase of 1.8%, and the overall income of Pokdakan Baraya members increased by 81% after adopting the biofloc system, with the sale value of the catfish harvested rising from Rp. 4,432,000 to Rp. 8,035,200.

3. Health and Fish Quality:

   The health of the fish also improved, with a 15-day reduction in harvest time, compared to traditional farming methods, resulting in fresher and healthier fish. The biofloc system contributed to better feed efficiency and water quality, ensuring the overall well-being of the fish.

These improvements highlight the positive impact of the program on the knowledge, economy, and fish health of the community. The successful adoption of biofloc technology has paved the way for sustainable growth in the region.

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CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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