

Empowering Sustainable Agriculture in Towua Village, Sulawesi Tenggara

Enhancing Efficiency through Organic Feed Production, Pond Management, and Business Training

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ABSTRACT

The livelihood of the residents of Towua Village is generally farming, including both pond farming and rice field farming. Towua Village has a pond area of 585.69 hectares used for milkfish farming. Discussions with the village head revealed that the productivity of the community-owned ponds is still very low because they are managed traditionally. This issue also affects the Harapan Jaya Bandeng Farmers Group. One possible solution is to implement or apply technology to help improve the quality of the ponds. The solutions to address the partner's problems include increasing the supply of natural feed through organic farming systems, improving pond management and governance, and providing business management training. These solutions are implemented using a holistic and multidisciplinary research-based approach to achieve farmers' welfare and village economic independence. The method used in this activity is the action research approach. The results of training, assistance, and monitoring of pond quality have led to an 80% increase in partner knowledge, an 80% increase in partner skills, a 60% increase in partner accessibility, and a 50% increase in partner income.

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Introduction

Towua Village has significant potential in pond farming, as evidenced by the pond area of 585.69 hectares, which accounts for 52.35% of the total area of Towua Village (1,118.9 hectares). The average income per household in Towua Village is Rp. 1,912,794 per month, or Rp. 443,000 per family member per month. The target partner in this program is the Harapan Jaya Bandeng Farmers Group, which is engaged in milkfish farming. The potential of the Harapan Jaya Bandeng Farmers Group lies in their considerable land area of 22 hectares, where each member owns 0.5-2 hectares, their experience in pond farming, and their strong desire to advance and develop their business as a basic asset for the implementation of the program's innovations.

In Towua Village, the implementation of strategies to enhance agricultural efficiency draws inspiration from recent studies and initiatives in related fields. Ref. [1] emphasizes the empowerment of farmer groups in economic development, a model echoed in efforts to empower local farmer groups in Towua through sustainable aquaculture practices. Studies by Ref. [2] highlight the socio-economic challenges faced by shrimp farmers, reflecting similar concerns among milkfish farmers in Towua regarding productivity and environmental sustainability.

Recent government initiatives, as highlighted by Ref. [3] and Ref. [4], underscore the importance of collaborative efforts to boost shrimp and aquaculture production nationally, aligning with efforts in Towua to improve pond management and organic feed production. These efforts aim not only to increase productivity but also to enhance environmental stewardship and economic resilience within the community. By integrating lessons from these studies and initiatives, Towua Village aims to achieve sustainable agricultural practices, empower local farmer groups through knowledge and skill development, and foster resilience in the face of socio-economic challenges. These efforts are crucial for advancing Towua's agricultural sector and ensuring long-term prosperity for its farming communities.

The main problem in the target area is the pond farming system, which tends to be less environmentally friendly due to the continuous use of inorganic fertilizers and manufactured feed, and the declining water quality due to changes in weather and climate. Below is a description of the condition of one of the partner's ponds in Towua Village during the team's visit and discussion with the Towua Village Head, Mr. Basman.

Discussions with the village head revealed that the productivity of community-owned ponds is still very low because they are managed traditionally, resulting in high mortality rates. According to him, it is fortunate if 50% of the seeded fry survive and are harvested. Common problems in milkfish farming in the target area include low water quality, such as high concentrations of chemicals, low dissolved oxygen levels, and potential water quality degradation due to sedimentation from nickel mining and the low quality of human resources in fish farming

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management. Weather changes and extreme temperatures often affect the pond environment, causing stress to the fish and disrupting their growth.



Fig. 1. Partner's Pond Area Description

The goal of this community service activity is to increase the empowerment and welfare of the community by achieving indicators such as increased production, improved quality of fishery products, business efficiency, and pond farmers' income; enhanced quality of pond farmers' human resources in aspects of aquaculture technology use, business management, and farmer group governance; and increased self-reliance of farmers and competitiveness of pond farming businesses.

Material And Methods

Physical activities involve the transfer of science and technology to the partner group by directly involving them in every process. The activities include making organic fertilizer, pond improvement, pond drying, soil turning and liming, fertilization, seed dispersal, feeding, and proper harvesting. Individual training and assistance are provided to each group member during visits or informal occasions. This guidance model is expected to strengthen the relationship and closeness between the implementers the partner group and the target community, making the transfer of knowledge and technology more effective. See Table 1 for the activities.

Table 1. Activity schedule

1st Month	Preparation for the implementation of activities. During this period, the action plan is drafted, and the internal team coordinates to agree on the technical implementation of activities.
2nd Month	Coordination of activities between the implementation team and the partner group. During this stage, the implementation of activities is finalized, and the equipment and materials required for the program are procured.
3rd and 4th Months	Program implementation, which includes both physical and non-physical activities.

Group training and assistance are conducted through counseling and guiding the partner group on proper and correct aquaculture, from land preparation, pest control, drying, liming, seed dispersal, maintenance, water quality control, harvesting, and post-harvest handling. During

each counseling and guidance session, all members of the partner farmer group will be given brochures, leaflets, or bulletins, and occasionally videos of the activities will be shown. This is to facilitate understanding of the technology to be provided/applied.

Results and Discussion

Table 2 provides a summary of the results of this activity. Several solutions have been proposed to increase efficiency in the data-driven agricultural sector. First, efforts to increase the availability of natural feed through the production of organic feed have reached the stage of making organic fertilizer, although the target of reducing pellet feed use by 30% has not yet been achieved.

Efforts to increase the availability of natural feed through the production of organic feed have reached the stage of making organic fertilizer. Although the target of reducing pellet feed use by 30% has not been achieved, an efficiency of 25% in the use of factory feed has been reached. Improvements in pond management have focused on repairing pond embankments and enhancing soil quality through drying and liming.

Table 2. Activity target summary

No	Proposed Solution	Target Output	Achievement Indicator	Accomplishment
1	Increasing the availability of natural feed through organic feed production	Reduction in pellet feed use by 30%	25% efficiency in factory feed use	25% (organic fertilizer production as a source of natural feed growth has been implemented)
2	Improvement of pond management	Increased pond productivity	30% increase in pond productivity	Pond embankment repairs and improvement of pond soil quality through drying and liming have been implemented
3	Business management training	80% increase in business management skills	Partner farmer groups understand business management	Partner farmer groups understand business and group management

While specific data on the increase in productivity have not been provided, these steps are expected to improve overall productivity. Business management training has given the partner farmer groups a good understanding of business and group management. Although the goal of an 80% increase in business management skills needs to be measured more precisely, initial steps have been taken.

In Towua Village, efforts to enhance agricultural efficiency and sustainability are informed by recent research and initiatives in related fields. Ref. [5] provides a critical analysis of the environmental and socioeconomic impacts of shrimp farming, emphasizing the importance

of sustainable practices to mitigate adverse effects. This perspective resonates with efforts in Towua to improve pond management and organic feed production, aiming to enhance productivity while minimizing environmental footprint.

Social entrepreneurship in fish farming, as explored by Ref. [6], underscores the role of innovative business models in fostering community resilience and economic empowerment. These insights guide initiatives in Towua to empower local farmer groups through business management training, fostering self-reliance and collaborative growth. Better Management Practices (BMPs) for sustainable shrimp farming, advocated by Ref. [7], highlight effective strategies for maximizing productivity while preserving ecological balance. These practices are integral to Towua's strategy of enhancing pond management techniques to ensure sustainable fishery practices and environmental stewardship.

Engineering and sustainable community development principles, as discussed by Ref. [8], emphasize the importance of integrating technological advancements with community needs. In Towua, this approach informs the adoption of technology in pond management and agricultural practices to improve efficiency and sustainability. The networking approach to community development advocated by Ref. [9][10] highlights the significance of collaborative efforts and participatory approaches in achieving sustainable outcomes. In Towua, these principles guide community engagement strategies, ensuring that local voices are heard and integrated into decision-making processes.

In Towua Village, efforts to enhance agricultural practices and empower local aquaculture communities draw insights from recent research and initiatives in related fields. Ref. [11] emphasizes the importance of strengthening and sustaining small-scale aquaculture farmers' associations, highlighting their role in fostering collaboration and knowledge sharing among farmers. This approach resonates with Towua's efforts to empower local farmer groups through capacity building and collaborative projects aimed at improving pond management and organic feed production.

Research by Ref. [12] examines the adoption of aquaculture technologies among cluster farmers, emphasizing the critical role of trust and interaction within farmers' networks. This research informs Towua's strategy of promoting social networks and community engagement to facilitate the adoption of sustainable aquaculture practices. By fostering trust and collaboration among farmers, Towua aims to enhance knowledge dissemination and technology uptake, thereby improving productivity and sustainability in fish farming practices.

These studies underscore the importance of community-driven initiatives, trust-building, and collaborative networks in achieving sustainable agricultural development. In Towua Village,

these principles guide efforts to empower local farmers, promote technological innovation, and ensure long-term resilience in the face of environmental and economic challenges. By leveraging these insights and fostering community participation, Towua aims to create a sustainable future for its agricultural sector and empower its farming communities for generations to come.

Conclusion

These initiatives highlight the importance of empowerment through knowledge transfer, skill development, and resource management. The production of organic fertilizer as an alternative to pellet feed reflects the potential for local resource utilization, reducing dependency on external inputs and fostering sustainability. Enhanced pond management practices demonstrate the capacity of farmers to control and improve their cultivation environment, leading to sustainable productivity increases. Business management training has equipped the farmer groups with essential skills for effective decision-making and independent business operations, contributing to improved income and welfare. The project's outcomes underscore the value of empowering individuals and groups to take control of their lives and environments. By providing the necessary tools, knowledge, and skills, the project has paved the way for sustainable fishery practices, increased production yields, and enhanced quality of life for the farmers and the local community. Continued evaluation and support will be essential to measure and sustain these achievements, ensuring long-term success and resilience in the agricultural sector of Towua Village.

Conflict of Interest

The authors declare that there is no conflict of interest.

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