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# Implementasi Model Budidaya Udang Galah Berbasis Eco-Masjid di Kendari

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**ABSTRACT**

The development of mosques as centres for sustainable community empowerment is an important issue in the socio-economic development of urban communities. This activity aims to implement and analyse a model for giant prawn (Macrobrachium rosenbergii) farming based on eco-mosques in the Tawang Alun 2 Complex, Kendari City. The approach used is the application of science and technology with a Participatory Action Research (PAR) approach. As a result, it was revealed that the integration of eco-mosque principles with giant river prawn farming allows for the optimisation of limited land, efficient water use, environmentally friendly waste management, and the strengthening of the congregation's economy. The developed model encompasses technical aspects of farming, mosque institutional aspects, congregation participation, and environmental sustainability. This programme has the potential to increase community income, support local food security, and strengthen the role of mosques as centres of worship, education, and community economy. This model is recommended as an alternative for developing productive eco-mosques that can be replicated in other urban areas.



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## 1. INTRODUCTION

Sustainable development requires the integration of economic, social, and environmental aspects in every community development activity (Depari, 2024). In urban areas such as Kendari City, the limited productive land and increasing economic needs of the community are the main challenges in the development of local resource-based businesses. Mosques, as socio-religious institutions, have the strategic potential to play a broader role not only as a place of worship, but also as a center for economic empowerment and environmental education.

The concept of eco-mosques developed in response to the need for sustainable environmental management based on Islamic values. Eco-mosques emphasize resource efficiency, waste management, concern for the environment, and strengthening the economy of the people collectively. However, most of the implementation of eco-mosques in Indonesia is still limited to symbolic and educational aspects, such as hygiene management, energy saving, and environmental campaigns, while integration with

community-based productive economic activities is still relatively minimal. In fact, according to Susanti (2018), productive economic businesses can build partnerships, increase knowledge, and encourage the sustainability of micro businesses in society. In addition, it can provide increased income, job creation, and food security (Sahabuddin et al., 2024), as well as increased access to economic resources (Achmad et al., 2023).

Lobster (Macrobrachium rosenbergii) is a freshwater fishery commodity with high economic value with relatively stable market demand. A number of previous studies have mostly discussed the technical aspects of lobster cultivation, feed efficiency, and increased production on a commercial or household scale. On the other hand, studies that link lobster cultivation with socio-religious institutions, especially mosques, as well as the principle of eco-mosques as a framework for sustainable management are still very limited. Thus, there is a research gap in the integration between (1) the concept of eco-mosques as socio-ecological institutions, (2) lobster cultivation as a productive economic activity, and (3) the empowerment of worshippers based on Islamic values in an urban context. This service is here to fill this gap by implementing an eco-mosque-based lobster cultivation model that not only emphasizes the technical aspects of production, but also institutions, congregational participation, and social and environmental sustainability.

The novelty of this service lies in the application of the results of the development of a conceptual model of lobster cultivation that explicitly integrates the principles of eco-mosques, the use of mosque resources, and congregation-based collective business governance. This model offers an alternative approach to the economic empowerment of the ummah that is contextual, applicative, and potentially replicated in other urban mosques. This study aims to compile and analyze an integrated, sustainable, and applicative eco-mosque-based lobster cultivation model, as well as examine the social, economic, and environmental implications of its application in the Tawang Alun 2 Mosque, Kendari City.

## 2. METHODS

This activity is a community service based on the application of science and technology with a Participatory Action Research (PAR) approach. The location of the activity is at the Tawang Alun 2 Mosque, Kendari City, with the main partners of the mosque management and worshippers as the target beneficiaries. The implementation of the service begins with the identification of problems and potentials carried out through observation of the mosque environment and discussions with administrators and worshippers, to map the potential of land, water sources, and productive business interests. The next stage is the design of a productive eco-mosque model, which includes the design of lobster cultivation ponds, environmentally friendly water management systems, and the division of mosque-based institutional roles. Furthermore, knowledge and technology transfer is carried out through lobster cultivation training, water quality management, and strengthening understanding of the eco-mosque concept. Implementation and assistance are carried out through the application of limited cultivation models, production simulations, income, and water use efficiency. Finally, monitoring and evaluation are carried out to assess the output achievements, the level of pilgrim participation, and the potential sustainability of the program. Service data was collected through participatory observation, interviews, activity documentation, and recording of technical and economic simulation results. Data analysis was carried out in a descriptive-qualitative and simple quantitative manner to evaluate the effectiveness of the service model and its impact on partners.

## 3. FINDINGS AND DISCUSSION

### *3.1 Potential for the Development of Lobster Cultivation in the Mosque Environment*

The results of observations show that the environment of the Tawang Alun 2 Mosque has limited land but enough for the development of small-scale tarpaulin ponds. Access to fresh water is relatively adequate and can be optimized through a recirculation system. Mosque worshippers show interest in productive business activities that are managed collectively and provide economic benefits. The

findings are in line with the views of community-based development and sustainable aquaculture experts who affirm that limited land in urban areas is no longer a major obstacle to the development of fisheries businesses, as long as it is supported by small-scale aquaculture technology innovations and adaptive institutional governance. FAO (2020) and Boyd et al. (2021) emphasize that compact aquaculture systems, including tarpaulin ponds and small-scale concrete ponds, are an effective form of spatial adaptation for urban contexts and densely populated communities..

From the perspective of water resource management, several recent studies indicate that the application of recirculating systems in small-scale aquaculture can improve water-use efficiency while reducing environmental impacts (Badiola et al., 2021; Tacon & Metian, 2022). This approach is consistent with the concept of eco-efficiency in the green economy, which emphasizes the optimization of production inputs without increasing ecological pressure. In the context of an eco-mosque, efficient water utilization has dual relevance, serving both as a technical aquaculture practice and as a form of environmental education grounded in religious values (Ministry of Religious Affairs of the Republic of Indonesia, 2021; Rahman & Yusuf, 2023).

Furthermore, institutional theory and social capital theory position socio-religious institutions as important actors in promoting the success of community-based collective enterprises. Ostrom (2020) and Uphoff (2021) emphasized that trust, shared norms, and social legitimacy play significant roles in reducing coordination costs and improving the sustainability of common resource management. Within this framework, the mosque functions not only as a place of worship but also as a social capital generator that strengthens cohesion and congregational participation in productive economic activities (Aziz et al., 2022; Huda et al., 2024).

The interest of the congregation of Tawang Alun 2 Mosque in collectively managing giant freshwater prawn aquaculture further strengthens the argument that the success of a productive eco-mosque model is highly determined by the synergy between technical innovation and local institutional strength. This is in line with the findings of Nugroho et al. (2022) and Pratama and Sari (2023), who stated that community-based fisheries enterprises have higher sustainability potential when managed through institutions with strong social legitimacy and shared values.

Thus, theoretically, the eco-mosque-based giant freshwater prawn aquaculture model implemented in this activity expands the discourse on eco-mosques from merely symbolic environmentally friendly practices into a tangible instrument for community economic empowerment. The integration of sustainable aquaculture principles, green economy concepts, and mosque-based institutional arrangements addresses a research gap concerning the role of religious institutions in the development of community-scale aquaculture in urban areas, particularly in developing countries.

Giant freshwater prawn was selected because it has high market value, a relatively short culture period of 4–6 months, and can be cultivated using simple technology. These characteristics make this commodity suitable for development within the eco-mosque framework. The selection of giant freshwater prawn (*Macrobrachium rosenbergii*) as the main commodity in the eco-mosque model is consistent with the views of aquaculture experts who classify this species as a high-value freshwater commodity that is adaptive to small-scale aquaculture systems. FAO (2020) and New et al. (2021) stated that giant freshwater prawn has relatively stable market demand and competitive selling prices, thereby offering potential to increase the income of community-level business actors.

From a technical perspective, several recent studies confirm that the relatively short culture period of giant freshwater prawn, ranging from 4 to 6 months, provides advantages in the form of faster capital turnover and more manageable production risks compared with other freshwater aquaculture commodities (Valenti et al., 2021; Nugroho & Hartono, 2022). In addition, its ability to be cultivated using simple technologies, such as small-scale tarpaulin or concrete ponds, makes it suitable for environments with limited land and infrastructure.

Moreover, Boyd et al. (2021) and Tacon and Metian (2022) emphasized that giant freshwater prawn is a species relatively tolerant of variations in water quality, enabling the implementation of environmentally friendly aquaculture practices with low input requirements. These characteristics

reinforce the suitability of giant freshwater prawn for development within an eco-mosque framework that prioritizes resource efficiency, environmental management, and ease of adoption by mosque congregants.

Therefore, theoretically and empirically, the selection of giant freshwater prawn in the eco-mosque model is not based solely on economic considerations, but also on biological and technological suitability that supports the sustainability of community-based aquaculture systems.

### *3.2. Integration of Eco-Mosque Principles in Aquaculture*

The eco-mosque model developed in this study integrates several key principles, namely water-use efficiency, environmentally friendly waste management, and congregational participation. Used ablution water that has undergone simple filtration has the potential to be utilized as an additional water source for aquaculture ponds. Organic waste generated from mosque activities can also be processed into pond fertilizer or natural feed.

Several studies have stated that water-use efficiency through water recycling systems or the reuse of non-consumptive water is a key strategy in sustainable aquaculture, particularly at the community scale and in areas with limited water resources (FAO, 2020; Badiola et al., 2021). In the mosque context, the utilization of filtered used ablution water as an additional water source for aquaculture ponds represents a form of local adaptation aligned with the principles of eco-efficiency and ecological footprint reduction.

From the perspective of waste management, recent literature confirms that the utilization of organic waste as an input in fisheries production systems, either as pond fertilizer or natural feed, can improve nutrient cycle efficiency while reducing waste loads released into the environment (Boyd et al., 2021; Tacon & Metian, 2022). This practice strengthens the circular economy approach, which is increasingly recommended in the development of environmentally friendly aquaculture, particularly in small-scale community-based production systems.

In addition to technical aspects, the strengthening of Islamic values such as trustworthiness, togetherness, and environmental responsibility serves as the foundation for managing aquaculture enterprises. The mosque acts as a center for coordination, education, and institutional strengthening of the aquaculture group.

Islamic values such as *amanah* or trustworthiness, collective solidarity, and environmental responsibility are viewed as forms of social capital that strengthen trust and collective commitment in the management of productive enterprises (Rahman & Yusuf, 2023; Aziz et al., 2022). Within this framework, the mosque has a strategic role as an institution that not only internalizes these values but also facilitates coordination, learning, and institutional strengthening of business groups. Furthermore, institutional and community empowerment theories suggest that local institutions with strong social legitimacy can function as centers of education and collective decision-making, thereby enhancing the sustainability of common resource management (Ostrom, 2020; Uphoff, 2021). The role of the mosque as a center for coordination and institutional strengthening in this eco-mosque model confirms that religious institutions can serve as enabling institutions for the development of sustainable community-based aquaculture.

### *3.3. Conceptual Model of Eco-Mosque-Based Giant Freshwater Prawn Aquaculture*

The implemented model consists of four main components: (1) environmentally friendly technical aspects of giant freshwater prawn aquaculture, (2) mosque-based institutional and management systems, (3) congregational participation and empowerment, and (4) environmental and economic sustainability. The integration of these four components is expected to create a productive, inclusive, and sustainable aquaculture system.

The application of this model reflects an integrative approach, as recommended by scholars of sustainable aquaculture and community-based development. In the technical aspect, the development

of environmentally friendly giant freshwater prawn aquaculture is consistent with the perspectives of FAO (2020) and Boyd et al. (2021), who emphasized that the sustainability of freshwater aquaculture is largely determined by the application of production technologies that are efficient, low-waste, and adaptive to resource limitations.

The mosque-based institutional and management component strengthens the theoretical argument that local institutions with high social legitimacy play an important role in maintaining the consistency of collective enterprise management. Ostrom (2020) and Uphoff (2021) emphasized that strong community institutions can reduce the risk of failure in common resource management through internal rules, social monitoring mechanisms, and trust among members. In this context, the mosque functions as a center of coordination and governance that integrates spiritual and economic dimensions simultaneously.

The component of congregational participation and empowerment is aligned with the community-based development approach, which positions the community as the main actor in development. Studies by Nugroho et al. (2022) and Pratama and Sari (2023) show that a high level of participation contributes directly to the sustainability of small-scale fisheries enterprises, particularly through the enhancement of a sense of ownership and the capacity of local human resources.

Meanwhile, the dimension of environmental and economic sustainability reflects the triple bottom line principle, which has increasingly become a reference in the development of natural resource-based productive enterprises. Tacon and Metian (2022), as well as Rahman and Yusuf (2023), emphasized that the integration of economic performance, environmental conservation, and socio-religious values is a prerequisite for creating a resilient and competitive production system in the long term.

Thus, the integration of these four components in the model functions not only as an operational framework for giant freshwater prawn aquaculture but also as a conceptual model that bridges technical innovation, mosque-based institutional strengthening, and congregational empowerment within a productive, inclusive, and sustainable aquaculture system.

### *3.4. Quantitative Simulation of Production, Income, and Water Efficiency*

To strengthen the empirical aspect of the implemented model, a simple quantitative simulation was conducted based on the field conditions of Tawang Alun 2 Mosque and technical references for small-scale giant freshwater prawn aquaculture.

#### *1) Production Simulation*


Figure 1. Photograph of the Double-Deck Backyard Aquaculture Technology

The aquaculture model is assumed to use 10 tarpaulin pond units, each measuring 2 m × 1 m with a water depth of 0.5 m, allowing for a two-level system within each pond. The simulated stocking density is 25 prawns/m²; therefore, the total number of stocked juveniles is calculated as follows: 2 levels × 2 m² × 25 prawns/m² × 10 units = 1,000 prawns. With a conservative survival rate (SR) of 70% and an average harvest weight of 80–100 g per individual, the estimated harvest yield per production cycle of 5–6 months ranges from 55 to 66 kg of giant freshwater prawns.

***2) Income Simulation***

Assuming a local selling price of giant freshwater prawn of IDR 110,000/kg, the potential gross revenue per production cycle is approximately IDR 6,000,000–7,000,000. After deducting the main operational costs, including juveniles, feed, electricity/water, and maintenance, which are estimated to account for 45–55% of total revenue, the potential net income for the group ranges from IDR 2,700,000 to 3,850,000 per cycle. This income can be allocated for group member incentives and a contribution to the mosque treasury, with 10% of the net income designated for the mosque fund.

***3) Simulation of Water-Use Efficiency***

The implementation of eco-mosque principles is carried out through a simple recirculation system and the utilization of filtered ablution water. The simulation indicates that water replacement requirements can be reduced to 20–30% per cycle, compared with conventional systems that require water replacement of up to 50–60%. This efficiency not only reduces freshwater consumption but also lowers operational costs and decreases the discharge of liquid waste into the surrounding environment.

The simulation results obtained from this activity support the view of experts that economic feasibility is a key prerequisite for the successful development of community-based aquaculture. FAO (2020) and Valenti et al. (2021) emphasized that small-scale giant freshwater prawn farming systems can be considered economically feasible when they generate positive profit margins within relatively short production cycles and manageable operational risks. The simulation findings in this study are consistent with this framework, thereby strengthening the argument that the eco-mosque-based giant freshwater prawn aquaculture model has promising development potential at the community level.

From the perspective of resource efficiency, several recent studies have shown that the application of low-input aquaculture systems and optimized water use contributes significantly to improved production efficiency and reduced operational costs (Badiola et al., 2021; Boyd et al., 2021). The integration of this efficiency principle into the eco-mosque model confirms that economic feasibility does not stand alone, but is positively correlated with improved environmental management practices.

Furthermore, experts in sustainable aquaculture emphasize that environmental sustainability is a key factor in maintaining production stability and income in the long term. Tacon and Metian (2022), as well as Rahman and Yusuf (2023), stated that aquaculture systems that reduce waste and use resources efficiently tend to have greater economic resilience against cost fluctuations and environmental pressures. Therefore, the results of this simulation reinforce the argument that the eco-mosque-based giant freshwater prawn aquaculture model is not only economically feasible but also consistent with the principles of environmental sustainability, which have become a major concern in recent literature.

***3.5. Social, Economic, and Environmental Implications***

From the perspective of local food security, recent studies have emphasized that community-based food production plays an important role in shortening supply chains, increasing the availability of animal protein, and reducing dependence on external food supplies (HLPE, 2020; Valenti et al., 2021). In this context, eco-mosque-based giant freshwater prawn aquaculture has the potential to strengthen local food security by providing a stable and affordable source of nutritious food for the surrounding community.

Moreover, scholars in environmental economics and sustainable development have emphasized that environmentally friendly production practices contribute to increasing ecological awareness among communities. Boyd et al. (2021) and Rahman and Yusuf (2023) stated that direct community involvement in green economic activities can encourage behavioral change toward more responsible resource use. The eco-mosque model, with its emphasis on water efficiency and waste management, serves as a practical medium for internalizing sustainability values.

In addition to economic and environmental impacts, recent literature also highlights the role of community-based enterprises as a medium for social learning or experiential learning. According to Kolb et al. (2021) and Huda et al. (2024), practice-based learning integrated with real economic activities is more effective in improving community literacy regarding green economy concepts, water management, and sustainable resource utilization. Therefore, the eco-mosque-based giant freshwater prawn aquaculture model functions not only as a production instrument but also as an educational platform that strengthens the knowledge capacity and environmental awareness of mosque congregants and the surrounding community.

The implementation of this model has the potential to increase congregational income and mosque financial resources, strengthen local food security, and enhance environmental awareness within the community. Furthermore, the model serves as a practical learning platform for mosque congregants and surrounding communities regarding green economy principles, water management, and the sustainable utilization of natural resources. Studies conducted by FAO (2020) and Nugroho et al. (2022) demonstrate that collectively managed small-scale aquaculture systems can contribute to increased income for participants and provide additional funding sources for community institutions, including socio-religious organizations, thereby reinforcing the long-term sustainability of development programs.

The implementation of the eco-mosque-based giant freshwater prawn aquaculture model generates a range of social, economic, and environmental implications, as illustrated in Figure 2:

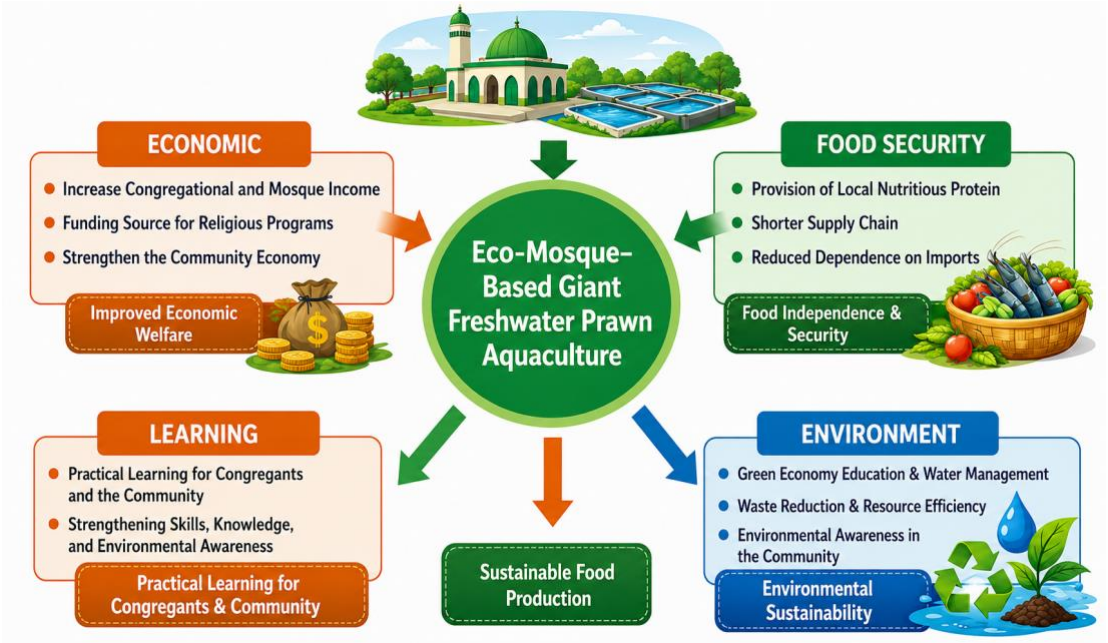


**Figure 2.** Social, Economic, and Environmental Implications of the Eco-Mosque-Based Giant Freshwater Prawn Aquaculture Model

## 4. CONCLUSION

The eco-mosque-based giant freshwater prawn aquaculture model implemented at Jabal Rahmah Mosque, Puri Tawang Alun 2, Kendari, represents an innovative community empowerment approach that integrates economic, social, and environmental dimensions. The model demonstrates considerable potential for further development and replication as an alternative strategy to strengthen the role of mosques in supporting sustainable development, particularly in urban areas with limited land availability.

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## REFERENCES

Achmad, W., Nurwati, N., & Sidiq, R. S. S. (2023). Community economic empowerment through the development of micro and small and medium enterprises: a case study in alamendah tourism village. Journal of Economic Empowerment Strategy (JEES), 6(2), 99-104.

Aziz, A., Kurniawan, F., & Lestari, E. (2022). Community-based economic empowerment through religious institutions: Evidence from mosque-based programs in urban Indonesia. Journal of Islamic Social Economics, 14(2), 101–115. https://doi.org/10.21043/jise.v14i2.XXXX

Badiola, M., Mendiola, D., & Bostock, J. (2021). Recirculating aquaculture systems (RAS) analysis: Main issues on management and future challenges. Aquacultural Engineering, 51, 26–35. https://doi.org/10.1016/j.aquaeng.2021.102010

Boyd, C. E., McNevin, A. A., Davis, R. P., & Risius, A. (2021). Aquaculture sustainability and environmental issues. World Aquaculture, 52(3), 10–15.

Depari, E. T. (2024). Pembangunan Berkelanjutan: Integrasi Ekonomi, Sosial, dan Lingkungan. *Circle Archive*, *1*(5).

Food and Agriculture Organization of the United Nations. (2020). Freshwater prawn farming: A manual for the culture of Macrobrachium rosenbergii. FAO Fisheries and Aquaculture Department.

Food and Agriculture Organization of the United Nations. (2020). The state of world fisheries and aquaculture 2020: Sustainability in action. FAO. https://doi.org/10.4060/ca9229en

High Level Panel of Experts on Food Security and Nutrition. (2020). Food security and nutrition: Building a global narrative towards 2030. HLPE, FAO.

Huda, N., Santoso, B., & Prasetyo, A. (2024). Experiential learning through community-based enterprises: Strengthening social and environmental awareness. Journal of Community Development Studies, 9(1), 45–59. https://doi.org/10.22146/jcds.XXXX

Huda, N., Santoso, B., & Prasetyo, A. (2024). Mosque-based social capital and local economic resilience: Lessons from community enterprises. Journal of Community Development Studies, 9(1), 45–59. https://doi.org/10.22146/jcds.XXXX

Kementerian Agama Republik Indonesia. (2021). Panduan pengembangan eco-masjid. Direktorat Jenderal Bimbingan Masyarakat Islam.

Kolb, D. A., Kolb, A. Y., Passarelli, A. M., & Sharma, G. (2021). On becoming an experiential educator: The educator role profile. Simulation & Gaming, 52(4), 1–20. https://doi.org/10.1177/10468781211023445

Nugroho, E., Sari, D. P., & Widodo, A. (2022). Community-based aquaculture as a strategy for sustainable rural and urban development. Jurnal Pembangunan Berkelanjutan, 7(2), 85–96. https://doi.org/10.29244/jpb.7.2.85-96

Ostrom, E. (2020). Governing the commons: The evolution of institutions for collective action (Updated ed.). Cambridge University Press. https://doi.org/10.1017/CBO9781316423936

Pratama, R., & Sari, M. (2023). Strengthening local institutions for sustainable small-scale fisheries development. Journal of Coastal and Community Studies, 11(2), 133–146.

Rahman, A., & Yusuf, M. (2023). Eco-masjid and green economy: Integrating Islamic values into sustainable community development. Journal of Islamic Economics and Sustainability, 5(1), 21–34. https://doi.org/10.23917/jies.v5i1.XXXX

Sahabuddin, R., Nurhidayanti, H., Rara'Topadang, F., Hasanah, U., & Ramadhan, S. (2024). Pemberdayaan Ekonomi Masyarakat Melalui Usaha Ekonomi Produktif (Uep) Di Kelurahan Sibatua. Community Development Journal: Jurnal Pengabdian Masyarakat, 5(1), 2658-2662.

Susanti, N. (2018). Pengembangan community based economic development sebagai upaya pencapaian Sustainable Development Goals (SDGs) 2030 (Studi deskriptif pada kelompok usaha peningkatan pendapatan keluarga sejahtera (UPPKS) di Kecamatan Peterongan Kabupaten Jombang) (Doctoral dissertation, Universitas Airlangga)

Tacon, A. G. J., & Metian, M. (2022). Feed matters: Satisfying the feed demand of aquaculture. Reviews in Fisheries Science & Aquaculture, 30(2), 158–170. https://doi.org/10.1080/23308249.2021.1905224

Uphoff, N. (2021). Understanding social capital: Learning from the analysis and experience of participation. World Development, 145, 105521. https://doi.org/10.1016/j.worlddev.2021.105521

Valenti, W. C., New, M. B., & Tidwell, J. H. (2021). Freshwater prawn farming: Global status, constraints, and prospects. Aquaculture Reports, 20, 100682. https://doi.org/10.1016/j.aqrep.2021.100682