

Sustainable Agribusiness Development In Coastal Areas: Integrating Marine Resource Management And Agriculture

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Abstract

This research aims to integrate marine and agricultural resource management to realize sustainable agribusiness in coastal areas. This research uses a qualitative and case study approach to understand holistically how integrating marine and agricultural resource management can support sustainable agribusiness development in coastal areas. By involving various stakeholders such as fishermen, farmers, local governments, and NGOs, this research applies an integration model that includes integrated zoning, community participation, sustainable agricultural practices, and the application of innovative technology. The research results show that the implementation of this model has the potential to increase economic productivity and local food security and preserve coastal ecosystems. The research conclusions provide in-depth insight into these integration efforts and their relevance in supporting sustainable development in the Banyuwangi coastal area.

Keywords: Resource Integration, Maritime Affairs, Agriculture, Sustainable Agribusiness, Coastal Areas.

A. INTRODUCTION

Sustainable agribusiness development in coastal areas is vital in maintaining ecosystem balance and supporting the economic sustainability of local communities. Sustainable agribusiness in coastal areas can make a positive contribution to environmental conservation, Agribusiness can minimize negative impacts on coastal ecosystems by implementing sustainable agricultural practices, such as using environmentally friendly technology, reducing waste, and conserving natural resources (Febrian et al., 2023).

Sustainable agribusiness development in coastal areas can also improve the economic welfare of local communities (Faqih et al., 2020; Ram & Irfan, 2021). By paying attention to sustainable economic principles, agribusiness in coastal areas can create local jobs, increase farmer incomes, and help reduce poverty levels (Lefers et al., 2020). Diversifying agricultural products and increasing added value through processing local agricultural products can be a strategy to increase the income and economic resilience of coastal communities. This can also play a role in maintaining regional food security. Dependence on local food production can increase food security and reduce the risk of price fluctuations and supplies from outside the region. By utilizing the potential of available natural resources sustainably, coastal agribusiness can become the backbone of local food security (Kourantidou et al., 2020).

Through a sustainable agribusiness approach, the management of coastal natural resources can be optimized to prevent land degradation and environmental damage. Implementing sustainable agricultural practices can help maintain soil, water, and air quality and minimize negative impacts on marine ecosystems (Correa-Cano et al., 2022; Zhai et al., 2020). This supports the long-term sustainability of coastal natural resources, which are essential for the survival of coastal communities and their economies.

Sustainable agribusiness development in coastal areas can be an inspiring model for overall sustainable development in various sectors (Roestamy & Fulazzaky, 2022). By demonstrating that economic activities such as agribusiness can be carried out with sustainability principles in mind, coastal areas can become laboratories for innovation and positive change in how we interact with the environment. Through sustainable agribusiness development, we can balance ecological, economic, and social sustainability in coastal areas (Choudhary et al., 2021).

The southern coast of East Java includes a series of hills stretching from Pacitan, Trenggalek, Tulungagung, and Blitar to Malang Regency. These mountains are classified as limestone, a continuation of the Sewu Mountains. Generally, this region has a wet tropical climate with average rainfall reaching 1900mm per year. Located directly along the Indian Ocean, this coastal area faces oceanographic characteristics that tend to be harsh, with high waves and strong currents, which limit the potential of coastal ecosystems such as Coral Reefs, Seagrass, and Mangroves.

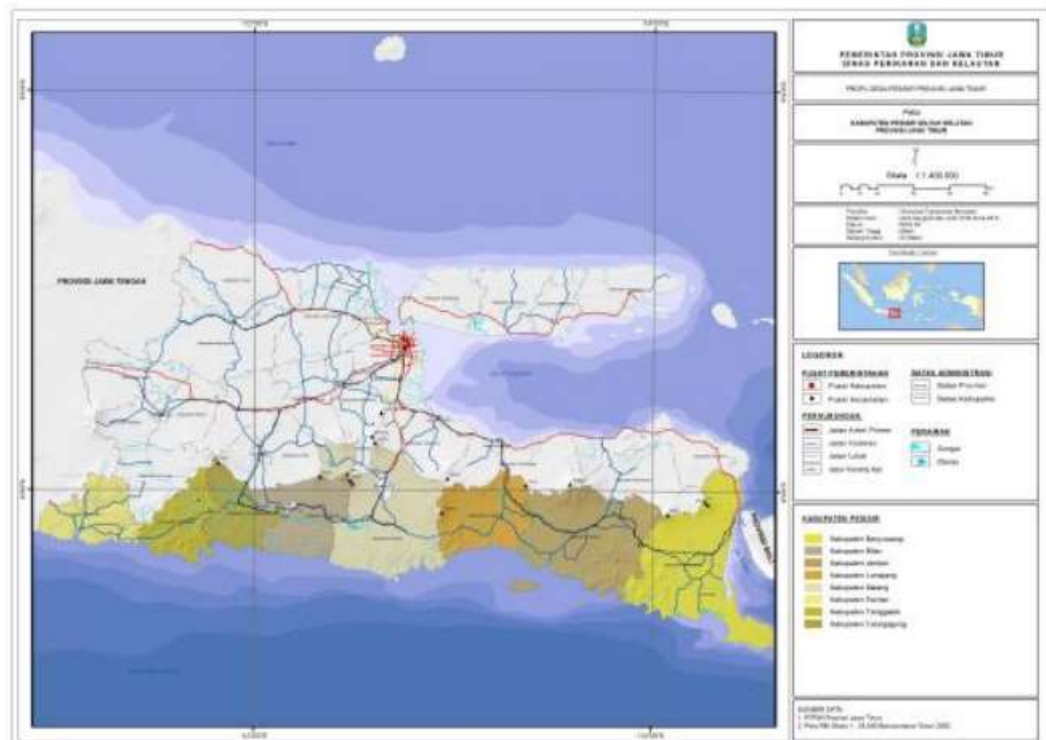


Figure 1. Map of the South Coast of East Java Province

This area has the potential to be developed, especially in the capture fisheries and tourism sectors. Pelagic fisheries production in East Java Province is highly dependent on catches in the southern coastal areas, including Pacitan, Trenggalek, Malang, and Banyuwangi Regencies. Tuna, tuna, and skipjack are the primary commodities on the southern coast of East Java, especially at the Fish Auction Place (TPI) in Pacitan, Trenggalek, and Malang Regencies. Tourism that has the potential to develop on the south coast is marine tourism, especially beach tourism because the beaches here still maintain their natural authenticity. Some beaches are even destinations for turtles to lay their eggs, making them potential ecotourism destinations. Some areas in the south also still have coral reef ecosystems, ideal as snorkeling and diving tourist locations, although this activity is more suitable for experienced divers.

Foods commonly found on the south coast are fish and processed fish. In every coastal district, various types of processed fish are available, such as fresh fish, grilled fish, smoked fish, salted fish, shrimp paste, fish crackers, and fish floss. These products are generally handmade by homemakers in the area. Fishing homemakers often carry out This fish processing process to survive, especially during the lean season. The majority of

fishing households on the southern coast of East Java are Javanese, with diverse ethnicities, but Banyuwangi Regency is an exception; because the original population is the Osing tribe, it is not uncommon to find people with indigenous Madurese, Makassar, Butonese and Bugis ethnic backgrounds, who live harmoniously side by side in the southern coastal region of East Java.

Management of marine and agricultural resources in the coastal region of East Java faces several problems and challenges that require serious attention. First of all, the sustainability of marine resources is threatened due to unsustainable fishing practices. Overfishing and using fishing gear that destroys marine habitats can threaten fish populations and marine ecosystems around the coast (Agus, 2020; Skoulikaris et al., 2021). This problem creates uncertainty in maintaining the balance of the ecosystem and the survival of fishermen dependent on marine catches. Degrading the coastal environment, such as damaging coral reefs and losing mangrove habitat, is a severe challenge. Uncontrolled coastal development, including tourism and residential development, can threaten the sustainability of coastal ecosystems. Climate change has negative impacts, such as rising sea temperatures and storm intensity, damaging coastal structures and disrupting fisheries production (Kandrot et al., 2022; Ngondo et al., 2021).

The problem in the agricultural sector is that excessive use of pesticides and chemical fertilizers can pollute seawater and cause eutrophication, threatening the balance of the marine ecosystem. In addition, converting agricultural land into residential or industrial areas reduces land that can be used for agriculture, increases pressure on local food production, and harms farmers' livelihoods (AbdelRahman & Arafat, 2020; Ahmadov, 2020). Another challenge is the need for stricter regulations in managing marine and agricultural resources in coastal areas. Weak policy implementation and lack of oversight can provide opportunities for exploitative and detrimental practices. Marine and agricultural resource management systems that need to be optimized can cause conflicts between parties regarding resource use and access (Chakraei et al., 2021; Zahoor & Mushtaq, 2023).

Management of marine and agricultural resources in the East Java coastal region requires a holistic approach that involves active participation from various parties, including the government, local communities, and industry players. There is a need to increase community capacity in implementing sustainable practices, developing environmentally friendly agricultural technology, and enforcing strict regulations to maintain ecosystem balance and sustainability of this coastal area's marine and agricultural sectors (Le Tissier, 2020; Winter et al., 2020).

This research aims to formulate specific in-depth objectives to integrate marine and agricultural resource management in coastal areas. This research aims to identify the region's potential for marine and agricultural resources. This involves analysis of the condition of the marine ecosystem, the dominant types of fish, and the potential for agricultural land that can be used sustainably. This research also examines the impact of management practices implemented in the marine and agricultural sectors. This analysis includes an evaluation of the practices' ecological, economic, and social sustainability, this objective is needed to understand how the management efforts that have been carried out can achieve sustainability goals and identify areas that still require improvement.

B. LITERATURE REVIEW

Sustainable Agribusiness Concept

As a holistic approach to managing agricultural businesses, sustainable agribusiness emphasizes combining economic, ecological, and social sustainability. This concept becomes a relevant and crucial basis in coastal areas, where the relationship between society and the environment is very close (Fava et al., 2021; Srivastav et al., 2021). The high dependence on natural resources, especially in the agricultural and marine sectors,

means that agricultural and fisheries practices must be designed taking into account the sustainability of marine ecosystems and the welfare of local communities:

- a. The research "The development of a framework for the integrated assessment of SDG trade-offs in the Sundarban biosphere reserve" by (Marcinko et al., 2021) looked at the implementation of integrated agricultural systems in coastal areas, focusing on evaluating impacts on the environment and society. This research provides concrete recommendations for improving sustainability in coastal resource management.
- b. The study "The book of abstract: international conference on natural farming for revitalizing environment and resilient agriculture (NF-RERA, 2023)" by (Sarangthem et al., 2023) provides in-depth insights into integrated coastal zone management strategies, identifying challenges and opportunities in supporting sustainable agriculture in coastal areas of India.
- c. In the coastal region of Japan, the research "Enhancing sustainability in traditional agriculture: Indicators for monitoring the conservation of globally important agricultural heritage systems (GIAHS) in Japan" by (Reyes et al., 2020) highlighted organic farming practices and factors that support the sustainability of agribusiness in the area.
- d. The research "Development of a Tourism Carrying Capacity Index (TCCI) for sustainable management of coastal areas in Mediterranean islands—Case study Naxos, Greece" by (Leka et al., 2022) discussed the role of agroecology in achieving agricultural sustainability in the coastal regions of Greece, emphasizing the integration of natural resources and the participation of local communities.
- e. The research "An integrative analytical model for the water-energy-food nexus: South Africa case study" by (Nhamo et al., 2020) explored a community-based coastal resource management model that supports the sustainability of aquaculture in coastal areas of the South Africa.

The findings from these studies form the basis of a better understanding of sustainable agribusiness in coastal areas. Integrating sustainability principles in agricultural and fisheries practices is the key to supporting the welfare of coastal communities while preserving the marine environment, which is their primary resource.

Resource Integration

Integration in marine and agricultural resource management refers to efforts to combine and harmonize various aspects, practices, and policies related to these sectors, resource integration aims to balance economic, ecological, and social sustainability (Abdullah et al., 2021; G. G. Singh et al., 2021). In the context of coastal area management, integration involves harmonizing agricultural, fisheries, and marine sector activities to increase productivity while maintaining environmental sustainability and supporting the welfare of local communities (Fu et al., 2021; Vargas et al., 2023).

Several previous studies that support the concept of integration in the management of marine and agricultural resources include:

- a. "Identification of land use conflicts in China's coastal zones: From the perspective of ecological security" (Zong et al., 2021), this research highlights the importance of integrated coastal zone management to support sustainable agriculture in coastal areas of China. Resource integration is emphasized to balance agriculture and maritime affairs optimally.
- b. "Evolution of China's marine ranching policy based on the perspective of policy tools" by (Qin et al., 2020), this study focuses on implementing integrated agricultural systems in coastal areas, showing that integrating agricultural and fisheries practices can increase productivity and sustainability.
- c. "Effectiveness of the coastal and marine conservation initiatives in Bangladesh: analyzing the drawbacks of the legal, policy, and institutional framework" by (Rahman, 2022). This research explores a community-based coastal resource

management model that supports the sustainability of aquaculture in the Bangladesh, emphasizing the importance of integration between local communities and resource management.

- d. " Applications of data mining and machine learning framework in aquaculture and fisheries: A review" by (Gladju et al., 2022). This study examines organic farming practices in the coastal region of Kerala, showing that integrating sustainable agricultural technologies can increase crop yields while minimizing environmental impacts.
- e. " Land-use suitability assessment using Delphi and analytical hierarchy process (D-AHP) hybrid model for coastal city management: Kuala Terengganu, Peninsular Malaysia" by (Bagheri et al., 2021). This research evaluates the role of agroecology in achieving agricultural sustainability in the coastal region of Kuala Trengganu, emphasizing the integration of natural resources and the participation of local communities in resource management.

The results of this research provide evidence that resource integration is a critical approach to maintaining balance and sustainability between the marine and agricultural sectors in coastal areas. Integration not only provides economic benefits but also supports environmental sustainability and the welfare of local communities. This concept becomes the basis for holistic and sustainable management in facing complex challenges in coastal areas.

C. METHOD

Research Design

This research uses a qualitative and case study approach to understand holistically how integrating marine and agricultural resource management can support sustainable agribusiness development in coastal areas. This approach was chosen because case studies allow researchers to understand the dynamics, challenges, and potential in the selected locations.

Locations and Samples

This research location covers several districts or villages along the coastline. The research focused on the southern coast of East Java, Indonesia. Researchers chose coastal areas in Banyuwangi Regency, East Java, Indonesia. Banyuwangi is a district located at the eastern tip of Java Island. It has a long coastline and a variety of ecosystems both on land and at sea. The research covers varied coastal areas, such as the northern coast, which is more open to the Java Sea, and the southern coast, which may be more protected. Sample selection involves districts or villages that represent variations in the region's ecological, social, and economic conditions, namely villages around Watu Dodol Beach, Pulau Merah Beach, or Sukamade Beach, which can be used as sample locations.

Data Collection Tools

Data collection tools involve a combination of interviews and field observations. Interviews were conducted with farmers, fishermen, and related stakeholders. Surveys are used to collect quantitative data on agricultural and fishing practices. Field observations can provide a direct understanding of the conditions of land and marine ecosystems.

Research Data Analysis

Data analysis in this research was carried out using content analysis or thematic analysis methods. Qualitative data can be categorized based on specific themes from interviews and field observations. This allows researchers to identify patterns, tendencies, and critical aspects that support or hinder marine and agricultural resource management integration.

D. RESULT AND DISCUSSION

Marine Resources Management

Coastal areas with abundant marine and agricultural resources have become a focal point in efforts to achieve sustainable development. Banyuwangi Regency in East Java, Indonesia, the location of this research, is an example of a coastal area that shows the complexity of the dynamics between humans and their environment. The region's marine and agricultural resources play a central role in supporting the livelihoods and sustainability of local communities.

By involving various stakeholders, such as fishermen, farmers, farmer groups, local governments, and NGOs, this research applies the thematic interview method to explore each group's views, evaluations, and hopes regarding the sustainability of marine and agricultural resources. Interview data collected from various parties will provide a comprehensive picture of the actual conditions faced by Banyuwangi coastal communities and explore the extent to which management efforts have achieved sustainability goals. The fishermen started with a question to the fishermen, "What do you think about the current condition of marine resources in the Banyuwangi coastal area?" The fishermen answered, "The condition of marine resources here is decreasing. In the last few years, we have seen a decline in the number of fish, and certain species are difficult to find. We are worried about the impact on our livelihoods."

Meanwhile, with the question, "What do you think about the management efforts that have been implemented to support the sustainability of marine resources in this region?" fishermen answered, "Current management is not effective enough. We need more supervision of unsustainable fishing practices; we also want to be more involved in the decision-making process related to marine resource management."

Most fishermen expressed concerns regarding the decline in fish numbers in the Banyuwangi coastal area. They saw real impacts on their livelihoods, and changes in fishing patterns became a severe problem. Fishermen voiced a desire to be more involved in decision-making regarding marine resource management. They feel that the existing management is not effective enough and hope that there will be increased supervision of unsustainable fishing practices; the fishermen suggest a more comprehensive educational program about sustainable practices; they also hope that there will be incentives for environmentally friendly fishing technology, strengthening the power of fishing, their competitiveness and encourage sustainable practices.

Meanwhile, when interviewing farmers, several questions were asked, namely, "What is your evaluation of the condition of agricultural resources in the Banyuwangi coastal area?" and farmers answered as follows: "Agricultural resources here are still good, but we are starting to feel the impact of climate change. Rainfall is irregular, and water shortages are a problem for our agriculture."

A further question was then asked: "How do you view the existing management models or strategies for agriculture in this region?" and "Do you feel the current management model achieves the desired sustainability?" the farmers' answers were as follows: "The government has introduced several sustainable agricultural programs, such as water management and the use of organic fertilizers. More support is needed to address climate change and reduce the use of pesticides, but there needs to be improvement in supporting organic farming and sustainable approaches. We also want more training to implement more environmentally friendly agricultural technologies."

Farmers note that agricultural conditions are still good. They are starting to feel the impacts of climate change. The main challenges are irregular rainfall patterns and water shortages, which impact agricultural productivity. Local governments have introduced several sustainable agriculture programs. Farmers feel they still need more support to tackle climate change and reduce the use of pesticides that have the potential to harm the environment. Farmers hope for more training to implement more environmentally friendly agricultural technology. They want more support for organic farming and sustainable approaches to improve their well-being.

In response to a question, "What do you think about the condition of marine resources in the Banyuwangi coastal area?" the regional government answered, "The condition of marine resources in Banyuwangi needs serious attention. We have implemented several management policies, but big challenges remain, especially related to illegal fishing and the management of protection zones." Regarding management models or strategies that regional governments have implemented to support the sustainability of marine resources, the government answered, "We have established marine protection zones, increased marine patrols, and collaborated with fishermen in joint management programs, we realize that there is still room for improvement."

The regional government acknowledged severe challenges related to the condition of marine resources, including illegal fishing and changes to marine protection zones. They expressed a commitment to increased supervision and law enforcement. Regional governments have established marine protection zones, increased marine patrols, and are working with fishermen on co-management programs. Despite existing measures, they recognize that there is still room for improvement in their implementation and effectiveness. One of the main challenges recognized by local governments is stricter law enforcement. They also seek to increase community involvement in decision-making and raise sustainability awareness.

Regarding the context of "How does your NGO contribute to supporting the sustainable management of marine resources and agriculture in Banyuwangi?" the relevant NGO representative answered, "Our NGO provides training on sustainable agriculture and fisheries to the community. We also work with local governments to develop programs to restore marine ecosystems."

LSM memberikan pelatihan tentang pertanian dan perikanan berkelanjutan kepada public. They work together with local governments to develop marine ecosystem restoration programs. NGOs see that the management model is heading in the right direction but still needs more support and investment. Support from various parties, including government, society, and the private sector, is critical to achieving sustainability.

Analysis of Marine Management Models that Have Been Implemented and Their Potential for Achieving Sustainability

In evaluating management models or strategies implemented in the Banyuwangi coastal area, the interviews with various stakeholders provide a more in-depth picture. This management model includes concrete steps taken by local governments and related parties to maintain the sustainability of marine and agricultural resources (Awaad et al., 2020). The following is the analysis:

a. Marine Protection Zone

The regional government has established marine protection zones in the management model. This step is intended to protect critical marine habitats, support the sustainability of marine ecosystems, and control illegal fishing activities. While these steps are positive, challenges regarding law enforcement and the effectiveness of protection zones continue to arise.

b. Marine Patrol and Law Enforcement

Law enforcement efforts through maritime patrols have been strengthened to monitor and prevent illegal fishing activities. Despite increased maritime patrols, challenges continue to arise in responding quickly and efficiently to violations; further support is needed to ensure the effectiveness of patrols and law enforcement.

c. Joint Management Program with Fishermen

Collaboration with fishermen in co-management programs is also integral to this model. By involving fishermen directly, local governments seek to include local perspectives and strengthen community awareness of the importance of sustainability.

Further steps are needed to ensure more effective engagement and a fairer sharing of decisions.

d. Training and Education

Training and education programs introduced by NGOs also contribute to the management model. This training aims to increase community understanding of sustainable agricultural and fisheries practices. Despite the potential to have a positive impact, further funding and support are needed to expand coverage and ensure successful implementation.

e. Marine Ecosystem Restoration Program

NGOs are also involved in marine ecosystem restoration programs, emphasizing the importance of restoring marine habitats affected by human activities. These measures can support the sustainability of marine resources but require special attention regarding planning and implementation to achieve recovery goals successfully.

The potential of this management model lies in the concrete efforts made to involve the community, maintain the sustainability of marine and agricultural resources, and provide protection for marine ecosystems. Challenges continue to arise, especially in law enforcement, optimal community involvement, and sustainability of implementation. Increasing coordination between local governments, fishermen, NGOs, and other related parties is essential. Further support from the community and private sector also needs to be recognized as a critical factor in overcoming challenges and increasing the sustainability potential of this management model. Successful implementation will require collaboration and shared commitment to balance resource utilization and coastal ecosystem conservation.

Establishing marine protection zones is clear evidence of the regional government's commitment to preserving marine ecosystems, although challenges related to law enforcement and coordination still require further attention. Efforts to increase maritime patrols and law enforcement promise more effective protection against harmful activities, but adequate human and technological resources are crucial (Rizal, 2021; S. Singh et al., 2021).

Involving fishermen in joint management programs is also a strategic step, strengthening the community's sense of ownership of sustainability. The need for precise mechanisms and fair participation highlights the importance of formulating participatory strategies. Training and education programs, which are an integral part of this model, can change behaviour toward more responsible use of resources (Emadodin et al., 2020; Maraveas et al., 2023). The success of this program depends on adequate budget allocation and effective delivery—steps related to marine ecosystem restoration promise to reverse damage and improve ecological balance. Successful restoration requires a deep understanding of local ecosystems and their impact on society, suggesting that this approach involves physical efforts and ongoing research and monitoring.

Sustainable Agricultural Management

Sustainable agricultural practices in coastal areas are an approach that pays attention to the balance between agricultural productivity, environmental preservation, and the welfare of local communities. One practice that can be applied is agroecology, where an agricultural system is built based on harmonious interactions between plants, animals, and the surrounding natural environment. Organic farming is also a good choice, where chemical fertilizers and synthetic pesticides are avoided to maintain healthy soil and water (Batista et al., 2020; Hoque et al., 2022).

Implementing crop rotation and polyculture systems can also increase the sustainability of agriculture in coastal areas. By rotating the crops planted and combining various types of plants on the same land, you can reduce the risk of spreading disease and enrich soil fertility. In addition, planting cover crops such as legumes can help control soil erosion and improve soil health. Sustainable agricultural practices also include efficient water management, especially in coastal areas that may face challenges regarding water availability. Utilizing environmentally friendly irrigation technology and rainwater capture

can be a solution to manage water wisely, using renewable energy for agricultural purposes can also help reduce environmental impacts (Hoque et al., 2022; Kumar et al., 2022).

The involvement of local communities in decision-making regarding agricultural practices is critical to achieving sustainability. Empowering farmers, educating them regarding sustainable agricultural techniques, and providing support from local governments will positively contribute to maintaining ecological balance and increasing food security in coastal areas. By adopting sustainable agricultural practices, coastal communities can balance meeting food needs and preserving the natural environment that is the basis of their lives.

Agricultural technology is crucial in improving sustainability in Banyuwangi's coastal environment. Several innovative agricultural technologies that increase productivity and minimize environmental negative impacts can be identified. One of the relevant technologies is:

- a) **Smart Irrigation Systems:** Implementing intelligent irrigation systems is essential because water conditions are likely to be challenging in coastal areas. This technology utilises soil moisture sensors and automation technology to optimise water use. This helps prevent water waste and maintains the balance of coastal ecosystems.
- b) **Vertical Farming:** Vertical farming is an innovation where crops are grown in vertical layers using hydroponic or aeroponic systems. This technology is efficient in land use and can be applied in limited areas, such as coastal areas; farmers can increase crop production more efficiently without damaging the local ecosystem by utilizing this technology.
- c) **Use of Organic Fertilizers and Soil Amenders:** Reducing chemical fertilizers and switching to organic fertilizers and soil amendments is crucial in sustainable agriculture. This technology can increase soil fertility, reduce the risk of water pollution, and minimize negative impacts on coastal ecosystems.
- d) **Integrated Pest Management Technology:** Integrated pest control systems use a holistic and sustainable approach to managing crop pests. It involves using environmentally friendly biological, mechanical, and chemical methods. Selective use of pesticides and targeted pest control can maintain the balance of coastal ecosystems.
- e) **Sensor-Based Agricultural Monitoring:** Sensor technology embedded in agricultural land can provide real-time data regarding soil moisture, air temperature, and overall crop condition. This allows farmers to make more precise and efficient decisions in agricultural management, reducing the risk of losses and increasing productivity.

Applying this agricultural technology in the Banyuwangi coastal environment can provide innovative solutions to simultaneously increase plant productivity and care for the natural environment. Farmers in coastal areas can contribute to local food security while preserving biodiversity and balancing marine ecosystems by adopting appropriate technology.

Integration of Marine and Agricultural Resource Management

Based on interviews conducted in the Banyuwangi coastal area, an integration model that combines marine and agricultural resource management to achieve sustainability can be developed. This model was designed to take the contributions of various stakeholders and recognize the complexity of the relationship between coastal ecosystems and agricultural activities. The following is the framework of the integration model:

Table 1. Integration of Marine and Agricultural Resource Management in Banyuwangi

Models	Description and Rationalization
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Integrated Zoning	Implement an integrated zoning approach in coastal areas to identify areas dedicated to agriculture and marine resources. This zoning allows for focused management considering agricultural needs, marine ecosystem protection, and local food security.
Joint Management System	Establish a joint management system that involves active participation from fishermen, farmers, local governments, and NGOs. The active participation of local communities in decision-making increases awareness of sustainability, strengthens local understanding, and ensures fairness in resource allocation.
Implementation of Sustainable Agricultural Practices	Promote sustainable agricultural practices such as agroecology, organic fertilizers, and vertical farming. Sustainable agricultural practices help maintain ecosystem balance, increase crop productivity, and reduce negative impacts on coastal environments.
Innovative Agricultural Technology	We are integrating innovative agricultural technologies such as intelligent irrigation systems, vertical farming, and agricultural sensors. Innovative technology increases efficiency in water resource management, maximizes land use, and provides real-time data for informed decision-making.
Continuous Education and Training	They organize ongoing education and training programs for farmers, fishermen, and local communities. Continuous education increases understanding of sustainable practices, agricultural technologies, and their positive impact on sustainability.
Mentoring and Periodic Evaluation	Conduct periodic monitoring and evaluation of the implementation of the integration model. Regular monitoring ensures the model's effectiveness, allows adjustments to suit changing local conditions, and assesses positive impacts on the environment and local economy.

The integration model designed for the Banyuwangi coastal region reflects a holistic approach to managing marine and agricultural resources with sustainability as the primary focus. Through interviews with various stakeholders, this model presents several vital elements expected to create positive synergies and support the balance of coastal ecosystems.

An integrated zoning approach is the basis for identifying and managing areas suitable for agriculture and marine resource use. This zoning considers the sustainability of marine ecosystems and local food security needs, providing a basis for wiser resource allocation. This model includes a joint management system involving fishermen, farmers,

local governments, and NGOs. Active participation of local communities in decision-making creates a shared understanding of sustainability, ensures fair distribution of resources, and results in policies that are more responsive to local needs.

Implementing sustainable agricultural practices is the central pillar of advocating agroecology, using organic fertilizers, and vertical farming. Thus, this model creates a balance between agricultural productivity and environmental conservation, promoting agriculture that is more environmentally friendly and efficient in resource use. Innovative agricultural technologies, such as intelligent irrigation systems and agricultural sensors, are integrated to increase efficiency in water resource management, maximize land use, and provide relevant data for timely decision-making.

Continuous education and training provide the foundation for strengthening the capacity of local communities to implement sustainable practices and make good use of technology. This approach engages the community in a continuous learning process, improves skills, and ensures continued adoption. Monitoring and evaluation carried out periodically provide insight into the effectiveness of the integration model. This allows continuous adjustment according to local dynamics and ensures that the model can adapt to changing ecological and social conditions.

This integration model forms a comprehensive framework that includes the marine and agricultural sectors to achieve sustainability in the Banyuwangi coastal area. By combining these aspects, it is hoped that this model can positively contribute to the welfare of local communities, ecosystem sustainability, and food security. The integration of marine and agricultural resource management in the Banyuwangi coastal area is expected to provide several significant benefits in the context of sustainable agribusiness. Some of the anticipated benefits include:

- a) **Increased Productivity and Economic Welfare:** This integration can increase agricultural and fisheries productivity by utilizing resources optimally and efficiently. In this way, it is hoped that there will be an increase in income for farmers and fishermen, which will improve local communities' economic welfare.
- b) **Local Food Security:** Integration of marine and agricultural resources creates a more robust and diverse agribusiness system. With this approach, local food security can be increased due to diversification of production and more planned resource management.
- c) **Coastal Ecosystem Conservation:** This model is expected to reduce negative impacts on coastal ecosystems. Sustainable agricultural practices, wise management of marine resources, and an integrated zoning approach can maintain ecological balance, protect ecosystems, and prevent environmental degradation.
- d) **Community Participation and Local Empowerment:** This integration can empower local communities by involving local communities in decision-making and implementing sustainable practices. Increasing community involvement in sustainable agribusiness will create shared responsibility for environmental sustainability.
- e) **Adoption of Innovative Agricultural Technologies:** This integration drives the adoption of innovative agricultural technologies, such as intelligent irrigation systems and vertical farming. Applying this technology will likely increase resource use efficiency, reduce environmental impacts, and open up new opportunities for sustainable agribusiness development.
- f) **Increased Competitiveness and Markets:** Sustainable practices implemented in this integration can increase the competitiveness of local agricultural and fisheries products in the market. Sustainability is an added value that is increasingly appreciated by global consumers, which can support local economic growth.
- g) **Resilience to Climate Change:** This model can create an agribusiness system more resilient to climate change. By utilizing technology and adaptive practices, local

communities can better face the challenges of climate change and respond quickly to changing environmental conditions.

- h) Improving Quality of Life and Environment: By maintaining the sustainability of coastal ecosystems, improving soil quality, and reducing the use of synthetic chemicals, this integration is expected to improve the quality of life of local communities and preserve their natural environment.

Integrating marine and agricultural resource management in Banyuwangi can sustainably impact the local economy, environment, and community welfare.

Opportunities and Challenges

Implementing marine and agricultural resource management integration in the Banyuwangi coastal area will be unrestricted by several complex challenges. Understanding these challenges is essential for designing effective and sustainable strategies.

The most important thing is that environmental uncertainty is the main challenge. Coastal areas are often vulnerable to climate change, extreme weather, and natural disasters. This uncertainty can make long-term planning difficult and require rapid adaptation to changing conditions. The second challenge is Community Engagement and Sustainability Awareness. Encouraging active participation from local communities and increasing sustainability awareness requires ongoing educational efforts. Some community members may still need to fully realize the benefits or urgency of sustainability, so building understanding and support can be complex.

The third challenge is limited resources and infrastructure. Some coastal areas may still need more financial resources, technology, and infrastructure. Developing innovative agricultural technologies, improving irrigation infrastructure, and training human resources can require significant investment. Next, conflict between stakeholders can also be an obstacle. Competition between fishing groups, farmers, and local governments in resource use may arise. Conflict management and consensus between various parties are challenges in ensuring a smooth implementation.

The fifth challenge is Disaster Risk Management. Coastal areas are vulnerable to disaster risks such as floods, storms, or earthquakes. Preparing an effective and responsive risk management system will be the key to maintaining the continuity of agribusiness operations. The final challenge is that measuring and evaluating the performance of this integration model will be a challenge in itself. Ensuring that sustainability metrics are measured accurately and efficiently requires developing reliable monitoring and evaluation systems and implementing corrective actions when necessary. Although these challenges can be complex, identifying and addressing them is an integral part of planning and implementing the integration of sustainable marine and agricultural resource management in the Banyuwangi coastal region. With a thoughtful approach, active collaboration between stakeholders, and ongoing support, many of these challenges can be overcome to achieve the desired sustainability.

Social and economic barriers can significantly challenge achieving agribusiness sustainability in coastal areas. Socially, cultural changes and the educational level of society play an important role, as not all members of society may be ready or willing to adopt new sustainable practices. Disagreement and resistance to change can arise due to limited understanding or reluctance to abandon conventional agricultural traditions. Gender inequality in access to resources and opportunities can also be a social barrier that needs to be overcome.

From an economic perspective, there needs to be more capital and access to markets that can affect the sustainability of agribusiness. Farmers and fishermen may need help accessing financial resources to introduce innovative agricultural technologies or diversify businesses. Unstable or limited markets can also hamper revenue potential, forcing businesses to remain dependent on conventional practices that may need to be more sustainable. Unequal socio-economic conditions among coastal communities can also make it difficult to implement sustainable agribusiness. Economic disparities between societal

groups can create disparities in their ability to adapt to change and adopt new practices. In some cases, disadvantaged communities may need help accessing training or infrastructure that supports sustainable practices.

Increasing awareness of these social and economic challenges is essential in overcoming these obstacles. An approach that considers the local social and economic context involves active community participation and organizes training programs that meet the community's real needs, which can help reduce social and economic barriers. Policy support that is inclusive and pro-poor to underprivileged stakeholders can also help create an environment that supports the sustainability of agribusiness in coastal areas (Caviedes et al., 2020; Gaaloul et al., 2021).

E. CONCLUSION

This research concludes that integrating marine and agricultural resource management in the Banyuwangi coastal area has great potential to support sustainable agribusiness. Although faced with several challenges, such as environmental uncertainty, community involvement, and limited resources, collaborative and integrated efforts between stakeholders can overcome these obstacles. An integration model involving integrated zoning, community participation, sustainable agricultural practices, innovative technology, and educational approaches forms a holistic framework. The sustainability of agribusiness in the Banyuwangi coastal area can significantly increase economic productivity, local food security, ecosystem preservation, and community welfare. Strategic steps can be taken to encourage successful and sustainable implementation of this integration model, positively contributing to sustainable development at local and regional levels with a deep understanding of the challenges and potential.

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