

INTEGRATION OF AQUACULTURE IN MARINE TOURISM DEVELOPMENT: A CASE STUDY IN BULUKUMBA REGENCY

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Abstract

Aquaculture is a biological resource management activity aimed at meeting food needs, increasing community income, and conserving natural resources. Bulukumba Regency in South Sulawesi Province has significant potential in maritime tourism, with a coastal and marine area of 237.87 km² and a coastline of 128 km. However, the potential of these marine resources has not been optimally utilized as a leading tourism product. Currently, tourism activities in Bulukumba are still limited to conventional activities such as swimming, snorkeling, and diving, without considering the principles of sustainable tourism, which can actually increase negative impacts on the environment. This study aims to explore the possibility of integrating the concept of aquaculture as a leading sustainable tourism product in Bulukumba Regency and assess its suitability with local community activities and tourist behavior. The study used a case study method through observation and interviews. Observations were conducted on coastal community activities and tourist behavior, while interviews were used to explore potential collaboration between aquaculture and tourism activities. This study also reviewed government policies related to aquaculture and tourism management to assess their alignment. The research stages include preparation, data collection, analysis, interpretation of results, and report preparation. The research results indicate that aquaculture activities have the potential to be developed as an educational and conservation-based tourism product that can enrich the tourist experience while improving the well-being of coastal communities. Integrating aquaculture into the tourism sector could be a strategy for sustainable tourism development in Bulukumba. These findings are expected to serve as a reference for the local government in formulating policies and will be disseminated through publication in indexed national journals.

Keywords: aquaculture, marine tourism, sustainable tourism, tourism development, Bulukumba regency

1. INTRODUCTION

Coastal and marine tourism, often referred to as maritime or marine-based tourism, has emerged as one of the fastest-growing sectors within the global tourism industry. It encompasses a diverse range of activities in coastal and marine environments, including beach recreation, snorkeling, diving, sailing, fishing, and eco-marine exploration. Marine and coastal tourism contributes significantly to the global economy while playing a critical role in sustaining coastal livelihoods (Zorpas & Irene, 2010). For archipelagic nations such as Indonesia, comprising over 17,000 islands and an extensive coastline exceeding 80,000 kilometers, potential for developing sustainable maritime tourism is substantial. Despite these advantages, much of Indonesia's marine potential remains underexploited due to the lack of innovative, integrated, and sustainable approaches that connect community-based livelihoods with tourism development (Atika Sari, 2019).

Previous research has emphasized the importance of linking local economic activities with sustainable tourism models. Marine tourism can act as a catalyst for environmental conservation and community empowerment when supported by participatory planning and equitable benefit-sharing mechanisms (Olale et al., 2020). Furthermore, integrating aquaculture, a biological resource management activity involving the cultivation of aquatic organisms such as fish, shellfish, and

seaweed under controlled conditions into tourism practices presents a promising approach to strengthening local economies while promoting ecological balance (Bunting, 2013). Aquaculture is not only vital for food security but also provides opportunities for education, research, and eco-tourism, particularly when designed in alignment with sustainability principles (Hughes, 2001).

In Indonesia, particularly in South Sulawesi Province, Bulukumba Regency represents a region of significant interest for sustainable coastal development. The area boasts extensive coastal and marine resources, covering approximately 237.87 km² with a coastline stretching 128 km. It is renowned for its natural beauty, traditional *Phinisi* boat craftsmanship, and rich marine biodiversity. However, current tourism activities in Bulukumba remain largely conventional focused on recreation such as swimming, snorkeling, and diving without integrating sustainable practices or local livelihood elements. This limited scope reduces tourism's contribution to community welfare and, in some cases, exacerbates environmental degradation due to the absence of sustainable management frameworks (Syukur et al., 2021).

The gap between Bulukumba's vast maritime potential and its underutilization as a sustainable tourism destination underscores a critical challenge. There is an urgent need for innovative models that connect economic productivity, environmental stewardship, and tourism experience. The integration of aquaculture into the marine tourism sector could offer a strategic and holistic solution to these challenges. Nevertheless, empirical studies exploring this integration—particularly regarding community participation, government policy alignment, and sustainable implementation strategies—remain limited in the Indonesian context.

Therefore, this study aims to explore the potential integration of aquaculture as a sustainable tourism product in Bulukumba Regency, South Sulawesi. The specific objectives are to: (1) identify existing aquaculture practices and their socio-economic functions, (2) assess local community and government perspectives on aquaculture-tourism integration, and (3) evaluate the potential contribution of this integration to sustainable coastal tourism development. The findings are expected to contribute theoretically to sustainable marine tourism discourse and practically to local policy formulation and community-based tourism initiatives in Indonesia.

2. RESEARCH & METHODOLOGY

2.1. Research Design

This study employs a qualitative research approach, which is appropriate for exploring complex social and environmental phenomena that involve human interaction, community participation, and policy interpretation. Qualitative inquiry allows the researcher to gain a deep understanding of the meanings, perceptions, and experiences of the local community, policymakers, and tourism stakeholders in relation to the integration of aquaculture into sustainable marine tourism development. According to Creswell, (2015) qualitative research seeks to interpret social reality through the subjective experiences of participants and the context in which they live. This approach is particularly suitable for understanding the multidimensional relationship between aquaculture practices, tourism development, and community livelihoods, all of which are shaped by cultural, ecological, and institutional factors.

The design adopted for this study is a case study, as proposed by Yin (2018), which enables an in depth exploration of a particular setting in Bulukumba Regency, South Sulawesi Province as a representative example of coastal regions in Indonesia with high marine potential but limited sustainable integration of economic and tourism activities. The case study method allows the researcher to explore real-life contexts and processes, revealing both challenges and opportunities in developing a synergistic model between aquaculture and marine tourism. This research focuses on the following core questions:

- What are the potential and challenges of marine tourism in Bulukumba Regency
- How is aquaculture implemented in Bulukumba Regency?
- What factors should be considered in developing aquaculture in marine tourism?

By addressing these questions, the research design aims to generate a comprehensive understanding of how the integration of aquaculture can function as a sustainable tourism product and contribute to long-term coastal development.

2.2 Research Methodology

The research was conducted in Bulukumba Regency, South Sulawesi, Indonesia, an area renowned for its maritime heritage and extensive coastal resources. Bulukumba possesses a coastline of approximately 128 km and a marine area covering 237.87 km² (Bulukumba Regional Government, 2023). The region is home to fishing and aquaculture communities, particularly in areas such as Bira, Ara, and Kajang, where traditional practices coexist with emerging tourism activities. These characteristics make Bulukumba an ideal case for investigating the potential integration of aquaculture with tourism initiatives.

This study relies on primary and secondary data sources. Primary data were collected directly from key informants, including:

- Local community members engaged in aquaculture and fishing,
- Government officials from the Marine and Fisheries Department and Tourism Office,
- Private tourism operators and coastal business owners, and
- Domestic and international tourists visiting Bulukumba's coastal destinations.

Secondary data were obtained from government reports, academic publications, policy documents, statistical records, and official websites relevant to marine tourism and aquaculture development. A purposive sampling technique was used to select participants who possess relevant knowledge and experience in aquaculture and tourism activities (Sugiyono, 2021). The total number of informants included 15 participants: 8 from local communities, 3 from government agencies, 2 from tourism operators, and 2 from the tourist group category.

Also, data collection was carried out through three primary techniques: In-depth interviews, Participant observation; Documentation study. All interviews were audio-recorded with participants' consent and later transcribed for analysis. Field notes and photographic documentation were used to complement interview data. Lastly, data analysis was conducted using the interactive model (Miles et al., 2016), consisting of data reduction, data display, and conclusion drawing/verification. Then, to ensure credibility and reliability, the study applied triangulation of data sources and methods, peer debriefing, and member validation (Sutton & Austin, 2015). These procedures enhance the trustworthiness and transparency of qualitative research findings

3. FINDINGS AND DISCUSSION

3.1 The Potential and Challenges of Marine Tourism in Bulukumba Regency

Bulukumba Regency, located in the southern part of South Sulawesi Province, represents one of Indonesia's most promising areas for marine tourism development. Its coastal and marine area covers approximately 237.87 km², with a coastline extending 128 km, and features diverse landscapes ranging from coral-rich waters to white-sand beaches and limestone cliffs. Key destinations such as Tanjung Bira, Manyampa Village, Dego-dego, and Liukang Loe Island attract thousands of domestic and international tourists each year. Beyond natural beauty, Bulukumba's cultural heritage, especially the traditional *Phinisi* boatbuilding in Ara and Lemo-Lemo Villages, reinforces its identity as a maritime cultural center and strengthens its positioning within Indonesia's sustainable coastal tourism network.

From an economic perspective, the tourism sector contributes significantly to local employment, particularly in small-scale enterprises such as homestays, culinary stalls, and local transport services. However, despite its potential, Bulukumba's marine tourism development remains primarily conventional. Current activities are concentrated on recreation—swimming, snorkeling, and diving—without integrating ecological education, cultural interpretation, or livelihood-based tourism innovation. Field observations and interviews with tourism stakeholders indicate several key challenges:

Table 1. Key Challenges of Tourism in Bulukumba Regency

No.	Indicators	Remarks
1.	Environmental degradation	including coral reef damage and coastal waste accumulation, due to uncontrolled tourist behavior and limited environmental awareness.
2.	Infrastructure gaps	inadequate sanitation, limited waste management facilities, and poor accessibility to smaller coastal villages.
3.	Limited community involvement	tourism planning and management, causing unequal economic benefits and reducing local ownership.
4.	Weak coordination among government agencies	the marine, fisheries, and tourism sectors often working separately rather than under an integrated coastal management framework.

Source: Research, 2025

These findings align with Hall, (2001) argument that sustainable marine tourism must balance environmental conservation with socio-economic benefits. In Bulukumba, achieving such a balance requires innovation in product diversification and stronger collaboration among tourism actors. Integrating aquaculture into tourism could serve as one of these innovations, providing an alternative attraction while promoting ecological and cultural values.

3.2 Implementation of Aquaculture in Bulukumba Regency

Aquaculture has long played a central role in supporting the livelihoods of Bulukumba's coastal communities. The dominant activities include seaweed cultivation, fish farming in floating cages, and brackish-water pond aquaculture. These aquaculture activities are predominantly small-scale and community-managed, using traditional ecological knowledge passed through generations. Seaweed farming, in particular, provides both environmental and economic benefits, as it enhances coastal ecosystem services such as nutrient absorption and carbon sequestration while generating regular household income. The economic potential of marine resources in Bulukumba can be seen from the following fishery data:

Tabel 1. Name of Table

No	Types of Fish	Production Value (Rp)
1	Layang	a. 143,179,000
2	Tuna	b. 14,134,500
3	Cakalang	c. 98,378,200
4	Kembung	d. 124,001,900
5	Parepek	e. 15,600,000
6	Tembang	f. 29,955,000
7	Kakap	g. 29,059,300
8	Tongkol	h. 27,523,000
9	Kerapu	i. 5,818,000

Sources: Research, 2025

Those data indicate that Bulukumba's marine fisheries are dominated by pelagic species such as Layang and Kembung, which form the backbone of local fishery production and provide a foundation for aquaculture expansion. While Bulukumba's aquaculture sector remains economically viable, it is still viewed primarily as a subsistence livelihood rather than a potential tourism asset. Nevertheless, several sites demonstrate the feasibility of combining aquaculture with educational and recreational tourism. For

example, in Manyampa Village, seaweed farmers have begun welcoming visitors to observe cultivation activities, learn about marine ecosystems, and participate in simple hands-on experiences.



Figure 1: Community Seaweed Cages in Manyampa Village, Bulukumba
Regency Source: Authors, 2025

These community-based practices exemplify how aquaculture could evolve from a purely economic activity into a multifunctional coastal enterprise that supports both food production and tourism engagement. However, the transition requires policy alignment, training, and improved infrastructure to ensure that tourism development does not disrupt the ecological balance or traditional livelihoods.

3.3 Factors to Consider in Developing Aquaculture-Based Marine Tourism

The integration of aquaculture into marine tourism in Bulukumba must be guided by sustainability principles and strategic planning. Based on data analysis, field observations, and interviews with community members and local government officials, five major factors were identified as critical for successful development:

1. **Environmental Sustainability**
Sustainable aquaculture-tourism integration requires maintaining ecological integrity. Practices such as Integrated Multi-Trophic Aquaculture (IMTA), which combines seaweed, fish, and mollusk cultivation can reduce nutrient waste and support water quality (Fao, 2008). Environmental monitoring, coastal zoning, and waste management must be institutionalized to prevent habitat degradation and conflicts between tourism and aquaculture sites;
2. **Community Empowerment and Participation**
Local communities are central to successful integration. Community-based management encourages ownership, accountability, and cultural preservation (Syafi'i & Suwandono, 2015). Training programs in hospitality, environmental education, and small-business management can help residents transition from traditional fishers to eco-tourism operators, ensuring equitable benefit-sharing;
3. **Infrastructure and Accessibility**
Supporting infrastructure such as eco-friendly docks, waste disposal facilities, and educational interpretation centers must be developed (Melikh, T., Dmytro, V., Dariia, 2019). Improved transportation to remote fishing villages will enhance accessibility for tourists and create a sustainable tourism circuit connecting Ujung Loe, Bira, Liukang Loe;
4. **Education, Innovation, and Promotion**
Developing innovative tourism packages; such as “Aquaculture Learning Tours” or “Seaweed Farming Experiences” can attract environmentally conscious tourist (Mohammadi et al., 2024).

Collaborative marketing through local cooperatives, digital platforms, and schools can position

Bulukumba as a model for sustainable marine tourism in Indonesia (Muksin et al., 2021).

3.3 Summary of Findings

The results indicate that Bulukumba Regency possesses high natural, cultural, and economic potential for developing sustainable marine tourism through aquaculture integration. Nonetheless, the challenges lie in fragmented institutional coordination, environmental risks, and limited community capacity (Mustofa, 2020). Aquaculture in Bulukumba especially seaweed and fish cage culture, has strong potential to diversify tourism products and strengthen community-based economies. When supported by inclusive policies and sustainable practices, aquaculture can transform from a subsistence livelihood into a tourism attraction that educates, empowers, and conserves.

Ultimately, this approach contributes to Indonesia's national agenda for the Blue Economy and aligns with the Sustainable Development Goals (SDGs), particularly Goal 8 (Decent Work and Economic Growth), Goal 14 (Life Below Water), and Goal 11 (Sustainable Cities and Communities). Therefore, integrating aquaculture into marine tourism development is not only a viable strategy for local economic growth but also a pathway toward sustainable coastal management that aligns with Indonesia's blue economy vision. If implemented systematically, Bulukumba could emerge as a national example of integrated marine tourism and aquaculture innovation, where economic sustainability thrives in harmony with nature.

4. CONCLUSION

This study explored the integration of aquaculture within marine tourism development in Bulukumba Regency, South Sulawesi, as a strategic approach toward sustainable coastal management and embodies a transformative model for sustainable coastal development. The findings reveal that Bulukumba possesses remarkable natural, cultural, and economic potential, characterized by its extensive coastline, pristine marine ecosystems, and rich maritime heritage, including the traditional *Phinisi* shipbuilding tradition. Despite this potential, the region's tourism activities remain largely conventional and concentrated on recreational uses, such as swimming and diving, with limited innovation in developing environmentally responsible or community-based tourism products. Research also identifies key challenges that must be addressed to ensure the success of this integration. These challenges include weak institutional coordination between government agencies, limited infrastructure in coastal villages, insufficient public awareness of sustainable tourism practices, and inadequate training for local communities to manage eco-tourism ventures. Moreover, without a proper management framework, tourism expansion could risk disturbing the ecological balance that supports aquaculture productivity.

In summary, the integration of aquaculture into marine tourism offers a multifunctional approach that aligns economic productivity, environmental conservation, and social empowerment. By combining these sectors under the principles of sustainable tourism and blue economy development, Bulukumba can serve as a model for other coastal regions in Indonesia seeking to balance livelihood needs with ecosystem protection.

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