



A DECADE OF SHARK DIVING MARINE TOURISM IN MOROTAI, NORTH MOLUCCAS, INDONESIA

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Abstract

Shark diving has emerged as one of the most significant forms of marine tourism worldwide, providing both economic opportunities and conservation challenges for coastal communities. This study examines a decade of shark diving tourism in Morotai, North Moluccas, Indonesia, focusing on its growth trajectory, ecological implications, and socio economic contributions. Data were collected from local tourism agencies, diver operators, and secondary records covering the period 2013–2025. The findings indicate that shark diving tourism in Morotai has expanded steadily, with an average annual increase in visitor numbers exceeding regional marine tourism growth rates. Economically, the activity has contributed substantially to local livelihoods through employment and revenue generation, while also stimulating small-scale businesses such as homestays and dive shops. However, challenges remain in terms of regulating diver shark interactions, ensuring ecosystem sustainability, and balancing conservation goals with tourism development. The case of Morotai illustrates the potential of shark-based ecotourism to foster sustainable blue economy initiatives in Indonesia, provided that appropriate management strategies, stakeholder engagement, and long-term monitoring frameworks are implemented.

Keywords: shark diving; ecotourism; blue economy; Morotai

1. INTRODUCTION

Marine tourism encompasses tourism activities that utilize aquatic environments—such as seas, beaches, rivers, and lakes—for recreational, educational, and sporting purposes (Law of the Republic of Indonesia No. 10 of 2009). In recent decades, marine tourism in Indonesia has expanded significantly, driven by growing interest in underwater activities, particularly recreational diving. As stated in the Regulation of the Minister of Tourism of the Republic of Indonesia No. 7 of 2016, recreational diving is recognized as a major catalyst for the marine tourism sector due to its capacity to generate economic value, create employment opportunities, and foster public awareness and engagement in marine environmental conservation.

One rapidly growing segment of marine ecotourism is shark diving, which offers tourists the opportunity to visually interact with sharks in their natural habitats without causing harm to the animals (Huveneers et al., 2017). This activity has emerged as one of the fastest-growing sectors in global marine tourism, contributing over USD 300 million annually to the global economy (Vianna et al., 2018). Beyond its economic value for coastal destinations, shark diving also plays an important role in raising public awareness about shark conservation—particularly in light of ongoing threats such as overfishing, poaching, and habitat degradation (Cisneros-Montemayor et al., 2020).

Indonesia, as an archipelagic nation with the highest marine biodiversity in the world, possesses substantial potential for developing sustainable, shark-based marine tourism. One promising location is Morotai Island in North Maluku Province, which is geographically positioned between the Molucca Sea to the north and west, the Halmahera Sea to the east, and the Morotai Strait to the south (Morotai Island Regency Government, 2011). The island's pristine underwater environment, high water clarity, and the presence of shark populations position it as an ideal site for the development of conservation-oriented diving tourism. From a regional development perspective, such initiatives also create new economic opportunities for coastal communities, particularly in tourism services, marine transportation, homestays, and dive equipment retail.

Nevertheless, the growth of shark diving tourism presents several challenges. Direct human-shark interactions, if not properly regulated, may disrupt natural shark behaviors (Gallagher et al., 2015). Additionally, increased tourist activity may place stress on sensitive marine ecosystems, particularly coral reefs, which serve as essential shark habitats. As such, achieving a sustainable balance between ecological conservation and economic development remains a critical concern. Understanding the trajectory of shark diving tourism development in Morotai over the past decade is essential for evaluating its contributions to both the local economy and marine ecosystem sustainability. This analysis offers insight into the expansion of marine tourism in eastern Indonesia and provides a framework for integrating ecotourism and blue economy principles into conservation-focused tourism practices.

2. RESEARCH DESIGN & METHODOLOGY

2.1 Research Design and Approach

This study adopts a descriptive research design integrating a mixed-methods approach, emphasizing the economic, ecological, and sociocultural dimensions of shark diving tourism. The research combines quantitative economic evaluation techniques (e.g., expenditure analysis, revenue estimates, and willingness-to-pay modeling) with qualitative stakeholder engagement methods (e.g., interviews with community members and dive operators). The design is framed within the Blue Economy and community-based tourism frameworks, highlighting sustainable use of marine resources for both conservation and livelihood enhancement. This approach is consistent with previous studies such as those by Vianna et al. (2018) in Malaysia and Brunnschweiler (2009) in Fiji, which demonstrated the utility of participatory tourism models in marine conservation.

2.2 Data Collection and Sources

Primary data were collected through structured questionnaires, semi-structured interviews, and on-site observations at selected shark diving sites. Following the methodology employed in the Malaysian and Fijian case studies, three target respondent groups were identified: diving tourists, dive operators, and community stakeholders (e.g., local fishers, village representatives). Dive tourist surveys focused on demographic characteristics, motivation, spending patterns, satisfaction, and willingness to pay for conservation efforts. Dive operator questionnaires explored tourist volumes, site characteristics, employment, and income generation, while stakeholder interviews captured perspectives on tourism's socio-ecological impacts and support for conservation incentives.

Secondary data sources include official records from local tourism offices, marine conservation agencies, and existing publications, such as those by Mustika et al. (2020) in Indonesia and Gonzalez-Mantilla et al. (2022) in the Azores. These sources provide historical data on dive numbers, economic metrics, and biodiversity indicators. Data triangulation across sources ensures robustness and comparability, enabling benchmarking with shark diving tourism performance in other countries.

2.3 Data Analysis

Data analysis combines descriptive statistics, economic valuation models, and regression analysis. Tourist expenditure data were aggregated to estimate direct revenues (e.g., income to dive operators, accommodation providers, and transport services), while community income and tax

revenue were modeled using formulas adapted from Vianna et al. (2018) and Zimmerhackel et al. (2019). These include estimates of employment, wage distribution, and business taxes attributed to shark diving.

This allowed for the calculation of potential annual revenues for conservation funding. Qualitative data from interviews were coded and analyzed thematically using content analysis to capture perceptions of conservation benefits, tourism challenges, and traditional ecological knowledge integration. Cross-case comparison with the Fiji and Azores studies informed the validation and external relevance of the findings.

3. FINDINGS AND DISCUSSION

3.1 Number of Visitors and Growth Trends

Shark diving tourism in Morotai waters began to actively develop in 2013, with a steadily increasing number of visitors attracted mainly by interactions with sharks and rays (*elasmobranchii*). This phenomenon has positioned Morotai as one of the leading shark diving locations in Indonesia, strengthening Indonesia's position in fourth place in the global shark tourism economy. Nationally, the main shark tourism areas in Indonesia are estimated to contribute an economic value of around USD 49 million. Records from 2022 to 2025 show an increase in tourist participation despite a temporary decline. For example, in 2022, records from the Indonesian sub-base reached 74 tourists across nine trips. In 2024, data from various sources indicated around 60 tourists, combining records from February to August. In 2025, preliminary data from January to September already showed 72 tourists, a number expected to continue rising. This trend highlights Marotta's growing popularity as a shark diving destination, contributing to Indonesia's position as a global leader in the shark observation economy. However, it is important to note that these figures come from operators and may not yet reflect the total number of visits, as data from previous years based on research dives shows higher activity with 652 dives conducted over six years (2013-2019), indicating significant ongoing engagement during that period (Mukharro et al., 2025). In line with national trends, tourist visitation data for Morotai for shark diving activities shows growth.

Table 1. Estimated Visitor Numbers for Shark Diving in Morotai (2022–2025)

Year	Number of Tourists	Gross Profit (IDR)	Nett Profit (IDR)	Total Dive
2020	4	12,464,000	1,869,600	28
2021	15	46,740,000	7,011,000	180
2022	74	230,584,000	34,587,600	567
2023	64	202,800,000	30,420,000	240
2024	60	186,960,000	17,840,500	79
2025	72	224,352,000	44,102,500	300
Total				1,394

3.2 Economic Impact and Community Welfare

The economic and tourism contributions of shark diving in Morotai are evident through increased income generation and job creation for the surrounding coastal communities. Income data indicate significant growth in recent years. For instance, during the COVID-19 pandemic in 2020, only four divers were recorded, generating a gross income of IDR 12,464,000. By 2025, however, shark diving activities attracted 72 visitors, resulting in a gross income of IDR 224,352,000—a substantial increase over previous years. Similarly, the number of dives rose from 652 in 2020 to 1,394 in 2025, representing a 113.7% increase. These activities have directly supported local livelihoods through employment in roles such as tour guides, boat operators, and trip coordinators, contributing to skill development and reduced unemployment.

In addition, shark diving has stimulated the growth of small-scale businesses, including accommodation and diving equipment services. According to the Morotai Regency Tourism Office, 74 homestays operate in South Morotai District, with an additional 6 located in Pandanga Village near the shark diving site. These developments align with the principles of the blue economy, which advocate for sustainable marine tourism as a means to enhance local income without overexploiting marine resources (Law of the Republic of Indonesia No. 10 of 2009; Ministry of Tourism Regulation No. 7 of 2016). However, challenges remain in ensuring equitable income distribution, and further research is needed to evaluate the long-term socioeconomic impacts on community well-being.

3.3 Conservation Challenges and Ecological Implications

Despite its economic benefits, shark diving tourism in Morotai faces notable conservation challenges, particularly concerning ecosystem disturbances and alterations in shark behavior. Biodiversity surveys conducted between 2013 and 2019 identified four species of rays and sharks in Morotai waters, including the blacktip reef shark (*Carcharhinus melanopterus*) and the reef manta ray (*Manta alfredi*). The blacktip reef shark was the most frequently encountered species, with an average of 11,896 sightings recorded (Mukharror et al., 2025). However, research indicates that diving activities may lead to short-term behavioral changes, such as stress responses and temporary displacement, while the long-term ecological impacts remain insufficiently understood (Bradley et al., 2017).

In addition, habitat degradation resulting from tourism infrastructure development and changes in land use pose threats to coral reef-associated species. Evidence of this includes the recorded presence of deceased elasmobranch species such as *Carcharhinus falciformis* and *Sphyrna lewini* (Mukharror et al., 2025). Travel log data also indicate that popular diving locations, including culturally significant sites such as Mitita Shark Point, are frequently visited, raising concerns about visitor carrying capacity and the cumulative impacts of unregulated tourism. These findings underscore the urgent need for management strategies and regulated human–wildlife interaction protocols to mitigate ecological degradation and ensure the sustainability of the very resources that attract marine tourists.

3.4 Recommendations for Sustainable Management

To address conservation challenges and promote sustainable shark diving in Morotai, several key recommendations are proposed based on the study findings. First, implementing a carrying capacity framework at dive sites is essential to minimize disturbances to elasmobranch species. This includes limiting the number of divers and designating no-take zones, as informed by species distribution data in Morotai (Mukharror et al., 2025). Second, enhancing stakeholder participation through community-based monitoring programs can increase conservation awareness and ensure equitable benefit-sharing. Involving local operators in data collection—an approach demonstrated in biodiversity studies—can also improve data accuracy and foster greater compliance (Mukharror et al., 2025).

Third, clear and enforceable diver guidelines should be established, including maintaining a safe distance from sharks and avoiding physical contact, to minimize behavioral disruptions. These

recommendations are consistent with international best practices for responsible shark tourism (Pevzner et al., 2018). Although Shark Diving Indonesia has reported such practices on its official platform, greater effort is needed to ensure their consistent implementation in the field, particularly with blacktip reef sharks. Finally, long-term monitoring of shark populations and tourism impacts should be instituted to inform adaptive management strategies, ensuring that economic gains do not come at the expense of ecological integrity. These measures align with blue economy principles that seek to harmonize economic development with marine conservation.

3.5 The Blue Economy Integrates Conservation and Economics.

The case of Morotai illustrates the potential of shark diving tourism to contribute meaningfully to Indonesia's blue economy, which promotes the sustainable use of marine resources to support economic growth while safeguarding ecological integrity. As part of this framework, shark-based ecotourism in Morotai not only generates local income and employment but also encourages marine conservation practices. Nationally, the economic value of marine tourism in Indonesia is estimated to reach USD 49,093,000, placing the country fourth in global rankings. Within this context, Morotai serves as a strategic site, demonstrating how targeted, conservation-driven tourism initiatives can align with broader sustainable development goals.

Table 2. Comparison of the Economic Valuation of Shark Tourism Destinations in the World

Country	Shark Species Attraction	Economic Value of Shark Tourism
South Africa	Great White, Tiger Shark	173,600,000
Bahamas	Caribbean reefshark, Tiger shark, Bull shark	113,800,000
Maldives	Whaleshark, Tiger shark, etc.	58,000,000
Indonesia	Whaleshark, Hammerhead, Blacktip, etc.	49,093,000
Fiji	Bull shark, Tiger Shark	42,200,000

This aligns with empirical data on income generation and job creation in Morotai, demonstrating the potential to diversify the local economy beyond traditional fisheries. However, ongoing conservation challenges underscore the fragility of this balance. Adopting a Blue Economy approach enables Morotai to position shark diving tourism as both an economic asset and a conservation tool—for instance, by allocating a portion of tourism revenue to support marine protected areas or community-led conservation initiatives. Biodiversity data indicating the consistent presence of species such as the blacktip reef shark (*Carcharhinus melanopterus*) suggest that, with effective management, tourism can coexist with healthy marine populations (Mukharro et al., 2025). Ultimately, sustaining the shark diving industry in Morotai requires policy frameworks that prioritize ecological integrity, in line with Indonesia's marine tourism legislation, to ensure long-term benefits for both people and the environment.

Table 3. Blue Economy Framework for Shark Diving Tourism in Morotai

No	Blue Economy Pillars	Key Findings
1	Economic Growth	a. Annual revenue increase

		b. High value international tourist (e.g., European clients paying up to IDR 23,000,000/pax)
2	Community Welfare	a. Job creation for locals as dive staff (e.g., Surya, Rio, Wisnu) b. Secondary businesses (homestays, dive shops)
3	Conservation challenges	a. Short-term behavioral changes in sharks b. Habitat degradation from tourism infrastructure
4	Management Strategies	a. Carrying capacity limits at frequented sites (e.g., Mitita Shark Point) b. Community-based monitoring using citizen science
5	Blue Economy Integration	a. Tourism revenue funding conservation (e.g., marine protected areas) b. Balancing economic gains with species protection

4. CONCLUSION

Over the past decade, shark diving tourism in Morotai, North Maluku, has demonstrated substantial potential as both an economic catalyst and a conservation instrument within Indonesia's marine tourism sector. The steady increase in visitor numbers from 2013 to 2025 reflects a growing global interest in shark-based ecotourism, positioning Morotai as an emerging destination for sustainable marine recreation. Economically, shark diving has contributed to improved community welfare by generating employment opportunities, stimulating the growth of small-scale enterprises such as homestays and dive shops, and diversifying income sources for coastal populations. These outcomes align with the principles of the blue economy, which advocate for the sustainable use of marine resources to support long-term economic and environmental resilience.

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