

MARINE TOURISM: BETWEEN CHALLENGES AND OPPORTUNITIES IN SUSTAINABLE DEVELOPMENT IMPLEMENTATION

TURISMO MARÍTIMO: ENTRE DESAFIOS E OPORTUNIDADES NA IMPLEMENTAÇÃO DO DESENVOLVIMENTO SUSTENTÁVEL

Article received on: 1/23/2026

Article accepted on: 4/24/2026

Paramita Prananingtyas*

*Faculty of Law, Universitas Diponegoro, Semarang, Indonesia
Orcid: <https://orcid.org/0000-0002-6145-7376>
paramitaprananingtya@lecturer.undip.ac.id

Fildzah Lutfiyani*

*Faculty of Law, Universitas Diponegoro, Semarang, Indonesia
Orcid: <https://orcid.org/0009-0009-7774-2583>
fildzah@live.undip.ac.id

Shofiy Zulfah*

*Faculty of Law, Universitas Diponegoro, Semarang, Indonesia
shofiyzulfah@live.undip.ac.id

Rinitami Njatrijani*

*Faculty of Law, Universitas Diponegoro, Semarang, Indonesia
rinitaminjatrijani@lecturer.undip.ac.id

The authors declare that there is no conflict of interest

Abstract

Marine areas dominate much of the planet, giving archipelagic countries significant tourism potential in destination development. Indonesia and the Philippines, as the two largest archipelagic nations in the world, can leverage marine tourism as a tourism asset that contributes to economic growth, social development, and environmental advancement. However, excessive exploitation of natural resources can lead to the degradation of marine ecosystems, making it necessary to balance natural resource management especially of the seas with tourism growth that impacts the economy. Although the pillars of sustainable tourism are well known, the implementation in practice is often difficult due to the lack of effective and applicable regulatory models to enhance and realize sustainable tourism. Therefore, it is necessary to analyze the obstacles faced in the form of challenges and opportunities in sustainable tourism. Using a descriptive-analytical research method, this study utilizes secondary data as the primary source for analysis and elaboration, while primary data serves as supplementary information to support the writing. The study examines the importance of sustainable tourism in marine tourism, as well as the challenges and opportunities in its implementation. The findings

Resumo

As áreas marinhas ocupam grande parte do planeta, conferindo aos países arquipelágicos um potencial turístico significativo para o desenvolvimento de destinos. A Indonésia e as Filipinas, como as duas maiores nações arquipelágicas do mundo, podem aproveitar o turismo marítimo como um recurso turístico que contribui para o crescimento econômico, o desenvolvimento social e o avanço ambiental. No entanto, a exploração excessiva dos recursos naturais pode levar à degradação dos ecossistemas marinhos, tornando necessário equilibrar a gestão dos recursos naturais, especialmente dos mares, com o crescimento do turismo que impacta a economia. Embora os pilares do turismo sustentável sejam bem conhecidos, a implementação na prática é frequentemente difícil devido à falta de modelos regulatórios eficazes e aplicáveis para aprimorar e concretizar o turismo sustentável. Portanto, é necessário analisar os obstáculos enfrentados na forma de desafios e oportunidades no turismo sustentável. Utilizando um método de pesquisa descritivo-analítico, este estudo utiliza dados secundários como fonte primária para análise e elaboração, enquanto os dados primários servem como informação complementar para apoiar a



show that the pillars of sustainable tourism can be implemented if there is awareness of the need for sustainable tourism development, which can be achieved through collaboration between the government, the private sector, and the community. Similar practical models implemented by other developed countries can also be considered. This research is expected to broaden insights and increase awareness of the urgency of sustainable tourism, with long-term and multifaceted impacts.

Keywords: Sustainable Tourism. Challenges and Opportunities. Marine Tourism.

redação. O estudo examina a importância do turismo sustentável no turismo marinho, bem como os desafios e oportunidades em sua implementação. Os resultados mostram que os pilares do turismo sustentável podem ser implementados se houver consciência da necessidade de desenvolvimento do turismo sustentável, o que pode ser alcançado por meio da colaboração entre o governo, o setor privado e a comunidade. Modelos práticos semelhantes implementados por outros países desenvolvidos também podem ser considerados. Espera-se que esta pesquisa amplie os insights e aumente a conscientização sobre a urgência do turismo sustentável, com impactos de longo prazo e multifacetados.

Palavras-chave: Turismo Sustentável. Desafios e Oportunidades. Turismo Marinho.

1 INTRODUCTION

The surface area of the world's oceans is much larger than that of the land, covering most of the Earth's surface. The total surface area of the world's oceans is estimated to be around 361 million square kilometers. This vast area accounts for about 71% of the Earth's surface, playing a vital role in influencing the planet's climate and weather patterns, as well as supporting diverse types of marine life and ecosystems (Von Schuckmann *et al.*, 2024). Some of the largest archipelagic countries in the world include Indonesia (Marewa & Parinussa, 2020) and the Philippines, known as the two largest archipelagic countries (Hill, 2008), followed by Japan, Fiji, the Maldives, the Bahamas, and several other countries. Meanwhile, according to National Geographic Indonesia, Sweden ranks first as the country with the most islands, followed by Norway. Indonesia itself ranks sixth in the world, with more than 17,000 islands spread across the country. These archipelagic countries are known for their geographical characteristics, consisting of numerous islands (Dos Santos, 2019). An archipelagic country is considered important in the world's political geography because it possesses unique characteristics along with various challenges it faces, such as climate change and resource management (Dos Santos, 2019).

Countries with archipelagos have opportunities to develop tourism, especially marine and water tourism. Marine tourism focuses on marine and coastal environments, encompassing activities such as snorkeling, diving, sailing, and island tours. Marine tourism emphasizes introducing marine biodiversity and coastal ecosystems, and is closely related to environmental and conservation aspects. Marine tourism includes recreation and attractions located in coastal and marine ecosystems, such as water parks and theme parks. Water tourism has a narrower scope, focusing on in-water activities such as swimming, rafting, and canoeing in lakes, rivers, or pools. Marine tourism can provide significant economic benefits through sea-related jobs, while water tourism contributes to local development and domestic tourism.

The development of marine tourism has overcome the limitations of activities in the past, which were mostly limited to sightseeing, walking on the beach, fishing, and playing. As time progressed, surfing began to gain popularity in Hawaii in the late 18th and mid-19th centuries. Jetsurf, a motorized surfboard, became popular around 2013. Scuba Diving or holding your breath underwater without assistive equipment is an example of water recreation. In Indonesia, the Bajo Tribe engages in this activity to catch sea animals. In Greece, diving has been recorded since around 500 BC. Today, marine tourism has become a tourist destination that attracts visitors from outside the area and has the potential to boost the local economy. However, as it develops, this type of tourism can grow rapidly and have a significant impact on the local economy, environment, and society. This presents various challenges and opportunities in balancing economic growth, environmental sustainability, and social aspects. The urgency of sustainable tourism in marine tourism has become a serious issue, due to environmental impacts that can affect economic growth. Without the implementation of sustainable measures, the impact of marine tourism can cause significant environmental damage, such as pollution, habitat destruction, and loss of biodiversity. Additionally, wildlife can also be directly affected, as maritime activities such as dolphin-watching tours can disrupt the natural behavior of marine species if not managed sustainably (Wu *et al.*, 2020). Failure to implement sustainable practices can damage coastal ecosystems and marine resources, reducing the ecological value and appeal of areas that are important for tourism (Viana *et al.*, 2017). From an economic perspective, unsustainable practices generate short-term profits at the expense of sustainability. The development of sustainable tourism is

important for the management of coastal and marine resources (Niavis *et al.*, 2019). Unsustainable tourism results in excessive exploitation and economic losses for the local community (Boukas & Ziakas, 2013; Tegar & Saut Gurning, 2018). Dependence on unsustainable maritime tourism can undermine the social and cultural structure as well as the long-term livelihoods of communities (Su *et al.*, 2015). The absence of sustainable practices can undermine ecological integrity, economic viability, and social stability, making it essential to integrate sustainability principles into tourism management (Singh & T Easow, 2023).

The urgency of sustainable tourism has become an important issue that needs to be addressed by all parties not only the government and the private sector, but also public awareness. These three elements need to collaborate in applying and improving the implementation of sustainable tourism. Therefore, given the urgency in economic, environmental, and social aspects within the tourism sector, policies are needed to ensure that the balance of these aspects is maintained through the implementation of sustainable tourism concepts in marine tourism. On the other hand, up to now, there has not been an ideal implementation model for practicing sustainable tourism, as its application will vary from one region to another. However, there are already main pillars of sustainable tourism that can serve as references, and from these pillars, various opportunities and challenges in its implementation can be analyzed. This writing focuses on discussing the urgency of implementing sustainable tourism, as well as the challenges and opportunities encountered in applying this concept to marine tourism.

2 METHOD

This study employs a descriptive analytical method to explore the challenges and opportunities in implementing sustainable development in the marine tourism sector. This method was chosen because it allows researchers to systematically, factually, and accurately describe the phenomena under study, as well as analyze the relationships between the variables involved. Data were collected through a literature review from various secondary sources, including scientific journals and publications from relevant institutions. The collected data were then analyzed qualitatively to identify key themes related to the challenges and opportunities of implementing sustainable development in

the context of marine tourism. The results of the analysis are presented descriptively to provide a comprehensive overview of the researched topic.

3 RESULT AND DISCUSSION

3.1 Sustainable tourism in marine tourism

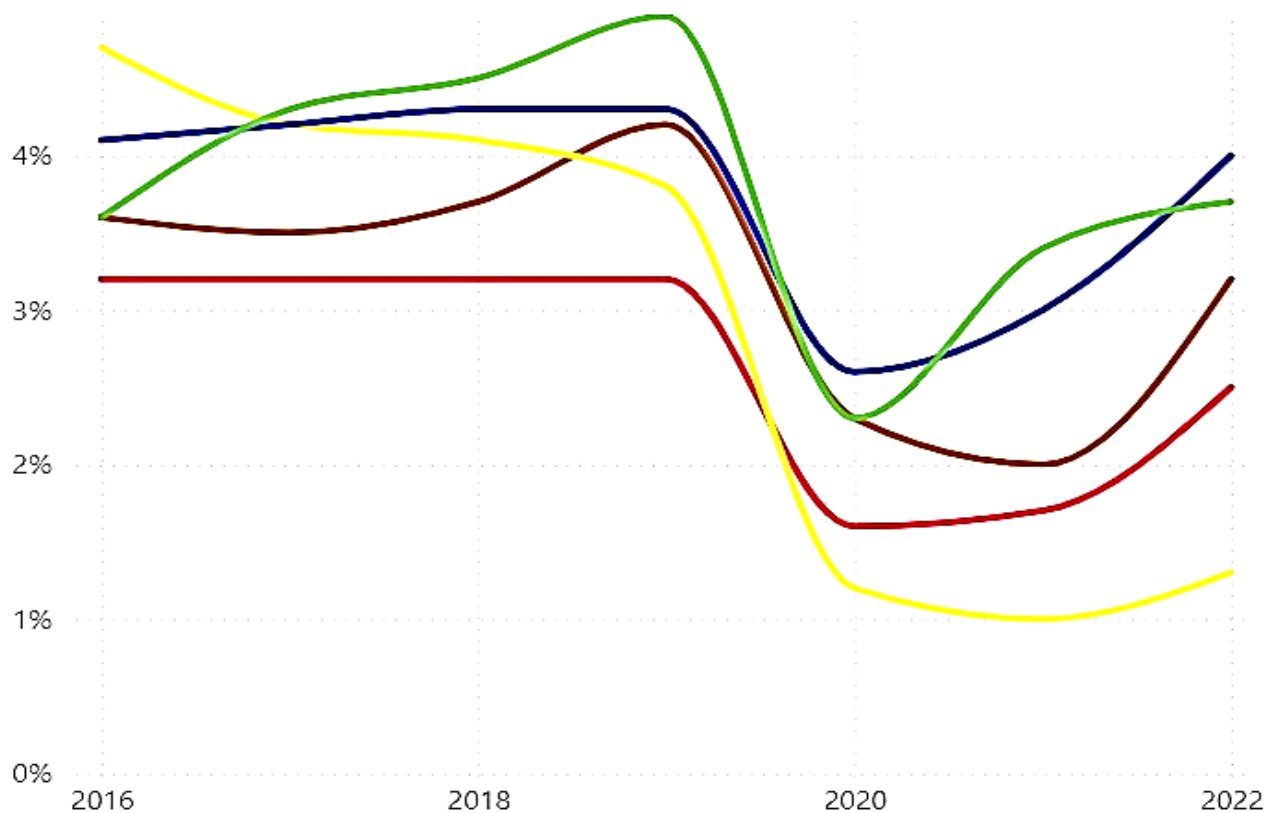
3.1.1 Principles of sustainable tourism

Sustainable development is a fundamental paradigm for promoting human and economic progress, based on preserving ecological integrity and the resilience of social systems that support the structure of regional economies. In the context of developing countries, tourism has emerged as a strategic instrument to drive economic growth, reduce poverty, create job opportunities, and enhance food security. These countries typically possess rich biodiversity, abundant natural resources, and significant cultural heritage sites that serve as major attractions for international tourists. The spending by these tourists contributes to increased local income and stimulates job creation, thereby strengthening regional economic development. Furthermore, tourism is increasingly aligned with the sustainable development paradigm due to its ability to promote environmental conservation and support community livelihoods.

In developing countries, tourism is often seen as an important instrument to stimulate economic growth, reduce poverty, and strengthen food security. These countries possess natural wealth, history, and cultural heritage that serve as unique assets in economic development. The development of the tourism sector involves major projects such as infrastructure development, industry expansion, and job creation, all of which have a positive impact on society. However, this development can also have negative effects on the environment and local communities. Therefore, although tourism makes a significant contribution to global economic development, its role in the context of sustainable development remains debatable and is not necessarily definitive or conclusive.

Table 1*Tourism Gross Domestic Product by Region in the World***Tourism GDP by Region (%)**

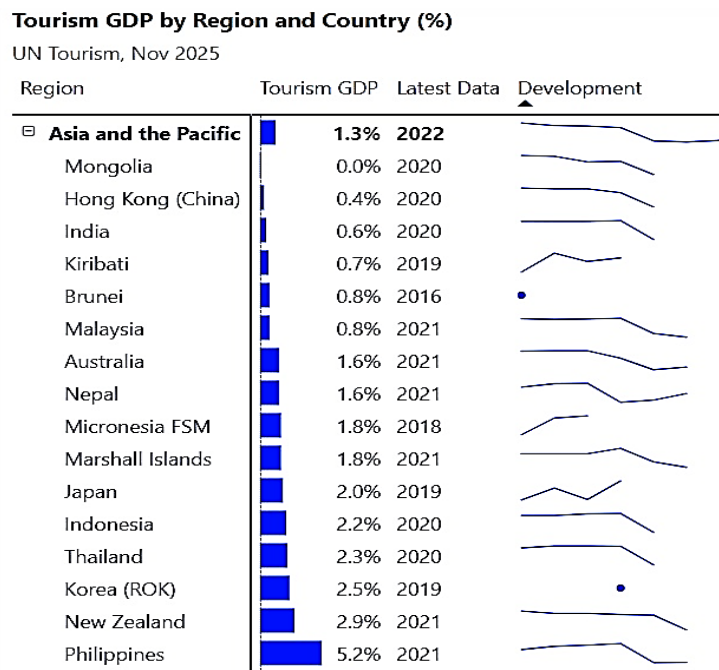
UN Tourism, Nov 2025

Region ● Africa ● Americas ● Asia and the Pacific ● Europe ● Middle East

Source: UN Tourism Data Dashboard

Table 2

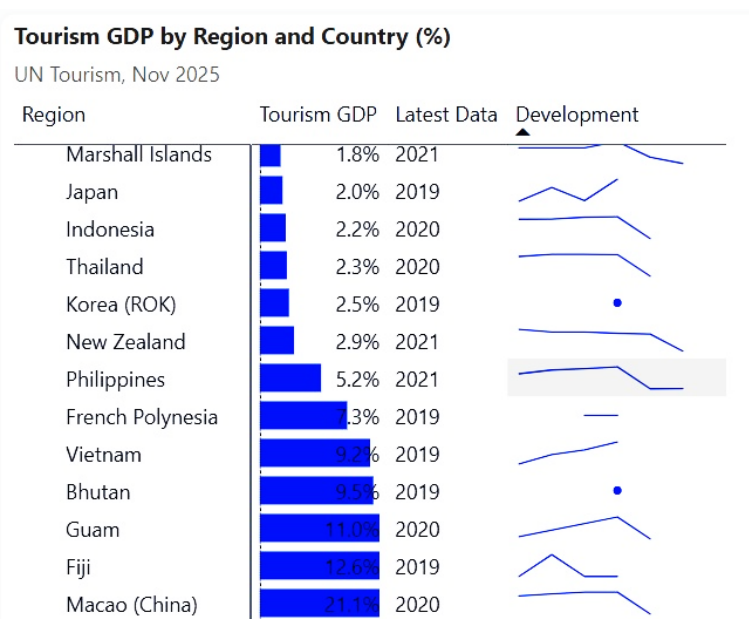
Tourism Gross Domestic Product by Region in the World



Source: UN Tourism

Table 3

Tourism Gross Domestic Product by Region in the World



Source: UN Tourism

According to history, sustainable tourism was first introduced by Bramwell and Lance as an economic development model designed to improve the quality of life of local communities, support the tourism experience at tourist destinations, and preserve the environment of those destinations. Historically, this literature developed closely alongside the growth of tourism and later the development of sustainable economies through tourism development. Previous studies have shown the negative impacts of tourism development, which are closely linked to pollution, depletion of natural resources, and the destruction of habitats. As a result, tourism experts began to connect the concept of tourism with the emerging concept of environmental sustainability. This concept aligns with international policy trends, which have gradually expanded to cover various issues ranging from social, community, economic, to environmental aspects.

In its development, a total of 1,596 documents on sustainable tourism have emerged since 1990. Since that year, growth was somewhat modest, but from 2005 onward, it became quite significant and has continued to develop in line with the times. In international journal publications, data shows that documents on STD (Sustainable Tourism Development) or sustainable tourism are most frequently published by the United States with 276 documents, followed by academics from Australia with 255, the United Kingdom with 238, China with 65, and South Africa with 45. Progress in the scientific and literary fields related to sustainable tourism has shown a significant increase in recent years. Several studies have focused on various aspects in this field, covering sustainability practices across different economic and geographic sectors. The development of sustainable tourism relies on several main pillars that ensure the continuity of this industry while minimizing its negative impacts. These main pillars include environmental, economic, and social sustainability, each of which is essential for the holistic approach required in sustainable tourism. The pillars of sustainable tourism include, among others:

a. Environmental Sustainability

This pillar emphasizes the importance of minimizing the ecological footprint of tourism activities. It includes efforts to protect and preserve natural resources and biodiversity. The implementation of environmentally friendly infrastructure and the reduction of pollution are crucial in this pillar. For example, green infrastructure plays a

key role in environmental sustainability by reducing the negative impact of tourism on the natural environment (Arya *et al.*, 2024).

b. Economic Sustainability

Economic sustainability in tourism aims to ensure that tourism provides long-term economic benefits to host communities. This includes aspects such as financial sustainability, job creation, and tourism competitiveness. The economic dimension focuses on managing financial resources and tourism costs so that the sustainability of tourism can be maintained over time (Arya *et al.*, 2024). In the context of sustainable tourism, it is essential to leverage tourism to enhance the region's economic competitiveness while managing its impacts (Jayawardena *et al.*, 2008).

c. Social Sustainability

This pillar relates to the impact of tourism on host communities and aims to promote social equity as well as cultural preservation. Health, safety, and cultural authenticity are inseparable components. An important aspect of social sustainability is encouraging the implementation of health and safety measures for both tourists and local communities (Arya *et al.*, 2024). Identification and promotion of cultural sustainability indicators help ensure that tourism respects and preserves local culture (Gaonkar & Sukthankar, 2025).

These three pillars are interconnected and require integrated planning and management to achieve truly sustainable tourism development. Sustainable practices include the development of and adherence to composite indicators such as the SusTour-Index, which evaluates sustainability from economic, environmental, and social perspectives (Punzo *et al.*, 2022). In addition, cultural sustainability has been recognized as an important aspect of sustainable tourism, emphasizing the need for tourism practices that respect and promote cultural heritage. Research has highlighted a number of cultural sustainability indicators, such as authenticity and empowerment, which influence the growth of sustainable cultural tourism (Gaonkar & Sukthankar, 2025).

Some examples of cities that implement the pillars of sustainable tourism include cities such as Helsinki, Gothenburg, and Copenhagen. According to the Global Destination Sustainability Movement (GDSM), these three cities rank as the top three out of 20 cities in the GDS-Index and are considered successful in implementing sustainable tourism. Out of these 20 countries, two are from the Asian continent: Singapore, which

ranks 13th, and Goyang City from South Korea, which ranks 15th. In Helsinki, Finland, sustainable tourism is very important for preserving the environment. The city does many things to reduce pollution and make activities more environmentally friendly. They use low-carbon transportation and energy-efficient accommodations, thereby reducing CO2 emissions (Xing, 2024). Technology also supports sustainable tourism in Helsinki. Technologies such as blockchain, the Internet of Things (IoT), and artificial intelligence (AI) are used to manage resources, reduce waste, and monitor carbon emissions. These innovations make operations more efficient, lower costs, and attract environmentally conscious travelers (Chakraborty, 2024). In addition, Helsinki involves the community in sustainable tourism. This is important for preserving local culture and ensuring that everyone benefits. By engaging the community and preserving culture, sustainable tourism in Helsinki makes the community more satisfied and the culture richer (Xing, 2024). Overall, Helsinki's approach to sustainable tourism involves technology, community engagement, and efficient resource management to achieve a better environment, economic growth, and social equity. This effort highlights the importance of sustainable tourism in improving the quality of the urban environment and meeting the expectations of environmentally conscious travelers. Meanwhile, in the city of Gothenburg, Sweden, the main strategy is to create an environmentally friendly city with smart technology. This technology supports the environment, society, and economy in urban tourism. Infrastructure with smart technology and ecological principles aims to drive innovation, increase resource efficiency, and support sustainable growth (Asrifan *et al.*, 2024). Another important aspect is the bike-sharing scheme, such as "Styr & Ställ," which complements the city's public transportation. This initiative is environmentally friendly and affordable, reinforcing the city's identity as human-friendly (Nikitas *et al.*, 2016). In addition, education plays an important role in promoting sustainability in Sweden. Sweden has incorporated Education for Sustainable Development (ESD) into formal education, in line with global policy strategies. This initiative helps create a sustainable society by integrating sustainable practices into the education curriculum, thereby enhancing understanding and implementation of sustainability (Cars & West, 2014). A simple practical example of this application can be seen in studies of water networks such as the Yangtze River in China, which show that government support and intervention play a crucial role in optimizing environmental and economic sustainability

in the tourism sector (Li *et al.*, 2024). Another example of sustainable tourism can be found in Costa Rica, which is famous for its ecotourism. Costa Rica has succeeded in linking conservation with local economic development. As a renowned ecotourism destination, its success is supported by environmental policies, the private sector, and research centers (Valverde Sanchez, 2018). The Monteverde Cloud Forest Reserve demonstrates sustainable tourism by balancing visitation, finances, ecology, and the economy (Aylward *et al.*, 1996). Research shows that ecotourism in Costa Rica supports conservation and the local economy. In the Osa Peninsula, Lapa Rios Lodge plays an important role in local well-being and environmental conservation, including achieving the highest reforestation rate in the area (Zambrano *et al.*, 2010). However, ecotourism does not always have a positive impact. Issues such as litter, habitat destruction, and socio-cultural impacts can occur (Stem, Lassoie, Lee, & Deshler, 2003). Ecotourism is effective when it becomes part of a larger conservation strategy (Stem, Lassoie, Lee, Deshler, *et al.*, 2003). Despite the challenges, ecotourism in Costa Rica demonstrates that conservation and local economic development can be achieved sustainably.

In another literature review, the identification of main themes in sustainable tourism development research was found, namely rural tourism, tourism business management, and sustainable tourism development that prioritizes the balance of economic, social, and environmental aspects (García-García *et al.*, 2023). Meanwhile, the application of technology in conditioning the metaverse demonstrates how tourism can evolve in a virtual environment, shaping a new paradigm in tourism sustainability (Mihalic, 2024). Similarly, literature related to education for sustainable development in higher education has shown a significant increase in research output since 2018, with a greater focus on environmental and economic dimensions rather than social ones (Tafese & Kopp, 2025). Overall, a multidisciplinary and collaborative approach is essential to achieve effective sustainable tourism development. The implementation of these sustainability practices not only impacts the economic aspect but also plays an important role in environmental and social preservation (Alhawamdeh *et al.*, 2023; Tafese & Kopp, 2025).

3.1.2 The importance of sustainable tourism in marine tourism

Marine tourism holds significant importance in sustainable development. Its aim is to ensure that tourism activities do not damage natural resources for future generations. Marine tourism provides economic benefits to local communities through increased income and job opportunities. Environmental protection is a crucial aspect to prevent ecosystem damage. Marine tourism also plays a role in preserving local culture, contributing to sustainable development that takes into account economic, social, and environmental aspects.

In addition to playing a significant role, marine tourism is also one of the largest and fastest-growing segments in the tourism industry. This phenomenon presents various challenges in balancing economic growth with environmental conservation and social sustainability. The following are several points highlighting the importance of sustainable tourism in the context of marine tourism:

a. Blue Economy Development

The Blue Economy concept emphasizes ecosystem principles in the development of marine tourism, aiming not only to generate economic growth but also to ensure ecological and social sustainability (Tegar & Saut Gurning, 2018). In this context, nature-based tourism can support marine conservation while reducing negative impacts on the ecosystem.

b. Economic Contribution and Employment

Marine tourism is a main part of the maritime economy and contributes significantly to the local economy by creating jobs and driving tourist spending (Cisneros-Montemayor *et al.*, 2020). The development of sustainable tourism can help facilitate the achievement of economic goals and the sustainability of conservation efforts.

c. Environmental Conservation

The adoption of sustainable tourism practices can reduce the environmental footprint of the tourism sector, such as by decreasing CO₂ emissions and water usage (Xing, 2024). This is important for maintaining the health of the ecosystem, which is the main attraction of marine tourism, for example in ecotourism that focuses on the conservation of key species and the preservation of biodiversity.

d. Challenges and Social Issues

Marine tourism often faces various social issues such as unequal access to natural resources and environmental health problems (Leposa, 2020). The implementation of sustainable tourism can help address these issues through community participation and the fair distribution of benefits.

e. Legal Framework and Collaboration

To achieve sustainable tourism, a strong legal framework is needed that can promote environmental conservation as well as economic development (Khater *et al.*, 2024). Collaboration between the public and private sectors is also key to developing infrastructure and promoting environmentally friendly tourism activities.

By taking these aspects into consideration, it is important for the marine tourism sector to integrate sustainable practices into all aspects of their development and operations to ensure that economic growth goes hand in hand with environmental preservation and equitable social development (Cisneros-Montemayor *et al.*, 2020; Khater *et al.*, 2024; Leposa, 2020; Tegar & Saut Gurning, 2018; Wang & Zhang, 2019; Xing, 2024).

3.2 Challenges and opportunities of marine tourism in implementing sustainable

3.2.1 Tourism

In recent years, tourism experts have highlighted the urgency of developing sustainable tourism, as more and more tourist destinations are facing sustainability challenges. Marine tourism, as one of the fastest-growing tourism sectors and highly dependent on marine ecosystems, has become a key subject in enforcing and implementing sustainable tourism. Marine tourism, which relies on the beauty of its marine ecosystems, faces serious challenges related to ecosystem degradation. Environmental damage, such as the destruction of coral reefs in the Thousand Islands area of Jakarta where more than 50% are damaged—illustrates this issue. Both natural factors and human activities are responsible for this damage. The negative impacts of snorkeling activities, including destructive behavior by tourists, are among the causes of coral reef destruction. This certainly requires special attention to the implementation of standards,

regulations, and preventive measures for diving activities, in order to preserve existing coral reefs. The importance of regulation and social responsibility in these activities is crucial to create a balance between the interests of humans and nature.

The implementation of sustainable tourism in the marine tourism sector faces complex and multidimensional challenges, including pressure on marine ecosystems, limitations in product innovation development, ethical issues related to stakeholder behavior, as well as structural obstacles such as institutional weaknesses and the sensitivity of local cultures. One of the main issues is the increasing pressure on marine resources as a result of population growth and economic activities, which drives up demand for food, energy, minerals, and marine-based recreational activities (Dwyer, 2018). The tourism industry also contributes to environmental degradation through plastic pollution, carbon emissions, and disruption of marine ecosystems, resulting in significant ecological impacts (Dube & Nhamo, 2020). In addition to ecological challenges, stagnation in innovation and the development of marine tourism products has become an obstacle to maintaining the competitiveness of destinations. The lack of diversification and renewal of tourism offerings has led to decreased consumer interest and hindered the sector's sustainable growth (Wang & Zhang, 2019). The ethical dilemmas arising from the behavior of tourists and stakeholders demand a collaborative approach between the government, the private sector, local communities, and the tourists themselves. Encouraging responsible tourism practices and increasing local community participation are strategic steps to overcome these challenges (Dar, 2024). In addition, the use of technology for resource management and carbon footprint monitoring has become a key element in ensuring environmental sustainability and social welfare (Chakraborty, 2024). Structural challenges such as limited infrastructure, lack of cross-sector coordination, and minimal private sector involvement also pose significant obstacles, as reflected in the case of marine tourism development in Sri Lanka (B.S *et al.*, 2024). Another issue that also poses a challenge is related to pollution, the decline in ecosystem health, and high operational costs, all of which further complicate sustainability efforts in the Gulf of California region and the Baja California Peninsula, Mexico (Cisneros-Montemayor *et al.*, 2020) Meanwhile, in the Andaman coastal region of Thailand, sustainability challenges are compounded by the need to integrate cultural values into destination development, particularly in serving the Muslim tourist segment. Strategies such as

providing halal services and environmentally friendly accommodations have become relevant solutions (Pongsakornrungsilp *et al.*, 2024).

Overall, these challenges underscore the need for a holistic and adaptive approach that encompasses strengthening infrastructure, product innovation, technology integration, and cultural sensitivity. Partnerships between the public and private sectors, along with inclusive and evidence-based policy support, are key to realizing marine tourism that is ecologically, economically, and socially sustainable.

Although the implementation of sustainable tourism in the marine tourism sector faces a variety of structural and ecological challenges, opportunities for its application remain open through strategic and collaborative approaches that integrate environmental, social, and economic dimensions in a balanced manner. The potential for implementing sustainable tourism in the marine tourism sector encompasses interrelated environmental, economic, and social dimensions. Some of the strategic opportunities include, among others:

a. Evaluation of Ecological Carrying Capacity

The determination of ecological carrying capacity is a fundamental step in maintaining the balance between tourism activities and environmental conservation. Studies conducted in the coastal area of Topejawa Village, South Sulawesi, indicate that setting a maximum limit on the number of visitors based on ecological carrying capacity can prevent environmental degradation and ensure the long-term sustainability of tourist destinations (Nurjayanti *et al.*, 2023). Such evaluations also serve as tools for spatial planning and for controlling the cumulative impacts of tourism activities.

b. Konservasi Keanekaragaman Hayati

Sustainable tourism has great potential to support biodiversity conservation through ecotourism-based approaches and the development of protected areas. The implementation of conservation programs integrated with tourism activities has been proven to increase the biodiversity index by up to 25% (Xing, 2024). This strategy not only protects species and habitats, but also enhances the educational and recreational value of marine tourism destinations.

c. Development of Tourism Based on Culture and Environment.

Tourists' preferences for experiences that align with their cultural values demand that tourism products be adapted with local sensitivity. Research in the Andaman coastal

region highlights the importance of providing environmentally friendly services and facilities that support religious practices, such as halal accommodations and prayer rooms, in order to enhance inclusivity and visitor satisfaction (Pongsakornrungsilp *et al.*, 2024). This approach also strengthens local identity and expands the tourism market segment.

d. Improvement of Environmentally Friendly Infrastructure

The development of infrastructure focused on energy efficiency and low-carbon technology is a key component in mitigating the environmental impact of the tourism sector. The implementation of green technology has proven capable of reducing the carbon footprint by up to 40%, while also enhancing the destination's image as a sustainable tourism area (Xing, 2024). Investment in this kind of infrastructure also contributes to climate change adaptation and the resilience of coastal ecosystems.

e. Involvement of Local Communities

Active community participation in the planning and decision-making processes of tourism is a prerequisite to ensuring the fair distribution of economic benefits and the preservation of cultural heritage. The involvement of local communities not only enhances the legitimacy of policies but also strengthens social capacity in maintaining the sustainability of destinations (Raveendran, 2024). This participatory model fosters a sense of ownership and collective responsibility for tourism resources.

f. Tourism Product Diversification

The development of innovative and diverse tourism products has become a key strategy in expanding a destination's appeal and reducing dependence on a single type of tourism activity. This diversification includes the development of educational tourism, adventure tourism, and community-based tourism, which simultaneously support the sustainable growth of the marine tourism industry. (Wang & Zhang, 2019).

g. Adoption of Sustainable Business Practices

The application of sustainability principles in destination management and tourism business operations has shown a positive impact on economic performance and company reputation. A study in Malaysia revealed that tour operators who adopt sustainable practices gain additional profits and increase customer satisfaction (Hamid *et al.*, 2020). This affirms that sustainability is not just an environmental responsibility, but also a competitive business strategy (Hamid *et al.*, 2020).

Overall, these opportunities form a strategic foundation for the sustainable development of marine tourism. An approach that integrates environmental conservation, social empowerment, and economic efficiency can generate long-term benefits aligned with the principles of sustainable development. Cross-sector collaboration and evidence-based policy support are key elements in realizing the transformation of the tourism sector toward an inclusive and resilient model.

3.3 Implementation of sustainable tourism in marine tourism

The application of sustainable development principles in the marine tourism sector requires a multidimensional approach that simultaneously integrates environmental conservation, economic growth, and social equity. This effort necessitates the formulation of comprehensive and adaptive strategies, as reflected in various findings and recommendations identified through relevant literature reviews.

The strategy for implementing sustainable tourism in marine tourism involves various approaches aimed at maintaining a balance between economic growth and marine environmental conservation. For example, research in Sri Lanka highlights strategies such as the development of public-private partnerships, the construction of industry infrastructure, sectoral collaboration, and the development of ports as solutions to address challenges in marine and coastal tourism. These approaches are expected to support the country's economic growth through the blue economy concept, which focuses on the sustainable use of marine resources (B.S *et al.*, 2024).

In addition, the importance of understanding Marine Cultural Heritage (MCH) is recognized as part of sustainable planning and development efforts in coastal areas. According to existing research, paying attention to the cultural aspects of human interaction with the sea can provide deeper insights for evidence-based decision-making in the marine and coastal sectors.(Henderson, 2019).

Other studies have shown how the implementation of efficient energy management practices and energy knowledge can contribute to the development of sustainable tourism, as demonstrated in a case study in Jerash, Jordan. These practices are mediated by top management's commitment, which highlights the importance of support

and involvement from organizational leaders in integrating sustainable practices into the tourism industry (Alhawamdeh *et al.*, 2023).

To achieve more sustainable marine tourism development, policies such as the introduction of marine tourism fees can be implemented. Studies conducted in Lombok and Weh Island in Indonesia support the idea that these fees can become a significant source of income to support marine conservation and incentives for coastal communities. This shows that marine tourism can be a more sustainable alternative economic activity compared to unsustainable fishing practices.(Booth *et al.*, 2022).

Overall, the strategy for implementing sustainable marine tourism includes strengthening local capacity through collaboration and engagement with the private sector, environmental conservation, as well as the development of environmentally friendly infrastructure and policies. Paying attention to cultural elements is also important to support sustainability efforts in coastal and marine areas. Sustainable marine tourism requires a strategic approach that balances environmental, social, and economic dimensions. In this context, several strategies have been identified as important instruments to support the transformation of the tourism sector toward a more responsible and sustainable model.

3.3.1 Community-based ecotourism development ecotourism

It is an approach that emphasizes environmental conservation and the empowerment of local communities. This strategy not only maintains ecological balance but also creates direct economic benefits for local communities (Tegar & Saut Gurning, 2018). For example, in Misool, Raja Ampat Islands, traditional practices such as *sasi laut* are used in coastal resource management, which have proven effective in preserving biodiversity and strengthening local values (Prasetyo *et al.*, 2019). In Pangandaran, West Java, the development of marine ecotourism is carried out through the use of information technology and local regulations to support sustainable practices (Nurhayati *et al.*, 2019). Meanwhile, in Malaysia, community involvement in the management of marine protected areas (MPAs) has become a key factor in the success of socially and ecologically sustainable ecotourism (Rahman *et al.*, 2021).

3.3.2 Implementation of blue economy principles blue economy

Offers a framework that emphasizes ocean-based economic growth while maintaining ecosystem integrity. In the context of tourism, this principle includes efficient resource use, waste reduction, promotion of renewable energy, and the implementation of environmentally friendly operational practices (Tegar & Saut Gurning, 2018). This approach enables the tourism sector to contribute to sustainable development without compromising the ecological functions of the sea. The application of blue economy principles in sustainable marine tourism emphasizes the efficient use of marine resources, waste reduction, and the use of renewable energy to support economic growth while maintaining ecosystem integrity. This strategy includes responsible environmental management, the adoption of low-carbon technology, and inclusive business practices that involve local communities. Examples of its implementation can be found in marine conservation areas and ecotourism destinations in Indonesia and Malaysia, where the blue economy approach has been proven to improve environmental performance while also strengthening the socio-economic well-being of coastal communities.

3.3.3 Community participation and cultural preservation

Active involvement of local communities in tourism planning and management is crucial to ensure a fair distribution of benefits and the preservation of cultural values. Integrating customs and local practices into tourism products can enhance visitor satisfaction while also strengthening the cultural identity of the destination (Pongsakornrungrungsilp *et al.*, 2024; Xing, 2024). Community participation and cultural preservation are key elements in sustainable marine tourism. The involvement of local communities in tourism planning and management ensures a fair distribution of economic benefits and strengthens cultural identity. Integrating local values, such as customs and religious practices, into tourism products enhances visitor satisfaction and expands market segments, while also maintaining the social and cultural sustainability of the destination. This strategy also fosters a sense of ownership and collective responsibility toward tourism resources.

3.3.4 Integrated environmental management

Effective environmental management is an essential component of sustainable marine tourism. This practice includes controlling the number of visitors, efficient waste management, and the protection of sensitive marine habitats (Dwyer, 2018; Xing, 2024). Thus, negative impacts on the ecosystem can be minimized, and the environmental carrying capacity can be maintained. This approach preserves the carrying capacity of the environment while also strengthening the image of the destination as a responsible tourist area.

3.3.5 Development of environmentally friendly infrastructure

Investment in sustainable infrastructure, such as accommodations based on renewable energy and low-carbon facilities, plays a crucial role in reducing the ecological footprint of tourism activities. The implementation of low-emission technologies, such as renewable energy systems, wastewater treatment, and green-standard building designs, not only supports the conservation of the marine environment but also strengthens the destination's image as a responsible tourism area. Studies show that sustainable infrastructure contributes significantly to tourist satisfaction and the competitiveness of destinations in the global market (Xing, 2024).

3.3.6 Sectoral collaboration and public-private partnerships

Synergy between the public and private sectors is needed to overcome infrastructure limitations and strengthen institutional capacity. This partnership can encourage innovation, investment efficiency, and the dissemination of best practices in marine tourism management. Collaboration between the government, private sector, academia, and civil society enables the integration of resources, expertise, and innovations in the planning and management of tourist destinations. This partnership plays a role in addressing infrastructure limitations, accelerating the adoption of environmentally friendly technologies, and improving investment efficiency. Studies in Sri Lanka show that a cross-sectoral collaborative approach can drive inclusive and

resilient marine tourism growth, especially through strengthening institutional capacity and evidence-based policy support (B.S *et al.*, 2024).

3.3.7 Sustainability-based certification and marketing

The implementation of certification systems for sustainable tourism practices can enhance the credibility and competitiveness of destinations. Marketing that highlights a commitment to sustainability can attract environmentally conscious tourist segments while also increasing tourism sector revenue. Environmental certification, such as eco-labels or sustainable tourism standards, serves as an indicator of credibility and commitment to environmentally, socially, and economically friendly practices. Destinations that obtain certification tend to be more trusted by tourists who have a preference for sustainability, thereby increasing the potential for visits and market loyalty. On the other hand, marketing strategies that emphasize sustainability credentials through narratives of conservation, local community engagement, and resource efficiency can expand the environmentally conscious tourist segment and drive economic growth without compromising marine ecosystems (Xing, 2024). Thus, certification and sustainable marketing not only serve as promotional tools, but also as instruments of transformation towards more adaptive and sustainable marine tourism.

Overall, these strategies form a comprehensive framework to support sustainable marine tourism. By integrating ecological, social, and economic aspects, as well as strengthening cross-sector collaboration and evidence-based policies, this sector can develop inclusively and resiliently, while also contributing to the preservation of the marine environment and the well-being of coastal communities.

4 CONCLUSION

Sustainable marine tourism faces complex challenges, including pressure on marine ecosystems, pollution, lack of innovation, as well as ethical, cultural, and institutional issues. To address these challenges, an integrated approach is needed, involving technology, institutional strengthening, and respect for local values. However, there are strategic opportunities such as assessing environmental carrying capacity,

biodiversity conservation, developing culture-based tourism, environmentally friendly infrastructure, and community involvement. Product diversification and sustainable business practices also support inclusive sector growth. The application of blue economy principles, community participation, integrated environmental management, and the development of eco-friendly infrastructure are key strategies. Cross-sector collaboration and evidence-based policies are crucial for the successful implementation of sustainable marine tourism that balances economic, social, and environmental aspects.

REFERENCES

- Alhawamdeh, H., Bani Ahmad, A. Y. A. B., Almasarweh, M. S., Al-Hamad, A. A.-S. A., Ayasrah, F. T. M., & Al-Saad, S. A. (2023). The Role of Energy Management Practices in Sustainable Tourism Development: A Case Study of Jerash, Jordan. *International Journal of Energy Economics and Policy*, 13(6), 321–333. <https://doi.org/10.32479/ijee.14724>
- Arya, V., Kokatnur, P., Agarwal, S., Auruskeviciene, V., Verma, R., & Kumar, H. (2024). Let us take a walk to the sustainable tourism practices: a qualitative study through the lens of tourism experts. *Environmental Science and Pollution Research*, 31(9), 12892–12915. <https://doi.org/10.1007/s11356-023-31503-7>
- Asrifan, A., Murni, M., Hermansyah, S., & Dewi, A. C. (2024). *Eco-Smart Cities* (pp. 267–296). Igi Global. <https://doi.org/10.4018/979-8-3693-6720-9.ch010>
- Aylward, B., Allen, K., Echeverr□A, J., & Tosi, J. (1996). Sustainable ecotourism in Costa Rica: the Monteverde Cloud Forest Preserve. *Biodiversity and Conservation*, 5(3), 315–343. <https://doi.org/10.1007/bf00051777>
- Booth, H., Mourato, S., & Milner-Gulland, E. J. (2022). Investigating acceptance of marine tourism levies, to cover the opportunity costs of conservation for coastal communities. *Ecological Economics*, 201, 107578. <https://doi.org/10.1016/j.ecolecon.2022.107578>
- Boukas, N., & Ziakas, V. (2013). A Chaos Theory Perspective of Destination Crisis and Sustainable Tourism Development in Islands: The Case of Cyprus. *Tourism Planning & Development*, 11(2), 191–209. <https://doi.org/10.1080/21568316.2013.864995>
- B.S, G., Wenchang, C., A, V., Mohammad, S. I. S., E.A, E., Hunitie, M. F. A., & Al-Daoud, K. I. (2024). Sustainable Marine and Coastal Tourism: A Catalyst for Blue Economic Expansion in Sri Lanka. *Journal of Ecohumanism*, 3(6), 1214–1228. <https://doi.org/10.62754/joe.v3i6.4098>

- Cars, M., & West, E. E. (2014). Education for sustainable society: attainments and good practices in Sweden during the United Nations Decade for Education for Sustainable Development (UNDESD). *Environment, Development and Sustainability*, 17(1), 1–21. <https://doi.org/10.1007/s10668-014-9537-6>
- Chakraborty, P. P. (2024). *The Role of Technology in Enhancing Sustainable Tourism Practices* (pp. 195–230). Igi Global. <https://doi.org/10.4018/979-8-3693-5903-7.ch011>
- Cisneros-Montemayor, A. M., Johnson, A. F., Haas, A. R., Salorio-Zuñiga, T., Townsel, A., Navarro-Holm, E. E., & Gonzales, C. M. (2020). Nature-based marine tourism in the Gulf of California and Baja California Peninsula: Economic benefits and key species. *Natural Resources Forum*, 44(2), 111–128. <https://doi.org/10.1111/1477-8947.12193>
- Dar, H. (2024). *Sustainable Measures Deterring Ethical and Decent Dilemmas in Tourism* (pp. 219–229). Igi Global. <https://doi.org/10.4018/979-8-3693-6260-0.ch016>
- Dos Santos, L. M. (2019). Recruitment and Retention of International School Teachers in Remote Archipelagic Countries: The Fiji Experience. *Education Sciences*, 9(2), 132. <https://doi.org/10.3390/educsci9020132>
- Dube, K., & Nhamo, G. (2020). Sustainable Development Goals localisation in the tourism sector: lessons from Grootbos Private Nature Reserve, South Africa. *GeoJournal*, 86(5), 2191–2208. <https://doi.org/10.1007/s10708-020-10182-8>
- Dwyer, L. (2018). Emerging Ocean Industries: Implications for Sustainable Tourism Development. *Tourism in Marine Environments*, 13(1), 25–40. <https://doi.org/10.3727/154427317x15018194204029>
- Gaonkar, S., & Sukthankar, S. V. (2025). Measuring and evaluating the influence of cultural sustainability indicators on sustainable cultural tourism development: Scale development and validation. *Heliyon*, 11(4), e42514. <https://doi.org/10.1016/j.heliyon.2025.e42514>
- García-García, A. R., Valdez-Del Río, S., Ochoa-Jiménez, S., & Jacobo-Hernández, C. A. (2023). Sustainable Development and Tourism: A Review of the Literature in WoS from 2001 to 2020. *Sustainability*, 15(24), 16805. <https://doi.org/10.3390/su152416805>
- Hamid, M. A., Isa, S. M., & Kiumarsi, S. (2020). Sustainable tourism practices and business performance from the tour operators' perspectives. *Anatolia*, 32(1), 23–32. <https://doi.org/10.1080/13032917.2020.1830135>

- Henderson, J. (2019). Oceans without History? Marine Cultural Heritage and the Sustainable Development Agenda. *Sustainability*, 11(18), 5080. <https://doi.org/10.3390/su11185080>
- Hill, H. (2008). Globalization, Inequality, and Local-level Dynamics: Indonesia and the Philippines*. *Asian Economic Policy Review*, 3(1), 42–61. <https://doi.org/10.1111/j.1748-3131.2008.00087.x>
- Jayawardena, C., Patterson, D. J., Brain, R., & Choi, C. (2008). Sustainable tourism development in Niagara. *International Journal of Contemporary Hospitality Management*, 20(3), 258–277. <https://doi.org/10.1108/09596110810866082>
- Khater, M., Ibrahim, O., Sayed, M. N. E., & Faik, M. (2024). Legal frameworks for sustainable tourism: balancing environmental conservation and economic development. *Current Issues in Tourism, ahead-of-print*(ahead-of-print), 1–22. <https://doi.org/10.1080/13683500.2024.2404181>
- Leposa, N. (2020). Problematic blue growth: a thematic synthesis of social sustainability problems related to growth in the marine and coastal tourism. *Sustainability Science*, 15(4), 1233–1244. <https://doi.org/10.1007/s11625-020-00796-9>
- Li, Q., Wang, X., Chen, Z., & Arif, M. (2024). Assessing the conjunction of environmental sustainability and tourism development along Chinese waterways. *Ecological Indicators*, 166, 112281. <https://doi.org/10.1016/j.ecolind.2024.112281>
- Marewa, Y. B., & Parinussa, E. M. (2020). PERLINDUNGAN PULAU-PULAU TERLUAR INDONESIA BERDASARKAN KONSEP NEGARA KEPULAUAN. *Paulus Law Journal*, 2(1), 1–14. <https://doi.org/10.51342/plj.v2i1.151>
- Mihalic, T. (2024). Metaversal sustainability: conceptualisation within the sustainable tourism paradigm. *Tourism Review*. <https://doi.org/10.1108/tr-09-2023-0609>
- Niavis, S., Psycharis, Y., Rodriguez, J., Martinez Codina, A., Font, X., & Papatheochari, T. (2019). Conceptualising Tourism Sustainability and Operationalising Its Assessment: Evidence from a Mediterranean Community of Projects. *Sustainability*, 11(15), 4042. <https://doi.org/10.3390/su11154042>
- Nikitas, A., Wallgren, P., & Rexfelt, O. (2016). The paradox of public acceptance of bike sharing in Gothenburg. *Proceedings of the Institution of Civil Engineers - Engineering Sustainability*, 169(3), 101–113. <https://doi.org/10.1680/jensu.14.00070>
- Nurhayati, A., Aisah, I., & Supriatna, A. K. (2019). Model Development of A Synergistic Sustainable Marine Ecotourism—A Case Study in Pangandaran Region, West Java Province, Indonesia. *Sustainability*, 11(12), 3418. <https://doi.org/10.3390/su11123418>

- Nurjayanti, N., Hatta, M., & Tuwo, A. (2023). Evaluating Coastal Area Suitability and Ecological Carrying Capacity in Topejawa Village, South Sulawesi. *IOP Conference Series: Earth and Environmental Science*, 1272(1), 012034. <https://doi.org/10.1088/1755-1315/1272/1/012034>
- Pongsakornrungsilp, S., Chansamran, S., Niyomdecha, H., Pongsakornrungsilp, P., Chouykaew, T., & He, Y. (2024). Integrating Sustainability and Cultural Sensitivity: Clustering Muslim Tourist Lifestyles in the Andaman Coastal Cluster, Thailand. *Sustainability*, 16(21), 9542. <https://doi.org/10.3390/su16219542>
- Prasetyo, N., Carr, A., & Filep, S. (2019). Indigenous Knowledge in Marine Ecotourism Development: The Case of Sasi Laut, Misool, Indonesia. *Tourism Planning & Development*, 17(1), 46–61. <https://doi.org/10.1080/21568316.2019.1604424>
- Punzo, G., Trunfio, M., Castellano, R., & Buonocore, M. (2022). A Multi-modelling Approach for Assessing Sustainable Tourism. *Social Indicators Research*, 163(3), 1399–1443. <https://doi.org/10.1007/s11205-022-02943-4>
- Rahman, M. K., Akhtar, R., Masud, M. M., & Hossain, M. M. (2021). Impact of community participation on sustainable development of marine protected areas: Assessment of ecotourism development. *International Journal of Tourism Research*, 24(1), 33–43. <https://doi.org/10.1002/jtr.2480>
- Raveendran, N. (2024). Promoting Responsible Tourism: Assessing Sustainable Practices, Community Engagement, and Environmental Conservation for Balancing Economic Growth and Ecological Preservation in Global Travel Destinations. *International Journal for Multidimensional Research Perspectives*, 2(10), 30–44. <https://doi.org/10.61877/ijmrp.v2i10.206>
- Singh, A., & T Easow, D. D. (2023). Systematic review on the Benefits and Challenges of Maritime Tourism. *Journal of Advanced Zoology*, 44(3), 725–745. <https://doi.org/10.17762/jaz.v44i3.860>
- Stem, C. J., Lassoie, J. P., Lee, D. R., Deshler, D. D., & Schelhas, J. W. (2003). Community Participation in Ecotourism Benefits: The Link to Conservation Practices and Perspectives. *Society & Natural Resources*, 16(5), 387–413. <https://doi.org/10.1080/08941920309177>
- Stem, C. J., Lassoie, J. P., Lee, D. R., & Deshler, D. J. (2003). How “Eco” is Ecotourism? A Comparative Case Study of Ecotourism in Costa Rica. *Journal of Sustainable Tourism*, 11(4), 322–347. <https://doi.org/10.1080/09669580308667210>
- Su, M. M., Wall, G., & Xu, K. (2015). Heritage tourism and livelihood sustainability of a resettled rural community: Mount Sanqingshan World Heritage Site, China. *Journal of Sustainable Tourism*, 24(5), 735–757. <https://doi.org/10.1080/09669582.2015.1085868>

- Tafese, M. B., & Kopp, E. (2025). Education for sustainable development: analyzing research trends in higher education for sustainable development goals through bibliometric analysis. *Discover Sustainability*, 6(1). <https://doi.org/10.1007/s43621-024-00711-7>
- Tegar, D., & Saut Gurning, R. O. (2018). Development of Marine and Coastal Tourism Based on Blue Economy. *International Journal of Marine Engineering Innovation and Research*, 2(2). <https://doi.org/10.12962/j25481479.v2i2.3650>
- Valverde Sanchez, R. (2018). Conservation Strategies, Protected Areas, and Ecotourism in Costa Rica. *Journal of Park and Recreation Administration*, 36(3), 115–128. <https://doi.org/10.18666/jpra-2018-v36-i3-8355>
- Viana, D. F., Halpern, B. S., & Gaines, S. D. (2017). Accounting for tourism benefits in marine reserve design. *PLoS ONE*, 12(12), e0190187. <https://doi.org/10.1371/journal.pone.0190187>
- Von Schuckmann, K., Cheng, L., Jansen, E., Hodges, K., Pisano, A., Drevillon, M., Juza, M., De Toma, V., Jandt-Scheelke, S., Morrison, H., Ciani, D., Thual, S., Cancet, M., Stoffelen, A., Panteleit, T. R., Moreira, L., Baker, J., Castrillo, L., Bricaud, C., ... Van Gennip, S. (2024). The state of the global ocean. *State of the Planet*, 4-osr8, 1–30. <https://doi.org/10.5194/sp-4-osr8-1-2024>
- Wang, L., & Zhang, H. (2019). The Impact of Marine Tourism Resources Development on Sustainable Development of Marine Economy. *Journal of Coastal Research*, 94(sp1), 589. <https://doi.org/10.2112/si94-117.1>
- Wu, H., Chen, M., Xu, Y., Zeng, Q., Jefferson, T. A., Yu, X., Wang, X., Peng, C., Huang, H., & Huang, S.-L. (2020). Dolphin-watching tourism and indo-Pacific humpback dolphins (*Sousa chinensis*) in Sanniang Bay, China: impacts and solutions. *European Journal of Wildlife Research*, 66(1). <https://doi.org/10.1007/s10344-019-1355-6>
- Xing, W. (2024). Sustainable tourism: Pathways to environmental preservation, economic growth, and social equity. *Applied and Computational Engineering*, 66(1), 166–171. <https://doi.org/10.54254/2755-2721/66/20240943>
- Zambrano, A. M. A., Broadbent, E. N., & Durham, W. H. (2010). Social and environmental effects of ecotourism in the Osa Peninsula of Costa Rica: the Lapa Rios case. *Journal of Ecotourism*, 9(1), 62–83. <https://doi.org/10.1080/14724040902953076>