



## Strategy for utilizing local wisdom in the development of Blue Economy in marine ecotourism on Gili Genting Island, Sumenep Regency

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### A B S T R A C T

The purpose of this study was to analyze and identify how the strategy of utilizing local wisdom in the development of blue economy in marine ecotourism on Gili Genting Island, Sumenep Regency. This research uses descriptive qualitative methods by prioritizing the meaning and actions of the experiences of a group of people and social behavior. Data collection techniques by conducting observations, interviews, and browsing documentation. Key informants namely, the Sumenep Regency Youth Culture and Sports Tourism Office, related village governments, private parties, PokDarwis, and Gili Genting Island community leaders. The data analysis technique uses four steps from Creswell, namely data collection, data reduction, data presentation and conclusion drawing. Based on the previous data collection, the data from interviews, field observations, and documentation review were then compared and compiled to obtain synthesis results between the three and presented thematically. The results show that zero waste management and waste management efforts have been made, however, challenges such as seawater intrusion, plastic waste, coral reef damage, and lack of community involvement still exist. Community empowerment, preservation of local wisdom, and government support are important to create inclusive and sustainable tourism. Marine ecotourism has the potential to improve the local economy through employment and infrastructure investment, with innovation, climate change adaptation, and cooperation between stakeholders, Gili Genting can become a sustainable ecotourism destination that preserves the environment and community welfare.

### INTRODUCTION

Blue Economy is interpreted as an idea or policy model oriented towards balancing the utilization and preservation of marine resources so that their availability can be obtained continuously. The blue economy policy is internalized as a policy model directed at building a marine economy, it is evidenced in Law No. 32 of 2014, which states that the central government and local governments exercise their authority to carry out marine management through the blue economy policy model, which is projected to bring benefits to together (Polanunu & Kusumaningrum, 2022).

Sumenep district is a unique area, consisting of a land area with 125 islands, the number of inhabited islands is 48 islands or 38%, while uninhabited islands are 77 islands or 62%. The Sumenep District Government is starting to realize its ecotourism potential, although it is still slow and not optimal in carrying out development in the tourism sector (Musleh, 2023). Marine Ecotourism in Sumenep District is very promising, considering the natural conditions and topography of the beautiful and natural beaches, which have the potential to implement Blue Economy-based Marine Ecotourism development (Musleh, Subianto, & Prasita, 2023).

In realizing the blue economy on Gili Genting Island, Sumenep Regency, what must be done is to protect and preserve the coastal and marine environment, this relates to aspects of local, social and economic wisdom on sustainable environmental protection (Irman & Akbar, 2021). Gili Genting Island has marine ecotourism potential that can be a major resource for sustainable tourism development (D'hautesserre, 2016). The uniqueness of biodiversity, the beauty of the natural landscape, and the sustainability of local culture are the main attractions for tourists seeking a unique nature experience (Rahadian, 2016). Local

economic development can also be realized through the development of marine ecotourism, helping to reduce poverty levels and improve the welfare of local communities (Rahim et al., 2014).

However, marine ecotourism on Gili Genting Island is also faced with a number of problems that need to be managed carefully. Increased tourist visits can cause environmental damage, especially if not managed properly (Baloch et al., 2023; Suhardono et al., 2023), such as damaging coral reefs and marine ecosystems (Rahardjanto et al., 2019). Over-tourism is becoming a serious problem, putting excessive pressure on local infrastructure, environment and culture (Butler & Dodds, 2022). The vulnerability of Gili Genting island to climate change may also threaten the sustainability of ecotourism (Jamaliah & Powell, 2018, 2019; Mkiramweni et al., 2016). In addition, conflicts with conservation efforts and over-reliance on ecotourism may pose long-term problems (Aseres & Sira, 2021; De Zoysa, 2022; KC et al., 2022). Preservation and environmental protection of coastal and marine areas must be carried out in Gili Genting Island marine ecotourism, especially in areas that have suffered a lot of damage.

In addressing this challenge, a good governance approach is needed, involving active participation from various parties including the government, local communities, the private sector, and NGOs (Musleh, Subianto, & Prasita, 2023; M. H. Tamrin & Lubis, 2023). Long-term sustainability should be the main focus, by ensuring that ecotourism provides equitable benefits to local communities, protects the environment, and promotes sustainable economic prosperity (Eshun & Tichaawa, 2020; Mnisi & Ramoroka, 2020; Salman & Mohamad, 2020).

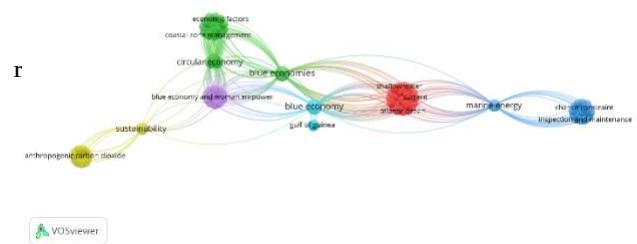
Sustainable tourism can only be achieved if it consistently pays attention to environmental conservation and requires cross-

sector collaboration in its management (Musleh, Subianto, Tamrin, et al., 2023; Yesayabela et al., 2023). The study of collaborative governance is very important in the context of marine ecotourism destination governance, especially on small islands that strive towards sustainable tourism (Bichler & Losch, 2019; Islam et al., 2018; Mulyani et al., 2021). Involving key stakeholders such as government, local communities, private sector, and non-governmental organizations (Barandiarán et al., 2019), where collaborative governance increases participation, efficiency, and effectiveness of decision-making (Ansell & Gash, 2008; Mulyani et al., 2021). With a focus on environmental and social sustainability, collaborative governance supports the preservation of natural resources, local culture, and community empowerment (B et al., 2022; Ika Nur Afni, 2022). In addition, this approach promotes destination resilience to change and stimulates innovation to address complex challenges in the tourism industry (Nugroho & Sari, 2023).

Previous studies have shown that the collaborative governance framework can be a good alternative for developing marine ecotourism in realizing Blue Economy development in Small Islands (Adshead, 2017; Dickson et al., 2018). collaborative governance from experts provides diverse views on managing cooperation in various contexts. Ansell and Gash(2008) bring a theory of collaborative governance that considers institutions, participation, dialog, and trust as key elements. Peters and Pierre's concept of multi-level governance highlights the role of different levels of government in collaborative decision-making Kirk Emerson, Tina Nabatchi, Stephen Balogh(2012), identify six important elements in the establishment and management of collaborative governance regimes, including capacity, commitment, and conflict. John M Bryson, Barbara C Crosby, Melissa Middleton Stone(2015) , developed a framework with eight key elements, including shared vision, leadership, and evaluation, to achieve collaborative success.

To comprehensively understand and identify research trends and gaps, the authors used VOSviewer in bibliometric analysis, to produce a Graphical Map that aims to map research networks related to the Blue Economy, marine ecotourism, and local wisdom based on the Scopus database, thus providing a visual overview of research developments, under-explored topics, and potential cross-disciplinary collaborations. This analysis can reveal the extent to which previous research has addressed similar issues and where novel contributions of this research can be identified, especially in a specific local context such as Gili Genting.

This research explores clusters using VOSViewer's Co-occurrence relationship feature with keywords for clustering concepts regarding Blue Economy Development. The Scopus database lists 1374 keywords with a total of Six occurrences. We created a conceptual map using 112 of the 1374 keywords that met the threshold (Figure 1). Concept items that frequently co-occur in a single publication will appear close together in the concept map, while less related terms are located far apart. The greater the magnitude of a concept item means the more often the concept is used by researchers.



Literature related to the utilization of local wisdom for Blue Economy development, especially in the context of marine ecotourism in archipelagic areas such as Gili Genting Island. Although the concepts of Blue Economy and sustainability have been widely discussed, the integration between local wisdom, environmental management, and social inclusiveness in a specific context such as Gili Genting is still limited. The novelty of this research lies in the holistic approach that combines ecological, economic, and socio-cultural aspects, as well as the identification of specific challenges such as seawater intrusion, coral reef damage, and limited community participation.

The Blue Economy approach is an ecosystem-based management to fully utilize well-managed marine resources to carry out cross-sectoral cooperation with government, community and private collaboration or often known as collaborative governance which will provide benefits for regional economic income (Praptiwi et al., 2021; Y. A. Wahyuddin et al., 2022). The Blue Economy can create great opportunities to overcome problems in coastal areas by overcoming the challenges they pose. Blue Economy is a sustainable development concept that focuses on the utilization of marine and ocean resources to support economic growth, food security, and community welfare, taking into the sustainability of marine ecosystems (Lee et al., 2020; Voyer et al., 2018).

The concept involves the wise utilization of marine resources to generate economic benefits without damaging or compromising the marine environment. Blue Economy emphasizes integration between economic sectors, especially tourism, by optimally utilizing marine resources and maintaining the preservation of coastal and marine areas in order to create sustainable development (Thorburn, E., Milne, S., & Deuchar, 2021), using the main principles of Gunter Pauli's thinking(2010) related to the Blue Economy concept: 1) Resource efficiency; 2) Zero waste; 3) Social inclusion; 4). Social equality and employment opportunities for the poor; 5) Innovation and adaptation and economic multiplier effects.

## METHOD

This research uses a qualitative approach with a case study method to understand the strategy of utilizing local wisdom in the development of the Blue Economy in marine ecotourism on Gili Genting Island, Sumenep Regency. This approach was chosen because it allows in-depth exploration of local wisdom-based practices, values and policies that have the potential to be developed into an island marine ecotourism attraction that supports a sustainable blue economy. This research was conducted at the Sumenep District Culture, Youth, Sports and Tourism Office and at marine ecotourism objects located on Gili Genting Island in Sumenep District.

The instruments used in this research include semi-structured interview guides, observation sheets, and documentation. The selection of informants was carried out by purposive sampling, namely selecting individuals who have direct involvement with the research topic. The main informants are the Head of the Sumenep Regency Youth Culture, Sports and Tourism Office, the Head of Bringsang Village, the Head of the Bringsang Village Tourism Awareness Group, community leaders around ecotourism, private parties who contribute to the management of Gili Genting Island Maritime Ecotourism.

This research uses two main types of data, primary data and secondary data. Primary data collection techniques used interviews, observations, and interactions with stakeholders involved in marine ecotourism and Blue Economy on Gili Genting Island. Secondary data collection techniques are obtained from documented sources such as local government policies, village regulations, research reports, academic journals, and documents related to local wisdom-based ecotourism management (Creswell, 2014).

The data analysis technique based on Miles et al., (2014) describes 4 lines of thought, namely: a) data collection, the results of interviews, observations, and various documents based on categorization in accordance with the research problem which is then developed data sharpening through further data search; b) data reduction, as a form of analysis that sharpens, classifies, directs, discards unnecessary data and organizes data so that final conclusions can be drawn and verified; c) Data display, in the form of sentence narratives, pictures / schemes, networks and tables as the narrative; d) Data display, in the form of sentence narratives, pictures / schemes, networks and tables as the narrative; c) Data display, in the form of narratives. Conclusions, researchers organize records, patterns, statements, configurations, causal directions, and various propositions (Figure 2).



Figure 2. Research flow chart

Source: Processed by researchers, (2025)

## RESULTS AND DISCUSSION

### Overview of the Research Location

In the process of realizing the vision and mission of the Sumenep District Culture, Sports and Tourism Office realizes that in implementing the development of an area, especially tourism, it cannot do it alone, it needs cooperation from all parties such as the private sector and the community (Rafani et al., 2024). Collaboration is one way that the Sumenep District Culture,

Youth, Sports and Tourism Office can improve development effectiveness by actively involving the private sector and the community in the decision-making process and the entire cycle of activities, so that the best formulation of how to manage natural resources can be obtained (Diamond et al., 2024; Musleh, Subianto, Tamrin, et al., 2023). This is as explained by Mohammad Iksan as the Head of the Sumenep District Culture, Sports and Tourism Office, Iksan said that the Sumenep Disbudporapar realized the limitations in carrying out development only carried out by the district government alone, because Disbudporapar manages many tourist destinations in Sumenep, so it needs resource assistance from the community around tourist destinations, the private sector, academics, and the media to promote (M. H. Tamrin et al., 2024).

Tourism is the flagship of development in Sumenep District, in 2017 Sumenep District was designated as one of the national tourism development areas (Musleh & Rosa, 2024), the entry of Sumenep District into a national tourism development area because it is seen from the potential of existing tourist destinations and the persistence of the Sumenep District Government in carrying out various tourism developments (Musleh, Subianto, & Prasita, 2023). It is proven that in the last 6 years from 2017 to 2019 tourist interest in visiting Sumenep Regency has continued to increase, but in 2020 tourist visits decreased dramatically due to the impact of the Covid-19 pandemic worldwide which caused many tourist attractions to be closed, but in 2021 to 2023 tourist visits continued to increase, as seen in Figure 3:



Figure. 3 Tourist Visit Data 2017-2023

Source: DISBUDPORAPAR Sumenep Regency, 2024

Based on Figure 3, it shows that domestic tourist visits in Sumenep Regency from 2017-2018 increased by 23%, 2018-2019 increased by 16%, while 2019-2020 experienced a decrease in tourist visits by -86%, in 2020-2021 domestic tourist visits increased again by 19%, and in 2021-2022 domestic tourist visits increased by 77%. In 2022-2023, domestic tourist visits increased again by 24%. Furthermore, foreign tourist visits in Sumenep Regency from 2015-2016 experienced a very large increase of 219%, this also happened in 2016-2017 which increased by 203%, but in 2017-2018 foreign tourist visits decreased by -33%, 2018-2019 also experienced a decrease of -40%, 2019-2020 further decreased by -96% and the peak of the decline was in 2020-2021 by -100% due to the impact of the covid-19 pandemic which required several tourist attractions in the Sumenep district to be temporarily closed. However, in 2021-2022 foreign tourist visits increased again by 21%, and continued to increase in 2022-2023 by 95%.

The continued increase in tourist visits in Sumenep Regency is because Sumenep Regency has many potential tourist

attraction destinations that are diverse, recorded in 2023 there are 34 tourist objects in Sumenep Regency consisting of various tourist categories such as island tourism, natural tourism, artificial tourism, marine tourism, culinary tourism, historical tourism, and religious tourism. Data on tourist attractions and visits in Sumenep district in 2023 can be seen in table 1:

Table 1. Visitors to Tourist Attractions in Sumenep Regency, 2023

No	Obyek Wisata	Wisatawan Mancanegara	Wisatawan Nusantara
1	Asta Gumuk	2	1.393
2	Asta Jokotole	0	29.950
3	Asta K. Faqih	0	7.079
4	Asta Katandur	0	5.873
5	Asta Panaongan	0	180.369
6	Asta Sayid Yusuf	0	159.196
7	Gili Iyang	72	8.547
8	Gili Labak	0	15.086
9	Makam Asta Tinggi	0	133.468
10	Masjid Jamik Sumenep	0	145.423
11	Museum Dan Keraton	369	25.850
12	Sembilan Beach	0	4.734
13	Badur Beach	0	9.529
14	Lombang Beach	1	26.202
15	Slopeng BEACH	0	17.404
16	Kasur Pasir Village	0	1.011
17	Benteng Site	0	1.282
18	Batugong Site	0	402
19	Bukit Tinggi Tourism	0	0
20	Tectona Park	0	5.780
21	Mutiara Tirta	0	73.331
22	Tirta Sumekar Indah	0	17.506
23	Bukit Kapur Tourism	0	393
24	Water Park Sumekar	0	6.669
25	Yellow Cave	0	787
26	Soekarno Cave	0	1.217
27	E Kasoghi Cave	0	24.966
28	Kedatim Mangrove	0	31.562
29	Tawap Hill Tourism	0	14.758
30	Aengtongtong Tourism	0	126
31	Semaan Tourist Village	0	719
32	Sun Beach	0	59.592
33	Aeng Somber Raje Ganding	0	10.793
34	Aeng Benger Source	0	20.070
35	Jokotole Paralayang	0	1.653
36	Event	0	346.202
Total		444	1.388.922

Source: DISBUDPORAPAR Sumenep District, 2024

Based on table 1, it shows that the lowest number of tourist visits is in Bukit Tinggi tourist attraction due to the impact of the Covid-19 pandemic which requires Bukit Tinggi tourism to be temporarily closed, while the largest number of tourist visits is in event activities carried out in the Sumenep Regency by 25% of the total number of tourist visits in 2023, while the number of tourist visits on the beach of nine Gili Genteng Islands is 0.3% of the total number of tourist visits in 2023 in the Sumenep Regency.

Gili Genteng Island Marine Ecotourism is included in the local government policy contained in the 2018-2025 Sumenep Regency Tourism Development Master Plan (RIPPARKAB), which explains that Gili Genteng Island is a leading destination for natural tourism in Sumenep Regency and a top priority in terms of tourism development (Jannah, 2018; M. H. Tamrin et al., 2024).

## Dynamics of Marine Ecotourism Management on Gili Genting Island

Gili Genteng Island is a small island located in the southeast of Madura Island. Administratively, the location of this island is included in Gili Genteng Sub-district, Sumenep District. Gili Genteng Island has an area of 30.32 km<sup>2</sup> and is divided into 4 (four) villages including Galis Village, Gedugan Village, Bringsang Village, Aenganyar Village. The population of Gili Genteng is recorded at 12,760 people with a population density of 670.06 people/km. The majority of Gili Genteng residents work as builders and some work as fishermen, farmers and migrants (Jannah & Idajati, 2018). Gili Genteng Island has sufficient facilities and infrastructure for the local community such as diesel electricity, Bringsang Village Government office, school buildings from elementary to junior high school, Puskesmas and Polindes. To get to Gili Genteng Island, tourists can park a motorcycle at one of the residents' houses for IDR 10,000, and park a car for IDR 20,000. The travel time needed during the crossing from Tanjung Harbor to Bringsang Harbor is 30-45 minutes using a motorboat with a tariff of IDR 15,000 per person or IDR 1,500,000 per boat. This crossing boat is available every day starting at 07.00 WIB until 16.00 WIB (Rina et al., 2021; M. H. Tamrin et al., 2024), the following can be seen in Figure 4 map of Gili Genteng Island:

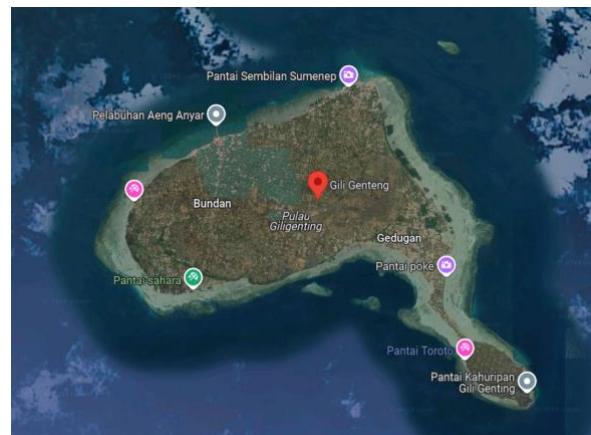


Figure 4. Map of Gili Genteng Island Area  
Source: Google.com, (2024)

Beach Nine is a tourist destination located in Bringsang Village, Gili Genteng Island, Sumenep Regency with an area of 30.318876 km<sup>2</sup>. Pantai Sembilan is one of the attractions that became the icon of Gili Genteng Island with beautiful natural charms such as white sand, sea clarity for water sports and twilight paronamas in the afternoon. Beach nine is approximately 5 minutes from Tanjung Gili Genteng Harbor. The entrance ticket price to Pantai Sembilan is IDR 15,000 per person. The operating hours of Pantai Sembilan are open for 24 hours. In order to maintain the progress of the ecotourism area and the order of life of the Gili Genteng community, the majority of whose population is Muslim, Pantai Sembilan has several unwritten special rules such as not allowing the circulation of alcohol and clothing that is too vulgar (Wicaksono et al., 2019).

Pantai Sembilan is an iconic tourist destination on Gili Genteng Island. In the past, Pantai Sembilan was a small harbor where boats docked or in Madurese called "Tangkek" which was used to connect Gili Genteng Island with other islands. Initially, Pantai Sembilan was named Bringsang Beach because it was only intended for local tourism which included the people of Gili Genteng Island.

In 2015, a natural phenomenon occurred that formed a beach sand dune resembling the number 9 (nine) which was immortalized from an aerial perspective using a drone. With this natural phenomenon, many tourists come to watch it directly so that it becomes its own attraction. In 2017-2018, Pantai Sembilan received such rapid enthusiasm from tourists that at that time the Head of Bringsang Village, BUMDES and the Bringsang Village community began to coordinate the development of beach facilities by providing sea transportation (boats), semi-permanent stalls, homestays, prayer rooms and gazebos for visitors' needs. However, during the Covid-19 Pandemic, Pantai Sembilan experienced a drastic decline in both facilities and the number of tourists. In 2022 to 2024, tourist visits to Gili Genting Island, especially Pantai Sembilan, increased again.

Based on field searches and interviews with the Head of BUMDes Bringsang, Ari, until now Pantai Sembilan still does not have a license from either the Regency or Provincial Government. In addition, the Bringsang Village Government also does not yet have a Village Regulation that forms the basis for regulation of the management of Pantai Sembilan. Juridically, the management of village assets is regulated in the Minister of Home Affairs Regulation Number 1 of 2016 Article 1 Point 5 'is village property or originating from original village assets, purchased or obtained at the expense of the Village Revenue and Expenditure Budget (APBDesa) or acquisition of other legal rights'. Based on the Minister of Home Affairs Regulation, it can be seen that village assets are pure village ownership managed by BUMDes and determined by Village Regulations.

This is in line with [Kartikasari et al., \(2023\)](#) which states that the empowerment of BUMDes managed by the Village Government can be formed from the utilization of village assets with the aim of increasing village income. By utilizing BUMDes properly, the Natural Resources and Human Resources of the Village can be optimized according to the characteristics and needs of the community so that they are able to coexist and be sustainable ([Destemi Elsi & Bafadhal, 2019](#)). The purpose of the establishment of BUMDes in accordance with Law Number 6 of 2014 in [Setyobakti\(2017\)](#) is to strengthen the village economy by carrying out activities oriented to the potential owned by the village in order to improve the welfare of the village community.

## The main principles of Blue Economy development in marine ecotourism on Gili Genting Island, Sumenep Regency

### 1. Nature's efficiency (Resource Efficiency)

Nature's Efficiency is a concept that refers to the way nature works efficiently in using energy and resources without producing excessive waste or damaging its ecosystem. In nature, each element has an interrelated role and function, creating a continuous cycle where all materials are processed and reused in an optimal way ([Pauli, 2010](#)). Nature's Efficiency principles are often applied in the context of sustainability and the management of human, technological and economic resources to mimic this natural efficiency. The goal is to create systems that do not waste energy, minimize environmental impacts, and maintain the long-term balance of ecosystems.

The application of the principle of Resource Efficiency in marine ecotourism on Gili Genting Island can involve various approaches that maximize the use of natural resources with the least possible environmental impact. Based on the results of field observations, it shows that the application of the principle of

Resource Efficiency has been implemented even though it is not optimal, sustainable use of resources such as the use of energy and renewable resources, similar to how natural ecosystems utilize energy efficiently without wasting it. The use of solar panels on Gili Genting Island to meet electrical energy needs, replacing dependence on polluting fossil fuels, is not just a dream, because currently on Gili Genting Island utilizes diesel power and solar power for electricity needs for the community.

Gili Genting Island has been served by PLN as a power plant since 2015. Electricity on this island has been lit for 24 hours, meanwhile, for lighting at the Pantai Sembilan marine ecotourism object in Bringsang Village using assistance from Diesel Power Plants (PLTD) and Solar Power Plants (PLTS) ([Sumenep, 2022](#)). This is because the use of electricity in Bringsang Village is very high in cost, especially for lighting and water pumps. Whereas this area really needs lighting, especially at night. So that other power plants are needed as alternative sources of electricity on this island, such as PLTD and PLTS. The PLTS itself is a grant from PENS (Politeknik Negeri Surabaya) in 2018 which was installed in the marine ecotourism area of Pantai Sembilan, Bringsang Village, Gili Genting Island. The installation of PLTS consists of several tools installed in the tourist area including solar cells, batteries, solar inverters, LED lights and spotlights, power meters, PLTS sets, and monitoring sets ([Jannah, 2018](#)). With this PLTS assistance, it is very helpful to meet electricity needs up to 75%, as shown in Figure 5 below:

Figure 5. Electricity network on Gili Genting Island using PLTS

Source: Processed by Researchers (2024)

Furthermore, in early 2022, there was a Central Government Program or Policy to develop renewable energy sources, especially for Power Plants that have been using Solar Fuel. And efforts to develop the Power Plant with renewable energy, by utilizing Solar Energy or known as PLTS. As part of the Renewable Energy Development Program, Gili Genting Island also received the PLTS Development Program which is scheduled to be realized in 2022 to 2023. The program is expected to facilitate the community's need for electricity during the day which is increasing, in line with the economic improvement of the local community, with the existence of PLTS on Gili Genting Island, the local community to compactly install solar panels to meet the electricity needs of inns, restaurants, and public facilities, replacing fossil energy that produces high carbon emissions, especially in supporting marine ecotourism activities on Gili Genting Island.

Pantai Sembilan on Gili Genting Island has great potential as a marine ecotourism destination, to support the principle of sustainability, the development of renewable energy using windmills is a strategic solution to provide environmentally

friendly energy for this tourist area. The utilization of wind energy is expected to reduce the carbon footprint and strengthen the image of the area as a green tourist destination. Gili Genting Island also has geographical advantages with consistent sea breezes throughout the year. This condition strongly supports the implementation of windmills as the main energy source. This project can increase public and tourist awareness about the importance of renewable energy, in addition to the objectives of utilizing windmills, namely: 1) Reduce dependence on fossil fuels; 2) Provide a clean energy source for ecotourism operations; 3) Support the concept of sustainable and environmentally friendly tourism; 4) Increase tourist attractiveness with green technology innovation; 5) Provide education and inspiration to the community about the use of renewable energy; 6) Open local jobs in the field of renewable energy and technology maintenance.

One important aspect that supports the sustainability of this area is effective and environmentally friendly clean water management. This management includes various strategies ranging from supply sources, distribution systems, to water use efficiency to support tourism activities and the needs of local communities. For clean water on Gili Genting Island is the same as other small islands, where the availability of fresh water is an important thing that can support community life. Gili Genting Island uses wells as a source of fresh water with a depth of about 10-15 meters. There are as many as 4 source points that are used to meet the needs of clean water on this island. During the rainy season the water supply is abundant, but during the dry season the wells are dry. To overcome this, the community takes fresh water from the mainland of Sumenep. Meanwhile, water reservoirs and water pumps are available at tourist attractions to serve the needs of tourists.

Clean water management in Pantai Sembilan, Gili Genting, demonstrates a strong commitment to the principles of resource efficiency and environmental conservation. Through a combination of simple technology, community empowerment and tourist engagement, the area has managed to maintain the availability of clean water to support sustainable tourism. Further innovation and investment in desalination and filtration technologies are expected to strengthen water security in the region.

The Communication Forum of Indonesian Conservation Cadres (FK3I) Korlap Sumenep District together with residents of Dadap Hamlet, Bringsang Village, Gili Genting Island, Sumenep District, work together to plant mangroves. This activity is carried out to prevent abrasion. Fadel Abu Aufa, chairman of the FK3I Korlap Sumenep District, has sent 3,500 mangrove seeds in the first phase, immediately following the delivery of the second phase of 3,500 mangrove seeds, so that a total of 7,000 mangrove seeds will be distributed to four villages in the Giligenting Islands, *rhizophora stylosa* or *tenjang* mangrove seeds. A thousand mangrove seedlings were planted on Gili Genting Island with local residents. This was also part of the sixth Mangrove Festival. Not only did they carry out mangrove planting activities, but the Forum Communication of Indonesian Conservation Cadres Sumenep District also provided education to local communities regarding the correct procedures for planting mangroves and their maintenance. FK3I's next effort is to monitor the location of mangrove seedlings in four villages in Gili Genting, so that in the future mangrove seedlings can grow well and be safe from waves (Table 2).

**Table 2. Application of Nature's efficiency principles in marine ecotourism on Gili Genting Island**

No	Program	Implementation
1	Renewable Energy Utilization	a) Solar Power Plant (PLTS) b) Windmill power plant
2	Effective and environmentally friendly clean water management	a) Bore Wells and Groundwater b) Rainwater Harvesting c) Water Transportation from Mainland
3	Environmental preservation	a) Mangrove seedling planting b) Education to local community

Source: Processed by Researcher, 2025

## 2. Zero Waste and Cyclic System of Production

The principle of Zero Waste and Cyclic System of Production is a resource management concept that aims to minimize waste and optimize the use of materials, so that no waste ends up in landfills. The main idea of Zero Waste is to create a system where all resources can be reused, recycled, or composted, thus reducing the need to dispose of waste and reducing pollution (Budiyanto, 2022; Fahrurrozi, 2020).

The application of the Zero Waste concept in marine ecotourism on Gili Genting Island can be an important step to maintain natural beauty and environmental sustainability. Gili Genting, as a marine ecotourism destination, has a sensitive ecosystem, especially to waste generated by tourist activities. By applying the Zero Waste principle, waste management can be more structured and environmental impacts can be minimized.

Pantai Sembilan tourist attraction has an unwritten rule that no garbage should be circulated in the beach area. Former Bringsang Village Head Sutlan, as the initiator of the development of marine ecotourism at Pantai Sembilan, revealed that his party will continue to develop the Pantai Sembilan marine ecotourism object through cooperation with various parties, including BUMDes, to improve facilities and better management. Thus, waste management in Pantai Sembilan marine ecotourism requires cooperation between managers, local communities and local governments to create a clean, comfortable and sustainable tourist environment. On the other hand, Muzakki said the village still has limitations to provide a proper waste management site. In fact, to this day, many residents still collect their waste in their yards and burn it.

The absence of restrictions or regulations on the number of visitors and the use of facilities that are not in accordance with the carrying capacity of the local environment, so it tends to have a negative impact on the environment, especially generating plastic waste which is very disturbing to the sustainability of the environment on Gili Genting Island. Stakeholders involved in the process of managing marine ecotourism beach nine on Gili Genting Island must evaluate the waste generated from tourism activities so far, because this is certainly very influential on the management of tourist attractions on Gili Genting Island, if the area around the beach is dirty with a lot of garbage and even damaged by abrasion, the existence and sustainability of ecotourism beach nine on Gili Genting Island will also be worrying.

Reducing plastic waste from marine ecotourism activities, can be done by campaigning for "Plastic Free" around the Beach and Aquatic marine ecotourism area, implementing strict policies to prohibit the use of plastic in the beach nine area, but this is still not seriously implemented. Based on the results of field research, it shows that there are already quite a lot of trash can facilities in the beach nine area, there are 15 large trash cans that are very easy

to find by visiting tourists, while waste management in the marine ecotourism area of beach nine is still carried out independently by beach nine janitors, cleaning activities from the results of tourist activities are carried out in the morning and evening, by using traditional tools such as brooms and so on.

The amount of waste generation on Gili Genting Island, which is a small island, is very large per day. From this huge amount of waste, it is necessary to know that the current waste system on Gili Genting Island is still not running. The previously known waste system has 6 sub-systems, namely the containerization system, collection system, transfer system, transportation system, processing system and final processing system. However, on the island of Gili Genting there is still no system built according to these 6 stages. Based on the results of field research, waste that has been collected by residents and waste from tourism on beach nine, all of them are stockpiled in one location and if the amount of waste is large, then the waste is burned. This is still a big problem for stakeholders on Gili Genting Island, especially waste management around the marine ecotourism object of beach nine. The solution to the problem is that all stakeholders consisting of the village government, the region, the community, the private sector can work together to build a landfill for waste processing on Gili Genting Island, so that environmental sustainability on the coast of Gili Genting Island can be maintained.

One of the reasons for the waste problem is that people who produce waste do not separate their waste into organic and inorganic waste. As a result, inorganic waste cannot be recycled because it is mixed, smelly, wet, and structurally damaged. Therefore, waste management on the island of Gili Genting must be carried out at one management site with an integrated system to realize sustainable waste management. To avoid landfilling on the island, it is necessary to implement composting for all organic waste, manage recyclable waste through waste banks, recycle glass waste into bricks and send the remaining non-recyclable waste to the landfill on Gili Genting Island. Before implementing the system, a local regulation on solid waste management must first be made, which aims to familiarize waste segregation and reduction of waste generation.

### 3. Social Inclusiveness

Social Inclusiveness is an approach that aims to involve all community groups, including the marginalized, in sustainable tourism activities in island regions. In this context, social inclusion focuses not only on economic benefits, but also on environmental sustainability and social welfare for local communities. Inclusive marine ecotourism ensures that tourism on the island does not only bring benefits to a few parties, but also creates equitable benefits for the entire community, including vulnerable groups such as traditional fishers, women, and youth (Budiyanto, 2022; Donesia et al., 2023; Pauli, 2010).

The application of the concept of Social Inclusiveness in marine ecotourism on Gili Genting Island can be done in several ways that ensure the involvement of all elements of the local community in sustainable tourism development. Gili Genting, as a marine ecotourism destination, has great potential to combine nature conservation and local culture with equitable economic benefits for local communities.

The form of community empowerment activities carried out in the management of marine ecotourism on Gili Genting Island is carried out formally and informally, the form of formal community empowerment activities, namely, the Sumenep

District Government through the Culture, Youth, Sports and Tourism Office (Disbudporapar) to develop tourism, holding Homestay Management Training (Pondok Wisata). The training, which was held at the marine ecotourism object Pantai Sembilan, Bringsang Village, Gili Genting Island, involved dozens of participants from the Tourism Awareness Group (Pokdarwis) and the mainland and island tourism business community (Figure 6).

Figure 6. Training on Homestay Management in Bringsang Village, Gili Genting Island

Source: Processed by researchers (2024)

The Sumenep District Disbudporapar collaborates with the Ministry of Tourism of the Republic of Indonesia to hold the training, as a tangible manifestation of the Human Resources (HR) development program in the arrangement and management of tourist lodges in the tourist attraction area, with training that can add insight to participants to care about managing tourist lodges, considering that Sumenep District has the potential of tourist attractions that require skilled hands to develop them, so that tourists can feel comfortable and will return again someday. However, these activities have only been carried out once in recent years, so that after the change of management and the change of the new Village Head in Bringsang Village, there has not been a good and sustainable regeneration, there is a tug of war between the old manager and the new manager, which causes a conflict of interest in the development of marine ecotourism beach nine on Gili Genting Island, Sumenep district.

On the other hand, local communities and ecotourism managers are still unable to provide good and impressive services to foreign tourists due to weak human resources about speaking English. Teenagers and culinary sellers at locations around beach nine on Gili Genting Island still lack the ability and skills to speak English so they find it difficult when interacting with foreign tourists both when asked for information services, transactions and others.

The form of informal community empowerment activities is carried out regularly at least once a week, representatives from the Bringsang Village Government every 1 week always visit the BUMDes Bringsang and MSME kiosk owners in the beach nine area, with the aim of accommodating input or informing problems that need to be assisted by the Bringsang Village Government, in addition to exchanging opinions and informing the latest government policies, as well as accommodating the aspirations of local communities to be submitted to DISBUDPORAPAR Sumenep Regency.

Another effort made by the Bringsang Village BUMDes is to popularize typical/traditional food from Gili Genting Island,

which has been a mandatory menu at every event/celebration on Gili Genting Island, one of the well-known specialties is "Bapel cake". This cake has a sweet taste and soft texture, making it a favorite among tourists and local people. Bapel is a traditional cake that has been around for a long time in Madura, including on Gili Genting Island. Originally, Bapel was made for family meals during traditional events or holidays, but now it has become a common snack.

Bapel cake not only has culinary value, but also contributes to the local economy. Many housewives in Gili Genting have turned Bapel making into a home-based business. They sell them in traditional markets, souvenir shops, and even online to reach a wider market. Bapel production is also part of the effort to preserve the local culinary culture. For tourists visiting Gili Genting, Bapel is often used as a typical souvenir. The cake lasts for several days, making it perfect to take home as souvenirs. In addition, its practical packaging makes it easy to carry on trips. Bapel is a representation of the traditional culinary richness of Gili Genting Island. With simple ingredients but delicious flavors, this cake is able to captivate the hearts of anyone who tastes it. Besides being a delicious snack, Bapel also reflects the traditions and local wisdom that continue to be maintained and passed down. Therefore, when visiting Gili Genting, don't miss the opportunity to taste and bring home Bapel cake as a memento of this exotic island.

In addition to Bapel cake, there are other specialties, namely brown sugar typical of Gili Genting Island, Sumenep, Madura, known as "gula cobruk" or "gula aren cobruk". This product is traditionally made from the sap of the palm or siwalan trees that grow in the area. The manufacturing process involves tapping the nira, cooking until it thickens, and molding using special molds. Cobruk sugar has a distinctive texture and flavor that distinguishes it from other regional brown sugar. This product is often used as a natural sweetener in various traditional Madurese culinary delights. Some local sellers offer authentic Gili Genting cobruk sugar and are ready to ship it throughout Indonesia. In addition to being a culinary ingredient, the typical brown sugar of Gili Genting Island is also utilized in the development of ethnoscience electronic modules as teaching materials in elementary schools, demonstrating the educational and cultural value of this product.

**Table 3.** Application of Social Inclusiveness Principles in Marine Ecotourism on Gili Genting Island

No	Stakeholder	Program
1	Disbudporapar Sumenep Regency	Development of Human Resources (HR) in the arrangement and management of tourist lodges in the Gili Genting tourist attraction area (formal form of empowerment)
2	Bringsang village government	Once a week, representatives from the Bringsang Village Government visit the BUMDes Bringsang and MSME kiosk owners in the beach nine area (Informal form of empowerment)
3	BUMDes Bringsang Village	Popularizing typical / traditional food Bapel Cake and Cobruk palm sugar as souvenirs typical of Gili Genting Island Ecotourism

Source: Processed by Researchers, 2025

The implementation of an inclusive economy in Gili Genting is done by providing business opportunities for groups that are often neglected, such as women and young people. The results showed that the activities carried out in the marine ecotourism of

the nine beaches of Gili Genting Island, have an impact on inclusive economic development, have a positive impact on the Sumenep District Government, including the increasing number of foreign tourist visits (wisman) and archipelago tourists (wisnus) coming to Sumenep Regency, as well as other benefits Sumenep Regency is increasingly recognized by many people, not only in Indonesia, but also abroad many are starting to recognize Sumenep Regency.

The increasing number of tourist visits each year will also directly increase the income of MSMEs on Gili Genting Island, every handicraft entrepreneur and typical Sumenep souvenirs also have no difficulty marketing the processed products produced. The same is felt by the community managing sea transportation on Gili Genting Island, the increasing number of tourists who come to visit each year, demanding more boats and crossing schedules, it will also directly require additional new workers, who then recruit unemployed youth from the area around Gili Genting Island.

#### 4. Innovation and Adaptation

The concept of Innovation and Adaptation in marine ecotourism management, especially on islands, includes two important aspects that are interconnected and focus on sustainability and tourism development that is responsive to change (Schutter et al., 2021). Innovation in marine ecotourism management refers to the development and application of new ideas, methods, or technologies that aim to improve the tourist experience and preserve the environment, while Adaptation in marine ecotourism management refers to the ability to adapt strategies and practices to changing environmental, social, and economic conditions (Budiyanto, 2022; Pauli, 2010).

The application of the Innovation and Adaptation concept in the management of marine ecotourism on Gili Genting Island can be described in several steps and strategies that support sustainability, improve the tourist experience, and preserve the environment. Marine ecotourism Pantai Sembilan on Gili Genting Island is a good example of efforts to optimize the uniqueness and distinctiveness of the region as a tourist attraction. This is evidenced by the existence of a natural phenomenon that occurs naturally, which should make the local community feel worried about the phenomenon, the people in Bringsang Village instead utilize this natural phenomenon into a source of economic income for the surrounding community, which previously the beach was famous for being a haunted place because it was adjacent to a public cemetery complex, with high innovation it is now transformed into all tourist destinations that are very extraordinary in demand, not only from the ticket sector, boat providers, and MSMEs who also benefit from the management of Pantai Sembilan Tourism on Gili Genting Island.

However, climate change threats such as rising temperatures, coral bleaching, and rising sea levels require effective adaptation and mitigation strategies. Increased flood intensity, declining inland waters, reduced fisheries and natural resources affect millions of people. The impacts of climate change are exacerbated by environmental pollution and human destruction of coastal and marine ecosystems. The destruction of coastal ecosystems (mangroves, coral reefs and seagrass beds) has resulted in coastal erosion and degradation and reduced biodiversity values. The impact of marine ecosystem damage can directly or indirectly affect the economic activities of fishing communities. High waves and erratic weather affect the activities of fishing boats. Climate change has also disrupted livelihoods on many islands.

From the description of fishermen's economic activities above, it can be explained that climate change affects environmental conditions and resources that also affect the activities of the Gili Genting Island community, so that people look for alternative business activities that are not far from their environment. Fishermen who maintain their fishing activities choose to look for other fishing grounds even though they have to travel further than the usual fishing ground. Meanwhile, fishermen who try to switch from fishing, namely by trying to cultivate seaweed. This seaweed cultivation is a choice of ways taken by the people of Gili Genting Island so that they still have economic activities that can generate income. Thus, despite climate change that causes environmental changes, the environment is still supportive for the cultivation of these resources.

**Table 4.** Application of the Principles of Innovation and Adaptation in Marine Ecotourism on Gili Genting Island

No	Principle	Program
1	Innovation	Utilizing natural phenomena into a tourist destination so that it becomes a source of economic income for the surrounding community.
2	Adaptation	<ul style="list-style-type: none"> <li>a) Climate change such as temperature rise, coral bleaching, and sea level rise require effective adaptation and mitigation strategies.</li> <li>b) The impact of marine ecosystem damage affects the economic activities of fishing communities</li> <li>c) Maintain their fishing activities choose to look for other fishing grounds</li> <li>d) Fishermen switch from fishing to seaweed farming</li> </ul>

Source: Processed by Researchers, 2025

In the context of marine ecotourism management on the island, a combination of innovation and adaptation is essential to create a sustainable tourism model. Innovation allows managers to find new and better ways to attract tourists and preserve the environment, while adaptation ensures that the model can survive and remain relevant in the face of changes that occur, both in the environment and in social and economic dynamics.

##### 5. Multiple Economic Effects

The concept of Multiple Economic Effects refers to the various economic impacts that arise as a result of a particular activity or sector in society. This concept is very important in economic analysis because it shows that economic activity not only produces direct effects, but also indirect effects that can affect various aspects of people's lives. The tourism sector often creates significant economic effects. Tourist visits generate direct revenue for hotels, restaurants and tourist attractions. In addition, increased visitation can encourage investment in infrastructure, create jobs in various sectors, and increase demand for local products (Fahrrrozi, 2020; Pauli, 2010).

Gili Genting Island, as one of the marine ecotourism destinations in Sumenep Regency, has tremendous potential to develop the local economy through the application of the Multiple Economic Effects concept. With its beautiful natural charm, abundant biodiversity and rich culture, Gili Genting can utilize marine ecotourism as the main driver of sustainable economic growth.

Marine ecotourism on Gili Genting Island has the potential to create many jobs, in ecotourism management, there are many

positions needed, such as tour guides, homestay staff, boat operators, and restaurant managers. These jobs not only absorb labor from the local population but also provide the necessary skills training to increase professionalism. In addition to direct employment, many small businesses will expand as the number of tourists increases. For example, souvenir stall owners, local food vendors, and ground transportation providers (such as motorbike taxis or local shuttles) will also benefit from increased tourist visits.

Sustainable ecotourism development while maintaining the beauty of the environment is the goal of ecotourism, one of which is Gili Genting Island. The community on Gili Genting Island participates in the development of ecotourism by providing services and becoming MSME actors. In terms of the area, the potential of the village's natural resources is the most important part in the development and development of a village. In this case, the Bringsang Village Government continues to strive to improve ecotourism activities that stand on Gili Genting Island, by utilizing natural potential and local wisdom.

Tourist spending on Gili Genting has a significant multiplier effect on the local economy. Tourists visiting marine ecotourism Pantai Sembilan Gili Genting Island will spend money on accommodation, food, recreational activities (such as snorkeling, diving, and island tours), and shopping. Every dollar spent by tourists has the potential to circulate within the local economy, creating additional income for businesses. In terms of supply chain impacts, local businesses that provide products and services to tourists, such as restaurants that use ingredients from local farmers and fishermen, will see an increase in revenue. For example, fish caught by local fishermen can be supplied to food stalls located on Gili Genting Island, which can certainly increase the income of fishermen and at the same time offer fresh food to tourists.

Similarly, the community managing sea transportation on Gili Genting Island feels that the increasing number of tourists who come to visit each year requires more boats and crossing schedules, which will directly require additional new workers, who then recruit unemployed youth from the area around Gili Genting Island. This will directly increase income and the economy will grow well, as a result of the economic activities of local communities around the nine coastal ecotourism of Gili Genting Island.

**Table 5.** Application of the Principle of Multiple Economic Effects in Marine Ecotourism on Gili Genting Island

No	Development	Economic Actors
1	Creating new jobs	<ul style="list-style-type: none"> <li>a) Tour guide</li> <li>b) Homestay staff</li> <li>c) Boat operators</li> <li>d) Restaurant/dining house manager</li> </ul>
2	Growth of small and medium enterprises	<ul style="list-style-type: none"> <li>a) Souvenir stall owners</li> <li>b) Local food stall sellers</li> <li>c) Land transportation providers (such as motorbike taxis or local shuttles)</li> <li>d) Sea transportation providers</li> </ul>
3	Utilization of natural potential and local wisdom	<ul style="list-style-type: none"> <li>a) Providing food and drinks from local farmers</li> <li>b) Providing processed fish from the fishermen of Gili Genting Island</li> <li>c) Utilizing sea transportation owned by the local community</li> </ul>

Source: Processed by Researchers, 2025

The application of the Multiple Economic Effects concept in the marine ecotourism of Pantai Sembilan on Gili Genting Island,

Sumenep Regency, offers significant opportunities to improve the economic and social welfare of local communities. With job creation, infrastructure development and increased awareness of the importance of environmental conservation, marine ecotourism can be a key driver for sustainable economic growth. The successful implementation of this concept relies heavily on local community involvement, wise management and sustainable practices. Through cooperation between the government, businesses, and the community, Gili Genting can develop marine ecotourism that is not only economically beneficial but also maintain and preserve the natural beauty and local culture for future generations.

## CONCLUSION

Blue Economy development in marine ecotourism on Gili Genting Island faces various challenges and opportunities. From the aspect of Nature's Efficiency, clean water management and ecotourism have implemented sustainable technologies and initiatives, such as mangrove planting and renewable energy, however, challenges such as seawater intrusion, high operational costs, and waste management and tourism still require comprehensive solutions, including increased government support and mastery of foreign languages by local communities. The concept of Zero Waste and Cyclic System of Production emphasizes the importance of optimal waste management to preserve the environment and tourist attraction. Efforts include reducing plastic waste, recycling, and composting organic waste. However, its success still depends on public education and the development of supporting infrastructure.

From the perspective of Social Inclusiveness, active participation of local communities, including marginalized groups, in ecotourism management is needed to create equitable economic benefits. The preservation of local wisdom, such as typical culinary products, contributes to the cultural identity and economy of the community. However, challenges in management and potential conflicts of interest need to be addressed. Meanwhile, damage to coral reefs is caused more by human activities, such as the use of fish bombs, than climate change. Fishing communities are adapting by finding new locations and switching to seaweed farming, although production is affected by weather conditions.

In the context of Multiple Economic Effects, the development of marine ecotourism has the potential to improve community welfare through job creation and increased local income. However, the non-optimal utilization of tourist facilities and the lack of community involvement are still obstacles. Therefore, synergy between the government, private sector and the community is key in developing sustainable ecotourism that is economically profitable and environmentally friendly.

This study highlights key implications for marine ecotourism management on Gili Genting Island, including the need for stricter regulations on destructive fishing, strengthened waste management to support the Zero Waste concept, community-based mangrove and coral reef conservation, optimization of renewable energy, and community empowerment grounded in local wisdom through Penta Helix collaboration. However, the study is limited by short-term primary data and a stronger focus on environmental and social aspects, while economic impacts on community income require deeper analysis. Future research should examine policy effectiveness, conduct long-term sustainability assessments, and explore technology-based approaches such as artificial intelligence for ecosystem

monitoring and digital marketing to enhance the benefits of ecotourism for local communities.

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