

## MANAGING SUSTAINABLE TOURISM OF PERAWAN BEACH, EAST JAVA, INDONESIA BASED ON THE COASTAL ECOSYSTEM SERVICE (CES) APPROACH

Adellia Wardatus SHOLEHA\* 

State University of Malang, Department of Geography, Faculty of Social Science, Malang City, Indonesia, e-mail: adellia.wardatus.2207219@students.um.ac.id

Sumarmi SUMARMI 

State University of Malang, Department of Geography, Faculty of Social Science, Malang City, Indonesia, e-mail: sumarmi.fis.um.ac.id

---

**Citation:** Sholeha, A.W., & Sumarmi, S. (2025). Managing sustainable tourism of perawan beach, east Java, Indonesia based on the coastal ecosystem service (ces) approach. *Geojournal of Tourism and Geosites*, 58(1), 78–88. <https://doi.org/10.30892/gtg.58107-1392>

---

**Abstract:** Coastal tourism at Perawan Beach in Malang Regency, East Java, presents both opportunities and sustainability challenge. The main challenge is that sustainable ecotourism often struggles with economic viability. Intense competition from more accessible destinations, which may disregard ecosystems, presents a major challenge. This research aims to (1) describe current activities at Perawan Beach, (2) identify tourism and other human activity threats to coastal ecosystems, and (3) explore coastal opportunities through a coastal ecosystem service approach for societal benefit. This study using the Coastal Ecosystem Service (CES) approach, involved interviews and observations to assess stakeholder perceptions, tourism threats, and opportunities. Following CES indicators, this study is based on grounded theory. The data collection technique was based on semi-structured interviews involving 10 stakeholders. Findings indicate that CES can enhance beach tourism sustainability by involving communities, protecting natural resources, and promoting fair economic growth. CES supports long-term environmental management and local well-being by integrating provision, regulation, support, and cultural services. The key focus is managing events and regulating the climate in coastal tourism areas. In order to educate visitors on coastal vegetation and sustainable fisheries. CES opportunities span diverse coastal ecosystems, including beaches, estuaries, forests, wetlands, and floodplains. The main initiatives were building Ocean Farms and following virtual reality promotions, promising steps for sustainable beach tourism. Ocean Farms offers hospitality services for tourism, such as floating hotels, and provides education on sustainable fisheries management. The development of Ocean Farms also represents support from academics, researchers, stakeholder collaborations, and the local government, all of whom are committed to the sustainability of this tourism initiative. The main challenges in developing Perawan Beach as a sustainable tourism destination include infrastructure problems, ineffective promotion, and geographic conditions that limit certain water tourism activities. However, there are great opportunities through a coastal ecosystem services (CES) approach, which emphasises the importance of environmental maintenance and education on coastal vegetation management. This beach has potential for further development in sustainable marine tourism while preserving its ecological services. Its natural wealth, including the Gondang Wetan Estuary and Pedotan Lagoon, supports water-based tourism activities. Based on CES indicators, the area is strong in providing food resources, biological assets, regulatory functions, and opportunities for coastal conservation and education.

**Keywords:** sustainable tourism, tourism beach, coastal ecosystem service (CES), local stakeholder, Indonesia

\* \* \* \* \*

### INTRODUCTION

Coastal areas have become the main tourist destinations with various potential natural resources (Fang & Dakui, 2014; Romero-Padilla et al., 2016). Coastal tourism stands at the intersection of natural beauty, cultural richness, and economic potential, offering a myriad of opportunities for tourists and local communities. It also promises not only beautiful views and recreational activities but also significant economic benefits through job creation, infrastructure development, and income generation (Mejjad et al., 2022). Throughout the scientific literature, beaches have been considered a very valuable ecosystem for the tourism industry because of their economic, recreational, aesthetic, and cultural values (Williams et al., 2016) so that their existence and use need to be sustainable. Sustainable coastal and marine tourism focuses on optimizing tourism opportunities (Chen & Teng, 2016). This optimization also minimizes negative impacts feared to affect environmental, economic, and social stability (Gössling et al., 2016). Implementing this paradigm requires careful planning, collaboration between stakeholders, and commitment to long-term environmental management (Drius et al., 2019). This involves not only protecting natural resources and biodiversity but also encouraging community involvement, preserving cultural values, and generating equitable economic opportunities for local populations.

The debate regarding the sustainability of coastal tourism covers many different points of view related to carrying capacity. The wisest definition of tourism carrying capacity offered may be “The maximum number of people who can visit a tourist destination at the same time without causing damage to the physical, economic, or socio-cultural environment, and an unacceptable reduction in the quality of tourist satisfaction” (Coccosis & Mexa, 2017). When too many tourists visit a site, what to consider the most is the site’s carrying capacity, because overtourism is a potential threat to the site’s sustainability (Cheung & Li, 2019). It is also based on the relationship between human well-being and ecosystem functioning being continuously affected by environmental degradation (Mendoza-González et al., 2021). The next dilemma is when tourism has

---

\* Corresponding author

good natural resource potential and works with an ecotourism system but tends to have few visitors. Previous research also explains that socially and environmentally sustainable ecotourism initiatives often struggle to achieve economic viability (Neger, 2022). Previous research confirms that there are challenges to economic sustainability in tourist areas beyond the influence of massive environmental protection. The fact is that for tourism to develop, its economic sustainability must be taken into account, especially in terms of economic viability (Neger, 2022). Previous research also states that when an economic activity does not produce a net profit, it will be difficult to be sustainable in the long term (Picard, 2015).

The low economic income due to the minimal number of tourists is also influenced by the lack of effective promotion, conflicts over land ownership, lack of cooperation between stakeholders, minimal infrastructure to support tourism, the economic crisis in local communities, public security, lack of financial support, lack of clean water supply, the influence of seasonal tourism, and the possibility of immature skills or training (Neger, 2022). In this study, we highlight the challenges of sustainable beach tourism at Perawan Beach, Malang Regency, East Java Province, Indonesia. This beach has a large biodiversity capacity and at the same time has challenges for economic sustainability, especially in generating ideal profits for local communities (Sumarmi et al., 2023). Even though this area has large natural resources with a complex tourist typology, it is not included in a special protection scheme for conservation. As such, ecosystem service-based for sustainable coastal tourism can be adopted in managing this beach. In addition, ecosystem services can open integrated economic circulation and prevent stakeholders from switching to economic activities that may conflict with environmental conservation (Mendoza-González et al., 2021; Neger, 2022; Sumarmi et al., 2022). The Coastal Ecosystem Service (CES) approach is closely related to, among other things, coastal tourism (CT) and human activities (HA) (Drius et al., 2019). We concentrate on two types of relationships (benefits and threats) in sustainable coastal tourism development, linking CES, CT, and HA. Ecosystem service is known to use a comprehensive framework and can be adopted in managing sustainable beach tourism.

The indicators consist of (1) provision (all products of the ecosystem, including food, materials, genetic resources, and habitat), (2) regulation and maintenance (all ecosystem functions, that maintain maintenance and regulation, including, for example, air and water quality, climate regulation and natural hazards), (3) support (habitat and protection for species, and soil formation), and (4) culture (nonmaterial benefits that people obtain from ecosystems, including recreation, cognitive development and aesthetic experiences) (Drius et al., 2019; Mendoza-González et al., 2021). Previous research especially focused on Southeast Asia, highlighting that while provisioning and cultural services are often recognized and valued, regulating and supporting services such as mangrove conservation and education service (Rojas et al., 2019).

This research emphasizes the need for greater awareness and communication about the essential yet frequently overlooked ecosystem services that underpin sustainable tourism practices. Other study also advocated for participatory governance models, emphasizing the involvement of local communities and stakeholders to generate long-term benefits for both ecosystems and tourism economies (Dimitrovski et al., 2021; Phelan et al., 2020). However, they noted significant barriers, including fragmented governance structures and a lack of financial incentives. Additionally, CES emphasized the importance of adaptive management in addressing climate change impacts (Furlan et al., 2022), suggesting that CES, such as coastal resilience and natural buffers like mangroves (Sunkur et al., 2023), and can protect tourism from several challenges such as pollution, overexploitation of resources, and poor water quality (Booi et al., 2022). Recently, researcher also found that CES approach give positive feedback with focus on intangible benefit including recreational sense, aesthetic, spiritual, and cognitive ones (Sima et al., 2024). The researcher was concluded that visitors who have integrated nature into their lifestyle, develop a strong attachment to the location and are willing to engage in pro-environmental actions and adhere to visitation rules. Through initial identification regarding economic sustainability challenges and large ecosystem opportunities, we analyzed stakeholders' perceptions based on CES. We interviewed stakeholders, local communities, and tourists at Perawan Beach, because of their close relationship with this coastal ecosystem.. The aim of this research is to assess the sustainability of coastal tourism at Perawan Beach by analyzing stakeholders' perceptions through the lens of Coastal Ecosystem Services (CES). Specifically, the study seeks to (1) describe current community activities related to the coastal ecosystem, (2) identify key threats posed by tourism and other human activities to both the ecosystem and tourism sustainability, and (3) explore opportunities for sustainable coastal management by focusing on the ecosystem services most valued by society.

## MATERIALS AND METHODS

The research method using grounded theory method. Unlike other research methods that start with a hypothesis, grounded theory begins with the collection of data, and the theory emerges from this data (Corbin & Strauss, 2014). This study had several qualitative fieldwork steps carried out between May 2023 and December 2023. The first step was in-depth interviews with three selected experts to get a general picture of tourism development in Pantai Perawan (members of Powilis), Sidoasri Village. Based on interviews and literature, the next step was to identify potential ecotourism centers by visiting and observing tourist attractions. The map of the research location is presented in Figure 1. Semi-structured interviews were conducted based on a format that combined open and closed questions, allowing for guided and systematic conversations in discovering in-depth tourism-related information (Beedie, 2017; Pung & Chiappa, 2020). Those involved were organized into three groups to gain information about how they understand, use, and manage the beach. The next step was to conduct in-depth interviews involving 10 stakeholders. We adopted a CES approach so that the interview and field observation guidelines focused on collecting data related to CES. The transcription of interview responses was written in Microsoft Word.

Observation notes were analyzed directly from the original notes, considering the same comparison criteria as interviews. Then the texts compared were interview transcriptions and notes from observations. The comparative sample text classification considered stakeholders based on their authorities, local communities, and tourists to establish the unit of analysis. The methodological design model used in the data analysis was a concurrent triangulation strategy (Creswell &

Creswell, 2017). We used qualitative information in fieldwork collected during the same period, using semi-structured interviews, qualitative observations, and surveys. From this model, qualitative data analysis began with the transcription of interviews and adjustments to the research domain/keywords. A database was produced with data from the survey to enable comparison of results between the community, management, and also visitors as research respondents.

The first research objective was about the present situation and finding the main obstacle to economic viability; we focused on 1) knowledge of the ecosystem, 2) attachment of individual activities to the ecosystem, and 3) organizations related to use and management. Then, to answer the third objective regarding opportunities and CES, we focused on exploring 1) provisioning services, 2) regulating services, 3) cultural services, and 4) supporting services (Drius et al., 2019; MEA, 2005).

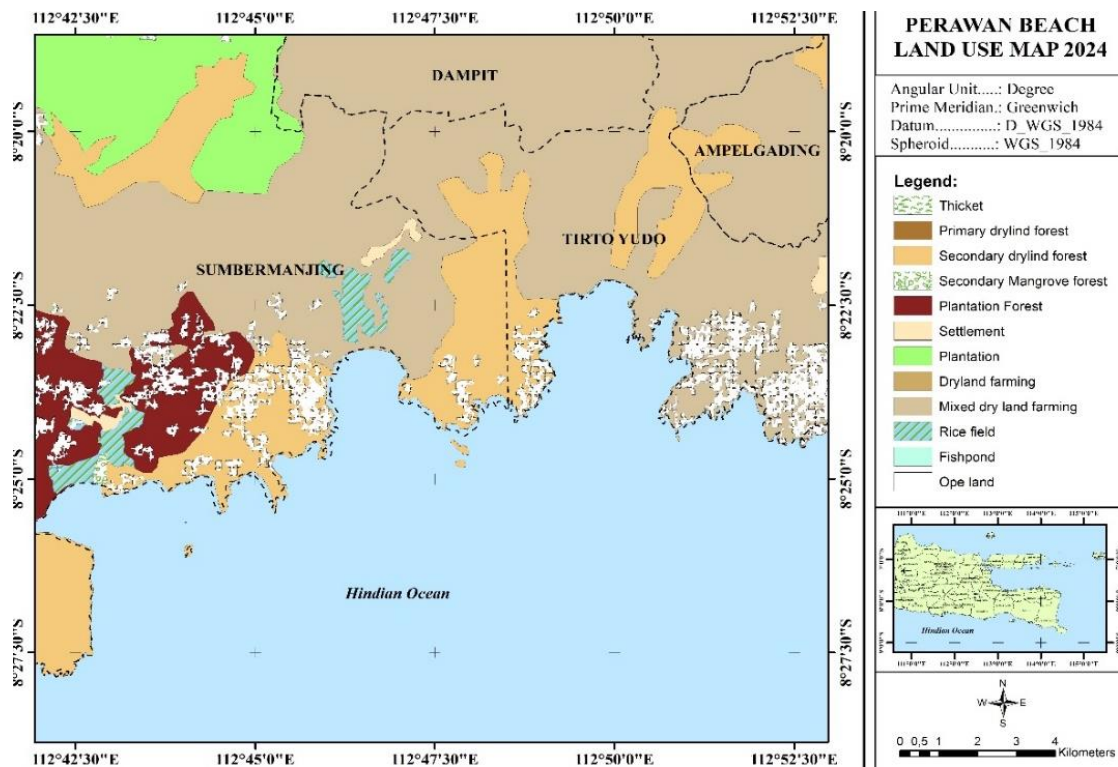


Figure 1. Land Use of Pantai Perawan (Source: The authors, 2024)

## RESULTS AND DISCUSSION

### 1. Present situation of Perawan Beach, coastal tourism, and human activities

Perawan Beach in Sidoasri Village has beautiful brownish-white sand that stretches for almost two kilometers. Having the feel of a private beach, the atmosphere at the beach is calm, far from the noise of the city, and the beach is also clean. This area does not appear to have experienced many changes because the residents mainly work as fishermen. Its visual landscape is just breathtaking. The area hides the potential of a tourist site. A Coastal Ecosystem Service (CES) approach will be suitable since it preserves the environmental and social conditions of the community while boosting economic sustainability in the future. Visuals of the Perawan Beach landscape are presented in Figure 2.



Figure 2. (a) The sand along the coastline of Perawan Beach and (b) the cliff along the coastline of Perawan Beach (Source: The authors, 2023)

Perawan Beach is a beautiful area that can be developed as a tourist destination. This beach has complex geomorphological elements for tourist activities. First, at the eastern end of this beach, there is an estuary known as

“Gundang Wetan”. The Gundang Wetan Estuary (Sidoasri River) is shallow and clean and has a light current. The estuary is a great place for water activities, which are rare to be found on the South Coast of East Java. Gundang Wetan can be accessed by following the path around the bushes or following the coastline to the eastern end of the beach (Figure 3). Currently, local managers have provided river tracing and canoeing services to support tourism activities. This water tourism activity has a quite good economic impact and supports community activities that previously focused on fish capture.



Figure 3. (a) Distance between Gundang Wetan Estuary and coastline  
(b) View of Gondang Wetan Estuary at high tide Perawan Beach (Source: The authors, 2023)



Figure 4. (a) Middle view of Pedotan Lagoon and (b) southern view of Pedotan Lagoon Perawan Beach (Source: The authors, 2023)



Figure 5. (a) The “Ocean Farmits” floating house and (b) boat renting at Perawan Beach (Source: The authors, 2023)

Second, there is a lagoon landscape. The local people call it “*Pedotan*”, which means “the flow is cut off or trapped” as the lagoon stands as if it greets visitors before reaching the Gundang Wetan Estuary. This spot was formed by hydrometeorological influences where high rainfall caused the Sidoasri River to overflow and fill the large basin. The water is calm and gives a healing impression to tourists and adds to the value of Perawan Beach as a tourist destination (Figure 4). This spot offers beautiful views from various angles. However, unlike the Gundang Wetan Estuary, which has undergone changes and improved management, this spot is starting to be abandoned. The interview results confirmed some problems related to the spot, starting from minimal infrastructure, security systems, and low interest. Recently, Perawan Beach has experienced an increase in activities related to coastal tourism with the construction of floating houses just off the coastline. This floating house’s name is “OCEAN FARMITS”, which is supported by Institut Teknologi Sepuluh Nopember (ITS) Surabaya,

Pertamina, PPP PONDOKDADAP, IKA ITS, PT. SAM Global Engineering, BKI, and PERPRO (Anti Corrosion Company). Ocean Farmits allows visitors to rent a boat and see the view of Perawan Beach from much more interesting angles (Figure 5).

The beach manager confirm that Ocean Farmits was first developed to combine a fish farming system (fisheries) and a floating hotel for tourists. The design of Ocean Farmits consists of an upper deck, a lower deck, and a fish net. The upper deck is used as a spot for tourism with one of the facilities being a floating hotel. The lower deck is used as a place to manage and educate people about fish farming. Meanwhile, at the bottom, there is a net as a place for cultivating fish. The Ocean Farmits was chosen as an alternative for water tourism on the beach because it can withstand wave heights of up to 6 meters, stands at a sea depth of at least 10 meters, and can last for 15 years (DIKST, 2023). In 2023, Perawan Beach using virtual reality-based website to improve promotional performance. This website is developed with the title “Adventure-Based Virtual Web Tour” following current promotional developments that are starting to utilize virtual reality. The visualized virtual content is in the form of landscape photos and videos along Perawan Beach developed with Theasys (Sumarmi et al., 2023). Respondents mentioned that to date the management team of the beach was still using virtual reality for promotion purposes. The other good thing about the beach is the cleanliness and beauty. The beach is home to many plant species, including *Pes-caprae*, *Barringtonia Asiatica*, *Pandanus Odorifer*, *Cocos nucifera*, *Ipomoea aquatica*, *Casuarina Equisetifolia*, *Rhizophora*, and shrub grassy vegetation (Sumarmi et al., 2023). The existence of these various plant species indicates that the beach has good ecological quality, and this must be maintained to attract visitors.



Figure 6. (a) The condition of the road's asphalt is not entirely in good shape and (b) The main route to Perawan Beach is quite small (Source: The authors, 2023)

## 2. Main obstacles for economic viability within the ecosystem and social practice for coastal tourism sustainability

Previous research and publications mentioned several major difficulties from the economic perspective for sustainable coastal tourism (Brščić et al., 2020). Inadequate marketing and promotional efforts can hinder economic viability, thereby limiting the ability of coastal tourism to attract visitors and generate fair income for local communities (Sumarmi et al., 2023). Then there is the problem of infrastructure maintenance, such as roads and equipment, to support tourism activities (Drius et al., 2019). Current conditions related to roads and maintaining equipment need to be made a priority for improvement.

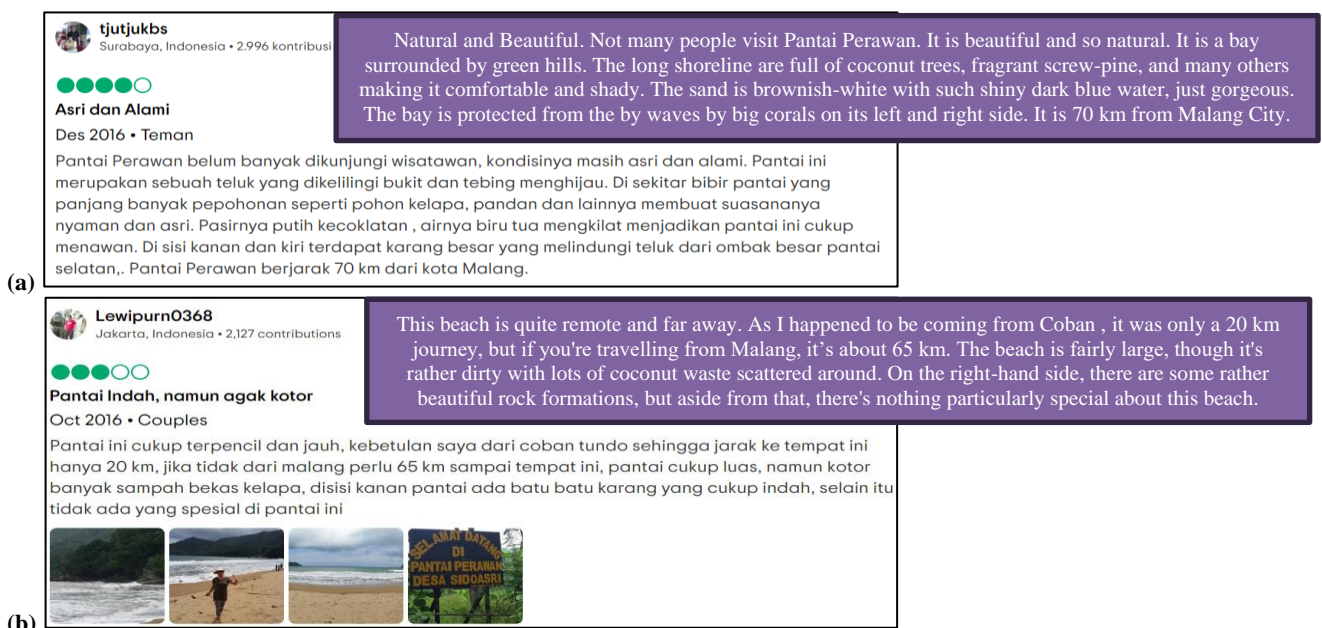


Figure 7. (a) A positive review from a previous visitor of Perawan including the yellow highlight was the translation and (b) A negative review about organic waste from visitor including the yellow highlight was the translation (Source: Tripadvisor.com latest review comment from visitors at 2016)

The next difficulties are the geographical conditions of Perawan Beach, which is located on the South Coast of Java. This place tends to have quite high waves, and the perception of visitors. Base on the geographical condition, for water-related activities such as snorkeling, diving, banana boats, surfing, and jet skiing, to be prohibited for safety reasons. This is a common obstacle in various tourist attractions on the southern coast of Java, yet alternative activities and water-related activities around the estuary or lagoon are still very possible. Then the variable inhibiting visitors from visiting is the lack of reviews from previous visitors - the reviews are not so helpful with positive and negative sides appearing to be balanced, thus confusing potential tourists. One example of the results of visitor reviews on Trip-Advisor.com is presented in Figure 7.

Based on the visitor’s review, it is known that Perawan Beach has a good quality environment as the review mentions “natural and beauty”, “comfortable”, and “gorgeous”. Thus, efforts to maintain, manage, and use the potential must be seriously made. One of the efforts we do along with the local community is the cleaning initiative (Figure 8). Apart from the influence of reviews from visitors, branding is also influenced by coastal tourism competitiveness. The competitiveness of coastal tourism in South Malang was very high considering that many other beaches more popular offering various water activities, easy access, highly organized conservation or educational tourism, and a more adequate hospitality system. The research results also show that visitors who intend to come back often complain about accessibility, stating that Perawan Beach is too far and minimum local transportation service. Therefore, the great natural resources, biodiversity, and natural beauty at Perawan Beach will attract visitors if complaints from visitors are points of evaluation and improvement.



Figure 8. (a) Cleaning organic waste at Parking area, Perawan Beach and (b) Cleaning organic waste at camping ground, Perawan Beach (Source: The authors, 2023)

### 3. Opportunity for sustainable tourism based on the Coastal Ecosystem Service (CES) approach

Firstly, this study highlights the importance of regulating the services provided by coastal ecosystems, such as controlling events and regulating climate, as human activities in coastal tourism areas can be very intensive. This can consist of the intensity of agriculture, aquaculture and fisheries, transportation and tourist activity, industrialization, and urbanization (tourist or community mobility) (Drius et al., 2019). The service became the main supporter of tourism resilience on the south coast of Malang Regency, which tends to have high waves and the threat of annual flooding (Mendoza-González et al., 2021), so maintenance must remain a priority in long-term sustainable tourism development. Several opportunities for improvement in managing ecosystem services are available, one of which is educating visitors regarding coastal vegetation management. Through our in-depth interviews, stakeholders also acknowledged the importance of organizing services, emphasizing their role in maintaining the resilience of coastal areas.

This effort can be seen in several ecological components of the area starting from planting and maintaining coastal vegetation. The management of Perawan Beach also emphasizes that the service function related to provisioning aims to provide habitat land, refugia, raw materials, food ingredients (live seafood), water sources or supply to support tourism activities and genetic resources. One of the things we highlighted is the large water resources in Pedotan Lagoon, which are also used by the community for fishing (Figure 9).



Figure 9. (a) Water resources in Pedotan Lagoon and (b) Pedotan Lagoon often used for fishing activity (Source: The authors, 2023)

Furthermore, the stakeholders highly valued the coastal ecosystem service indicator, namely cultural services, especially those related to recreational use and the aesthetic of the landscape. This study emphasizes the importance of cultural services for human well-being and highlights the role of tourism and recreational activities in appreciating the natural beauty of coastal areas. Understanding and preserving cultural services is considered essential for the sustainable management of beaches and coastal dunes. The cultural service indicators applied at Perawan Beach on the natural resources of long beach ridge (*gisik*), estuary, Australian pine forest, bushes, permanent wetland, grasslands, and floodplain swamps as part of 1) recreation and tourism, 2) symbolic and aesthetic values, and 3) cognitive effect (Drius et al., 2019). Recreation and tourism are grouped and included in cultural ES (MEA, 2005).

Humans (society / managers / visitors) benefit from interactions with nature because they supply important values, such as physical exercise / knowledge, aesthetic experiences, intellectual stimulation, inspiration, and other contributions to the physical and psychological well-being of each individual (Cheng et al., 2019; Daniel et al., 2012). Following the benefits obtained by individuals, the ecosystem, and the economy at Perawan Beach, Ocean Farimits has been developed. As previously explained, apart from facilitating visitors to see better coastal views, it provides accommodation (floating hotels) and education about sustainable fisheries management (Figure 10).



Figure 10. (a) Grouper fish cultivation (*Epinephelus sp*) and (b) educational activity on environmental protection service of Perawan Beach (Source: The authors, 2023)

The study focuses on how CES is aimed at providing benefits to society. Researcher have been detailed the ecosystem service opportunities provided by various types of coastal ecosystems, such as sandy beaches, estuaries, Australian pine forests, shrubs, permanent wetlands, grasslands, crops, and floodplain swamps (Figure 11). This study identifies and categorizes these ecosystem services into various types, including regulation, provision, strengthening tourism culture, and optimizing supporting services with reference to previous research (Drius et al., 2019; Mendoza-González et al., 2021).

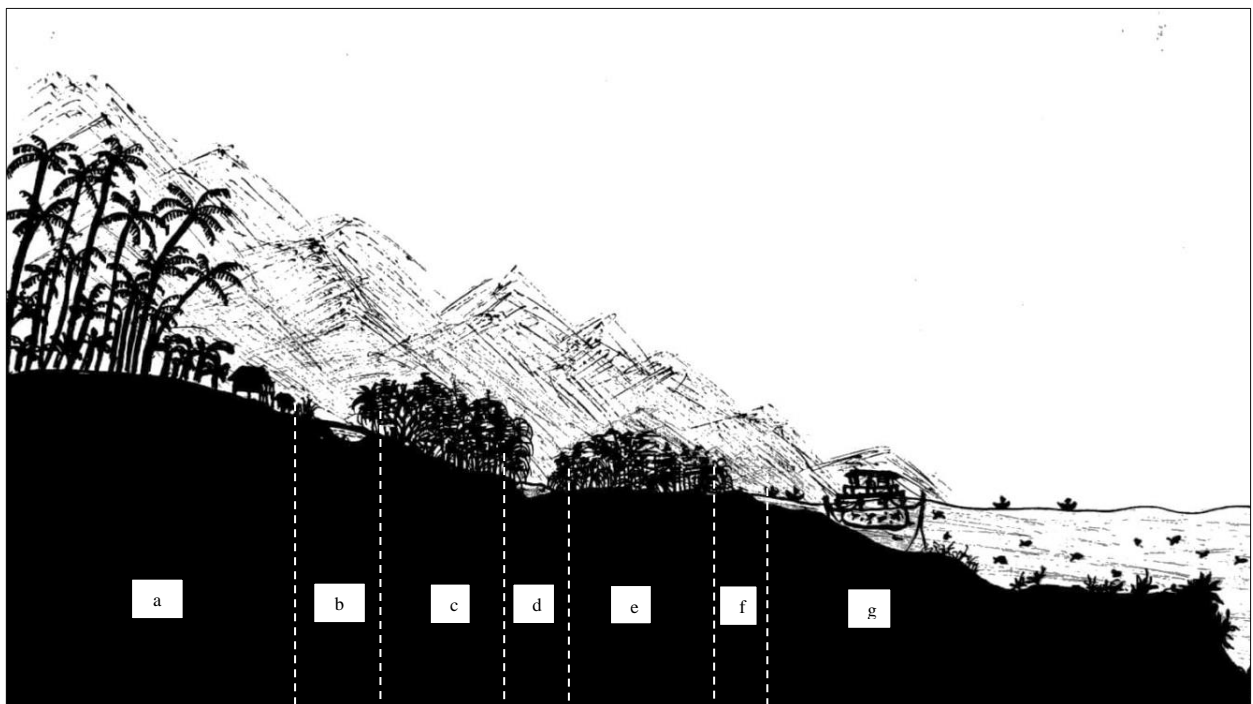


Figure 11. Code of Coastal Ecosystem (Note: explanation of the coastal ecosystem service in Table 1 The classification of coastal ecosystem service based on interviews with local managers and field observation) (Source: The author (2024))

Table 1. Details of Coastal Ecosystem Service in Perawan Beach (Source: Author analysis, 2024)

| Code | Coastal ecosystem  | Ecosystem Service   | Description  |
|------|--|---|--|
| a    | Forest material, crops, farming, and pod                                     | Provisioning Services:<br>1. Food provider from crop production<br>2. Provider of building materials<br>3. Provider of basic food ingredients for resale<br>4. Provider of firewood   | <b>Provisioning Services:</b><br>Provider of agricultural food products (corn and sugar cane), provider of pond products in the form of shrimp, old wood can be replaced with other crops and can be used as firewood, producer of commercial wood and coconuts, provider of food (bananas)  |
| b    | River and aquifers (permanent wetland)                                       | Provisioning Services:<br>1. Freshwater to support community activities<br>2. Provider of food (aquatic biota)<br>3. Reducing the potential for flooding<br>Regulating Services:<br>1. Supporting freshwater retention areas<br>2. Mangrove cultivation area<br>3. Natural filtering<br>Supporting Services:<br>1. Ecosystem maintenance<br>2. Nutrient cycle<br>Cultural Services:<br>1. Amazing views<br>2. Recreation and water tourism<br>3. Potential for Coastal Conservation Education | <b>Provisioning Services:</b><br>Freshwater providers that support community activities, places for cultivating freshwater biota such as fish and crabs, and river water flowing toward estuaries can reduce the potential for annual flooding<br><b>Regulating Services:</b><br>This area can support the water needs of the surrounding plants, rivers in coastal areas can be developed to cultivate various types of mangrove plants, and the presence of river flows and other plants reduces the potential for pollution from waste carried by river water through natural filtering.<br><b>Supporting Services:</b><br>This area of the Sidoasri River flows into the eastern part of Perawan Beach. This stream is an area for cultivating crabs (freshwater crabs) and several freshwater fish. Apart from that, this area provides a good nutritional cycle for cultivating mangrove plants.<br><b>Cultural Services:</b><br>As the river is surrounded by karst hills, this area offers beautiful and amazing views. This potential is developed as a tourist spot along the river and a mangrove education point for visitors. |
| c    | Shrubs and trees   | Provisioning Services:<br>1. Providing firewood<br>2. Genetic resources<br>Regulating Services:<br>1. Biological regulation<br>Supporting Services:<br>1. Maintaining ecosystems and supporting nutrient cycles   | <b>Provisioning Services:</b><br>Residents often use old/rotted plants to make firewood for personal use or to be sold (in the form of charcoal); the old plants are then replaced with new plants.<br><b>Regulating Services:</b><br>As a wild plant, shrubs are deliberately allowed to grow to maintain the beauty of the environment.<br><b>Supporting Services:</b><br>There is some biota around the beach which are sometimes hidden behind bushes. Apart from that, this point is also used to support food availability for several existing biota.   |
| d    | Lagoon and floodplain swamps   | Provisioning Services:<br>1. Reducing the potential for flooding<br>2. Water resources for food security<br>Regulating Services:<br>1. Aquifer recharge and hydric balance<br>Supporting Services:<br>1. Ecosystem maintainer<br>Cultural Services:<br>1. Recreation and water tourism<br>2. Amazing views<br>3. Potential for Coastal Conservation Education   | <b>Provisioning Services:</b><br>Large basins function to store water having the potential to become an annual flood. Apart from that, the water in this lagoon can be used as a water source for cultivating water spinach, <i>Keben</i> plants, and other plants that are cultivated by the management team.<br><b>Regulating Services:</b><br>This area can support the water needs of surrounding plants while maintaining balance in the area that tends to be dry due to the influence of weather and the karst hill landscape.<br><b>Supporting Services:</b><br>As an area that is always wet, this area is a point for aquatic plants and freshwater biota to grow, thus supporting the sustainability of the ecosystem.<br><b>Cultural Services:</b><br>As a river flow surrounded by karst hills, this area offers beautiful and amazing views. This area is being developed as a selfie area, paddle boat area, and coastal environmental education area.  |
| e    | Australian pine forests, bushes, <i>Keben</i> trees, and fragrant screw-pine | Provisioning Services:<br>1. Genetic resources<br>2. Firewood potential<br>Regulating Services:<br>1. Bioremediation<br>2. Regulating the atmosphere and microclimate<br>3. Protecting from floods and high waves<br>Supporting Services:   | <b>Provisioning Services:</b><br>It guards the genetic resources as it becomes a protected area and food source for several biota that live in coastal environments. The genetic resources also come as biodiversity that is complex enough to be used as material for sustainable coastal environmental studies. Apart from that, some rotten (old) trees can also be used as firewood by the management team or even sold (in the form of charcoal).<br><b>Regulating Services:</b><br>It can become a bioremediation point so that the ecological quality of the coast is sustainable and it also provides a much better microclimate impact compared to other beaches with less plant density. As is known, the southern coastal area of East Java has high tides, therefore the plant is deliberately cultivated and functions as a natural wave breaker so that the coastal environment is not easily eroded by waves.   |



|   |   |   |  |
|---|---|---|--|
|   |   | <p>1. Ecosystem maintainer<br/>2. Nutrient cycle</p> <p>Cultural Services:</p> <p>1. Staycation friendly<br/>2. Amazing views<br/>3. Potential for Coastal Conservation Education</p>   | <p><b>Supporting Services:</b><br/>This area has an important role in providing good nutrition because certain plants can be used as food. Then, the existing plant density also supports ecosystem maintenance because the plants have good long-term resistance.</p> <p><b>Cultural Services:</b><br/>The density of the Australian pine plants can be an advantage of this area as a place to take photos, and rest, and also provides comfort for tourists to do their activities around the coastline because of the cool air. Apart from that, the complete existing vegetation can also be used as educational material for visitors on how to maintain the ecosystem, especially plants around the coastline.</p>  |
| f | Estuary, mangrove vegetation, beach ridge, tides    | <p>Provisioning Services:</p> <p>1. Provider of food resource<br/>2. Aesthetic resources</p> <p>Regulating Services:</p> <p>1. Controlling erosion and protecting from high waves<br/>2. Biological regulation<br/>3. Natural waste management</p> <p>Supporting Services:</p> <p>1. Ecosystem maintainer<br/>2. Nutrient cycle</p> <p>Cultural Services:</p> <p>1. Recreation and tourism<br/>2. Amazing views<br/>3. Potential for Coastal Conservation Education</p> | <p><b>Provisioning Services:</b><br/>River estuaries often transport a lot of materials from along the water flow so this area is also a point where mangrove cultivation can be carried out as well as providing food for fish or freshwater biota. Apart from that, its location is on the border between land and seawater, so this point has amazing natural beauty and aesthetic resources.</p> <p><b>Regulating Services:</b><br/>The tidal area is planted with several coastal vegetation such as mangroves and fragrant screw-pine as natural wave breakers and to control coastal erosion. Apart from that, this area limits interaction between land and coastal waters so that one of its functions is to catch all the pollution before it enters seawaters (natural drainage).</p> <p><b>Supporting Services:</b><br/>Cultivation of mangroves and fragrant screw-pine around coastal areas and river estuaries is an indication of a good nutrient cycle for the surrounding biota. It has the potential to provide food for residents and also functions as a sustainable maintenance of coastal ecosystems.</p> <p><b>Cultural services:</b><br/>The beach ridges that stretch along the coastline function as a place for all tourist recreational activities (camping grounds, beach volleyball, silent tourism, sand tourism for children, and potential ATVs for visitors). The beautiful beach which directly borders the coastline surrounded by karst mountains or hills also provides high scenic quality. This point can also function as educational material for visitors to work together in maintaining the sustainability of the coastal environment.</p> |
| g | Sandy beach, fisheries, seagrass, and reef material | <p>Provisioning Services:</p> <p>1. Provider of food resource<br/>2. Aesthetic resources</p> <p>Regulating Services:</p> <p>1. Regulating the atmosphere and sea environment</p> <p>Supporting services:</p> <p>1. Ecosystem maintainer<br/>2. Nutrient cycle</p> <p>Cultural Services:</p> <p>1. Recreation and tourism<br/>2. Amazing views<br/>3. Potential for Coastal Conservation Education</p>   | <p><b>Provisioning Services:</b><br/>This is an area where local fishermen earn income and source food from fishery products, seaweed products, and other protein ingredients from fishery products. This area also has a high aesthetic resource value because of its clear blue waters and is bordered by karst mountains as a special view.</p> <p><b>Regulating Services:</b><br/>Underwater biomes such as seagrass and reef material provide a good sign that the waters of Perawan Beach are in good condition so the ecosystem needs to be maintained sustainably.</p> <p><b>Supporting Services:</b><br/>As explained in regulating services, biome density, clean seawater, and good physical condition of sea water indicate nutrient richness and maintenance of sustainable ecosystem cycles. Apart from that, the establishment of Ocean Farmits also seems to provide great support for the maintenance of the grouper fish ecosystem cultivated by the management.</p> <p><b>Cultural Services:</b><br/>The calming sea view is also the main attraction at Perawan Beach. This is also supported by the construction of Ocean Farmits which also provides accommodation in floating houses and even education on marine resource management. Apart from that, boat rental services can also be used as economic income for local fishermen in addition to their income from fishing.</p>  |

## CONCLUSION

Perawan Beach has great potential to be developed as a sustainable beach tourism destination. With clean white sand and a calm atmosphere, this beach offers beautiful views and a beautiful atmosphere. Other attractions, such as the Gundang Wetan Estuary and the Pedotan Lagoon, add to the attractiveness of this beach, although more attention is needed to infrastructure and management systems to increase tourist visits. Initiatives such as the construction of Ocean Farmits, which combines a fish farming system and a floating hotel, as well as promotions through virtual reality show positive steps in utilizing the potential of this beach optimally and sustainably.

The main challenges in developing Perawan Beach as a sustainable tourism destination include infrastructure problems, ineffective promotion, and geographic conditions that limit certain water tourism activities. However, there

are great opportunities through a coastal ecosystem services (CES) approach, which emphasizes the importance of environmental maintenance and education on coastal vegetation management. Researcher found that provisioning service and cultural service became major opportunity in Perawan beach. But in case of supporting service have minimum attention which mean that the indicator should be developing in the future.

Initiatives such as river tracing activities and conservation education in the Gundang Wetan Estuary, as well as the use of water resources in Pedotan Lagoon, show that ecosystem-based development can increase tourist attraction and provide sustainable economic benefits for local communities. Limitation on this research is that research only focuses on qualitative approach and the number of key informants was only based on the purposive technique Since the primary data was based on key informants as stakeholder, this research was lack of information about CES beneficial directly to visitor. Thus for further research it can be explored by using quantitative research or mixed methods, especially related to the level of tourist or visitor satisfaction with the CES strategy.

**Author Contributions:** Conceptualization, A.W.S and S.S; methodology, A.W.S and S.S; software, A.W.S; validation, S.S; formal analysis, A.W.S; investigation, A.W.S and S.S; data curation, A.W.S; writing - original draft preparation, A.W.S and S.S; writing - review and editing, A.W.S; visualization, A.W.S; supervision, S.S; project administration, S.S. All authors have read and agreed to the published version of the manuscript.

**Funding:** Not applicable.

**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** The data presented in this study may be obtained on request from the corresponding author.

**Acknowledgments:** The research undertaken was made possible by the equal scientific involvement of all the authors concerned.

**Conflicts of Interest:** The authors declare no conflict of interest.

## REFERENCES

- Beedie, P. (2017). Qualitative research: An application to tourism. In *Research Methods for Tourism Students*. 79 - 95 Routledge.
- Booi, S., Mishi, S., & Andersen, O. (2022). Ecosystem Services: A Systematic Review of Provisioning and Cultural Ecosystem Services in Estuaries. *Sustainability*, 14(12), Article 12. 1-19. <https://doi.org/10.3390/su14127252>
- Brščić, K., Prats Planaguma, L., Raschi, A., Marchi, V., Sugar, T., Lovrečić, K., & Poljuha, D. (2020). Can indicators for sustainable tourism improve tourism planning in the coastal destinations? Empirical evidence from Catalonia, Istrian Region and Tuscany Region. *Tourism: An International Interdisciplinary Journal*, 68(2), 144–155. <https://doi.org/10.37741/t.68.2.3>
- Chen, C. L., & Teng, N. (2016). Management priorities and carrying capacity at a high-use beach from tourists' perspectives: A way towards sustainable beach tourism. *Marine Policy*, 74, 213–219. <https://doi.org/10.1016/j.marpol.2016.09.030>
- Cheng, X., Van Damme, S., Li, L., & Uyttenhove, P. (2019). Evaluation of cultural ecosystem services: A review of methods. *Ecosystem Services*, 37, 1-10. 100925. <https://doi.org/10.1016/j.ecoser.2019.100925>
- Cheung, K. S., & Li, L. H. (2019). Understanding visitor–resident relations in overtourism: Developing resilience for sustainable tourism. *Journal of Sustainable Tourism*, 27(8), 1197–1216. <https://doi.org/10.1080/09669582.2019.1606815>
- Coccosis, H., & Mexa, A. (2017). *The Challenge of Tourism Carrying Capacity Assessment: Theory and Practice*. 1-15. Routledge.
- Corbin, J., & Strauss, A. (2014). *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. 85-105. SAGE Publications.
- Creswell, J. W., & Creswell, J. D. (2017). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. 120 - 133. SAGE Publications.
- Daniel, T. C., Muhar, A., Arnberger, A., Aznar, O., Boyd, J. W., Chan, K. M. A., Costanza, R., Elmqvist, T., Flint, C. G., Gobster, P. H., Grêt-Regamey, A., Lave, R., Muhar, S., Penker, M., Ribe, R. G., Schauppenlehner, T., Sikor, T., Soloviy, I., Spierenburg, M., & von der Dunk, A. (2012). Contributions of cultural services to the ecosystem services agenda. *Proceedings of the National Academy of Sciences*, 109(23), 8812–8819. <https://doi.org/10.1073/pnas.1114773109>
- DIKST. (2023, August 19). Ocean Farm ITS (OFITS). *SAINS TECHNO PARK*. <https://www.its.ac.id/stp/2023/08/19/ocean-farm-its-ofits/>
- Dimitrovski, D., Lemmetyinen, A., Nieminen, L., & Pohjola, T. (2021). Understanding coastal and marine tourism sustainability—A multi-stakeholder analysis. *Journal of Destination Marketing & Management*, 19, 100554. <https://doi.org/10.1016/j.jdmm.2021.100554>
- Drius, M., Bongiorno, L., Depellegrin, D., Menegon, S., Pugnetti, A., & Stifter, S. (2019). Tackling challenges for Mediterranean sustainable coastal tourism: An ecosystem service perspective. *Science of The Total Environment*, 652, 1302–1317. <https://doi.org/10.1016/j.scitotenv.2018.10.121>
- Fang, W., & Dakui, Z. (2014). The Study on Strategy of Sustainable Development in Coastal Tourism Resources from the Global Change Perspective. *Journal of Resources and Ecology*, 5(1), 32–41. <https://doi.org/10.5814/j.issn.1674-764x.2014.01.004>
- Furlan, E., Derepasko, D., Torresan, S., Pham, H. V., Fogarin, S., & Critto, A. (2022). Ecosystem services at risk in Italy from coastal inundation under extreme sea level scenarios up to 2050: A spatially resolved approach supporting climate change adaptation. *Integrated Environmental Assessment and Management*, 18(6), 1564–1577. <https://doi.org/10.1002/ieam.4620>
- Gössling, S., Ring, A., Dwyer, L., Andersson, A. C., & Hall, C. M. (2016). Optimizing or maximizing growth? A challenge for sustainable tourism. *Journal of Sustainable Tourism*, 24(4), 527–548. <https://doi.org/10.1080/09669582.2015.1085869>
- MEA (Ed.). (2005). *Ecosystems and human well-being: Wetlands and water synthesis: a report of the Millennium Ecosystem Assessment*. World Resources Institute.

- Mejjad, N., Rossi, A., & Pavel, A. B. (2022). The coastal tourism industry in the Mediterranean: A critical review of the socio-economic and environmental pressures & impacts. *Tourism Management Perspectives*, 44, 101007. <https://doi.org/10.1016/j.tmp.2022.101007>
- Mendoza-González, G., Paredes-Chi, A., Méndez-Funes, D., Giraldo, M., Torres-Irineo, E., Arancibia, E., & Rioja-Nieto, R. (2021). Perceptions and Social Values Regarding the Ecosystem Services of Beaches and Coastal Dunes in Yucatán, Mexico. *Sustainability*, 13(7), Article 7. <https://doi.org/10.3390/su13073592>
- Neger, C. (2022). Ecotourism in crisis: An analysis of the main obstacles for the sector's economic sustainability. *Journal of Ecotourism*, 21(4), 311–333. <https://doi.org/10.1080/14724049.2021.1942019>
- Phelan, A. (Any). Ruhanen, L., & Mair, J. (2020). Ecosystem services approach for community-based ecotourism: Towards an equitable and sustainable blue economy. *Journal of Sustainable Tourism*, 28(10), 1665–1685. <https://doi.org/10.1080/09669582.2020.1747475>
- Picard, D. (2015). Making ecotourism sustainable: Refocusing on economic viability. Lessons learnt from the “Regional strategic action plan for coastal ecotourism development in the South Western Indian Ocean.” *Journal of Sustainable Tourism*, 23(6), 819–837. <https://doi.org/10.1080/09669582.2015.1019512>
- Pung, J., & Chiappa, G. (2020). An exploratory and qualitative study on the meaning of transformative tourism and its facilitators and inhibitors. *European Journal of Tourism Research*, 24, 2404–2404. <https://doi.org/10.54055/ejtr.v24i.406>
- Rojas, A. M., Ruiz-Agudelo, C. A., Diazgranados, M. C., Polanco, H., & Anderson, R. (2019). Approach to an integral valuation of mangrove's ecosystem services in a marine protected area. Colombian Pacific region. *Journal of Environmental Economics and Policy*, 8(3), 322–342. <https://doi.org/10.1080/21606544.2019.1584127>
- Romero-Padilla, Y., Navarro-Jurado, E., & Malvárez-García, G. (2016). The potential of international coastal mass tourism destinations to generate creative capital. *Journal of Sustainable Tourism*, 24(4), 574–593. <https://doi.org/10.1080/09669582.2015.1101125>
- Sima, M., Dumitrascu, M., Grigorescu, I., & Costache, A. (2024). Tourists' perception of socio-cultural values of ecosystem services and management perspectives at the Vadu wild beach, Danube Delta Biosphere Reserve, Romania. *Ocean & Coastal Management*, 257, 107312. <https://doi.org/10.1016/j.ocecoaman.2024.107312>
- Sumarmi, Bachri, S., Sholeha, A. W., Kurniawati, E., Hakiki, A. R., & Hidiyah, T. M. (2023). Development Strategy for Special Interest Tourism (sit) Through Community-Based Ecotourism (cbet) in Perawan Beach to Promote a Sustainable Economy. *GeoJournal of Tourism and Geosites*, 48, 696–708. <https://doi.org/10.30892/gtg.482spl03-1069>
- Sumarmi, S., Bachri, S., Purwanto, P., Zubaidah, S., Shrestha, R. P., & Sholiha, A. W. (2022). Assessing Bedul Mangrove Ecotourism Using Green and Fair Strategy Empowerment to Fulfill SDGs 2030 Agenda for Tourism. *Environmental Research, Engineering and Management*, 78(2), Article 2. <https://doi.org/10.5755/j01.arem.78.2.31006>
- Sumarmi, S., Bachri, S., Putra, A., Hakiki, A. R., Hidiyah, T., & Osman, S. (2023). Pengembangan web virtual tour berbasis adventure untuk branding pantai perawan Di Kabupaten Malang. *Jurnal Praksis Dan Dedikasi Sosial (JPDS)*, 6, 172. <https://doi.org/10.17977/um032v6i2p172-183>
- Sunkur, R., Kantamaneni, K., Bokhoree, C., & Ravan, S. (2023). Mangroves' role in supporting ecosystem-based techniques to reduce disaster risk and adapt to climate change: A review. *Journal of Sea Research*, 196, 102449. <https://doi.org/10.1016/j.seares.2023.102449>
- Tripadvisor. (2016). *Pantai Perawan (Malang, Indonesia)—Review*. Tripadvisor. [https://www.tripadvisor.co.id/Attraction\\_Review-g297710-d11717465-Reviews-Perawan\\_Beach-Malang\\_East\\_Java\\_Java.html](https://www.tripadvisor.co.id/Attraction_Review-g297710-d11717465-Reviews-Perawan_Beach-Malang_East_Java_Java.html)
- Williams, A. T., Rangel-Buitrago, N. G., Anfusio, G., Cervantes, O., & Botero, C. M. (2016). Litter impacts on scenery and tourism on the Colombian north Caribbean coast. *Tourism Management*, 55, 209–224. <https://doi.org/10.1016/j.tourman.2016.02.008>

Article history: Received: 03.09.2024      Revised: 05.12.2024      Accepted: 03.01.2025      Available online: 31.01.2025