

Mapping the Potential and Distribution of Ecotourism on Ambon Island, Maluku, Indonesia

Fredy Leiwakabessy*, Muhammad Tarmizi Kubangun, Eifan Boyke Pattiasina

Study Program of Biology Education, Faculty of Teacher Training and Education, Universitas Pattimura, Ambon 97233, Maluku, Indonesia

*Corresponding author: edy.leiwakabessy@lecturer.unpatti.ac.id

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Abstract. Tourism in Indonesia now plays a significant role in providing benefits to the country's economic, social, and cultural activities. The development of nature-based tourism, or what we know as ecotourism, which emphasizes local culture and wisdom, is now being widely considered in various regions to attract tourists. Data management was carried out by analyzing community perception questionnaires related to the potential and distribution of ecotourism in the form of graphs of respondent personal data, ecotourism attractions, ecotourism facilities, community participation, and environmental impacts. Also, inputting tourist location coordinate data into ArcGIS 10.8 software, then creating a database that will be supplemented with non-spatial data. The results of the study, based on a tourist survey and questionnaire results, showed that the 10 ecotourism locations were favored by both local and foreign tourists in terms of facilities, ecotourism location attractions, community participation, and environmental impacts of the ecotourism locations.

Keywords: distribution ecotourism, mapping, potential

INTRODUCTION

Currently, tourism contributes significantly to Indonesia's economic, social, and cultural growth. Nature-based tourism, which emphasizes local culture and wisdom, is now widely promoted in various regions to attract tourists. This is known as ecotourism or ecotourism. Ecotourism is tourism that protects the environment, generates income, and preserves local culture. This aligns with conservation principles. (Nugroho et al., 2018).

Ecotourism is a combination of tourism markets and the application of environmentally friendly practices to develop sustainable natural resources (Ouattara et al., 2016). The development of the tourism sector is one of the leading sectors in the national economy that always needs to be developed and improved. If viewed from the socio-economic aspect, it can increase community income, expand employment opportunities, increase government income, increase foreign exchange earnings, increase national entrepreneurship and can help encourage development in the region (Maulana and Aprianto, 2018)

Ecotourism is a type of tourism that focuses on environmental conservation, local economic development, education, and training. Thus, ecotourism increases local income, especially for those starting businesses such as trade in the area. Therefore, ecotourism has an economic impact on the communities involved in this activity. (Sari et al., 2022). Tourism, while difficult to define, can improve a country's social, economic, and environmental well-being (Telfer & Sharpley, 2015). However, to fulfill its revolutionary potential, practicality, precision, and efficacy are required (Harianto et al., 2020). Describe tourism potential as a complex web of social, cultural, economic, and infrastructural factors. This initiative attracts tourists with its'appealing melody of accessibility and lofty quest of guardianship over multiple valuable resources, producing a tapestry of attraction that captivates the adventurous soul (Saner et al., 2019). Underutilization still occurs across various paradigms and sectors, awaiting transformation (Ramírez-Guerrero et al., 2021).

As the world's largest and fastest-growing economic subsector, tourism is a key sector. Developing people, especially local communities, who interact directly with tourists to achieve equality, exchange, and mutually beneficial cooperation is a top priority for tourism. (Baiquni, 2010). The development of primary tourism products, both tangible and intangible, is crucial as

a primary attraction that draws visitors. They hope to experience and learn about the unique products of the destination. Because many aspects are related to the product itself, this will be followed by the development of product diversification. (Benur & Bramwell, 2015). This means that tourism not only serves as a source of foreign income, but also serves as a tool to expand and equalize employment opportunities, encourage regional development, most importantly, improve the welfare and prosperity of the people, and enrich national culture to maintain national identity and preserve the function and quality of the environment. With this determination, the government has begun to pay serious attention to the tourism industry and continues to promote tourism in various locations according to local characteristics.

Ambon Island's tourism resources are highly diverse, with culinary, natural, historical, socio-cultural, and social tourism spread across Ambon City and Central Maluku Regency (Saimima et al., 2018). Furthermore, Ambon Island's tourism sector still has considerable room for future development, as demonstrated by its suboptimal management (Meturan et al., 2021). Beaches and hills are among the most attractive tourist destinations due to their natural beauty. Beach and hill tourism in eastern Indonesia is highly sought after by tourists, especially those in Ambon Island. Ambon Island boasts several beaches and hills, including Namalatu Beach, Pintu Kota Beach, Paralayang Hill, Natsepa Beach, Beby Tial Beach, and Hunimua Beach.

Furthermore, this research is an implementation of Pattimura University's Core Scientific Pattern (PIP). Furthermore, the results of the community assessment of ecotourism potential and the creation of an ecotourism distribution map are expected to impact tourism-based economic growth in Ambon Island. This will enable Ambon Island, Maluku Province, to meet the Sustainable Development Goals (SDGs).

METHODS

Determining the Research Location

To select the research locations, a survey of tourist attractions in Ambon Island was conducted; there were ten stations focusing on marine and land tourism. These stations were selected using purposive sampling, which means selecting based on known characteristics.

Data Collection

Primary

In the data collection process, spatial and non-spatial data, such as the coordinate points of tourist locations taken using GPS, photos of tourist locations, and others were collected through observation and filling out questionnaires by local community members.

Secondary

Identification of the study subject and research of related literature is part of the preparation process.

Research Location

The research locations for the distribution of marine tourism objects on Ambon Island are only in Nusaniwe District and South Leitimur District and for Serimau District, Teluk Ambon District and Teluk Ambon Baguala District do not have marine tourism objects or destinations (Figure 1) (Primary Research, 2025). The stations at this location were selected using the purposive sampling method, namely determination based on known characteristics.

RESULTS AND DISCUSSION

Result

The results of the analysis and construction of a map of the distribution of marine and land ecotourism in Ambon Island can be seen in Table 1 and Figure 1.

Table 1. Ecotourism Locations on Ambon Island

Tourism Category	Number of Locations	Location Name
Beach Tourism	9	Namalatu Beach, Pintu Kota Beach, Natsepa Beach, Beby Tial Beach, Hunimua Beach, Lubang Buaya Beach, Nitanghahai Beach, Moki Beach, Halassy Beach
Hill Tourism	1	Paralayang
Total	10	

Based on the data on the distribution of marine tourism objects obtained from the Maluku Province Tourism Office (Table 1), the researcher then conducted spatial mapping using Geographic Information Systems (GIS) at these locations and in the results of this study, the researcher explains the spatial distribution of marine tourism objects based on the administrative location of the sub-districts on Ambon Island, namely as follows:

Spatial Distribution of Ecotourism in Ambon Island

Table 1 shows that the distribution of marine tourism objects in Ambon Island is only found in Nusaniwe District and South Leitimur District and for Serimau District, Teluk Ambon District and Teluk Ambon Baguala District do not have marine tourism objects or destinations.

Based on data obtained from the Maluku Provincial Tourism Office, mapping and field surveys were conducted to produce a map of the distribution of marine tourism objects in each sub-district on Ambon Island, one of which is Nusaniwe Sub-district. The spatial distribution of marine tourism objects in Nusaniwe Sub-district can be seen in Figure 1.

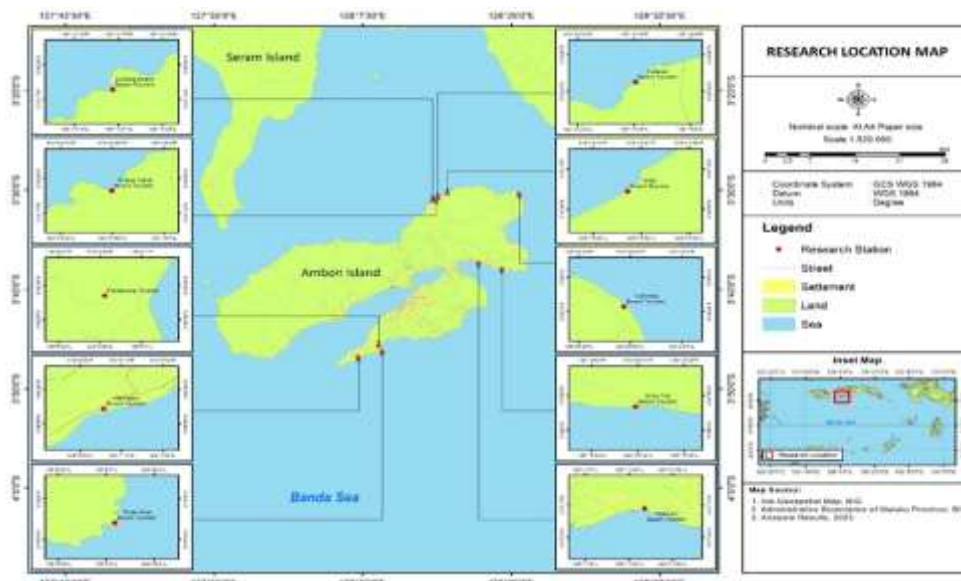


Figure 1. Research location map of Ecotourism Distribution in Ambon Island, Maluku

Based on the analysis and construction of an ecotourism distribution map in Ambon Island using ArcGIS 10.8 software, a total of 10 tourist locations with ecotourism potential were identified. This primary data was collected through field surveys and geographic mapping. These locations are divided into two main categories: coastal tourism and hill tourism. Ecotourism in Ambon Island tends to dominate coastal areas, reflecting the Island's geographical characteristics as an archipelago. These 10 tourist locations are popular among

both local and international tourists.

Identification of Tourist Attractions using Non-Participant Observation Techniques and Google Earth Imagery can be seen in Figure 2.

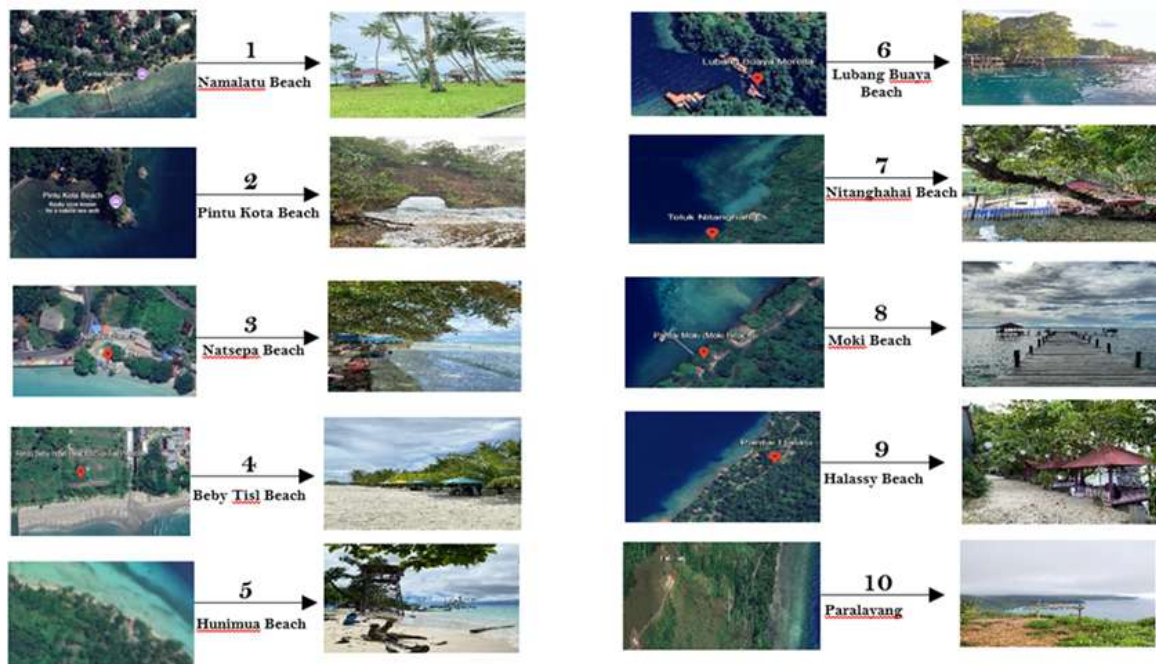


Figure 1. Figure 2. Identification of Tourist Attractions Using Non-Participant Observation Techniques and Google Earth Imagery in Ambon Island, Maluku

Based on the results of the questionnaire distributed randomly to 50 respondents from three age categories, namely 15 – 30 years (80%), 30 – 40 years (6%) and 40 – 60 years (16%) which are presented in Figure 3.

From the random results of respondents at Ecotourism Locations in Ambon Island, which amounted to 50 respondents, the dominant respondents were female respondents (66%) and male respondents (34%) as presented in Figure 4.

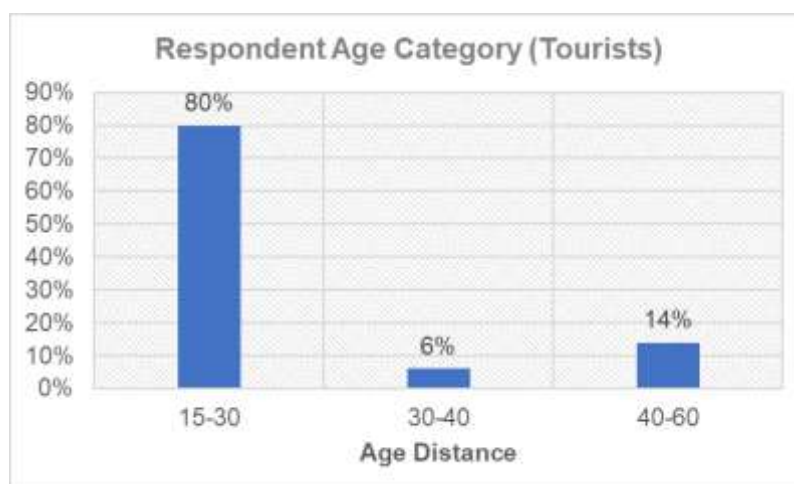


Figure 3. Respondent Age Category (Tourists)

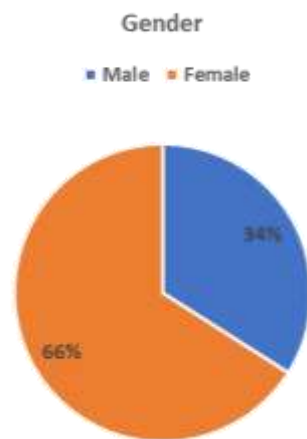


Figure 4. Respondent Gender Category (Tourists)

Each respondent who was randomly selected in the ecotourism area in Ambon Island had different levels of education, namely elementary school (22%), junior high school (2%), high school (26%) and undergraduate (50%) which are presented in Figure 5.

The respondents interviewed came from various work backgrounds as presented in Figure 3, namely Students (42%), Doesn't Work (12%), PNS (8%), BUMN (2%), Police (2%), Housewives (IRT) (2%), School Students (18%), Self-Employed (12%), Fishermen (2%) as presented in Figure 6.

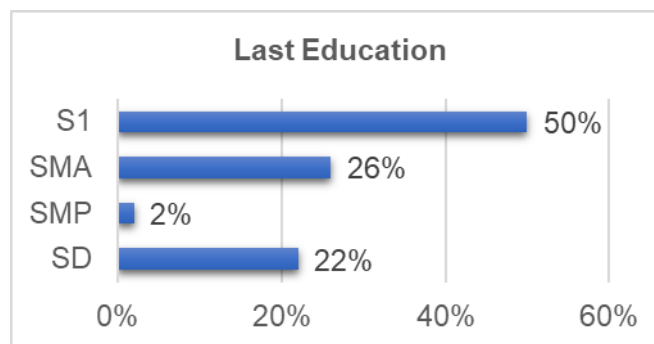


Figure 5. Respondent's Last Education

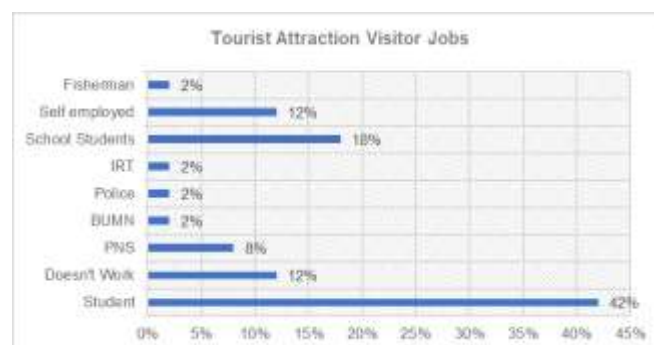


Figure 6. Respondent's Occupation (Tourist)

The results of the questionnaire to respondents regarding the ecotourism attractions in Ambon Island for the categories of beaches (48%), local cuisine (16%), environmental education (18%), environmental education (10%) and mountains (8%) are presented in Figure 7.

The results of the questionnaire to respondents regarding the facilities available at ecotourism sites in Ambon Island, namely the availability of public toilets with a percentage of (51%), provision of trash bins (9%), availability of electricity (15%), resting places (8%), availability of clean water (17%), environmental education (10%) and mountains (8%) are presented in Figure 8.

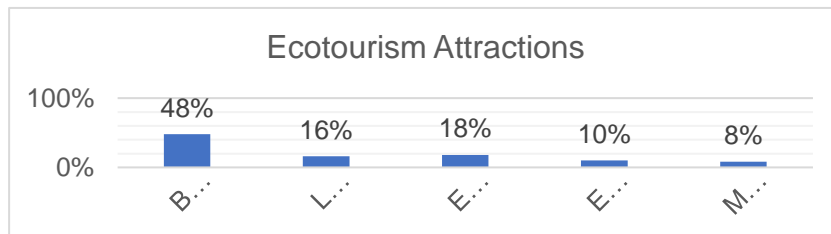


Figure 7. Ecotourism Attractions

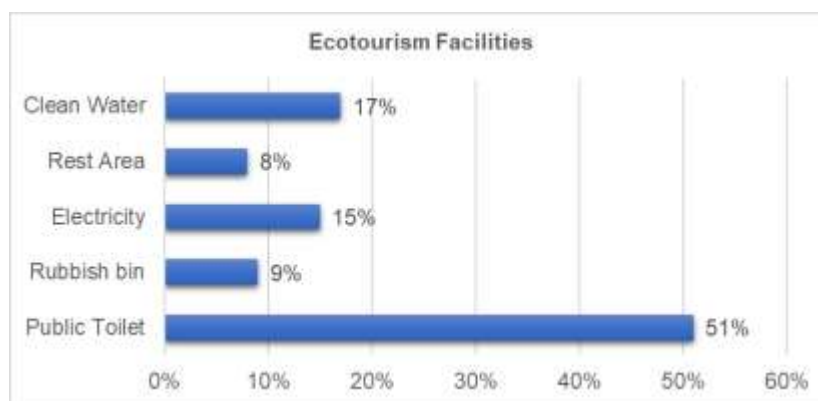


Figure 8. Ecotourism Facilities

The results of the questionnaire to respondents regarding community participation in ecotourism sites in Ambon Island were that tourist sites provide accommodation with a percentage of (48%), economic significance (16%), environmental conservation (18%), facility management (10%) and the presence of tour guides (8%). Figure 9.

The results of the questionnaire to respondents regarding the environmental impacts of ecotourism sites obtained were that ecotourism sites have a clean environment with a percentage (56%), garbage accumulation (8%), a fairly clean environment (20%), a very clean environment (10%), and a dirty environment (6%). The results of the questionnaire from respondents covering 10 ecotourism sites in Ambon Island can be seen in Figure 10.

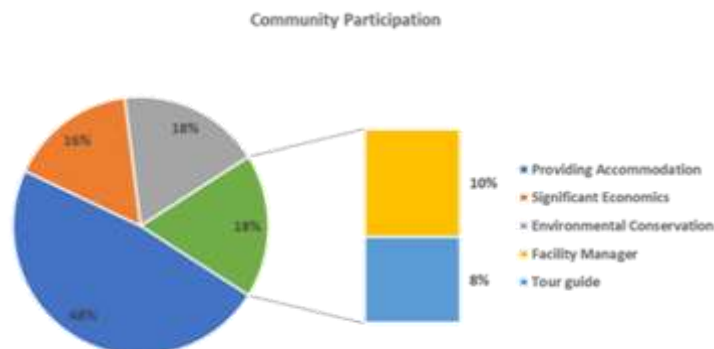


Figure 9. Community Participation in Ecotourism

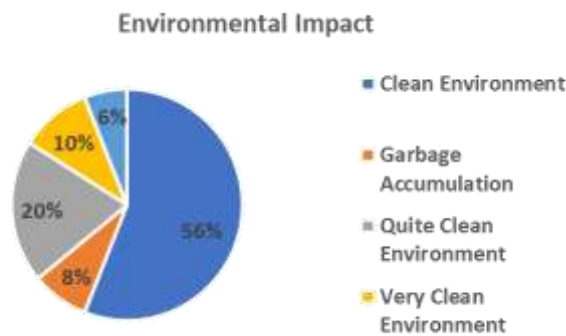


Figure 10. Environmental Impacts in Ecotourism Sites

As presented in Table 3, the square root of the AVE for each construct is higher than its correlations with the other constructs. This indicates that each latent variable shares more variance with its own indicators than with other variables in the model, thereby confirming satisfactory discriminant validity according to the Fornell-Larcker criterion.

In addition to the Fornell-Larcker criterion, discriminant validity was further evaluated using the heterotrait-monotrait ratio (HTMT), which is considered a more stringent test of construct distinctiveness. The HTMT results are reported in Table 4.

Table 4. Discriminant Validity Using the HTMT Ratio

Construct	Collaboration	Flexibility	Agility	Robustness
Collaboration	—	0.75	0.7	0.68
Flexibility	0.75	—	0.74	0.72
Agility	0.7	0.74	—	0.77
Robustness	0.68	0.72	0.77	—

Ecotourism is a tourist trip to areas with pristine natural environments, respecting cultural and natural heritage, supporting conservation efforts, not producing negative impacts, and providing socio-economic benefits and respecting the participation of local residents

DISCUSSION

The strategy for developing marine tourism potential, namely in the ecological dimension by applying the concept of ecotourism in the utilization of tourism activities can maintain the sustainability and preservation of existing resources. In the socio-economic dimension, the strategy for developing marine tourism potential is carried out by focusing on the role of stakeholders in improving the community's economy, promoting existing resources, improving coordination between SMEs and making formal education accessible to local communities (Kurniawan et al., 2016). The presence of these locations indicates that Ambon Island has a competitive advantage in developing coastal-based ecotourism, such as snorkeling, diving, and coral reef conservation. To ensure long-term sustainability, careful planning of tourism development must be carried out, particularly considering the suitability and carrying capacity of coastal areas. Tourism carrying capacity is the number of people who can use an area without disrupting the physical, spiritual, and socio-economic and cultural environment (Sofyan, 2019). Visitor numbers exceeding the area's carrying capacity can impact overall visitor comfort and satisfaction, as well as the environment (Aliyeva et al., 2020).

Ecological resilience is the ability of an area to adapt to external disturbances. However, ecological resilience is limited, while human pressures are unlimited (Ma et al., 2017). Consequently, analyzing ecotourism carrying capacity is crucial because resource sustainability

will be threatened if tourism numbers are not limited (Arinta et al., 2022). To support ecotourism, suitability and carrying capacity are necessary, and stakeholders must also play a role in sustainable ecotourism development. In tourism, synergy is crucial for developing tourism potential. To help tourism stakeholders develop destinations, a synergy model is needed (Berliandaldo, 2021). Other studies have also highlighted the importance of waste management to maintain cleanliness and tourist comfort, which are directly proportional to visitor satisfaction (Meyer et al., 2020). As one of Ambon Island's leading tourist destinations, Natsepa Beach boasts strong marine tourism potential, enhanced by its white sand and crystal-clear waters. Furthermore, the beach is renowned for its signature rujak (traditional Indonesian salad) cuisine. However, several studies have shown a decline in tourist visits due to declining service quality and a lack of attention to environmental cleanliness.

ubang Buaya Beach, located in Morela Village, West Leihitu District, is known for its unique natural features, including turquoise water and coral formations that resemble large holes. This beach is a favorite spot for diving and snorkeling due to its stunning underwater beauty. Its development is still largely managed by the local community, but research indicates that this potential needs further development to become an integrated and sustainable ecotourism destination (Nur et al., 2017). Meanwhile, references specifically related to Hunimua Beach, Nitang Hahai Beach, Moki Beach, Halassy Beach, and Beby Tial Beach are still limited in accessible scientific literature. However, based on a general analysis of ecotourism distribution patterns, it can be assumed that these beaches also have similar ecotourism potential to other beaches in Ambon, namely marine tourism. On the other hand, the existence of hill tourism such as paragliding indicates a diversification of ecotourism potential, although the number is still limited. These locations offer adventure tourism experiences and natural views from above, which can be an alternative attraction for tourists who are not solely interested in marine tourism.

Maluku boasts a well-known tourist destination, serving as an icon of Ambon Island, encompassing both beach and hill tourism. Ambon Island's tourism potential, particularly its beaches, can be transformed into diving destinations (Rumerung et al., 2023).. Brief interviews with visitors to the beaches and hills revealed that all facilities provided are solely the property of the management. Ecotourism is a tourist trip to areas with pristine natural environments, respecting cultural and natural heritage, supporting conservation efforts, not producing negative impacts, and providing socio-economic benefits and respecting the participation of local residents. The attractiveness of ecotourism sites in Ambon Island that were studied has several parameters or indicators that become the attractiveness of ecotourism sites that can be seen in Figure 4.6 related to the attractiveness of ecotourism sites in Ambon Island, namely for the categories of beaches (48%), Local Culinary (16%), Environmental Education (18%), Environmental Education (10%) and Mountains (8%) so that ecotourism as a form of business or economic sector of natural tourism is formulated as part of sustainable development (Nugroho 2015).

Community-based ecotourism is an ecotourism development that supports and enables local community involvement in planning, implementation, and management (Tisnawati et al., 2019). All activities are carried out by a group of local people for profit. The community is more aware of the natural, socio-cultural conditions related to the tourist attractions they have so that they can be made into tourist destinations that can be visited by tourists (Hadiwinata et al., 2014). The results of the study show that respondents or tourists interviewed came from various occupational backgrounds presented in Figure 5, namely Students (42%), Unemployed (18%), Civil Servants (8%), State-Owned Enterprises (2%), Police (2%), Housewives (IRT)

(2%), Students (12%), Entrepreneurs (12%), Fishermen (2%). Figure 9 shows that community participation in ecotourism locations is very beneficial because community-based ecotourism has a positive impact on local communities and tourists (visitors) and also environmental and socio-cultural preservation so that it can foster a sense of self-confidence among local residents that develops through ecotourism activities (Hijriati & Mardiana, 2014).

Impact is a change that occurs as a result of an activity (Hijriati & Mardiana, 2014). If the balance of payments experiences a surplus, it will automatically strengthen Indonesia's balance sheet and vice versa, this is in accordance with the results obtained regarding community participation and environmental impacts in ecotourism sites that can be seen in Figure 8-9, namely community participation in ecotourism sites in Ambon Island, namely in tourist attractions providing accommodation with a percentage (48%), economic significance (16%), environmental conservation (18%), facility management (10%) and the presence of tour guides (8%) and the environmental impacts in ecotourism sites obtained are for ecotourism sites to have a clean environment with a percentage (56%), Garbage accumulation (8%), fairly clean environment (20%), very clean environment (10%) and dirty environment (6%).

The social aspect plays a crucial role in supporting the performance of the ecotourism sector. It involves not only identifying stakeholders but also organizing them to generate optimal economic benefits and incentives for each stakeholder. This suggests that the social aspect not only benefits local communities but also stakeholders who support ecotourism development. These stakeholders are anyone who can influence and be influenced by the ecotourism sector, including local communities, the government, the private sector, non-governmental organizations (NGOs), tourists, and other parties not directly involved in ecotourism. The roles and functions of stakeholders are as follows (Nugroho, 2015).

Planners and researchers are among the government stakeholders who use academic advice or products as input for policy formulation. These products include potential identification, mapping, resource threshold values, development ideas, and so on, all of which are used to develop ecotourism areas. The manager is a government agency responsible for carrying out operational management tasks in the field. Their primary responsibility is to operate the concession rights granted to them by the government and to organize the interests of private businesses, cooperatives, or other business entities, particularly operators, to participate in developing sustainable ecotourism services and providing quality service and visitor satisfaction. The private sector is a stakeholder in ecotourism operations. It provides various facilities and accommodations, information, tourism products, destinations, education and training programs, and quality services with the aim of attracting tourists and providing them with satisfying and rewarding experiences (Rahmanita et al., 2022).

The results of the study in Figure 7 regarding ecotourism facilities for tourists include the availability of public toilets (51%), provision of trash bins (9%), availability of electricity (15%), rest areas (8%), availability of clean water (17%), environmental education (10%), and mountains (8%). Visitors are the most important indicator of the success of ecotourism development. Visitors are the main driver of demand for ecotourism services. Visitors from outside the region can contribute to the local economy and are expected to provide incentives for better environmental management. Positive local values will spread globally, thus fostering understanding among a wider audience. Good service to visitors will become one of the promotional media for ecotourism or an entry point for cultural development (Rahmanita et al., 2022).

The results of the study indicate that the social aspect variable partially has a significant effect on the community-based ecotourism variable because cultural heritage factors, local

wisdom factors and socio-cultural tolerance factors are the main factors in maintaining an ecotourism. The environmental aspect variable partially has a significant effect on the community-based ecotourism variable because accessibility and amenities are the determining factors for tourist satisfaction when visiting a tourist attraction, because both are important factors needed by tourists. This can be explained that social and environmental aspects must be interrelated with each other so that what is the main goal in maintaining ecotourism in a tourist village can be achieved in accordance with what is desired by the local community, namely it is expected to provide a positive impact from the financial side of the local community.

CONCLUSIONS

The results of the research based on a tourist survey with questionnaire results show that the 10 ecotourism locations are popular with both local and foreign tourists. The results of the questionnaire to respondents regarding the facilities available at ecotourism sites in Ambon Island, namely the availability of public toilets with a percentage of (51%), provision of trash bins (9%), availability of electricity (15%), resting places (8%), availability of clean water (17%), environmental education (10%) and mountains (8%), The results of the questionnaire to respondents regarding the ecotourism attractions in Ambon Island for the categories of beaches (48%), local cuisine (16%), environmental education (18%), environmental education (10%) and mountains (8%), The results of the questionnaire to respondents regarding community participation in ecotourism sites in Ambon Island were that tourist sites provide accommodation with a percentage of (48%), economic significance (16%), environmental conservation (18%), facility management (10%) and the presence of tour guides (8%) and The results of the questionnaire to respondents regarding the environmental impacts of ecotourism sites obtained were that ecotourism sites have a clean environment with a percentage (56%), garbage accumulation (8%), a fairly clean environment (20%), a very clean environment (10%), and a dirty environment (6%). The results of the questionnaire from respondents covering 10 ecotourism sites in Ambon Island.

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