Sustainable Mangrove Ecotourism Performance in Aceh Jaya: Potential and Competitiveness Analysis

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Abstract. This study aimed to analyse potential and competitiveness of sustainable mangroves in Aceh Jaya region as an alternative tourism destination. The ecotourism potential was identified from the existing onsite biodiversity, while the competitiveness level was investigated by distributing a questionnaire to 100 visitors asked about their perceptions of attraction, accessibility, ancillary services, amenities and activities regarding the mangrove site. A qualitative descriptive analysis was used to investigate the ecotourism potential and the competitiveness level was evaluated by scoring the competitiveness attributes on a 1- to 4-point scale where 1.00-1.74 (very low); 1.75-2.49 (low); 2.50–3.24 (high); and 3.25-4.00 (very high). The results on the biodiversity assessment showed that there are six species of mangrove vegetations were detected at this site, including *Rhizopora mucronata*, *Rhizopora apiculat*a, *Rhizopora stylos*a, *Bruguiera cylindrical*, *Bruguiera gymnorhiza*, and *Nypah fruticans*. In this ecosystem, the existence of crocodiles in captivity and specific aquatic wildlife (i.e., *Cerithidea sp.*) was also observed. Regarding the competitiveness level, the highest performance score was the mangrove "attraction" (scored 3.29), followed by "amenities" (scored 3.06) and "ancillary services" (scored 2.99), whereas the others were scored with the lowest performance attributes. To increase competitiveness, it is necessary to improve transportation and public facilities at mangrove ecotourism location.

1 Introduction

Indonesia boasts the largest mangrove region throughout the world, contributing 21% of the world's mangrove. Currently, the coverage mangrove area reaches 3.36 million hectares, showing that Indonesia is important in preserving these vital coastal ecosystems. However,

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a deforestation, driven by various factors such as aquaculture expansion, logging, and land conversion, poses a significant threat for mangrove ecosystem. Forecasts indicate that the mangrove deforestation during 2021-2030 reach 38%. Such a loss would not only have consequences for the availability of natural resources but also exacerbate the vulnerability of coastal communities to the impacts of climate change [1].

Mangroves play an important role in carbon storage, protecting coasts from abrasion, and its potential can be used as source of income for communities' livelihood. The total economic value provided by the mangrove from its ecosystem services is estimated at USD 1.5 billion/year [2]. Besides, mangrove has also potential as eco-tourism resources, providing global attraction to achieve both of mangroves' sustainability and community economy.

Sustainable Mangrove Ecotourism is a multifaceted approach that aims to harmonize human engagement with mangrove ecosystems while preserving their ecological integrity. This approach recognizes that mangroves are not only ecological treasures but also valuable economic assets for local communities. By responsibly managing visitor activities and fostering an understanding of the ecological and cultural importance of mangroves, sustainable ecotourism can contribute to both the preservation of these ecosystems and the prosperity of coastal community.

Aceh Jaya Regency is one of the coastal regencies in the Aceh Province. Located in the Southwestern Coastal region, this regency has an abundant mangrove area which has rich resources to be managed to captivate tourist attractions. One of the tourist destinations found in Aceh Jaya Regency is the Mangrove Ecotourism of Aceh Jaya, located in Gampong Baro Village, covering approximately 300 hectares of mangrove area. This ecotourism site has been developed since 2017 and continues to expand.

Mangrove forests preserve a huge potential to be developed as nature-based tourist destinations which not only boost the community economy, but also contribute greatly to mangrove conservation [3-5]. Mangrove area in Aceh Jaya has the potential of living natural resources to tourism development, it has a beautiful view and comfortable environment. Visitors over the weekend showed the potential of the location as a competitive tourist location. The ecotourism site has been managed by the village-own enterprises. The simple management system has been implemented by imposing money on the mangrove area, taking care of the facilities provided for visitors, recording the number of visitors and the income from entry tickets. However, based on the potential of the mangrove, there is no available database of mangrove resource and its potentials. Therefore, this study is conducted with aims to identify the potential mangrove ecosystem and analyse the competitiveness level of sustainable mangroves in Aceh Jaya region as an alternative tourism destination.

2 Materials and methods

2.1 Research location

The research was conducted in Aceh Jaya Regency (Figure 1). The scope of research was focused on the potentials and competitiveness of mangrove ecotourism in Gampong Baro, Setia Bakti Sub-district, Aceh Jaya. The competitiveness assessed in this research was limited to the visitors' perspective on mangrove ecotourism performances.

2.2 Sampling method

The method used were purposive sampling, the respondents in this study is all mangrove ecotourism visitors. The sample size was determined 100 respondents, as this number considered enough to represent the population ecotourism visitors. The respondents have

been taken accidentally for those who visit the mangrove location during the period of data collection from March, 2nd to March, 19th 2023.

2.3 Data collection

Data collection was carried out through structured interviews by using valid and reliable questionnaires. The variables measured in this study include visitors' characteristics, mangrove ecotourism potentials, and ecotourism competitiveness. Visitors characteristics were visitors' age (X1), gender (X2) and occupation (X3). The mangrove ecotourism potential (Y1) consist of the types of mangrove species, the types of fauna and the provided services. Ecotourism competitiveness (Y2) was assessed through visitors' perspective on the ecotourism performance, consists of mangrove attraction, facilities, ancillary services, amenities and activities.

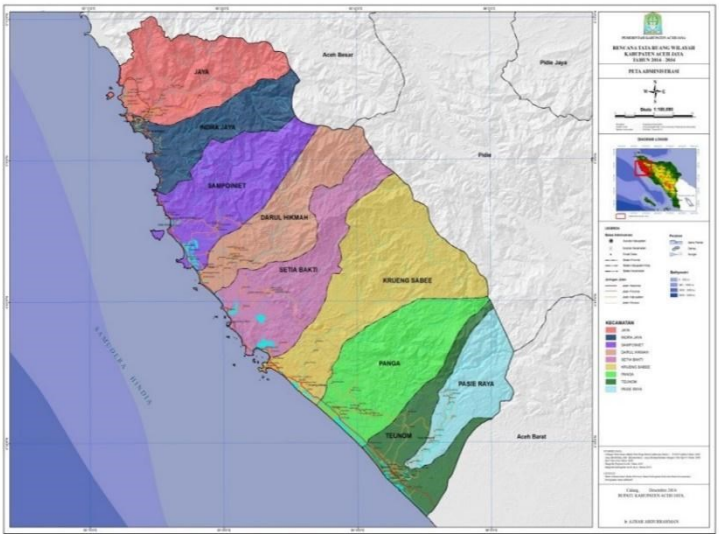

Fig. 1. The map of research location in Aceh Jaya Regency.

2.4 Data analyse

This research used descriptive and quantitative data analysis. Each variable in the questionnaire was measured using scores based on respondents' answers. We used the Likert scale to present the questionnaire data in 5 value levels: score 1 (very low), score 2 (low), score 3 (moderate), score 4 (high), and score 5 (very high). The competitiveness were defined through respondents perspective by scoring the indicators of competitiveness provided in ecotourism site. The level of competitiveness were analysed by calculating the average scored data, then the scores were grouped into four level categories as follows (Table 1):

Table 1. Level of mangrove ecotourism competitiveness.

No	Categories	Score
1	Low competitiveness	1.00 - 1.74
2	Moderate competitiveness	1.75 - 2.49
3	High competitiveness	2.50 - 3.24
4	Very high competitiveness	3.25 – 4.00

To evaluate the effect of visitors' perspective on mangrove competitiveness, the chi-square test was performed with the following formula (1). Where X^2 refers to chi-squared: Oi= observed value and E_i= expected value.

$$X^2 = \sum_{i=1}^{n} \frac{(O_i - E_i)^2}{E_i} \quad (1)$$

3 Results and discussion

3.1 Characteristics of respondents

Characteristics of respondents consist the age, gender and occupation of the mangrove ecotourism visitors. This study categorized the age groups of the Mangrove Ecotourism visitors into three groups: (1) teenagers aged 12-25 years, (2) early adults aged 26-45 years, and (3) late adults aged >45 years. The percentage of respondents based on age is presented in Table 2. The results showed that out of a total of 100 respondents, the number of tourists visiting the mangrove ecotourism with the age category of teenagers (aged 12-25) is 52% of the total respondents. The early adult age category within the range of 26-45 years' accounts for 36%, and the late adult age category above 45 years' accounts for 10% of the total respondents. These results indicate that the highest percentage of Mangrove Ecotourism visitors were the teenagers and early adults.

Table 2. Number and Percentage of respondents based on the age, gender, and occupation.

No	Respondents characteristics	Categories	Number of respondents	Percentage (%)
1	Age (years)	12-25	52	52.00
		26-45	36	36.00
		>45	12	12.00
2	Gender	Male	46	46.00
		Female	54	54.00
3	Occupation	Student	33	33.00
		Civil servants	26	26.00
		Private	13	13.00
		Farmers	17	17.00
		Others	11	11.00

From the gender of respondent, Table 2 showed that the visitors of mangrove ecotourism consist of female (53%) and male visitors (46%). This indicates that both men and women decide the Mangrove Ecotourism in Gampong Baro as their recreational or tourist destination. However, the frequency of females choosing Mangrove Ecotourism as their destination for tourism is higher compared to males. This could be attributed to the tendency of females to enjoy the beauty of nature. Compare to men, more women visited the tourist objects [6]. The primary motivation for females visiting tourist destinations is to enjoy the natural beauty and spend their leisure times with family or relatives [7]. Mangrove ecotourism is favoured as a tourist spot that offers scenic and pristine natural landscapes.

The last category is the occupation of respondents. The result showed that out of a total of 100 respondents, the highest number of visitors to the Mangrove Ecotourism is students/college students, they were still in formal education, either in junior high school, high school, or university. People in these age groups often go on trips with family and friends to spend their holidays or leisure time. This results also explained in Henri and Ardiwati research [8], that the highest number of tourist at ecotourism of Munjang Mangrove were

students and university students. Furthermore, the highest percentage of ecotourism visitors was government employees. This group of respondent consist of civil servants, military, and police personnel. The occupation of respondents the followed by the private sector employees and farmers. Visitors with other occupation statuses, counted 11% of the total respondents, include entrepreneurs or traders, housewives, and retirees.

3.2 Mangrove ecotourism potentials

The potentials of mangrove ecotourism in Aceh Jaya Regency is the existence of fauna, flora and the services. The results showed that there were six species of mangrove vegetation found in this ecotourism area: *Rhizophora mucronata, Rhizophora apiculata, Rhizophora stylosa, Bruguiera cylindrical, Bruguiera gymnorhiza,* and *Nypa fruticans*. The six species of mangrove plants can be classified into three families, ie *Rhizophoraceae, Acanthaceae,* and *Arecaceae* (Table 3). The mangrove ecotourism in Aceh Jaya has been enriched mangrove species and terrestrial fauna [9]. The terrestrial fauna potential in this ecotourism site includes birds, beetles, frog, snake, and monkeys while aquatic fauna such as pufferfish, mudskippers, snails, oysters, crabs, and clams can also be found. In this site was also founded reptiles ie monitor lizard and crocodiles. The appearance of these animals in the mangrove ecosystem indicates that the mangrove ecosystem still has an ecological function, and naturally the biodiversity in the site has not been damaged yet.

Table 3. The potential of mangrove can be utilized as ecotourism.

No	Resources	Types of resources	Description
1	Flora (mangrove species)	*Rhizophoraceae*	*Rhizophora mucronata* *Rhizophora stylosa* *Rhizophora apiculata* *Bruguiera gymnorrhiza*
		Acanthaceae	*Avicennia marina*
		Arecaceae	*Nypah Frutican*
2	Fauna	Mammals	Birds, beetles, frog, snake, monkeys
		Aquatic fauna	Shrimp, pufferfish, shellfish, snail
		Reptiles	Monitor lizard, crocodiles
3	Services	Location	Located 143 kilometres from capital city (Banda Aceh) Strategic location on the main city road
		Facilities	Boat, tracking mangroves, library, tour guides, tower, cafeteria, gazebo, parking, sanitation, praying room.

Furthermore, this ecotourism site offers tourism services, including location accessibility and facilities. The facilities include boats, library, mangrove tracking, tower, cafeteria, praying room, gazebo, parking facilities, sanitation and tour guides. The management of Aceh Jaya's mangrove ecotourism involves the local community in whole management such as the planning, implementation, and operation of the ecotourism business. However, this ecotourism site needs further development, necessitating studies on visitor satisfaction levels and strategies for the development of the mangrove ecotourism area in Aceh Jaya Regency.

3.3 Mangrove ecotourism competitiveness

The competitiveness of Mangrove Ecotourism defined as ability of mangrove ecotourism to provide their best performance in five aspects of tourism performance, consist of the

attractive, activities, ancillary services, accessibility and amenities. The visitors' perspective on the competitiveness indicators showed in Table 4. Based on Law No.10 of 2009 concerning Tourism, attraction refers to the uniqueness, beauty, and value of the diversity of natural wealth, culture, and human-made creations that become the destination of tourist visits. The attributes of the mangrove ecotourism's attraction in this study include the natural scenery, hospitality, sanitation, and visitors' satisfaction. Results showed that the visitors valued an excellence competitiveness on this indicator, which counted 49% in good perspective and 51 percent scored very good.

The mangrove ecotourism activities in this study included the availability of adequate facilities, the quality of facilities, parking area availability, ecotourism entrance fees, ticket purchasing methods and the cafeteria services. Results showed that the visitors have a varies perspectives on this indicator. Majority of respondents have a moderate perspective on the activities competitiveness, which showed in the questions about the quality of facilities, entrance fee and cafeteria services. The visitors argued that the cafeteria should provide a better quality services and the facilities should be managed because the condition for some facilities were poor. The entrance fee was valued as expensive based on the visitors' ability to pay. The poor value assigned for the limitedness of parking area, which on visitors' perspective that the parking area of mangrove ecotourism were cramped and inconvenience.

The ancillary services in this study observed the visitors' perspective on the competitiveness of the infrastructure, which consists of the access to of ecotourism areas, road conditions, and the availability of ecotourism signboards, street signs, and communication networks. The highest percentage of visitors (68%) have a good perspective on this indicator. There were a good condition of road and access to the mangrove area, which located nearby the main road. The signboard for ecotourism is only available on the site, and visitors hope to be completed with the street sign to gain better access to the site. The communication networks were limited for visitors, due to the lack of networks in the coastal areas.

Table 4. The distribution of respondents perspective based on the competitiveness of ecotourism in Aceh Jaya.

No	Indicators of competitiveness	Competitiveness perspective				Total
		Poor	Moderate	Good	Very good	
1	Attractive	0.00	0.00	49.00	51.00	100.00
2	Activities	4.00	58.00	35.00	3.00	100.00
3	Ancillary services	0.00	4.00	68.00	28.00	100.00
4	Accessibility	15.00	50.00	32.00	3.00	100.00
5	Amenities	0.00	3.00	72.00	25.00	100.00

The accessibility of mangrove ecotourism site consists of the availability of public transportation, information about accessible transportation services for visitors, and information about the availability of public transportation at the ecotourism location. Results showed that the visitors have a moderate perspective on the accessibility. The good competitiveness was shown by the availability of public transportation to the ecotourism site, however there were lack of information availability regarding the location, fares, schedules, routes, and transportation services. Therefore, the management can provide an information corner for visitors that provides access to the facilities provided by the mangrove ecotourism, including services related to transportation available to visitors.

The amenities of mangrove ecotourism indicators consist of the friendliness of the working staff, the readiness of rescue personnel, the safety of the environment around the ecotourism area, and the ability of staff to provide information regarding visitor's needs. This indicator was valued to have a good competitiveness due to the staff friendliness, the readiness of rescue personnel, and the ability of working staff to share the information asked by visitors. The moderate answers were find on the safety of the environment and the information availability about the safety of ecotourism rides.

Based on the visitors' perspective on mangrove ecotourism competitiveness, the scores of competitiveness level were performed in Table 5. In general, the Mangrove Ecotourism in Aceh Jaya has a high of competitiveness level. Based on its indicators, the attractive of ecotourism site was reported to have the highest competitiveness, while the lowest was the accessibility of mangrove ecotourism area. The indicators of attractive, ancillary services and amenities contribute to the high competitiveness score of mangrove ecotourism. Therefore, the ecotourism management should focus to increase the performance of activities and accessibility of mangrove ecotourism site to increase the competitiveness level.

Table 5. Level of mangrove ecotourism competitiveness.

No	Competitiveness Indicators	Score of competitiveness level	
		Scores	Categories
1	Attractive	3,29	Very high
2	Activities	2,42	Low
3	Ancillary services	2,99	High
4	Accessibility	2,30	Low
5	Amenities	3,06	High
Level of Competitiveness		2.69	High

Mangrove Ecotourism is one of the most visited places by tourists in Aceh Jaya due to its strategic location and the natural beauty. Moreover, the ecotourism area is located nearby the beach and shaded with numerous trees surrounding the mangrove site. The location also supported by good atmosphere to rides in mangrove areas. The study by Alvianna et al. [10] stated that attractions have a positive and significant impact on tourist satisfaction.

The facilities and transportation were a determining factors in customers' preferences to visit tourist destinations [11-12]. The low competitiveness of activities and accessibilities at the Mangrove Ecotourism in Aceh Jaya is due to the inadequate facilities. Visitors also faced difficulties in finding parking spots, and the available rides are limited. The better and more diverse the attractions offered, the higher the likelihood of tourists deciding to visit again. Therefore, the mangrove ecotourism must be well managed to improve the quality of services to provide better performance of competitiveness. These attributes include the natural scenery and ambiance, the available rides, the friendliness of the local community, the environment sanitation.

3.4 The determinant factors of mangrove ecotourism competitiveness

The determinants factors influenced the perspective to the competitiveness were studied by analysing effect of respondents' characteristics to their perspective on the mangrove ecotourism competitiveness (Table 6). The study results showed that there was no significant effect on visitors' occupation to the competitiveness level of mangrove ecotourism. Meanwhile, the visitors' gender and age were significantly affect their perspective on the attractive and ancillary services of mangrove ecotourism competitiveness.

The genders have a significant effect on ecotourism attractive and ancillary services. The distribution of respondent characteristics showed that females are dominated compare with male visitors. Woman have higher expectation on tourism site, their perspective on ecotourism competitiveness depends on the beauty and the diversity of natural view which brings the happiness for the visitors. Meanwhile, the male visitors expected the excellent of ancillary services at ecotourism site. Their perspective on competitiveness rely on the availability of the infrastructures, such as road conditions, parking areas, the signboards and communication networks.

Table 6. The distribution of significant value of chi-square analysis on effect of visitors' characteristics on mangrove ecotourism competitiveness perspective.

No	Competitiveness Indicators	Sig.		
		Gender	Age	Occupation
1	Attractive	0.05**	0.03**	0.45
2	Activities	0.73	0.09	0.47
3	Ancillary services	0.06*	0.06*	0.87
4	Accessibility	0.50	0.58	0.94
5	Amenities	0.07	0.42	0.30

Note: **) Significant at at the 0.05 level

The visitors age has a significant effect on ecotourism attractive and ancillary services. The distribution of respondent characteristics showed that more young age generation than others age visiting the mangrove ecotourism site. The young generation often visit the mangrove ecotourism to fill their leisure time with friends or family. They have a very good competitiveness perspective on mangrove ecotourism's attractive, such as natural beauty of mangroves and some photo spots that make them interest to visit the site. However, the older generation prefer their convenience and the availability of adequate facilities and infrastructure.

Based on the determinant factors analysis, the age and gender of the visitors were the important factors to be considered in developing the mangrove ecotourism facilities and infrastructures. The enhancement of mangrove ecotourism competitiveness need to focus on serving visitors with the natural beauty of mangroves and the improvements of infrastructure, especially on the safety of ecotourism rides.

4 Conclusion

The potentials of mangrove ecotourism were characterized by the specific of mangrove (flora and fauna) and the uniqueness of mangroves ecotourism location. Based on the visitors' perspective, mangrove ecotourism has a high level of competitiveness. Visitors perspectives of mangroves ecotourism competitiveness was determined by the age and gender. To increase competitiveness, it is necessary to improve transportation and public facilities at mangrove ecotourism location.

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