

The Potential and Attractiveness Mangrove Sylvo-Ecotourism Mapping around Tanjungpiayu Coastal Area Batam Island

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Abstract

The mangrove ecosystem in the Tanjungpiayu coastal area has protected forest status, making it the lungs of Batam City whose existence must be maintained. Therefore, it is necessary to initiate the use of mangrove environmental services in the form of Sylvo-ecotourism. This research aims to map the ecological potential and attractiveness of mangrove sylvo-ecotourism in the Tanjungpiayu coastal area, Batam City. Data collection used a survey method carried out using exploration techniques and direct observation in the field. The selection of respondents for interviews was carried out using an incidental sampling technique to provide an assessment of the beauty of the sylvo-ecotourism potential at the research location. Data analysis was carried out using qualitative descriptive methods and scenic beauty estimation. The research results found 12 types of true mangroves that grow naturally, with the dominant types being *Rhizophora apiculata*, *Rhizophora mucronata*, *Rhizophora Lamarckii*, *Bruguiera gymnorhiza*, *Bruguiera cylindrica*, *Sonneratia alba*, *Avicennia marina*, *Xylocarpus granatum*, *Ceriops tagal*, and *Lumnitzera litoria*. The potential and attraction of mangrove sylvo-ecotourism in the Tanjungpiayu coastal area, consisting of: (1) exploring or searching for mangroves, (2) observing animals and researching aquatic biota, (3) mangrove planting, (4) tracking endemic mangrove flora, (5) photography or mangrove selfies, (6) bird watching, (7) canoeing, (8) fishing, and (9) mangrove culinary delights. The Tanjungpiayu mangrove sylvo-ecotourism attraction shows the highest value in mangrove browsing attractions, then fishing in the mangrove area and mangrove culinary delights.

Keywords: Mangrove, Mapping, Sylvo-ecotourism, Natural attraction, Small Island.

1. Introduction

The mangrove ecosystem in the Tanjungpiayu coastal area, with protected forest status and a significant area, has the potential to develop mangrove sylvo-ecotourism activities, considering its location in the middle of Batam City. The mangrove ecosystem in this area grows and develops in tidal areas with a muddy substrate type. Kusmana (2008) reports that 43% (1.6 million ha) of mangroves in forest areas and 67% (3.7 million ha) of mangroves outside forest areas are experiencing damage due to uncontrolled exploitation, conversion to other forms of use, pollution, natural disasters, etc. Even though Batam City is an industrial area, most of the coastal communities in this area still depend on coastal and marine resources, in the form of fish resources that live in the mangrove ecosystem, which have various functions

and benefits that play a role in important in human life, both ecologically, socially and economically. Considering the importance of mangrove forests for human survival and preventing widespread destruction of mangrove forests, it is natural that a management plan is needed that considers sustainability. All existing potential, both in the form of environmental products and services, must be explored as widely as possible in a wise and planned manner to provide benefits to humans and development.

Mangrove sylvo-ecotourism is one approach to realizing sustainable development of coastal areas. The sylvo-ecotourism activities referred to in this research are forest ecotourism activities that are integrated with mangrove conservation, and local community empowerment so that local communities can participate in enjoying the benefits of these tourism activities through developing their local potential.

The Tanjungpiayu mangrove area has great ecotourism potential, especially ecotourism in the form of beaches and mangrove ecosystems. Even though the Tanjungpiayu mangrove area has a lot of sylvo-ecotourism resource potential, it has not been further researched into the aspects that support this area to be developed into a mangrove sylvo-ecotourism attraction, so the data and information are still general in nature. Meanwhile, to develop sylvo-ecotourism in an area, an in-depth study of various aspects is needed. Therefore, it is necessary to research the potential for mangrove silvo-ecotourism in the Tanjungpiayuse mangrove area so that it can be developed into a tourist area that supports nature conservation and improves the welfare of its people. The concept of ecotourism is an alternative to developing an area into a tourist destination that still pays attention to environmental conservation by using the potential resources and culture of local communities. On the one hand, sylvo-ecotourism development is aimed at generating economic benefits, but on the other hand, development must also pay attention to maintaining ecological and social quality. This kind of concept is often called the concept of sustainable development.

This method uses observation and Scenic Beauty Estimation (SBE). Data regarding tourism potential in the Tanjungpiayu mangrove area was obtained by conducting direct observations in the field, the data obtained will be presented in tabular and descriptive form. Potentials that are thought to have high beauty value are photographed and then assessed by the community and their beauty value is calculated using the Scenic Estimation Beauty (SBE) beauty estimation approach. It is hoped that the data and information obtained can be used as consideration in the sustainable management of mangrove silvo-ecotourism.

The research objectives are (1) To map the potential of mangrove sylvo-ecotourism in the Tanjungpiayu coastal area, Sei Beduk District, Batam City, (2) To determine the beauty value and attractiveness of mangrove sylvo-ecotourism in the Tanjungpiayu coastal area, Sei Beduk District, Batam City.

2. Methods

Research Location and Time

The location of this research was set in the mangrove sylvo-ecotourism area in the coastal area of Tanjungpiayu sub-district, Sei Beduk District, Batam City. The research period will be carried out from July to December 2023.

Research Objects and Procedures

The target object of this research is the potential for mangrove silvo-ecotourism in the coastal area of Tanjungpiayu Village. The tools used are: (1) Identifying tourist objects using cameras, binoculars, stationery, thematic maps, and field manuals, (2) Collecting data on visitors, the public, and stakeholders using question guides in the form of questionnaires and voice recording devices.

The research method uses survey techniques with an exploration method to inventory the potential of silvo-ecotourism including ecological potential including identification of mangrove and zoofauna species as well as the natural potential of the area for the development of Sylvo-Ecotourism. The mangrove ecosystem components observed in the development of mangrove silvo-ecotourism in the Tanjungpiayu coastal area are (1) mangrove flora components, (2) wildlife and aquatic biota, (3) landscape components, (4) endemic mangrove flora.

Types of Data Collected

The types of data collected to obtain the information needed by the research objectives consist of Primary and Secondary data. Primary data is basic data collected through direct observation in the field to support tourism activities: (a) Types of mangroves found at tourist locations; (b) Natural attractions, community culture, and types of tourist activities; (c) Characteristics and perceptions of respondents as well as hopes for development of tourist attractions. Secondary Data is data obtained from the results of existing research and publications as well as regulations and legislation that have been created. Secondary data collected includes: (a) Physical including location and area, topography, climate, geology, soil, and biology; (b) Regulations and institutions including forest management, conservation, tourism, regional regulations, and institutions related to tourism; (c) The socio-economic and cultural aspects of the surrounding community include population size, gender, livelihood, education level, religion and community culture.

Method of collecting data

Data collection was carried out using the survey method using direct observation in the field and interviews. Direct observation in the field consists of (a) Data regarding mangrove types, tourism potential in the form of tourist objects and attractions as well as supporting facilities. When carrying out the observation method, be accompanied by a member of the community who knows the location of silvo-ecotourism objects and attractions in the area; (b) Take photos or images of places that are considered to have the potential to be developed as tourist attractions. Next, interviews were conducted with visitors (tourists), who were closest to the research area.

Data analysis method

Analysis of the potential and attractiveness of mangrove silvo-ecotourism is input into data analysis software, then presented in tabulation and analyzed qualitatively descriptively. Estimation of the value of natural beauty is carried out using the Scenic Beauty Estimation (SBE) method. Data processing uses the Z value by varying the assessments given by respondents to photos or images of an object, where each object is taken from one point of view when taking the photo or image. For each image, the frequency (f), cumulative frequency (ef), cumulative probability (cp), z value for each photo or image, and the average z value are calculated. The SBE calculation is determined by calculating the object that has the smallest average z value. Next, the SBE value of a photo or image is determined using the following equation:

$$SBE_x = (ZLS_x - ZLS_p) \times 100$$

Description :

SBEX : Estimated value of scenic beauty to – x

ZLS-x : Average value of z for image or photo to – x

ZLS-p : Average value of z value for comparison image or photo

Photos or images that have an SBE value > (Y + s) are categorized as having a high beauty value, an SBE value between (Y – s) and (Y + s) has medium beauty, and an SBE value < (Y – s) has low beauty.

3. Results nd Discussion

The mangrove sylvo-ecotourism Potential and Attraction.

The potential for mangrove sylvo-ecotourism is known from the various resources found in the Tanjungpiayu mangrove area and can be developed into a sylvo-ecotourism attraction. In this case, the potential for mangrove sylvo-ecotourism is a determination of the resources possessed by the Tanjungpiayu mangrove area which can be developed into a sylvo-ecotourism attraction that is utilized for economic purposes by utilizing mangrove forest environmental services while still paying attention to the following aspects. other aspects.

Based on the results of observations in the field (Figure 1), the potential for sylvo-ecotourism in the Tanjungpiayu mangrove area is (1) exploring or tracing mangroves, (2) observing animals and researching aquatic biota, (3) mangrove planting, (4) tracking mangrove flora endemic, (5) photography or mangrove selfies (photography), (6) bird watching, (7) canoeing, (8) fishing, and (9) mangrove culinary delights.

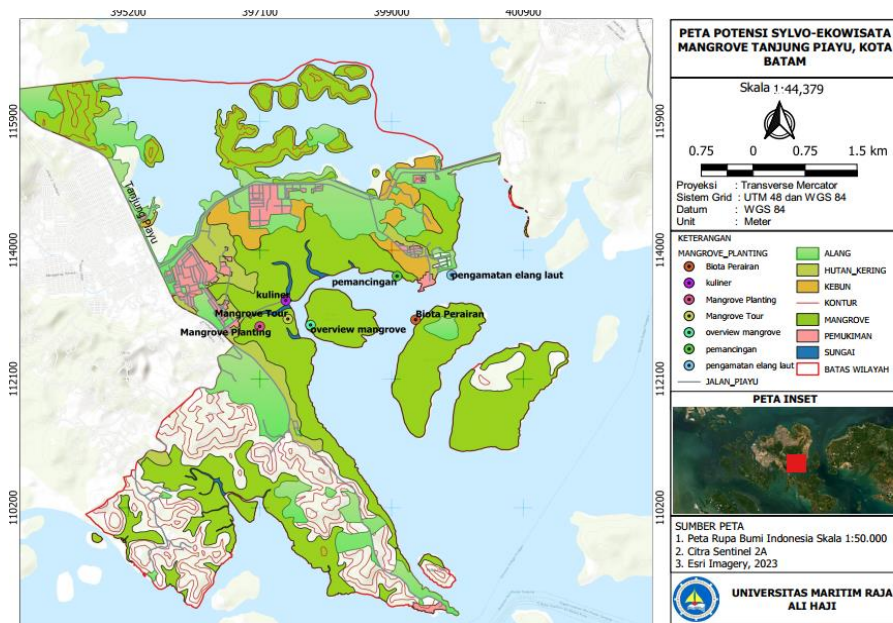


Figure 1.

Map of the distribution of potential mangroves sylvo-ecotourism of Tanjungpiayu coastal area

The mangrove stands found in the Tanjungpiayu mangrove area can be used as a learning tool for pupils and students to get to know nature better and increase awareness of the environment.

1. Tourist attractions

a. Observing the diversity of Mangrove species in the Tanjungpiayu Coastal Area.

There are 12 species of mangroves were found on the Tanjungpiayu Coast. The mangrove ecosystem is one of the tourism potentials on the Tanjungpiayu Coast. One way to enjoy it is to walk through the mangrove forest. Walking in the middle of a mangrove forest can provide experience and knowledge about the types of mangrove species and their distinctive characteristics as well as observing the types of fauna found around the mangrove ecosystem, such as water birds. It is hoped that this activity will foster interest and awareness of the importance of the mangrove ecosystem. Based on the results of observations in the field, the types of mangroves found in the Tanjungpiayu mangrove area are as follows.

Table 1.

The potential diversity of mangrove species found in the Tanjungpiayu Coastal Area, Batam Island

No.	Famili	Species	Common Name	Mangrove Group
1	<i>Rhizophoraceae</i>	<i>Bruguiera gymnorhiza</i>	Tanjang merah	Main
		<i>Bruguiera cylindrica</i>	Tanjang hijau	Main
		<i>Ceriops tagal</i>	Mentigi	Main
		<i>Rhizophora apiculata</i>	Bakau merah	Main
		<i>Rhizophora mucronata</i>	Bakau besar	Main
		<i>Rhizophora lamarckii</i>	Bakau seling- kuh	Main
2	<i>Sonneratiaceae</i>	<i>Sonneratia alba</i>	Prepat	Main
3	<i>Meliaceae</i>	<i>Xylocarpus granatum</i>	Nyirih	Main
4	<i>Avicenniaceae</i>	<i>Avicennia alba</i>	Api-api	Main
		<i>Avicennia marina</i>	Api-api	Main
5	<i>Rubiaceae</i>	<i>Scyphipora hydrophyllacea</i>	Duduk rambat	Support
6	<i>Combretaceae</i>	<i>Lumnitzera littorea</i>	Teruntum merah	Support

b. Mangrove River Flow

The Bulok River is a river located on the border of Tanjungpiatu and Kampung Bagan, Tanjungpiayu Coast. This river cuts through a mangrove forest area and flows directly into the sea. The unique structure of the mangrove stands located on the right and left sides of the river giving the impression as if we are crossing a passage or corridor. In the morning and evening, many water birds are looking for food and perching on the branches of mangrove trees.

c. River Estuaries and Beaches

This river has a fairly wide estuary, the edges and several parts of the estuary are covered with mangroves from the Rhizophoraceae family. At high tide, the estuary will be inundated with seawater so that the depth increases, but at low tide, there is still quite a lot of water remaining so it is ideal for water activities such as swimming and canoeing. The beach which is downstream of the Piayu River has a view of the sea with the shape of the beach resembling the letter U because it is a small bay.

d. Community Culture

The Tanjungpiayu mangrove area has an art and dance studio, the dances studied are traditional Lampung dances, namely the Bedana Kontakporer Dance and the Bedana Kreasi Dance. Apart from that, people also learn handicrafts, handicrafts from the people of the Tanjungpiayudi mangrove area are studied in the art studio. The materials used are usually materials that are easy to obtain and are around. Handicrafts that can be made by the community include brooches and headbands from corn husks, decorative flowers from banana fronds and corn husks, tissue boxes made from beads, decorative lamps from bamboo, and mini sailing ships made from bamboo and cloth.

2. Tanjungpiayu mangrove silvo-ecotourism development potential

a. Photography

Photography activities are carried out by taking pictures or photos of objects that are interesting to the photographer. The favorite place for photography activities in general is at the beach, the beach in the Tanjungpiayu mangrove area is quite beautiful. This beach is backed by Mount Rajabasa, but in the morning and evening, Mount Rajabasa is usually covered in fog, so a good time to take pictures is around 10.00 – 15.00 WIB. Apart from beaches, mangrove stands also have their beauty, because several types of mangroves have unique characteristics such as; respiratory roots, supporting roots, and propagules hanging from mangrove branches. Good times to take pictures are morning and evening because apart from the mangrove stands, in the morning and evening many birds perch on the mangrove branches.

b. Swimming (Swimming)

Swimming can be done at the beach, the beach downstream of the Bulok River is located in Lampung Bay so the waves are not too big and not dangerous. Big waves usually make tourists reluctant to swim because they are worried about their safety. This beach has a sand base, so tourists don't need to be afraid of injury due to coral.

c. Bird Watching

Bird watching can be done in estuaries and mangrove stands. The ideal time to observe birds is in the morning when the birds come out of their nests to look for food, or in the afternoon when the birds return to their nests. Unfortunately, this activity is not yet supported by adequate facilities and infrastructure. If there was an observation tower, this would make it easier for tourists to observe birds.

d. Canoeing

Canoeing can be done on the beach and also along the Bulok River. The length of the Bulok River which cuts through the mangrove forest is ± 1 km, with a width between the river banks ranging from 5 – 10 meters. Going along the river using a canoe through the mangrove forest will provide a pleasant experience. However, to preserve mangrove forests and by ecotourism principles, it is necessary to carry out a more in-depth study of the area's carrying capacity, so that ecotourism activities do not disturb the existence of mangrove forests and threaten their sustainability.

e. Exploring the Mangrove Forest (Mangrove Walk)

The infrastructure needed for this activity is a boardwalk and a tour guide. Land routes are made with consideration to areas that meet the criteria according to the tourist suitability index or conditionally

suitable categories. Tour guides must be able to interact with tourists and have knowledge about mangroves, especially the types of mangroves found in the Tanjungpiayus mangrove area so that if there are questions from tourists the guide can explain them.

f. Fishing

Fishing activities can be carried out in the Bulok River which cuts through mangrove forest areas, river estuaries, up to the shoreline and sea. The catch can be taken home or processed on-site by using the local community to process it. Processing can be done according to tourists' requests, it can be fried, grilled, or vegetable.

Estimating the Value of Attractiveness and Beauty

1. Assessment Based on Respondent's Employment Background

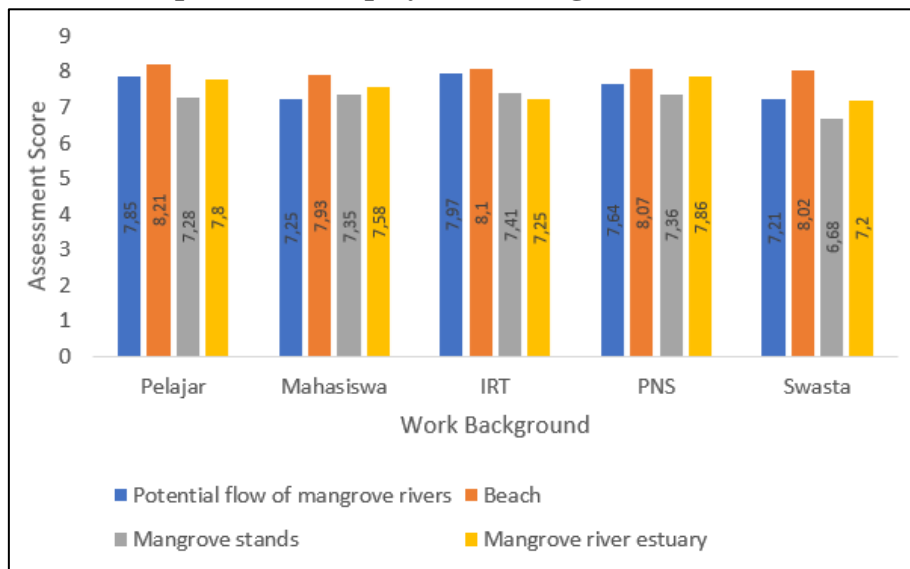


Figure 2. Classification graph of tourism potential assessment based on respondents' work background in research location.

The results shown by looking at the respondent's assessment graph based on work background can be concluded that each picture of tourism potential, namely the potential for mangrove river flows, beaches, mangrove stands and mangrove river estuaries, has an average value of 7.58; 8.07; 7.22; and 7.54, where the highest assessment of the potential for mangrove river flow was given by housewives with a score of 7.97; The highest rating for the beach was given by students with a score of 8.21; The highest assessment for mangrove stands was given by housewives with a score of 7.41 and the highest assessment for mangrove river estuaries was given by civil servants with a score of 7.86.

Even though the respondents' work backgrounds were different, it did not influence their assessment of the tourism potential shown through pictures or photos. This is by research by Trimukti (2012) which explains that the routine form of work does not influence the visual assessment of a vegetation-type design.

2. Attractiveness assessment based on the Scenic Beauty Estimation (SBE) Method

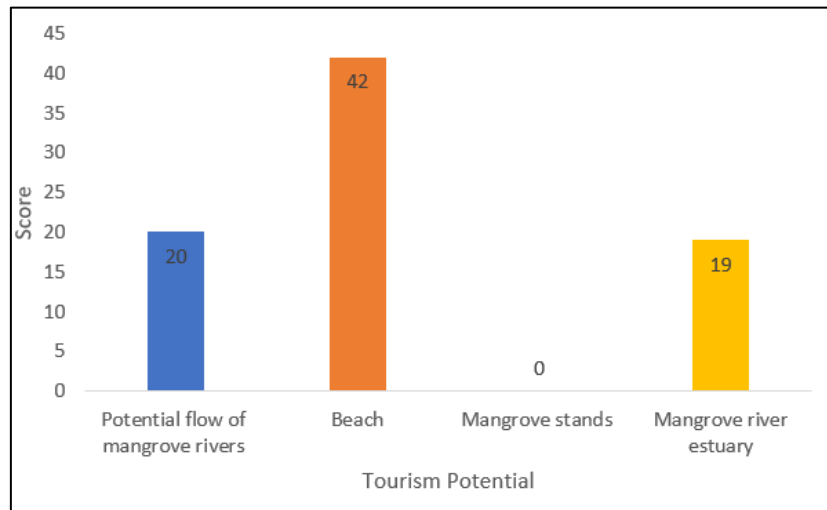


Figure 3. SBE Value Graph of Tourism Potential in Research

The results of calculating the SBE value for the tourism potential image are high, this is shown by the SBE value being greater than the $\bar{Y}+S$ value where the highest SBE value is obtained by the institution, with an SBE value of 42, then the river flow potential with an SBE value of 20, the mouth of the mangrove river with a value of 19 and images of mangrove stands with an SBE value of 0. Value 0 is the image used as a comparison image. This classification assumes that tourism potential that has a high SBE value is considered by respondents to have a high level of beauty.

The results of the calculations show that tourist visitors prefer beaches rather than tourism potential in the form of mangroves, be it mangrove river flows or mangrove stands. This is also shown by the tourist attractions visited by respondents, namely 157 or 74% of respondents chose to visit tourist attractions in the form of beaches. The community's very minimal knowledge about mangrove forests is a contributing factor, of the 212 respondents only 68 people, or 32% knew about mangrove forests and only 25 people, or 12% had seen mangrove forests directly.

Internal factors in society such as knowledge, education, culture, familiarity, economics, and demographic variables influence a person's decision to visit an object but do not influence the visual assessment of the beauty of an object.

The visual assessment of an object is influenced by the appearance of color, light, and order. The color of an object can cause a visual effect depending on the reflection of light falling on the object. Apart from that, color can also attract the attention of humans and animals and influence the emotions of those who see it. In general, people also like the orderliness or tidiness of an object, the more orderly and neatly arranged an object tends to be, the more it is liked (Utami, 2004). The results of the assessment using the SBE method show the relative value between images of tourism potential in terms of visual assessment.

4. Conclusion

Based on the results of the research that has been carried out, it can be concluded:

1. The potential for mangrove sylvo-ecotourism in the Tanjungpiayu mangrove area is the mangrove

ecosystem, mangrove river flows, river estuaries and beaches, dance arts, and handicrafts. Activities that can be done are photography, swimming, bird watching, canoeing, mangrove walks, and fishing.

2. The potential and attractiveness of mangrove sylvo-ecotourism in the Tanjungpiayu mangrove area based on the scenic beauty estimation (SBE) method is high with the SBE values as follows; beaches (42), mangrove river flows (20), mangrove river estuaries (19), and mangrove stands (0).

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