RESEARCH ARTICLE

MEDIA KONSERVASI
SCIENTIFIC JOURNAL IN CONSERVATION OF NATURAL RESOURCES AND ENVIRONMENT

Ecotourism Management Strategy in Mangrove Forest Kampung Sejahtera, Bengkulu City - Indonesia

Devi Nur Indah Sari[a], Nyoto Santoso[a] and Rachmad Hermawan[b]

[a] Study Program of Tropical Biodiversity Conservation, IPB University, Bogor 16680, Indonesia
[b] Department of Forest Resources Conservation and Ecotourism, IPB University, Bogor 16680, Indonesia

Article Info:
Received 07 May 2024
Revised 16 September 2024
Accepted 22 October 2024

Corresponding Author:
Study Program of Tropical Biodiversity Conservation, IPB University, Bogor 16680, Indonesia
E-mail:
devinurindahsari906@gmail.com

Abstract

The Mangrove Forest of Kampung Sejahtera (MFKS) in Bengkulu City has significant potential as a natural tourist destination due to its strategic location and abundant resources. However, the area faces environmental and management challenges, necessitating a sustainable tourism development strategy. This study, conducted from December 2022 to February 2023, assessed the ecological and social aspects of MFKS. Mangrove vegetation data were collected through field observations at five stations using the plot-line method and analyzed to determine the Importance Value Index and Species Diversity Index. Wildlife and aquatic biota data were gathered through exploration and interviews with fishermen, local communities, and fish auction managers. Visitor and community perceptions were evaluated via a survey of 60 respondents and analyzed using the Respondent Achievement Level based on a Likert scale. A SWOT analysis was used to formulate strategies for sustainable tourism development. Key recommendations include strengthening community-based tourism management, fostering investor partnerships, improving resource and visitor management, mitigating environmental risks, and developing eco-friendly infrastructure. Additionally, promoting tourism through media, enhancing safety and cleanliness, and integrating environmental education and law enforcement are vital. These strategies aim to balance tourism growth with environmental conservation, ensuring the long-term viability of MFKS as an ecotourism destination.

Keywords: management strategy, perception, potential, tourism

1. Introduction

Indonesia has the largest mangrove forest in the world, covering approximately 32 million hectares, or 226% of the total global mangrove forest [1]. Mangroves are a type of plant or plant community commonly found in muddy coastal areas and river estuaries that are influenced by tidal conditions [2]. Mangrove ecosystems are a natural resource that is very important for human survival, as well as for their role and function in maintaining ecological balance in coastal areas [3].

Mangrove forests form where saltwater meets freshwater, are characterized by mud and relatively small waves due to their usual location in bays or behind islands, and are not dependent on climate [4]. Mangrove forests serve various physical, ecological, and socioeconomic functions. The physical functions of mangrove forests include wind and wave protection, filtering of pollutants, flood control, and prevention of seawater intrusion onto land. They serve as breeding grounds, nurseries, feeding areas for fish and other marine organisms, and habitats for wildlife. Mangrove forests can be used for tourism, providing social and economic benefits [5–7].

The city of Bengkulu has a coastline length of approximately 1,722 km, with one of its areas being the Mangrove Forest of Kampung Sejahtera (MFKS) [8]. Since 2017, the community has managed a part of the mangrove forest for tourism, which boasts beautiful landscapes and diverse flora and fauna. With the increasing demand for natural tourism in the region, MFKS has the potential to be developed as a natural tourist destination in Bengkulu [8,9]. However, on the other hand, MFKS is not exempt from threats such as household waste disposal, visitor trash, and the potential conversion of mangroves for aquaculture. Tourism activities in MFKS are expected to provide socio-economic benefits while ensuring sustainability; therefore, it

is necessary to formulate development strategies that consider the potential of tourism resources and the perceptions of the community and visitors.

2. Materials and Methods

2.1. Research Location and Time

The Mangrove Forest of Kampung Sejahtera (MFKS) Bengkulu is located in Sumber Jaya Village, Kampung Melayu Subdistrict, covering an area of 256 ha along the Indian Ocean coast (Figure 1). Since 2017, a community has been managing a 30-ha area [8]. The research was conducted from December 2022 to February 2023 in the Mangrove Forest area of Kampung Sejahtera Bengkulu, Sumber Jaya Village.

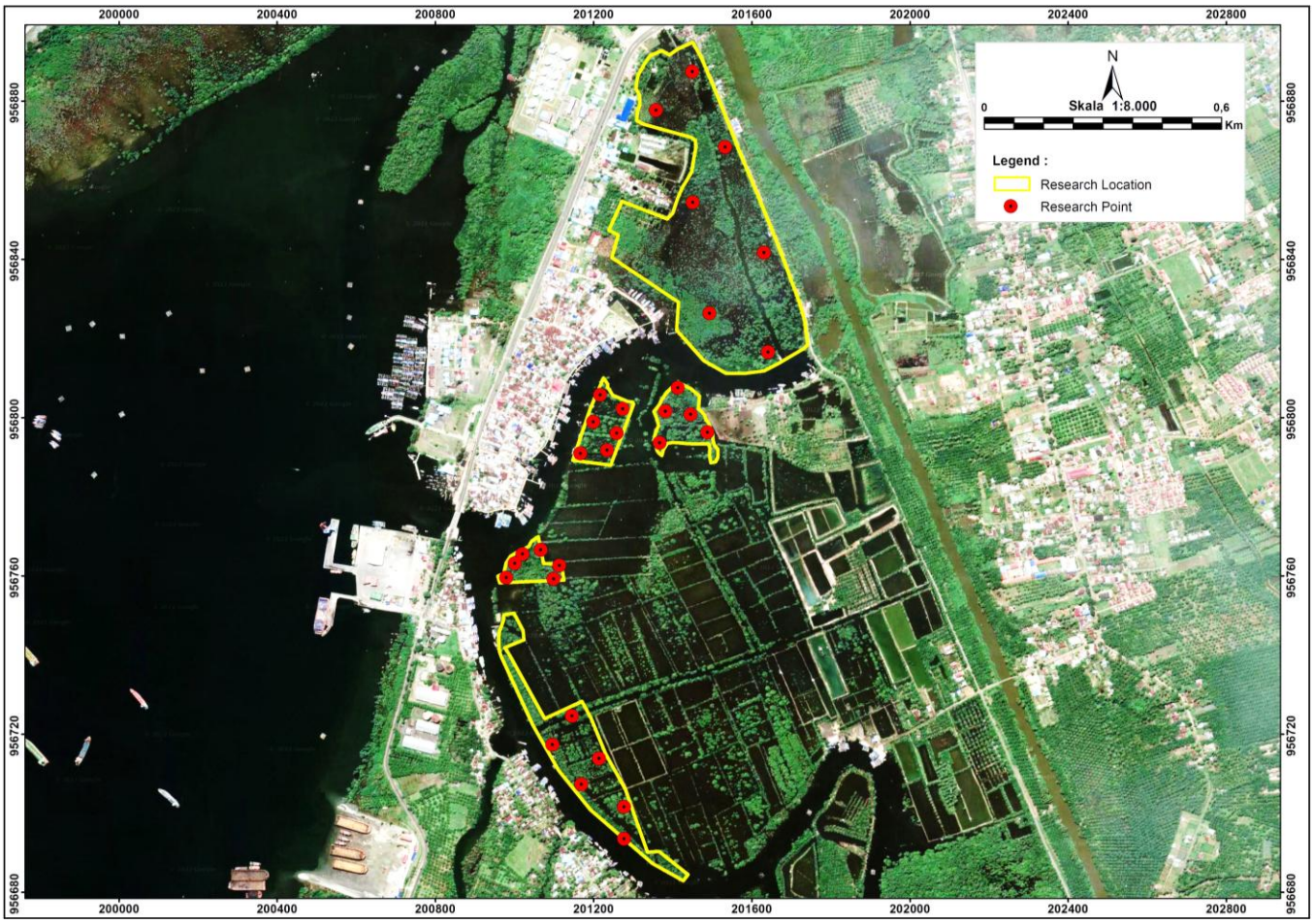


Figure 1. Map of the research location.

2.2. Tools

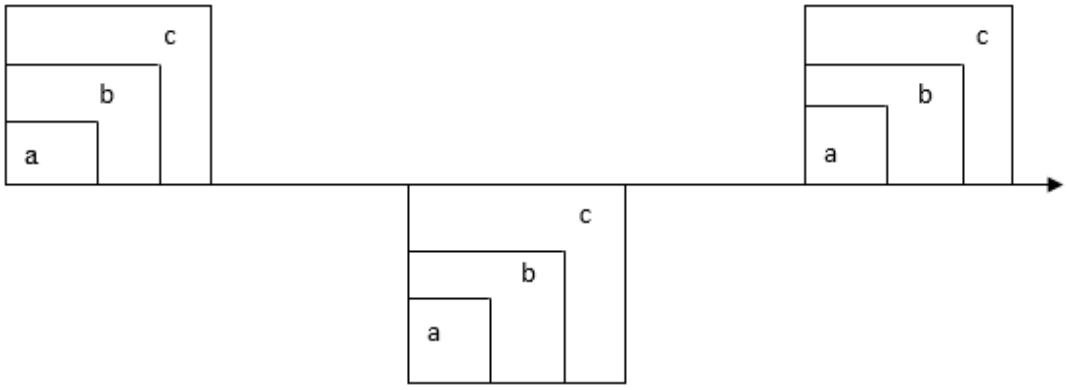
The tools used in the research included a Global Positioning System (GPS), measuring tape, writing tools, raffia strings, cameras, mangrove identification books, height gauges, questionnaires, and binoculars.

2.3. Data Collection Methods

Primary and secondary data were collected. Primary data consist of the potential of mangrove tourism resources, which include mangrove vegetation (structure and composition, mangrove diversity), wildlife diversity, aquatic biota, and public and visitor perceptions in supporting tourism development in Kampung Sejahtera. Secondary data were obtained from a literature review covering the general conditions of the research site.

2.3.1. Vegetation

Observation of mangrove vegetation was conducted using the plot line method (Figure 2) [10] at five stations (transects) by creating transect lines perpendicular to the station edge; subsequently, each transect was divided into hierarchical observation plots, with sizes of 10 × 10 m for tree stage, 5 × 5 m for sapling stage, and 2 × 2 m for seedling stage. The parameters recorded were the type and number of individuals (seedling-stage vegetation) and the type and diameter of the trunk (stake-stage vegetation and trees). At station one there are six observation plots, station two has six plots and station three has 6 plots, then for station four there are five plots, then station five has seven observation plots.



Description: a = 2 m x 2m; b = 5 m x 5 m; c = 10 m x 10 m

Figure 2. Layout of vegetation transect sampling plot.

2.3.2. Wildlife

Data collection for bird species was conducted using exploration and transect methods [11]. Observations were also carried out along visitor access paths, and data collection for mammals was performed through exploration methods, which involved walking along existing paths, both established trails, and wildlife paths. The method of collecting herpetofauna data is the Visual Encounter Survey (VES), which involves recording species based on direct encounters along both terrestrial (land) and aquatic (water) pathways. Data on aquatic biota were gathered through interviews with fishermen, communities, and Baai fish auction managers.

2.3.3. Perceptions of visitors and the community

Perceptions were obtained from two groups of respondents, visitors and community members, total of 60 respondents who were selected through purposive sampling [12]. The criteria for visitor respondents were that they resided outside Kampung Sejahtera and were aged between 12 and 60 years. The criteria for community respondents were that they had lived in Kampung Sejahtera for at least 1 year and were aged between 12 and 60 years. Furthermore, data collection was conducted using interview methods with the managers of the Mangrove Forest in Kampung Sejahtera, community leaders (youth), and local government officials.

2.4. Data Processing and Analysis

The composition and structure of stands are measured using the Importance Value Index and the Species Diversity Index, as follows [5]:

2.4.1. Important Value Index (IVI)

$$\mathrm{IVI} = \mathrm{RD} + \mathrm{RF} + \mathrm{RD} \quad (1)$$

Where D (Density) = number of individuals of a certain species/area of plot (individuals ha^{-1}); RD (Relative Density) = Density of a specific species/total density x 100%; F (Frequency) = The total number of plots found for a certain species/quantity of all plots; RF (Relative Frequency) = Frequency of a specific species/total frequency of all species x 100%; D (Dominance) = total area of the base of a certain type/area of plot (m^2 ha^{-1}); and RDo (Relative Dominance) = Dominance of a species/total dominance x 100%.

2.4.2. Diversity Index of Species

Species Diversity Index using the *Shannon index of general diversity* formula:

$$H' = -\sum_{n=1}^{n} \left(\left(\frac{ni}{N} \right) \ln \left(\frac{ni}{N} \right) \right) \quad (2)$$

Where H' = *Shannon Index of General Diversity* (Diversity Index); ni = important values of each species; and N = total index of important values.

Wildlife data that has been collected is then tabulated based on its group Visitor, and community perception data is processed to obtain the Respondent Achievement Level (RAL) using the following formula:

$$\text{Level of Respondent Achievement} = \frac{\text{total score}}{\text{maximum score}} \text{x } 100\% \quad (3)$$

The maximum score was obtained by multiplying the total number of respondents by the highest score on the Likert scale. The Respondent Achievement Level (RAL) scale criteria can vary, namely scores ranging from 0–19.99% (strongly disagree), 20–39.99% (disagree), 40–59% (neutral), 60–79.99% (agree) and 80–100% (strongly agree).

3. Results

3.1. General Condition of The Mangrove Forest in Kampung Sejahtera

The substrate is the main limiting factor for mangrove growth. Suitable substrate types for mangrove growth include soft mud containing silt, clay, and soft organic materials. The substrate in this research area consisted of muddy and sandy mud. The MFKS ecosystem mostly consists of trees that grow naturally, are planted by the surrounding community, and have not experienced damage. The tidal type in the MFKS is a double daily tide with the period is 12 h and 24 min, with a muddy and sandy substrate, and the wave height on Bali Island reaches 1–3.5 m. The water quality of the MFKS is threatened by household waste pollution [14].

3.2. Wildlife

Wildlife in the MFKS has potential as an object and attraction. Table 1 shows the wildlife species found in the MFKS, based on field observations and information from the community.

Table 1. Wildlife of the Mangrove Forest in Kampung Sejahtera

Local name	Scientific name	Family
Mammals		
Long-tailed monkeys	*Macaca fascicularis*	Cercopithecidae
Squirrel coconut	*Callosciurus notatus*	Sciuridae
Aquatic biota		
Bobfish	*Periophthhalmus barbarus*	Gobgiidae
Nugget Fish	*Lutjanu mahogani*	Lutjanidae
Red-spotted crab	*Portunus sanguinolentus*	Portunidae
Green clam	*Perna viridis*	Mytilidae
Mullet fish	*Crenimugil crenilabis*	Mugilidae
Sia snails	*Neritina natalensis*	Neritidae
Snail suction	*Semisulcospira libertina*	Semisulcospiridae
Birds		
Stone curlew bird	*Dendrocygna javanica*	Anatidae
Eagle oyster	*Padion haliaetus*	Pandionidae
King prawn bird	*Alcedo coerulescens*	Alcedinidae
Heron	*Egretta garzetta*	Ardeidae
Reptile		
Golden ring snake	*Boiga dendrophila*	Colubridae
Monitor lizard	*Varanus salvator*	Varanidae
Green chameleon	*Bronchocela cristatella*	Agamidae

3.3. Mangrove Vegetation

The vegetation composition in MFKS consists of api-api (*Avicennia alba*), mangrove (*Bruguiera gymnorrhiza*), teruntum (*Lumnitzera littorea*), bakau minyak (*Rhizophora apiculata*), perepat (*Sonneratia alba*), nyirih (*Xylocarpus granatum*), nipah (*Nypa fruticans*), paku laut (*Acrostichum aureum*), and soga (*Ceriops tagal*). IVI indicates the level of dominance of a particular species; the higher the IVI, the more successful the type is in occupying an area than other species [14,15]. Perepat (*Sonneratia alba*) has the highest IVI (89.68%), and the lowest (11.63%) is teruntum (*Lumnitzera littorea*) (Table 2). The highest IVI for sapling rate was observed for perepat (*Sonneratia alba*) at 51.29%, while the lowest IVI for sapling rate was observed for nypa (*Nypa fructicans*) at 6.17% (Table 3). The most common seedling stages were perepat (*Sonneratia alba*), oil mangroves (*Rhizophora apiculata*), and api-api (*Avicennia alba*) with IVI values of 58.64%, 45.50% and 47.68% respectively (Table 4).

Table 2. IVI of tree stage

No.	Local Name	Scientific name	Family	D (ind ha^{-1})	RD (%)	F	RF (%)	D (m^2 ha^{-1})	RD (%)	IVI (%)
1	Api-api	*Avicennia alba*	Acanthaceae	0.60	18.18	0.50	24.59	0.29	28.95	71.72
2	Mangi-mangi	*Bruguiera gymnorrhiza*	Rhizophoraceae	0.50	15.15	0.30	14.75	0.13	12.72	42.63
3	Teruntum (red)	*Lumnitzera littorea*	Combretaceae	0.13	4.04	0.10	4.92	0.02	2.07	11.63
4	Bakau minyak	*Rhizophora apiculata*	Rhizophoraceae	0.77	23.23	0.40	19.67	0.17	16.77	59.68
5	Perepat	*Sonneratia alba*	Lythraceae	1.00	30.30	0.53	26.23	0.33	33.15	89.68
6	Nyirih	*Xylocarpusgranatum*	Meliaceae	0.30	9.09	0.20	9.84	0.06	6.33	25.26

D = Density; RD = relative density; F = frequency; FR = relative frequency; D = dominance; RD = relative dominance; IVI = Important Value Index

Tabel 3. IVI of pole stage

No.	Local Name	Scientific name	Family	D (ind ha^{-1})	RD (%)	F	RF (%)	IVI (%)
1	Api-api	*Avicennia alba*	Acanthaceae	1.23	23.27	0.50	22.37	46.00
2	Mangi-mangi	*Bruguiera gymnorrhiza*	Rhizophoraceae	0.57	10.69	0.33	15.15	25.84
3	Teruntum (merah)	*Lumnitzera littorea*	Combretaceae	0.20	3.77	0.10	4.55	8.32
4	Bakau minyak	*Rhizophora apiculata*	Rhizophoraceae	0.93	17.61	0.43	19.70	37.31
5	Perepat	*Sonneratia alba*	Lythraceae	1.43	27.04	0.53	24.24	51.29
6	Nyirih	*Xylocarpus granatum*	Meliaceae	0.57	10.69	0.17	7.58	18.27
7	Nipah	*Nypa fructicans*	Arecaceae	0.17	3.14	0.07	3.03	6.17
8	Soga	*Ceriops tagal*	Rhizophoraceae	0.20	3.77	0.07	3.03	6.80

D= density; RD = relative density; F = frequency; FR = relative frequency; IVI = Important Value Index

Table 4. IVI of seedling stage

No.	Local name	Scientific name	Family	D (ind ha^{-1})	RD (%)	F	RF (%)	INP
1	Perepat	*Sonneratia alba*	Lythraceae	1.87	30.77	0.57	27.87	58.64
2	Bakau minyak	*Rhizophora apiculata*	Rhizophoraceae	0.77	25.82	0.40	19.67	45.50
3	Api-api	*Avicennia alba*	Acanthaceae	1.50	24.73	0.47	22.95	47.68
4	Nyirih	*Xylocarpus granatum*	Meliaceae	0.47	7.69	0.20	9.84	17.53
5	Paku laut	*Acrostichum aureum*	Pteridaceae	0.53	8.79	0.30	14.75	23.55
6	Nipah	*Nypa fructicans*	Arecaceae	0.13	2.20	0.10	4.92	7.12

D = Density; RD = relative density; F = frequency; RF = relative frequency; IVI = Important Value Index

The species diversity indices are shown in Table 5. The tree stage had a value of 1.64, the sapling stage had a value of 1.83, and the seedlings had an SDI of 1.55. According to the Shannon-Wiener diversity index criteria, if H' > 3, it indicates high species diversity; if H' is

between 1 and 3, species diversity is moderate; and if H' < 1, species diversity is low. The diversity of mangrove species in the Mangrove Forest of Kampung Sejahtera, Bengkulu City at various growth stage was considered moderate.

Table 5. Species Diversity Index

Growth Stage	H'	Category
Tree	1.64	Medium
Pole	1.83	Medium
Seedlings	1.55	Medium

H' = Species Diversity Index

Mangrove forest ecosystems generally consist of four zones: open zones, middle zones, zones that have brackish to freshwater rivers, and zones towards land that have fresh water. The MFKS zoning pattern is that the zone closest to the sea is overgrown with perepat (*Sonneratia alba*), api-api (*Avicennia alba*), then the middle zone is overgrown by oil mangroves *(Rhizophora apiculata*) and the back zone by nyirih (*Xylocarpus granatum*) and mangi-mangi (*Bruguiera gymnorrhiza*) [16]**.** Sloping topography can facilitate the periodic flooding of seawater, which affects the composition of mangrove forest vegetation. Community Mangroves usually grow in areas with wavy or sloping topography as well as with diverse soil textures such as rocky, muddy, and sandy mud. The topography of the area can also slope and have different levels of salt in the soil, which influences mangrove growth [17].

4. Discussion

4.1. Potential of the Kampung Sejahtera Mangrove Forest (Flora and Fauna)

The distinctiveness and uniqueness of mangrove trees are attractions for tourists. Mangi mangrove plants have a dense red flower color. Mangrove forest ecosystems that contain plant species and become wildlife habitats can be a source of learning for environmental education. The type of red antelope *(Bruguiera gymnorrhiza*) has high economic value, the fruit can be used as processed mangrove specialties and natural coloring materials for making batik. The corolla of the flowers is white to brown and fruit-shaped, similar to a tapered tip pen.

One type of plant found in the Kampung Sejahtera Mangrove Forest, which has great potential, is the nyirih tree (*Xylocarpus granatum*). The fruit is spherical in shape with a brownish green skin. Traditionally, nyirih is used in fever medicine, and the fruit can be used as a beauty scrub and powder. Utilization of mangrove fruit with community empowerment efforts to increase the potential of coastal community resources through mangrove fruit management. In addition to fisheries, non-timber forest products from mangrove forests have also been used in various products, such as mangrove syrup, dyes, and food [18].

Kampung Sejahtera Mangrove Forest has various species of wildlife that are included in several groups, namely birds, mammals, reptiles, and aquatic biota. Various species of birds typical of mangrove forest ecosystems have become interesting tourist attractions and can also be a source of learning for educational tourism, as well as for the activities of long-tailed monkeys and coconut squirrels. Additionally, the presence of various types of fish has become an attractive location for anglers. The local community uses it coastal resourse in fulfilling daily life. The catch the people of Kampung Sejahtera, Bengkulu City, which are locted in the mangrove forest, among others sia snails, crabs, shrimp, fish and sucker snails. The catch then sold in tradioal markets.

4.2. Potential of Natural Beauty

The mangrove forest of Kampung Sejahtera Bengkulu offers a beautiful view of mangrove trees and refreshes our eyes. Mangrove trees in this location have the characteristics of towering trunks, creeping roots, and birdsong, which can provide peace to every visitor. This location is ideal for tourists who want to enjoy a beautiful atmosphere that is different from the routine of life in the city. Tourists can start their journey using a boat provided by the community. The tour can begin from the pier and then along the mangrove forest. Tourists

can see the diversity of mangrove species and wildlife activities, such as the unique behavior of long-tailed monkeys. Visitors feel the experience of being in a cool and beautiful cave. Visitors can also see sunset at several points around the mangrove forest and enjoy a panoramic view of the open sea at Lentera Merah Beach.

4.3. Types of Tourism Activities in the Mangrove Forest of Kampung Sejahtera Bengkulu

Ecotourism is responsible for traveling to natural areas where the environment is protected, and can improve the welfare of local residents [19]. MFKS is a tourist destination that is in demand by the public because it has beautiful scenery. Tourism activities that can be done by visitors are diverse, such as taking pictures of the background of mangrove forests, surrounding mangrove forest tours using boats, fishing, and sports.

Fishing is a marine tourism that attracts tourists in groups of to 2–5 people in the afternoon. Sports can also be performed at MFKS with the aim that the body becomes healthy and fit, and gets fun and entertainment [20]. Today, photography is a modern human behavior that aims to meet needs and entertainment and express one's existence to others. In the tourism industry, aesthetics and visual information on social media can have interesting effects, causing others to imitate and do the same. At an MFKS location, tourists can capture the moment at a certain location.

Boating around MFKS, you can enjoy the beauty of nature, plant-watching, and wildlife attractions. In addition, it is also used for prewedding documentation pre-wedding documentation or a term that is commonly heard is that prewedding photos are activities or photo sessions of a bride and groom before the wedding day. MFKS is one of the photo spots for outdoor pre-weddings favored by the people of Bengkulu.

4.4. Characteristics of Respondents

MFKS visitors were dominated by the age group of 24–32 years. The total percentage of visitors in the age class of 24–32 years is 47%, with as many as 60% female visitors. The location of mangrove forests near the city is highly accessible. Visitors to mangrove forest tours in Kampung Sejahtera Kota Bengkulu have various jobs. This shows that the MFKS is in demand from all walks of life. Employees and self-employed workers dominated visitors. The average income of respondents was IDR 1,724,000 people, with the highest income of IDR 3,900,000. Most visitors have an income of between IDR 1,000,000–3,000,000. Visitors' jobs were mostly employees and self-employed. Only 3% of the respondents had elementary school education, while the dominant ones were bachelors.

As many as 50% of people around mangrove forests have a livelihood as fishermen, with a dominant education (37%) of elementary school graduates. The income of community respondents has a range of IDR 1,000,000–3000,000, with a percentage of 80%. Most of the respondents (57%) were male. The age group of respondents 23–29 years had the largest percentage (26 %). Based on the old category, 30% of the population lived in Kampung Sejahtera Kota Bengkulu within 3–9 years.

4.5. Visitor and Community Perceptions of Tourism Development

The perceptions of visitors and the public in tourism management at MFKS were measured using RAL. The complete RAL values are presented in Table 6. Table 6 shows that visitors and the public strongly agree with the various functions of mangrove forest ecosystems produced by the MFKS. Still, the community disagrees that mangrove forests are producers of firewood and charcoal. Visitors said they agreed that plastic waste became an environmental problem, but it was different from the community that said they disagreed. Visitors and the public agree that environmental concerns affect catch. Visitors and the public understand the importance of mangrove forests, so they disagree on whether there are parties who want to convert or clear mangrove forests.

Table 6. Respondent achievement level

Statement	Visitors		The surrounding community	
	RAL (%)	Category	RAL (%)	Category
Ecosystem Function				
Long tailed monkey habitat	89.33	SS	90.66	SS
The beauty of beaches, animals and vegetation	92.67	SS	89.33	SS
Produce firewood and charcoal	91.33	SS	31.33	TS
Produces oxygen	86.66	SS	90.66	SS
Education and research	92.00	SS	90.66	SS
Environmental Issues				
A lot of plastic waste	70.67	S	37.77	TS
Affects the catch	87.33	SS	79.33	S
Community members clearing forests	32.00	TS	32.66	TS
Facilities and Infrastructure				
Construction of wooden bridges	87.33	SS	79.33	S
Construction of a tourist ticket counter	88.00	SS	88.66	SS
Building mangrove interpretation boards	90.00	SS	92.66	SS
Travellers' needs available	91.33	SS	90.00	SS
Tourism Resources				
Comfortable conditions	91.33	SS	89.33	SS
The existence of mammals and birds	89.33	SS	81.33	SS
The existence of aquatic animals (fish)	90.66	SS	84.66	SS
Potential Environmental Hazards				
Long-tailed monkey disorder	32.00	TS	88.00	SS
Snake disturbance	34.66	TS	73.33	S
Frequent lightning	89.33	SS	88.66	SS
Tsunami Potential	89.33	SS	90.66	SS
Strong winds occur	88.66	SS	91.33	SS
Accessibility				
The road to the tour is wide	92.00	SS	91.33	SS
Road to tourist (paved)	87.33	SS	91.33	SS
Spacious and secure parking lot	88.00	SS	89.33	SS
Using public transportation	90.66	SS	92.00	SS
There are gas stations around the tour	88.00	SS	90.66	SS
Social Community				
There is no security disturbance	87.33	SS	93.33	SS
Communicate well	90.00	SS	89.33	SS
The surrounding tourist environment is clean	91.33	SS	93.33	SS
The community welcomes warmly	76.00	SS	90.00	SS
Tourism Management				
The service is not yet optimal	90.00	SS	88.66	SS
The need for collaboration with investors	90.00	SS	93.33	SS
Lack of professional workforce	90.00	SS	77.33	S
Insufficient promotion of mangrove tourism	92.00	SS	90.00	SS
The need of mangrove management training	91.33	SS	90.66	SS
Tourist Activities				
Mangrove forest as a recreational spot	89.33	SS	88.66	SS
Exploring the area by boat	94.00	SS	93.33	SS
Fishing in the tourist spot	90.66	SS	88.00	SS
Planting mangroves with visitors	91.33	SS	94.66	SS
Observing wildlife and plants	94.00	SS	92.00	SS

TS = Disagree, S = Agree, SS = Strongly Agree

The comfortable condition of MFKS as a habitat for birds and mammals, as well as a habitat for aquatic animals, is a resource that can be a tourist attraction. Environmental hazards that must be monitored at the MFKS include wildlife disturbances, such as long-tailed monkeys and snakes, lightning, strong winds, and potential tsunamis. Visitors disagree that long-tailed monkeys and snakes are potential environmental hazards. This is likely not found at the time of the visit, but it is different from what people living around MFKS feel.

Accessibility is a means of connecting tourists with the location of tourist attractions, both through access to information and means of transportation [21]. Accessibility to MFKS is very good, with wide and paved road conditions, affordable by public transportation, and with gas stations. In addition, there is also a large parking area, which is currently an important consideration for visitors when determining their choice of destination. Social conditions are very supportive of tourism; namely, there are no security disturbances, people can communicate well, and there is a clean environment and a friendly community attitude.

Visitors and the public strongly agree with the various activities that can be developed at MFKS, namely, boating tourism, fishing, educational tours planting mangrove trees, observation of wildlife and mangrove plants, and recreation with family. Tourism management can be improved through various programs, such as service improvement, collaboration with investors, and increasing the capacity to manage human resources through education and training. The results of research that have been previously carried out in the MFKS, and other strategic management in the MFKS include optimizing services to visionaries, developing human resources, and developing supporting infrastructure [22].

4.6. SWOT Analysis

The tourism management strategy in the Mangrove Forest of Kampung Sejahtera Bengkulu was carried out by identifying internal and external factors. The uniqueness and diversity of mangrove tree species in the MFKS are attractive to tourists. There are many types of wildlife in the MFKS, divided into several groups, including birds, mammals, reptiles, and aquatic biota. Various types of birds typical of the mangrove ecosystem, such as long-tailed monkeys and coconut squirrels, are interesting tourist attractions and educational sources for educational tourism. Additionally, the presence of various types of fish makes it an attractive location for anglers. The results of the identification of internal and external factors, as well as their management strategies, are presented in Table 7.

4.7. Concept of Ecotourism Management for the Mangrove Forest of Kampung Sejahtera Bengkulu

The SWOT analysis results produced a concept or strategy design for ecotourism management in the Mangrove Forest Kampung Sejahtera. This is based on the strengths and weaknesses of MFKS and management's biophysics, visitors' and public perceptions, and external factors in the form of opportunities and threats. The design strategies that management can implement at MFKS consist of the following nine efforts.

4.7.1. Strengthening the institutional capacity of community-based tourism management

The community Currently manages MFKS by forming a tourism management organization. Community-based management is appropriate because communities play a central role in providing significant benefits. They must have the capacity to manage tourism resources and visitors so that the management of human resources can be improved by attending various relevant education and training as well as internships at other developed tourist sites.

4.7.2. Cooperation with investors in ecotourism management

Professional tourism management often requires financial support. One of the problems encountered in developing tourism in MFKS is the limited funds. This problem can be overcome through cooperation with investors. Investors must be bound through cooperative agreements with commitments that are not only oriented towards economic benefits but also must pay attention to the sustainability of mangrove forests and care about the socio-economic conditions of the community.

Table 7. SWOT analysis

Internal / External	Strength	Weakness
	1. A community-friendly attitude that welcomes visitors. 2. The mangrove forest ecosystem can be used as a coastal natural tourism area with beautiful vegetation. 3. Comfortable conditions at MFKS attract people to visit. 4. Maintained level of tourist safety. 5. Have a structured tour organization group.	1. Limited facilities 2. Lack of promotion and marketing 3. The quality of human resources for tour managers is still limited 4. Tourists are crowded only on holidays. Limited budget in tourism development. 5. Disturbances caused by wildlife
Opportunity (O) 1. High recreational needs 2. The response of community support is very high to participate in managing tourism 3. High recreational needs 4. MFKS strategic tourist location. Open opportunities for investors who want to develop tourism programs and facilities	SO Strategy 1. Preparation of innovative and educational tourism programs. 2. Determine the ecological and psychological carrying capacity of the developed tourist sites 3. Strengthening the institutional capacity of community-based tourism managers. 4. Monitoring facilities' service life and feasibility so that they are not dangerous for visitors, which can be fatal.	WO Strategy 1. Improvement of tourism facilities and infrastructure and their supporters; 2. Increase promotion through electronic media, print media, and various social media platforms 3. Increasing the capacity of tourism human resources in the management of reservoirs and resources through various education and training, as well as internships in other more advanced tourist locations 4. Inviting investors to cooperate in tourism development
Threat (T) 1. Potential for storms 2. Potential for tsunami 3. Water pollution due to activities at the port of Bali Island 4. Visitors are not aware to maintain cleanliness Wildlife-induced disturbances 5. Tourists are only crowed on holidays	ST Strategy 1. Creating interpretation boards, advisories, warnings, and evacuation plans 2. Educating visitors and the local community about the importance of mangrove forest conservation 3. Collaborating with relevant authorities in enforcing laws to control waste disposal into the sea 4 Establishing standard operating procedures for tourism 5. Make rules and sanctions for visitors who do not comply with the rules	WT Strategy 1. Prepare various Occupational Health and Safety (K3) equipment for visitors 2. Prepare health workers and health facilities for first aid in accidents 3. Make an MOU with competent parties in Search and Rescue (SAR) 4. Visitor activity monitoring

4.7.3. Management of tourism resources and visitors

Tourist sites in the MFKS must be calculated for carrying capacity not to cause overcapacity, which can cause environmental damage. The number and distribution of visitors should be determined based on their vulnerability level. Determining carrying capacity is important for the safety and comfort of visitors.

4.7.4. Preparation of innovative and educational tourism programs

The programs that can be developed include animal-watching tours. One program that can be developed is bird-watching. Bird species attract tourists because of their beauty, sound/calling, and interesting behavior [23,24].

Educational tourism programs can also be developed at the MFKS. Students can be taught to observe a variety of wildlife species and identify the types of mangrove plants. The program needs to be packaged attractively and precisely, according to the level of education.

Educational tourism programs are not enough only in terms of knowledge; they can also be developed to encourage school students to plant mangroves.

4.7.5. Environmental hazard management

Environmental hazard management needs to be performed so as not to pose a risk to visitors, which can result in injury or even fatality. This needs to be a concern because MFKS has the potential to cause environmental hazards such as wildlife disturbance, lightning, storms, and even tsunamis. The installation of warning signs in dangerous places needs to be done, and safe tourism activity procedures are prepared. Visitors were required to use K3 equipment. The manager must have personnel to supervise the visitors to prevent risks. Monitoring the feasibility and service life of tourist infrastructure facilities is important. Managers also need to cooperate with the competent parties in the SAR [25].

4.7.6. Management and development of innovative and environmentally friendly facilities and infrastructure

The development of facilities and infrastructure is intended to satisfy visitors during tourist activities. Facilities and infrastructure are developed to have diverse tourist activities so that visitors have choices. Currently, one example of a facility that needs to be developed is the search for instagrammable photo spots. Health facilities must be prepared for first aid in accidents.

The construction of a typical sea café can be done with the aim of adding to tourist attraction. The shape of the building is in accordance with the nuances of the traditional house of Bengkulu Province, namely the five-ridge houses. Food sold with natural ingredients typical of MFKS.

4.7.7. Management and development marketing, promotion

Marketing and promotion can be achieved through electronic, print, and various social media platforms. Things that need to be considered in marketing and promotion are the attractive packaging of objects and tourist attractions offered.

4.7.8. Environmental Law Education and Enforcement

Environmental conservation education for visitors and the public should be conducted. Rules and regulations containing prohibitions that can cause environmental damage and sanctions need to be compiled and socialized. Managers also need to cooperate with related parties in law enforcement to control waste disposal at sea.

4.7.9. Improving safe, comfortable, and clean conditions in the community surrounding MFKS

In an effort to increase visitors, satisfaction, safety, comfort, and clean conditions must be maintained and improved in the community surrounding MFKS. This condition can give a good impression, and visitors return.

Original regional income is the main source of income for regional governments to carry out various programs and activities for the progress of the region. Ecotourism is an important economic sector in Brazil. An area can exploit its natural, cultural, and historical potential to attract tourists. This can create new jobs, increase regional income (IRI), and introduce uniqueness to the region. By developing ecotourism, regions can gain significant economic benefits, including levies obtained from the tourism sector. This income can become an IRI for the region and state and contribute to increasing community and government income. Tourist visits to a particular tourist attraction can provide various benefits to the area. The SWOT analysis included nine ecotourism management strategies in the MFKS. By implementing these strategies, ecotourism management in managed MFKS can become more effective and sustainable [26].

In line with Hartati's research, the development of mangrove ecotourism can provide significant economic benefits to local communities. By improving infrastructure and supporting facilities, increasing promotion and marketing, and involving local communities in the management and maintenance of mangrove ecosystems, the number of tourists and income generated can be increased. Thus, community welfare can be increased through the economic potential of mangrove ecotourism [27].

The results of previous research conducted Afriani and Yanti [22] using SWOT matrix analysis. One of the alternative strategies for developing Mangrove Forest Tourism in Kampung Sejahtera, Bengkulu city is to increase the promotion of mangrove forest, apart from that, it is necessary to develop human resources (HR) and infrastructure, to supports and optimizes services to visitors. Previous research only focused on four points, but there is still a lot that needs to be addressed and the potential explored in developing mangrove forest to realize more rapid development [28].

5. Conclusions

Kampung Sejahtera Mangrove Forest, Bengkulu City, has a strategic location and resources that can become tourist objects and attractions, so it has the potential to be developed into an alternative natural tourist destination. Tourism management strategies in MFKS can be implemented by strengthening the institutional capacity of community-based tourism managers, cooperation with investors to overcome funding, proper management of tourism resources and visitors, preparation of innovative and educational tourism programs, development of environmental hazard management, development of innovative and environmentally friendly facilities and infrastructure, development of marketing and promotion through various media, and education and enforcement of environmental laws. The development of MFKS ecotourism must apply principles of sustainable natural tourism.

Author Contributions

DNIS: Writing and Editing; **NS**: Conceptualization, Review, Editing; **RH:** Analysis, Review.

Conflicts of Interest

There are no conflicts to declare.

Acknowledgements

The author would like to thank Mrs. Nazuro Anur the Head of Sumber Jaya, for granting permission to conduct research in the Kampung Sejahtera Mangrove Forest. Acknowledgments were also conveyed to Pokdarwis MFKS, Bengkulu City Tourism Office, Bengkulu Provincial Environment and Forestry Service, Bengkulu City Education Office, Bengkulu Indonesian Forum for the Environment, Manager of the Baai Island Fish Auction Place Bengkulu for the data and information provided. Acknowledgments were also conveyed to colleagues who had helped collect field data, namely Aris Fernandes, Bii Lobing Syaputra, Hasan Badawi, Sri Wahyuni, Nanang Setiawan, and Rian.

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