



**The Management Strategy of Ecopreneurship-based Sustainable Mangrove Forest Ecotourism in Makassar City, South Sulawesi**  
*Strategi Pengelolaan Ekowisata Hutan Mangrove Berkelanjutan Berbasis Ecopreneurship di Kota Makassar Sulawesi Selatan*

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ABSTRACT

Mangrove forests provide various tropical and subtropical ecosystem services to support sustainable development and people's livelihoods. Ecopreneurship-based management became an alternative approach for mangrove forests ecotourism. Implementing the ecopreneurship concept in mangrove forest areas could include the utilization of mangrove forest products for business while maintaining biodiversity and the environmental sustainability of the ecosystem. This research aimed to formulate the strategy for ecopreneurship-based management of mangrove forests. This research employed direct observation and in-depth interviews. The respondents were purposively selected based on their specific roles within the communities, community leaders, local governments, and non-governmental organizations surrounding the mangrove forest areas. This research applied SWOT (Strengths, Weaknesses, Opportunities, and Threats) method to analyze the ecopreneurship-based mangrove ecotourism management in Makassar City. The SWOT analysis resulted in three strategies to capture the available opportunities. First, developing community business through innovations in local resource utilization. Second, empowering the community groups such as fishermen, farmers, and women to create mangrove-based household scale businesses. Third, providing training on the post-harvesting mangrove forest products and digital/online marketing for brown sugar.

INTISARI

Hutan bakau menyediakan berbagai jasa ekosistem tropis dan subtropis untuk mendukung pembangunan berkelanjutan dan sumber mata pencaharian penduduk. Pengelolaan hutan mangrove sebagai kawasan ekowisata berbasis ecopreneurship merupakan bentuk pengelolaan yang berpotensi untuk dilakukan. Ecopreneurship di kawasan hutan mangrove merupakan konsep kewirausahaan dengan memanfaatkan hasil hutan mangrove berupa kayu dan non kayu menjadi sebuah bisnis, namun juga menekankan pada kelestarian lingkungan, keanekaragaman hayati ekosistem mangrove. Penelitian ini bertujuan untuk mengetahui strategi pengelolaan hutan mangrove secara ecopreneurship. Pengumpulan data dilakukan melalui observasi langsung, wawancara mendalam dengan menggunakan pertanyaan role-specific kepada masyarakat sekitar kawasan mangrove, pemerintah daerah, lembaga swadaya masyarakat, dan tokoh masyarakat. Pendekatan metode SWOT (Strengths, Weaknesses, Opportunities, dan Threats) digunakan untuk mengkaji konsep strategi dalam pengelolaan ekowisata mangrove berbasis ecopreneurship di Kota Makassar. Hasil SWOT menunjukkan bahwa strategi yang digunakan adalah strategi agresif yang menggunakan kekuatan untuk menangkap peluang yang ada. Ada 3 (tiga) strategi yang dapat dilakukan yaitu (1) mengembangkan usaha perekonomian masyarakat melalui inovasi-inovasi pemanfaatan sumberdaya lokal, (2) pemberdayaan masyarakat melalui kelompok nelayan, kelompok tani, kelompok mangrove, kelompok perempuan untuk menciptakan usaha skala rumah tangga berbasis mangrove, (3) memberikan pelatihan dan pendampingan cara membuat produk dari mangrove dan sistem pemasaran digital/online misalnya produksi dan pemasaran gula merah.

## Introduction

Mangrove forests have ecological and economic functions for coastal communities. Mangrove forests commonly occupy muddy beaches or river deltas (Arfan et al. 2018). Mangrove ecosystems are crucial to support the fishery sector in the coastal areas and maintain fish farming or fishing activities (Mojjol et al. 2016; Romañach et al. 2018; Aye et al. 2019; Barua & Rahman, 2019; Kadykalo et al. 2019; Roldán et al. 2019). The mangrove ecosystem becomes the home for fishes and other species with high economic values (Sihombing et al. 2017; Vincentius et al. 2018; Wahyudewantoro, 2018). Its sustainable use contributes to the welfare of local communities (Potschin et al. 2016; Arfan & Taufieq, 2017; Díaz et al. 2018; Tanner et al. 2019; Getzner & Islam, 2020). Mangrove forests also have ecotourism potential to increase the local community's income (Handriana & Ambara 2016; Hakim et al. 2017; Widiyah et al. 2017).

Makassar City hosts 208.04 ha of mangrove forests (Arif et al. 2018) and can potentially become an ecotourism area and income source for coastal communities in Makassar City. A comprehensive and integrated ecopreneurship-based management model could lead to a productive and sustainable business. The ecopreneurship concept is a profit-oriented entrepreneurial approach that also considers environmental sustainability. Its implementation in mangrove forests involves the utilization of timber and non-timber products for business while maintaining biodiversity and the environmental sustainability of the ecosystem. Ecopreneurship focuses on nature preservation and future products, processes, and environmental services for more comprehensive economic and non-economic benefits for individuals and society (Shepperd and Holger 2011). Ecopreneurship searches for new opportunities to protect the environment and achieve environ-

mental sustainability (McEwen 2013). In other words, it is entrepreneurship through the environmental lens (Chopra 2014). Innovations to minimize the environmental impacts of the business became essential to its implementation (Gerlach 2003). Therefore, its implementation should benefit the business and the environment (Isaak 2017; Holger 2006). Kainrath (2009) mentioned three elements of ecopreneurship: eco-innovation, eco-commitment, and eco-opportunity. The eco-innovation is the behavior that contributes to innovative solutions for reducing environmental burdens. The eco-commitment deals with the commitment or willingness to invest time and energy for green or environmentally-friendly activities. The eco-opportunity is taking advantage of or exploiting market failures caused by environmental aspects.

Mangrove forests should be managed sustainably as renewable resources. Its economic and ecological utilization should consider current and future social equity. Therefore, its management should integrate various knowledge and techniques while coordinating stakeholders and sectors and considering its ecological functions (Kusmana & Sukristijiono 2016).

Mangrove forest management could involve a silvofishery business for a sustainable fishery and mangrove ecosystem. Raising mud crabs in floating cages using the Wanamina system could minimize mangrove forest conversion and produce high economic value mud crabs (Saidah & Sofia 2016). Communities who live along the coastal areas of Java use mangrove fruits as raw materials for processed foods, such as syrup. *Xylocarpus granatum*, *Sonneratia alba*, and *Bruguiera gymnorrhiza* are nutritious sources of antioxidants. Therefore, they can become a source of household income (Analuddin et al. 2019).

## Material and Method

### Study Method

This research employed direct observation and in-depth interviews in data collection. The direct observation consisted of trekking over the mangrove forest areas in Makassar City, while a question list guided in-depth interviews.

### Sampling Technique

This research used purposive sampling techniques to select respondents based on their direct involvement in mangrove ecotourism in Makassar City. The respondents included the Head of the Village, Makassar City Tourism Office, Makassar City Forestry Service, community groups surrounding the mangrove ecotourism area, fishermen, fish farmers, entrepreneurs, and non-government organizations. This research employed a Participatory Rural Appraisal (PRA) approach using a Focused Group Discussion (FGD) and in-depth interviews to collect information about the situation, problems, and potential solutions. The FGD and in-depth interviews focused on:

1. The potential of natural resources and mangrove forests.
2. Mangrove forests management and utilization model.
3. The current pattern of mangrove forest management and utilization by the community.
4. Community traditions in managing and utilizing mangrove forests.
5. Fundamental requirements for ecopreneurship and digital-based mangrove management
6. Types of fishing equipment
7. Local regulations for mangrove forest areas
8. Possible conflicts of interests

Based on the eight elements above, this research analyzed the factors that became challenges and opportunities in ecopreneurship-based mangrove ecotourism management using SWOT analysis.

### Data Analysis

This research used SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis to systematically identify internal and external factors and formulate management strategies. The analytical model applied the EFAS (External Factor Analysis Strategy) and IFAS (Internal Factor Analysis Strategy) matrices (Rangkuti 2009). The weight column indicated the importance of each factor. The weight values were 0.20 (very important), 0.15 (important), 0.10 (quite important), and 0.05 (not important). The maximum total value was 1.00. The rating values consisted of one to four, where one was poor, and four was excellent. Factors with values of three and four fell into strength, while factors with values one and two into weaknesses.

## Result and Discussion

Ecopreneurship-based sustainable mangrove forest management strategies were analyzed based on internal and external factors. The internal factors consisted of strengths and weaknesses, while external comprised opportunities and threats.

### Internal Factor

#### Strength

1. Mangrove ecotourism had many visitors

The mangrove forest areas in Makassar City had become a mangrove ecotourism area. This ecotourism area had many visitors, similar to the Lantebung mangrove ecotourism area in Bira Village, Tamalanrea Sub-district, and Tallo Sub-district in Lakkang Delta, Lakkang Village. Mangrove ecotourism areas could become ecopreneurship-based businesses to create

jobs. Implementing this ecopreneurship concept could involve mangrove-based culinary and souvenir businesses to serve the tourists. Online marketing could also support the development of these mangrove-based culinary and souvenir products. In addition, the mangrove ecotourism in Makassar City already had many visitors due to its relatively affordable entrance fee of IDR 5,000 per person. It was higher than its competitor in Lakang Delta, with an entrance fee of IDR 2,000 per person. However, tourists had to rent a small boat at an IDR 300,000/boat per three hours to go around Lakang Delta.

#### 2. Community groups surrounding mangrove ecotourism areas were active and productive

The forest community groups supported the ecopreneurship-based mangrove ecotourism development and management in Makassar City. For example, in Lantebung, many community groups engaged in mangrove conservation and rehabilitation, fishing, crab catching, and processing. Meanwhile, in Lakkang, Delta, the community groups made brown sugar from *Nypa* sp.

#### 3. The community utilized the mangrove ecotourism area as a source of income

Fishing, shrimp and crab catching, and making brown sugar from *Nypa* fruits became the main income for most communities surrounding the mangrove forest areas. The brown sugar price was from IDR 9,000/kg to 10,000/kg. In several places, communities produced mangrove seedlings and sold them outside Makassar City at IDR 2,500/ seedling to IDR 3,000/seedling. Several community groups also practiced mangrove cultivation. These livelihood strategies could provide ecological, economic, and social values.

#### 4. Sustainable management model and community participation around mangrove ecotourism area

The community managed mangrove forests as follows:

- a. They used nets, traps, and iron hooks for catching fish, shrimp, and crabs.
- b. They developed mangrove nurseries with a pull system or directly from fruits.
- c. They sold the mangrove seedlings outside South Sulawesi.
- d. They applied selective logging and enrichment planting.
- e. They provide mooring and boat lanes within the spatial arrangement of the area.
- f. They utilized the mangrove ecosystem for raising crabs in floating cages,
- g. They regularly planted mangroves on the edge of ponds, particularly those directly facing the river.
- h. They caught no juveniles and female crabs laying eggs.

The community groups expected involvement in the planning, implementation, monitoring, and conservation activities in mangrove forests management.

#### 5. Available resources

The mangrove forest areas in Makassar City had voluntary labor from community groups and sufficient and available mangrove seedlings to support the management.

#### 6. Supporting management systems, policies, and strategies

The Makassar municipality and other related organizations supported mangrove forests management, such as Forestry and Environmental service and Marine and Fisheries Service. The local government also collaborated with community

groups, NGOs, and the private sector in policy formulation and spatial planning for the mangrove forests and coastal areas.

**Weakness**

1. Lack of training on entrepreneurship and ecopreneurship

Entrepreneurship and ecopreneurship training for both community groups and individuals was still lacking. However, this training was needed to improve their capacity in mangrove forest utilization based on entrepreneurship and ecopreneurship principles. Entrepreneurship training should provide knowledge and skills for practical purposes, namely, starting a business (Valerio et al. 2014). Ecopreneurship training was an entrepreneurship program with a sustainability concept, such as eco-innovation. Eco-Innovation was an ecological innovation to measure the behavior of relevant role makers (companies, politicians, trade unions, associations, and families) and develop new ideas, behaviors, products, and processes. Implementing them would reduce environmental burdens or achieve ecological sustainability goals.

2. Extremely small groups of productive women

Most existing groups consisted of men, while those comprised of women were still very small. With training on food processing, women groups could have processed fish, crabs, and mangroves into marketable foods, such as meatballs, nuggets, mangrove flour, and brown sugar. Empowering women groups would enhance economic resilience, reduce hunger, increase policy impacts, and help achieve food security.

3. Lack of skills in processing mangrove fruits into merchantable products

The community surrounding mangrove forest areas lacked skills in processing mangrove fruits into merchantable products, such as flour, syrup, and cakes. For example, *Bruguiera gymnorhiza* fruits could produce flour, syrup, and dodol cake (Ernawati & Nugroho 2017), while *Acanthus ilicifolius* could produce flour (Jayadi et al. 2020).

4. Lack of assistance in managing mangrove forest resources

Communities around the mangrove forest areas received limited training, agricultural extension, and

**Table 1.** Internal Factor Analysis Strategy (IFAS)

No	Internal Strategic Factors	Weight	Rating	Score
<b>Strength</b>				
1	Mangrove ecotourism had many visitors			
2	Community groups surrounding mangrove ecotourism areas were active and productive	0.15	3.85	0.58
3	The community utilized the mangrove ecotourism area as a source of income	0.10	3.95	0.39
4	Sustainable management model and community participation around mangrove ecotourism areas	0.08	3.15	0.25
5	Available resources	0.06	3.25	0.19
6	Supporting management systems, policies, and strategies	0.06	3.80	0.23
<b>Sub-Total</b>		<b>0.60</b>		
<b>Total</b>				<b>2.22</b>
<b>Weakness</b>				
1	Lack of training on entrepreneurship and ecopreneurship training	0.10	2.00	0.20
2	Extremely small groups of productive women	0.08	3.15	0.25
3	Lack of skills in processing mangrove fruits into merchantable products	0.06	3.25	0.19
4	Lack of assistance in managing mangrove forest resources	0.08	3.10	0.25
5	Lack of informal education	0.08	2.10	0.19
<b>Total</b>				<b>1.06</b>
<b>Sub-Total</b>		<b>0.40</b>		
<b>Total</b>				<b>1</b>

Strength - Weakness score (IFAS) : (X) - (Y) = (2.22) - (1.06) = 1.16

assistance managing mangrove resources that could generate income, for example, by processing fruits into flour, syrup, dodol cake, and crackers.

#### 5. Lack of informal education

Informal education had a significant role as an agent of personal and social development or transformation. Each individual lived in their context within their community group. The informal education programs included life skills, women's empowerment, and job training were still lacking in the Makassar mangrove forest area. Therefore, some still converted mangrove forests into ponds.

### External Factor

#### Opportunity

##### 1. Trend in mangrove ecotourism

Several coastal villages of South Sulawesi developed mangrove ecotourism using village funds. The development of mangrove ecotourism created opportunities to formulate policies on ecopreneurship-based mangrove management, which considered economic and environmental conservation purposes.

##### 2. Implementation of the silvofishery system

Several coastal areas in Makassar City implemented a traditional silvofishery system for shrimp farming. The shrimp farmers planted mangroves along the pond's borders or planted several mangrove trees on the ponds to optimize shrimp production.

##### 3. Mangrove seedlings business

The abundance of mangrove fruits in certain seasons, notably *Rhizophora* sp, created an opportunity for ready-to-plant seedlings production. Currently, the community in produced mangrove seedlings merely based on demand. However, in

certain months of the year, the demand for mangrove seedlings could be very high. Therefore, mangrove seedlings production could become a profitable business and generate income for communities.

##### 4. Brown sugar business

In the Lakkang Delta of the Tallo estuary, the communities planted many *Nypa fruticans*. They produced brown sugar from the *Nypa* fruits and sold them at the traditional market in the city.

##### 5. Culinary and crafts business

Many mangrove forests in Makassar became ecotourism areas, such as in Lantebung and Delta Lakkang, and had many tourist visits. Therefore, this created an opportunity for entrepreneurs to start culinary and handicraft businesses to serve visitors.

##### 6. The trend in online shopping

Online shopping offered various conveniences and became a social trend. Therefore, the community groups could sell various mangrove-based products online.

##### 7. The location of the mangrove ecotourism was highly accessible

The mangrove forest area in Lantebung, Makassar City, was highly accessible on two or four wheels. The mangrove forests in Lakkang Delta were accessible using a small boat that passed by to pick up passengers frequently. Travel time from the pier to Lakkang Delta was approximately 15 minutes through the Tallo River.

#### Threat

1. The communities surrounding mangrove ecotourism areas experienced a decrease in income due to the COVID-19 pandemic.

The COVID-19 pandemic impacted all sectors and every social group, including the communities

surrounding the mangrove ecotourism areas. They experienced a decreased income, mainly affected by decreased overall purchasing power. This decrease affected the customers' purchasing power in buying the fish/crab/shrimp from the community, and their catches were often unsold. However, fish farmers still had to pay the fishing or fish farming operational costs. In this situation, fish farmers often look for alternative income or strategies to fulfill their needs, such as cutting mangrove trees for firewood, making charcoal, or construction.

2. Sedimentation in the Tallo River estuary

Sedimentation in the Tallo River estuary could threaten the surrounding mangrove forest areas. The debris carried by the Tallo River became accumulated sediments. The mangrove roots also contributed to this process. The sediments narrowed the river as a transportation hub for fisher boats to sail between the river and the sea. This situation could create different community perceptions of the importance of mangrove forests from an economic point of view.

3. Forest conversion and illegal logging in mangrove forest areas

Mangrove forest conversion to fish ponds and illegal logging still occurred in several places. The community did illegal logging for firewood and construction mainly due to decreased income affected by the COVID-19 pandemic.

4. Environmental pollution.

Environmental pollution could affect mangroves' growth and reproduction. Pollutants such as plastics, cans, and household or industrial waste could decrease mangrove roots' respiration and osmoregulation capacity. In the mangrove forest area of Makassar City, the commonly found pollutants were domestic wastes, such as plastic bags, cans, glass bottles, plastic sheets, scrap metal, and fishing net ropes.

5. Critical and shrinking mangrove forests

In several places, the mangrove forests in Makassar coastal areas were in critical condition and experiencing conversion into fish ponds and settlements, leading to shrinking areas of mangrove forests. The environmental pollution also contributed to the increasing size of mangrove forests in critical conditions.

Table 2. External Factor Analysis Strategy (EFAS)

No	Internal Strategic Factors	Weight	Rating	Score
<b>Opportunity</b>				
1	Trend in mangrove ecotourism	0.15	3.95	0.60
2	Implementation of the silvofishery system	0.15	3.90	0.58
3	Mangrove seedlings business	0.08	3.15	0.25
4	Brown sugar business	0.15	3.95	0.59
5	Culinary and crafts business	0.10	3.80	0.38
6	The trend in online shopping	0.08	3.25	0.26
7	The location of the mangrove ecotourism was highly accessible	0.06	3.25	0.20
<b>Sub-Total</b>		<b>0.66</b>		
<b>Total</b>				<b>2.86</b>
<b>Threat</b>				
1	The communities surrounding mangrove ecotourism areas experienced a decrease in income due to the COVID-19 pandemic	0.10	3.90	0.39
2	Sedimentation in the Tallo River estuary	0.04	3.25	0.13
3	Forest conversion and illegal logging in mangrove forest areas	0.06	3.95	0.24
4	Environmental pollutions	0.06	3.95	0.24
5	Critical and shrinking mangrove forests	0.08	3.80	0.30
<b>Total</b>				<b>1.29</b>
<b>Sub-Total</b>		<b>0.34</b>		
<b>Total</b>		<b>1</b>		

Opportunity - Threat score (EFAS) : (X) - (Y) = (2.86) - (1.29) = 1.57

### Ecopreneurship-Based Sustainable Mangrove Forest Management Strategy

The IFAS and EFAS calculation showed that the ecopreneurship-based sustainable mangrove forests management strategy in Makassar City fell in the first quadrant (see Figure 1). The strategy was an aggressive strategy that used strength to seize existing opportunities.

The strategies were as follows (see Table 3 for the summary).

1. Develop the community economy through innovative utilization of the local resources

The community around the ecotourism area sold brown sugar, crabs, and mangrove seedlings. The innovations could contribute to diversifying the products and marketing. For example, brown sugar into crystal brown sugar, while crabs into meatballs, crackers, and nuggets. They could sell these products directly and through online media.

2. Empower community groups to create mangrove-based household scale businesses

Mangrove forest areas became the source of income for the surrounding communities. The

communities used a silvofishery system that combined fish farming and mangrove cultivation to minimize inputs and environmental impacts. The business of brown sugar production, mangrove seedlings production and fishing in the mangrove forest areas was very small-scale. Therefore, empowering community groups, such as fishermen, farmers, mangroves, and women's groups, could improve the mangrove-based business scale into household-scale industries. These industries could produce fish balls, crab balls, nuggets, canned crab meat, brown sugar, and mangrove seedlings. Digital or online platforms, such as websites, search engines, social media, online advertisement, email, and videos, should support these products marketing.

The preparation for digital marketing included:

- a. Prepare digital marketing tools, such as websites, social media accounts, brand and product identities, uploading of blogs, and online trails (reviews and customer feedback).
- b. Create eye-catching and shareable content, such as photos, videos, and advertisements.

The content should consider the specific

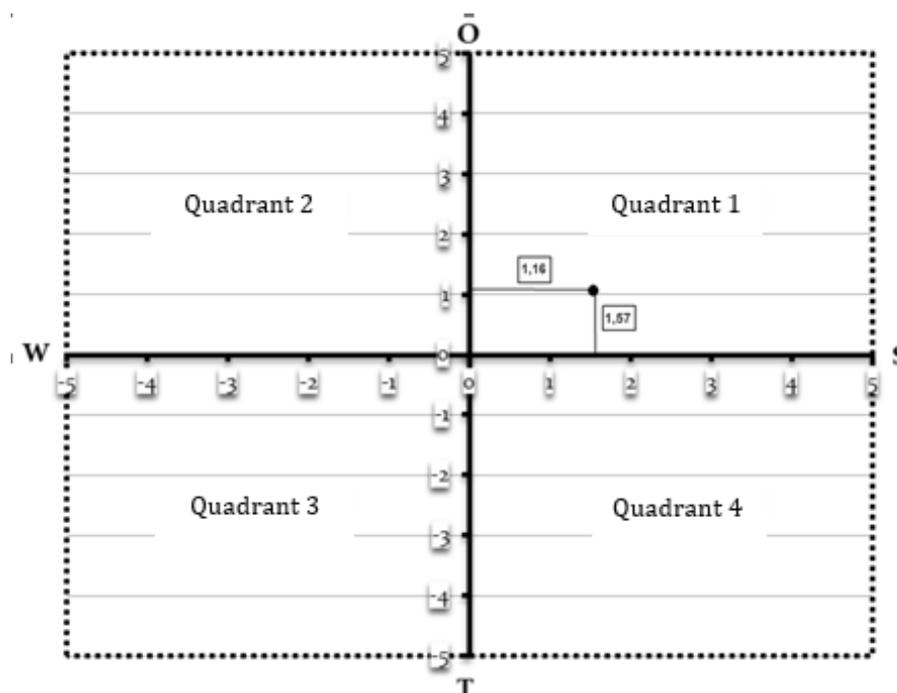


Figure 1. SWOT Analysis Quadrant

**Table 3.** SO Attack Strategy: Used internal strengths to meet external opportunities

Strength	SO Strategy
<ol style="list-style-type: none"> <li>1 Mangrove ecotourism had many visitors</li> <li>2 Community groups surrounding mangrove ecotourism areas were active and productive</li> <li>3 The community utilized the mangrove ecotourism area as a source of income</li> <li>4 Sustainable management model and community participation around mangrove ecotourism areas</li> <li>5 Available resources</li> <li>6 Supporting management systems, policies, and strategies</li> </ol>	<ol style="list-style-type: none"> <li>1 Develop the community economy through innovative utilization of the local resources</li> <li>2 Community empowerment through fishermen, farmers, mangrove, and women's groups to create mangrove-based household scale businesses.</li> <li>3 Providing training and assistance on means of making products from mangroves and digital/online marketing systems such as brown sugar production and marketing</li> </ol>
Opportunity	
<ol style="list-style-type: none"> <li>1 Trend in mangrove ecotourism</li> <li>2 Implementation of the silvofishery system</li> <li>3 Mangrove seedlings business</li> <li>4 Brown sugar business</li> <li>5 Culinary and crafts business</li> <li>6 The trend in online shopping</li> <li>7 The location of the mangrove ecotourism was highly accessible</li> </ol>	

- c. Upload and evaluate the content based on the feedback. Focus on the product with positive feedback.
  - d. Join the public marketplace forum.
3. Provide training and assistance on mangroves post-harvest processing and digital/online marketing

Mangrove forests provided various economic benefits for the communities, including mangrove fruits which could become raw material for flour, cakes, crackers, brown sugar, and syrup. These products could be sold directly in a local delicatessen or through online media to attract visitors. However, the communities need training and mentoring to improve their skills in maintaining the quality of products and diversifying the marketing system.

### Conclusion

Ecopreneurship-based sustainable ecotourism management of mangrove forests in Makassar City, South Sulawesi, should be carried out with an aggressive strategy that uses strength to seize existing opportunities. The strategies included developing the community economy through innovative utilization of the local resources, empowering community groups to create mangrove-based household scale

businesses, and Providing training and assistance on mangroves post-harvest processing and digital/online marketing.

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