

# APPLICATION OF THE SWOT METHOD IN SUSTAINABLE MARINE TOURISM VILLAGE MANAGEMENT IN CIRCULAR ECONOMIC PERSPECTIVE KALIWLINGI TOURISM VILLAGE CASE STUDY IN BREBES DISTRICT, CENTRAL JAVA

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## Abstract

Sustainable development is an attempt to accelerate a region's welfare through economic empowerment and the utilization of its natural and human resources. Sustainable tourism is an economic development perspective which employs natural and human potential. Kaliwlingi Village is one of the villages in the northern coastal area of Java, precisely in Brebes District, Brebes Regency, and Central Java Province. In 1983, The Brebes Regency coastal line was about 65.48 km long. This number continues to decrease due to abrasion. This study also aims at determining the existing condition of the mangrove ecosystem in the Pandansari mangrove area, Kaliwlingi Village, Brebes District and the socio-economic conditions of the surrounding community which include education and livelihoods. The finding shows the importance of acknowledging the local socio-cultural and ecological aspect to create a sustainable tourism.

**Keywords:** Tourism, Pandansari, Mangrove, Sustainable, Brebes Regency

## INTRODUCTION

Marine tourism is an activity to enjoy the beauty and uniqueness of natural environments in the coastal areas, sea and other recreational activities that support them (Orams, 1999). It includes fishing, snorkeling, swimming, diving, sailing, surfing, beach recreation, sunbathing, and others. Marine tourism contributes to job creations, other multiplier effects as well as state foreign exchange earnings (Dahuri et al., 2001).

There were 2,372 ha of mangroves stretched along Brebes coastal area in 1983. However, in 2013 the mangrove area plummeted into 243.20 ha (Suyono et.al. 2015). This shows that there is a significant damage to mangroves, one of which caused by the mangrove logging and ecosystem into ponds. Quoted from the Brebes Marine and Fisheries Service in 2010, mangroves concentrated in Kaliwlingi Village, Brebes District covering an area of 68 hectares are in good condition, whilst 20 ha of which are in a severely damaged condition (Cerlyawati, 2017).

Waves can generate energy to form beaches, generate currents and sediment transport in a perpendicular direction and along the coast. If the waves that occur form an angle with the

shoreline, there will be two processes of sediment transport that work simultaneously, namely components perpendicular to and parallel to the shoreline. Sediment that is abraded by the perpendicular component of the coast will be transported by currents along the coast to locations that are quite far away. Muddy Brebes beach substrate is relatively easy to be exposed to abrasion due to its unstable composition; consequently, when it is scanned from one location, the abraded coastal line during the storm cannot be reformed during the normal waves as the abraded material has been carried to another place for a long period of time.



**Figure 1: Abrasion Impact in Pandansari Area**

In addition, large-scale land clearing for tiger shrimp ponds in Brebes Regency is also one of the causes of abrasion. This is because the clearing of land for tiger prawns causes damage to the mangrove ecosystem which is the natural protector of the coast to prevent abrasion. Accretion in Brebes Regency generally occurs in the estuary area. Rivers are the sediment main contributors in the sea. The flow of the river water from upstream carries sediment particles along the stream which overflow the estuary area (accretion).

From the interpretation of Landsat 7 TM satellite quoted in Faperi et al. (2015) using the NDVI method, it was showed that the mangrove area in Brebes Regency was only 243, 20 hectares. The remaining mangrove area spread over several sub-districts, one of which was 161.31 ha in Brebes District (Kaliwlingi and Randusanga), whereas, Albana (2017) found that there were 207 ha mangrove area in Kaliwlingi Village and it grows larger.

Landsat image processing from 1999-2015 elucidated that accretion area in Brebes was 668.73 Ha and abrasion area was 1418.42 Ha. The data shows that abrasion is larger than accretion. The Brebes beach's character which has sloping type and muddy substrate makes the waves very influential on the dynamics shift of the beach.

Mangrove ecosystem management is regulated in Presidential Regulation Number 73/2012 regarding the National Strategy of Mangrove Ecosystem Management. It is the central government effort to protect coastal ecosystems. In this regulation, the Local Government (Pemda) will play an important role in managing mangrove areas which categorized as special areas need to be managed by Pemda based on Law Number 23/2014.

One alternative of mangrove ecosystems that can be managed by local governments in accordance with the principles of sustainable development is ecotourism. Mangrove ecotourism is a form of tourism which involve the community in conserving the mangrove ecosystem. The involvement of the local community will give an impact and best chance of management that leads to community empowerment in a tourist destination and sharing profits from tourism activities by the stakeholders of tourism (Khan Et.al., 2020).

Ross and Wall (1999) stated that ecotourism could possibly contribute to conservation and development in terms of positive symbiotic relationship between tourism and biodiversity that involve the locals who equipped with tourism destination management knowledge.

Sustainable management of mangrove tourism ecosystems is certainly something that must be achieved considering the important role of these ecosystems for coastal and marine areas. Unsustainable handling will certainly eliminate the benefits of the area, which if there is permanent damage, not only the economic and social benefits will be lost, but the ecological benefits will also disappear.

The well-maintained mangrove ecosystem in Kaliwlingi Village attracts tourists, thus the mangrove ecosystem in this area has the potential to be developed into a mangrove ecotourism area. As is the case with the condition of the mangrove ecosystem in Kaliwlingi, Prasenja et al (2017) concluded that the condition of the mangrove ecosystem on Lusi (Lumpur Sidoarjo), Sidoarjo, is currently suitable to be developed as a mangrove ecotourism area, yet, there are several efforts need to carried out such as an increasing mangrove diversity and breeding animals in order to create a better ecosystem. The development of mangrove tourism objects ultimately has an impact on the condition of coastal communities, especially fishermen.

The policy for the management or development of regional marine tourism through ecotourism activities as stated in the Minister of Home Affairs Regulation Number 33 of 2009 concerning Guidelines for Ecotourism Development in the regions is a step taken by the central government in encouraging increased tourism in areas based on natural resource conservation, as well as the government's efforts to increase local people's income through ecotourism. This condition is closely related to the approach of increasing national resilience in the tourism sector.

Coastal communities who earn income from marine tourism activities or marine tourism villages will contribute to the welfare of the village and will ultimately have an impact on the resilience of coastal areas and national security.

Currently, the efforts to formulate sustainable development policies are directed at the Sustainable Development Goals (SDG's) agenda proclaimed by the United Nations (Smith et

al., 2018). Various different concepts were introduced with the same goal, development that considers environmental sustainability such as green economy, blue economy, bioeconomy (D'amato, Droste, Winkler, & Toppinen, 2019), circular economy (Sassanelli, Rosa, Rocca, & Terzi, 2019) and several other concepts. It seems the same, but each concept approach has different assumptions and different implementation strategies in a country that has different geographical characteristics, levels of government level, parties involved, or different implementation guidelines (D'amato et al., 2019).

If a country decides to implement one of these concepts, regulation, provision of public services, use of economic instruments, and provision of measuring instruments need to be adjusted to the assumptions contained in the concept (D'amato et al., 2019). Is Indonesia a country that cares about a sustainable economy? Care or not, this is a necessity. This is reflected in the work program prepared by the government during the last 2 presidential leaderships. In the era of President Susilo Bambang Yudhoyono, Indonesia announced at the UN conference in Brazil (Rio+20) in 2012 that development policies in Indonesia adopted the concept of a blue economy.

### **Formulation of the problem**

The ideal development is sustainable development (Brundtland, 1987). Sustainable development should be a guide in developing the region by prioritizing harmony between social, economic and fostered aspects. This study formulates how to develop sustainable tourism in mangrove tourism at Pandansari Kaliwlingi by determining a circular economy model.

## **RESEARCH PURPOSES**

Referring to the formulation of the problem above, this research is aimed at formulating the management model of the Pandansari Marine Tourism Village in Kaliwlingi Village in a circular economy perspective, followed by using QSPM (Quantitative Strategy Planning Matrix) analysis in formulating a strategy for developing the Marine Tourism Village. This study also aiming to determine the existing condition of the mangrove ecosystem in the Pandansari mangrove area, Kaliwlingi Village, Brebes District and the socio-economic conditions of the surrounding community which include education and livelihoods.

## **LITERATURE REVIEW**

### **Sustainable Development**

Sustainable development is a development strategy that results in aesthetic area management and has economic value but the environment is well maintained (Ali, 2014). Sustainable development means the sustainable use of environmental resources by the community so that it can also be used by the community in the future (Prasenja, 2017). Thus, future generations will still have the same or better natural resource assets and environmental services than the current generation (Huda, 2008).

However, in practice, the notion of sustainable development is often misinterpreted or dominated by the sustainability of economic growth, which actually results in environmental unsustainability (Alamsyah, 2006). In line with Alamsyah (2006), the conditions at the research site are unsustainable in environmental aspects so that the management strategy is expected to be able to solve the problem of inequality in the management aspects of ecotourism areas.

The concept of marine tourism itself is the realization of sustainable development in the tourism sector. Mangrove ecotourism is a form of marine tourism in participatory management of mangrove ecosystems that involves the community through government assistance and environmental non-governmental organizations (NGOs). Prasenja et al., (2017) define eco-tourism as a travel activity to enjoy the natural atmosphere of the mangrove ecosystem and the fish resources in it responsibly by participating in maintaining its sustainability.

According to Prasenja (2017) in relation to sustainable development, mangrove ecosystem management should include several forms of main activities, namely:

- a. Mangrove ecosystem exploitation whose activities can be controlled by implementing a silvicultural system, arranging contracts and granting concessions.
- b. Protection and preservation of mangrove ecosystems is carried out by appointing, establishing and strengthening mangrove ecosystems into protected ecosystems, conservation ecosystems (Nature Reserves, National Parks, Great Ecosystem Parks, Tourism Ecosystems, etc.) and other protected areas (green lanes, coastal borders) /river, etc.).
- c. Rehabilitation of damaged mangrove areas in accordance with their management objectives with an appropriate implementation approach and use of science and technology (science and technology).
- d. Handling damage and managing mangrove ecosystems in a participatory manner by involving the community.

The benefit of the theory of sustainable development is to meet the needs and maintain the welfare of the community while maintaining a sustainable ecosystem both now and in the future (Prasenja, 2017). Coastal communities who are economically marginalized, by being actively involved in the management of marine tourism are able to improve their standard of living and maintain well-maintained ecosystem conditions.

### **Characteristics of Coastal Ecosystems**

Coastal areas are transitional areas between land and sea ecosystems that are affected by changes on land and sea (Law No. 27 of 2007 in conjunction with Law No. 1 of 2014).

According to Bengen (2004) with the addition that coastal areas have the following characteristics:

1. It has fish habitats and ecosystems such as mangroves, coastal ecosystems, estuaries, coral reefs, seagrasses, sand dunes and services such as research, education, recreation and cultural attractions.
2. The pressure on the existence of coastal ecosystems is characterized by competition for control in the use of resources and space by various stakeholders, so that conflicts often occur which have an impact on decreasing the function of these resources.
3. Provide resources which can generate income for coastal communities from activities such as fishing, aquaculture, marine services, tourism, education and others.
4. Usually has a high population density in rural areas with a pattern that extends along the coast and spreads out.

Integrated coastal area management is a coastal area management approach that involves one or more ecosystems, resources and utilization activities in an integrated manner in order to achieve sustainable coastal area development (Karubaba, et al., 2001).

It is necessary to increase active and positive community participation, through efforts to increase public awareness about the environment and conservation by participating in rehabilitation of damaged conditions.

This rehabilitation effort is not only to restore environmental sustainability in coastal areas, but also to optimize the utilization of coastal and marine areas related to coastal ecosystems.

To manage coastal and marine areas properly, it is necessary to have the participation of all stakeholders, so that coastal areas can maintain the sustainability of their ecosystem functions, and can also provide high economic benefits for coastal communities. This condition can be achieved through integrated management of coastal and marine areas, with the application of the principles of careful and well-planned regional development planning.

The coastal areas of Indonesia are like a super mall in a disaster, and until now they are still hitting. Therefore, in an effort to reorganize space in coastal areas that are prone to disasters, it is recommended to follow the seven basic principles of zoning/spatial planning plans to minimize disaster risk (Diposaptono, 2011).

The seven principles according to Diposaptono (2011) are:

- a. Recognizing coastal areas and small islands prone to disasters as a hazard.
- b. Recognizing the shape and type of coastal areas and small islands (sloping, steep, rocky, sandy, etc.).
- c. Identifying potential resources for coastal areas and small islands (fishing, tourism, settlements, transportation, etc.).
- d. Identify the need for conservation areas and disaster protection (mangroves, coastal ecosystems, sand dunes, etc.).
- e. Recognizing the character/function of the regional facilities and infrastructure placed (break water, ports, tall buildings, etc.).
- f. Recognizing the socio-cultural and socio-economic characteristics of coastal areas and small islands (determining vulnerabilities and risks).
- g. Develop a zoning plan/spatial planning concept by considering beauty, order, and safety.

To reduce the negative impact of disasters in coastal areas, it is necessary to carry out comprehensive coastal environmental mitigation efforts, namely a combination of structural efforts, such as the creation of infrastructure and control facilities, and non-structural efforts, such as making coastal environmental mitigation policies and public awareness. Mitigation is a long-term investment for the welfare of all levels of society. According to Diposaptono (2011), mitigation efforts must be implemented from the planning stage.

### **Socio-Economic Conditions of Communities and Coastal Area Facilities**

The coastal area based on the Decree of the Minister of Maritime Affairs and Fisheries Number KEP.10/MEN/2002 concerning General Guidelines for Integrated Coastal Management Planning is defined as a transitional area between interacting land and marine ecosystems, where towards the sea 12 miles from the coastline for the province and one third of the coastline. Sea area (provincial authority) for regencies/cities and towards the administrative boundaries of regencies/municipalities.

Coastal communities are groups of people or a community who live in coastal areas and their source of economic life depends directly on the utilization of marine and coastal resources (Sabarisman, 2017).

According to Law No. 1 of 2014 coastal communities are communities consisting of Indigenous Law Communities, Local Communities, and Traditional Communities who live in coastal areas and small islands. Thus, the coastal community is a group of people (owner fishermen, labor fishermen, fish cultivators, fish traders, fish processors, etc.)

A distinctive culture associated with its dependence on the use of coastal resources in its socio-economic activities.

Rini (2013) states that coastal communities are classified into 3 (three) parts, namely, aquatic communities, fishing communities and traditional coastal communities. In general, Indonesian coastal communities are closely related to socio-economic disparities, on average coastal communities still live at the poverty line, even a few who live below the poverty line.

According to Tuwo (2011), the current socio-economic condition of coastal communities is still dominated by fishing activities, while other economic activities such as coastal and marine ecotourism are still not well developed. In addition, fishing activities are still on a small scale with inadequate production and high operational costs. This causes the low level of welfare of people living in coastal areas.

The occurrence of the Abarasi disaster made the community experience pressure, from the influx of tidal water into settlements, houses destroyed, unable to carry out activities until agricultural land became salty, so that people could not develop like people in other areas. The impact of tidal water entering settlements paralyzes the economic value of the community, in the aquaculture sector it makes people lose fish because tidal water is higher than pond embankments, in the agricultural sector it makes farmers fail to harvest, sea water enters agricultural land, the soil becomes salty, water is bottled the rain can't cope.

The emergence of natural pressures and economic pressures creates the impact of new pressures, namely social pressure being the biggest pressure, people are not able to send their children to good and proper education, so that human resources are decreasing, elementary school graduates are forced to make money by going with their parents (MIYANG) to the sea to look for fish. The impact of declining human resources results in unemployment everywhere and a lack of creativity

### **Ecological Condition**

Based on the results of observations and identification at the research site, a total of 16 mangrove species were found scattered in the coastal area of Brebes Regency. The location of data collection includes 3 coastal villages in Brebes Regency, namely Randusanga Wetan, Randusanga Kulon and Kaliwlingi. The research area is very different compared to the city of Tegal, the mangrove ecosystem in Brebes Regency is much wider than the mangrove ecosystem in the city of Tegal. This is presumably because the mangroves at the location of data collection in Brebes Regency are good locations for mangroves to grow, namely in the delta resulting from sedimentation from the Pemali river.

Mangroves found in Brebes Regency are divided into 3 (three) mangrove components, namely major component mangrove species, minor component, and association component. The species found in the transect were also more numerous than in Kota Tegal. The major mangrove species found in the transect were *Rhizophora mucronata* Lam., *Avicennia marina* (Forssk.) Vierh. And *Avicennia Alba* Blume. Minor category of mangrove species found in the transect is *Xylocarpus granatum* Koen. And *Excoecaria agallocha* L, while no associated species were found in the transect, only in the study area.



## **Sustainable Tourism**

Tourism is defined as everything related to travel activities for recreation and tourism. The law of the Republic of Indonesia No. 10 of 2009 concerning Tourism, It is defines tourism as a variety of tourism activities and is supported by various facilities and services provided by the community, businessmen, government and local governments.

United Nations for World Tourism Organization (UNWTO) adopted the concept of sustainable tourism from the concept of sustainable development issued by the UN World Commission on Environment and Development (UNWCED). The concept of sustainable development continued to be developed, until at the Earth Summit in 2002 five agreements were born that were closely related to the conservation of natural resources and the environment, including the tourism sector (Qodriyatun, 2018). UNWTO defines sustainable tourism as a tourism activity that takes full account of current and future economic, social and environmental impacts, to meet the needs of tourists, industry, the environment and local communities.

According to Yazdi (2012) sustainable tourism is the latest concept used to reflect the need for a comprehensive analysis and management of tourism both as a business and an experience. The goal of sustainable tourism is to ensure that a development brings positive experiences for local communities, tourism companies and tourists themselves. However, in its development, tourism currently has problems, this is due to the addiction to tourism growth that is not in accordance with sustainability goals.

Research conducted by Desbiolles (2018) states that tourism must be understood and managed in a broader context of sustainability. In addition, a strategic approach to transitioning to a sufficiency approach for tourism and leisure is critical if sustainability is to be secured. Some of the recommendations made include: transforming the United Nations World Tourism Organization (UNWTO) into a Headquarters for Sustainable Mobility, creating a global Tourism Wealth Fund, fostering diverse approaches to tourism strategies for development and regulating and managing tourism for more balanced and equitable accounting, ecological boundaries. , benefits for people and a sustainable future.

## **Ecotourism**

Ecotourism is an activity that combines conservation and tourism activities. Ecotourism is responsible travel to natural places by preserving the environment and improving the welfare of local residents (TIES, 1991 in Wood, 2002). According to Barkauskiene et al (2013) ecotourism as a tool for sustainable development and providing social benefits, as well as the future economic environment and the right to be a priority in the country's economic development. Thus, ecotourism can be defined as a concept of sustainable tourism development that aims to support efforts to preserve the environment (nature and culture) and increase community participation in management, thereby providing economic benefits to the local community. The management of the eco-tourism will be a solution to suppress deforestation rate land utilization (Prasenja et al., 2018).

## **Circular economy**

Committee on Environmental Policy (2021) sustainability in the tourism sector and overall a shift from linear to circular models are becoming increasingly important for governments and businesses due to different environmental, economic and social factors. The concept of a circular economy has become popular in recent years (Tóth, 2019), but this concept can be traced to research (Boulding, 1966), Pearce, Markandya, and Barbier (2010) and Jackson (1993). Over time, the concept and definition of circular economy evolved according to the point of view of researchers. Kirchherr, Reike, and Hekkert (2017) summarize 114 definitions of a circular economy into an economic system that replaces the concept of "end-of-life" by reducing, reusing, recycling, and recovering. Materials or equipment in the production and consumption processes. This cycle applies to both the micro (household and enterprise) and macro (city, country, and regional levels) of scale.

This concept can be created with a new business concept and responsible consumers. Today, this concept is promoted by the European Union, several governments and non-governmental organizations around the world. This concept is considered to have the potential to be applied widely, because it can attract various kinds of businesses in a sustainable business circle. Limited resources will be managed sustainably where each production chain creates added value for the same resource or raw material (Korhonen, Honkasalo, & Seppälä, 2018).

The Circular Economy concept has been gaining momentum since the late 1970s (EMF, 2013b). Several authors, such as Andersen (2007), Ghisellini et al. (2016), and Su et al. (2013) attribute concept introduction to Pearce and Turner (1989). By describing how natural resources affect the economy by providing inputs to production and consumption and serving as absorbers of outputs in the form of waste, they investigate the linear and open-ended characteristics of contemporary economic systems.

Stahel and Reday (1976) introduced certain features of the Circular Economy, with a focus on industrial economics. They conceptualized a circular economy to describe industrial strategies for waste prevention, regional job creation, resource efficiency, and dematerialization of the industrial economy. Stahel (1982) also emphasizes the use of selling instead of ownership of goods as the most relevant sustainable business model for a circular economy, which allows industry to profit without incurring the costs and risks associated with waste.

## **RESEARCH METHODOLOGY**

Methodology is a strategy or action plan that connects various methods to produce the desired output (Creswell, 2003). Therefore, this research will not be supported by only one method, but is a combination of qualitative and quantitative methods. This is because this research will be based on field studies, secondary data analyzes, and interviews with stakeholders, so researchers must not be biased in conducting theory testing on studies conducted through deductive-inductive analysis.

This study is an effort to apply the principles of sustainable tourism Pandansari Kaliwlingi Mangrove Tourism. The principles of sustainable tourism are economically feasible (economically feasible), environmentally sound (environmentally feasible), socially acceptable, and technologically appropriate.

This study was conducted with a qualitative approach, because this study aims to explore the characteristics of Pandansari Kaliwlingi Mangrove Tourism to aspects of the natural environment, socio-culture, and also the regional economy, to formulate a strategy to develop sustainable tourism. The literature study step was carried out using data derived from studies of secondary data, statistical data and literature from various sources, while primary data was obtained through discussions with various sources, as well as questionnaires.

This study also uses the SWOT method (Strengths, Weaknesses, Opportunities, and Threats) where this method is used to determine the strengths and weaknesses as an effort to develop tourism objects. Sampling was carried out by the author using purposive sampling and incidental sampling techniques. While the method used when collecting data is by using observation, interviews, and documentation.

## **RESULTS AND DISCUSSION**

### **Sustainable tourism strategy**

Tourist destinations are expected to have developed and applied the development of long-term strategies by considering environmental, economic, social, cultural, quality, health, safety, and aesthetic issues developed together with the community. Monitoring and evaluation systems must also be implemented in order to minimize all impacts caused by tourism activities. In addition, tourism destinations are expected to have effective organizations, groups or committees, responsible for coordinating the development of sustainable tourism by involving the private sector and government. This organization also plays a role in providing supervision and reporting to the public on a regular basis. Christie (2005) starts from (a) identification and assessment of problems related to conservation issues at a local scale (b) preparation of plans or programs (c) official program adoption and financing (d) implementation and (e) evaluation. Such management activities can be implemented and evaluated from time to time under the coordination of one service, namely the Department of Fisheries and Marine Affairs.

These ecotourism facilities include:

1. Nature school

Learning media with nature which is followed from the aspect of community elements, regarding environmental education and aquaculture, followed from early childhood to students and the general public

2. Mangrove Joglo

Education center and learning space to understand about the mangrove ecosystem and other learning spaces

3. Art Gallery

A place to witness the space for creative ideas in the form of art and traditions performed from dance, music, painting, and theater.

4. Bruges romance

One of the supporting factors in the tracking path that connects tracking with the Pongol River which became history in 2004 during the planting era.

5. Tower of view

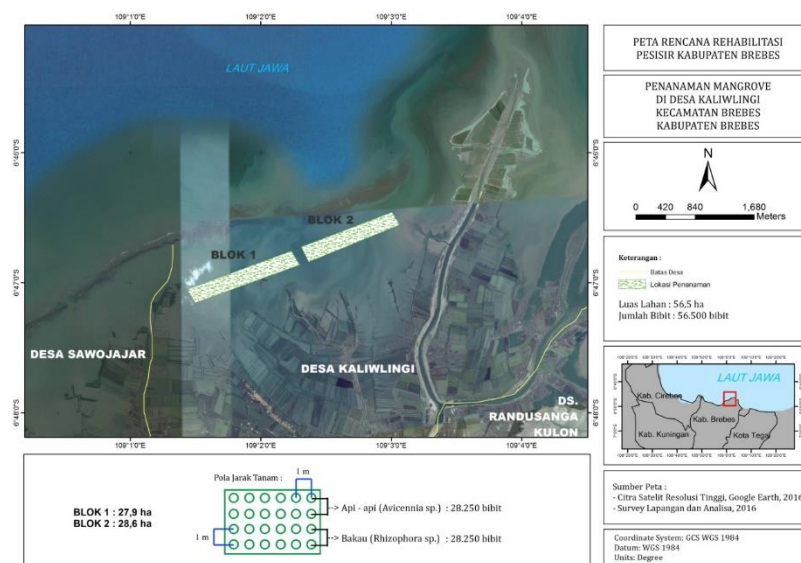
A building with a height of 15 meters. On top of the tower one can enjoy a view that cannot be seen from any angle

6. Glodog Advertising Park

A good mangrove ecosystem will become a home for fauna, one of which is a glodog advertisement and an icon for mangrove tracking destinations.

7. Sand Island

The expanse of plains that was originally known for abrasion, then turned into a shoreline



**Figure 2. Map of Pandansari Mangrove Ecosystem Management Plan Steps in the socio-cultural field in creating sustainable tourism**

In this pillar, sustainable tourism development requires tourist destinations to provide equal employment opportunities to all communities. Organizations must also have systems in place that encourage community participation in goal planning and decision-making on an ongoing basis.

Economic utilization for local communities can also be demonstrated by the existence of a system that supports local communities and small and medium-sized entrepreneurs to be able to promote and develop their local products in a sustainable manner. The local products in question can be in the form of food and beverages, handicrafts, art performances, agricultural products, and others. Cultural values that become ancestral heritage must be preserved. This cultural preservation can later become an attractive attraction for tourists so that it becomes a means of education and knowledge transfer. In addition, with the existence of tourist attractions in the form of local/cultural wisdom, it will bring tourists to be able to respect and appreciate the culture in every tourist destination they visit.

Tourist destinations are also expected to have a visitor management system, including actions to maintain, protect, and strengthen natural and cultural resource assets. To support this system, tourist destinations may provide or publish appropriate visitor behavior guidelines on sensitive sites. This information and guidance should also be adapted to the local culture developed through collaboration with the community.

Pandansari mangrove tourism provides many benefits, namely providing new jobs for local residents. This study took 5 respondents who had progress towards income after the opening of Pandansari mangrove tourism. Respondents consisted of parking attendants, restaurant owners, local women, and RT heads. Previously, these respondents worked as pond fishermen and housewives, but after the opening of this tour, it opened up other job opportunities that could be used to increase income.

The graph of Dewi Mangrovesari's annual visitors from 2017-2020 has always decreased, especially in 2020 due to the Covid-19 pandemic which caused a drastic decline.



**Figure 2: Recapitulation of the Number of Mangrove Tourism Visitors**

### Steps in the ecological field in creating sustainable tourism

Environmental conservation is carried out to reduce and prevent environmental damage caused by tourism activities. In this case, when developing a tourist destination, the organization is required to identify environmental risks and their management processes/systems. In addition, tourist destinations must play a role in providing protection for the wild, both flora and fauna

by providing a system that is adapted to local, national and international laws. Roberts and Hawkins (2003) explain that there is strong and convincing evidence that protecting areas from fishing leads to an increase in the number, size and biomass of the types of organisms being exploited. This is part of the bio-physical conditions in the three conservation areas where the coral reef environment is an effective and efficient place for marine storage and protection. Therefore, it is necessary to understand the sustainability and sustainability aspects of coral reef resources so that it will affect the pattern of their use.

Pelletier et al., (2005) suggested that the successful performance of a marine conservation area can be measured from 3 important points of view, namely ecological, economic and social. Several ecological variables that can be measured include (a) species richness and diversity index, (b) abundance of invertebrates, (c) coral cover, (d) spatial distribution of species, (e) species composition and relative density. Economic variables that can be measured include (a) management costs, (b) number of visits and gross expenditures directly related to conservation areas, (c) changes in fishing effort. The social variables that can be measured include (a) public perception, (b) the frequency of meetings between the community and marine conservation area managers.

**Table 1: Changes in the number of mangrove trunks in pandansari every year**

NO	AMOUNT STEM	LARGE (Beginning)	YEAR PROGRAM	TYPE OF PLANT	PRESENT CONDITION
1	15,000 btg	1 ha	2005	Rizophora Mucronata	75%
2	25,000 btg	2 Ha	2005	Rizophora Mucronata	1.5%
3	25,000 btg	2 Ha	2006	Rizophora Mucronata	1.5%
4	25,000 btg	2. Ha	2007	Rizophora Mucronata	15%
5	10,000 btg	1 ha	2007	Rizophora Mucronata	75%
6	185,000 btg	15 ha	2008	Rizophora Mucronata	70%
7	20,000 btg	1.5 Ha	2008	Rizophora Mucronata	75%
8	15,000 btg	1 ha	2009	Rizophora Mucronata	85 %
9	15,000 btg	1 ha	2009	Rizophora Mucronata	85 %
10	15,000 btg	1 ha	2009	Rizophora Mucronata	85 %
11	15,000 btg	1 ha	2009	Rizophora Mucronata	85 %
12	30,000 btg	2.5 Ha	2009	Rizophora Mucronata	85 %
13	185,000 btg	15 ha	2010	Rizophora Mucronata	0.5%
14	250,000 btg	20 ha	2010	Rizophora Mucronata	1.5%
15	30,000 btg	2.5 Ha	2010	Rizophora Mucronata	85 %
16	40,000 btg	3 ha	2010	Rizophora Mucronata	45%
17	40,000 btg	3 ha	2010	Rizophora Mucronata	15%
18	10,000 btg	1 ha	2010	Rizophora Mucronata	75%
19	40,000 btg	3 ha	2011	Rizophora Mucronata	85 %
20	50,000 btg	4 Ha	2011	Rizophora Mucronata	58%
21	40,000 btg	3 ha	2011	Rizophora Mucronata	35%
22	40,000 btg	3 ha	2011	Rizophora Mucronata	85 %
23	40,000 btg	3 ha	2011	Rizophora Mucronata	85 %
24	15,000 btg	1 ha	2011	Rizophora Mucronata	85 %
25	60,000 btg	5 ha	2012	Rizophora Mucronata	85 %
26	15,000 btg	1 ha	2012	Rizophora Mucronata	75%

27	200,000 btg	20 ha	2013	Rizhopora Mucronata	75%
28	50,000 btg	0.5 Ha	2013	Rizhopora Mucronata	90%
29	250,000 btg	25 Ha	2014	Rizhopora Mucronata	
30	250,000 btg	25 Ha	2015	Rizhopora Mucronata	75%
31	100,000 Rods	10 Ha2	2015	Rizhopora Mucronata	90%
32	660,000 Rods	66 Ha	2016	Rizhopora Mucronata	85 %
33	230,000 Rods	27 Ha	2016	Rizhopora Mucronata	90%
34	100,000 Rods	10 Ha	2016	Rizhopora Mucronata	90%
35	100,000 Rods	10 Ha2	2017	Rizhopora Mucronata	90%
36	1000 sticks	500 M	2018	Rizhopora Mucronata	100%
37	1,500 Rods	1.5 Ha	2018	Rizhopora Mucronata	50%
38	1000 sticks	1 ha	2018	Rizhopora Mucronata	60%
39	2,000 sticks	6 Ha	2018	Rizhopora Mucronata	
40	5.00 Rods	Ha	2018	Rizhopora Mucronata	100%
41	1,500 Rods	750 m	2018	Rizhopora Mucronata	100%
42	2,500 Rods	2.5 Ha	2018	Rizhopora Mucronata	70%
43	10,000 Rods	2 Ha	2019	Rizhopora Mucronata	100%
44	20,000 Rods	6 Ha	2019	Rizhopora Mucronata	90%
43	1,000 sticks	500 M	2019	Rizophora mucronata	90%
<b>AMOUNT</b>	<b>3,231,250 Rods</b>	<b>310 Ha</b>			

## Results of Assessment of Potential Forest Tourism Objects Pandansari Mangrove as a Tourist Attraction Education

### Attractiveness

The following are the results of calculations on the attractiveness of the Brebes mangrove educational tourism object:

**Table 2: The results of the calculation of indicators / components of Attraction in Pandansari Mangrove Forest Tourism Objects**

Tourist Attractions				
No.	Elements/Sub Elements	Weight	Value	Score Total *
1	The uniqueness of the potential of educational tourism that available	6	30	180
2	Variety of educational tourism activities	6	30	180
3	Cleanliness of tourist sites	6	25	150
4	Security tourist sites	6	30	180
5	Comfort tourist sites	6	30	180
<b>Attraction score</b>				<b>870</b>

## Accessibility

The results of the Assessment of Accessibility are presented in table 3.

**Table 3: Results of Object Accessibility Assessment Results**  
**Tour**

Accessibility				
No.	Elements/Sub Elements	Weight	Value	Score Total *
1	Road conditions	5	25	125
2	Distance from the city center	5	25	125
3	Road type	5	25	125
4	Travel time from the city center	5	30	150
<b>Total Accessibility Score</b>				<b>525</b>

## Accommodation

The results of the accommodation assessment are presented in table 4 below.

**Table 4: Accommodation assessment results**

No	Element / Sub	Weight	Element	Value	Total Score *
1	Total lodging	3		30	90
2	Number of rooms	3		15	45
<b>Total Accommodation Score</b>					<b>135</b>

## Facilities / Amenity

The results of the assessment of infrastructure / amenity are contained in the following table 5.

**Table 5: Eligibility level results**

No.	Criterion	Score **	Score Max ***	Index (%) ****	Ket
1	Highlights	870	900	96,7	Proper
2	Accessibility	525	600	87,5	Proper
3	Accommodation	135	180	75	Proper
4	Amenity	165	180	91,6	Proper
<b>Eligibility Level</b>				<b>87,7</b>	<b>Proper</b>

No	Element/ Sub Elements	Weight	Value	Total Score*
1	Means	3	25	75
2	Infrastructure	3	30	90
<b>Total Amenity Score</b>				<b>165</b>

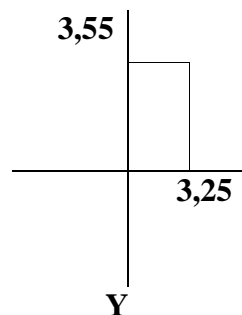
From the results of calculations that have been carried out, it is known that the Pandansari Mangrove Forest Tourism Object has been included in the category of worthy of being developed into an educational tour with a feasibility index that quite high with a value of 87.7%.



## Feasibility Level of Pandansari Mangrove Forest Tourism Object as an Educational Tourism Object

The results of the calculation regarding the feasibility of development as an educational tour in the Pandansari Mangrove Forest based on complete observations can be seen in table 5. Next.

Based on the results of the analysis that has been carried out, it can be seen that the value of the "x" axis is 3.25 and the value of the "y" axis is 3.55. Thus, it can be determined that the Pandansari Mangrove Forest tourism object is in the position of quadrant 1 of the SWOT analysis. The obvious can be seen in figure below.



Based on the picture above, mangrove forest attractions Pandansari in **quadrant 1 (+, +) position: Progressive strategy**, this position shows the state of a strong and very likely tourist attraction. In this case, the suitable recommendation given is Progressive (Growth Oriental Strategy), meaning that the object of study is in a strong and stable condition so that it can carry out this continue to develop in the form of expansion, growth, and progress made in a positive manner

## CONCLUSION

This result of this study suggests to maintain a harmony between the tourism and natural conservation by taking socio-cultural and ecological approach to the local communities, tourists and conservation area in order to create sustainable tourism.

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