Analysis of Sustainable Management Strategies in Gunung Anyar Mangrove Surabaya Ecotourism

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Abstract. Ecotourism functions as ecosystem protectors because they are able to protect biological habitats. The development of the city of Surabaya is expected to synergize with the existence and sustainability of mangrove forests, in order to maintain the preservation of mangrove forests are necessary through the management of ecotourism in the Mangrove Area. In realizing the success of ecotourism management in the Mangrove Area, environmental analysis and policy evaluation are carried out using the DPSIR (Driving Force, Pressure, State, Impact, Response) method approach. This research aims to formulate a Priority Strategy for Sustainable Management in the Gunung Anyar Mangrove Ecotourism Area Based on Community Based Tourism (CBT). Gunung Anyar Mangrove Ecotourism has various types of tourist attractions including jogging tracks, boat tours, viewing towers, gazebos, and several selfie spots. However, the availability of these tourist attractions needs to be given innovation in its management in order to increase public interest in visiting. To achieve this goal, the following steps are needed: (1) Analyzing environmental, economic and social factors in tourism management in the Gunung Anyar Mangrove Ecotourism Area using the DPSIR approach and (2) selecting indicators that influence tourism management in the Mangrove Ecotourism Area Gunung Anyar uses descriptive quantitative analysis and SWOT analysis. Research in producing sustainable management strategy directions for each factor, namely on environmental factors that need to expand mangrove seeding, on economic factors that require service trade activity facilities for community of local residents, and on social factors to expand employment opportunities that are prioritised for local residents. Based on the result of this research, recommended strategies for managing these indicators include:1) Regular and sustainable mangrove planting activity program; 2) Providing public transportation on routes to the Gunung Anyar Mangrove Ecotourism area; 3) Promotion of the potential tourist attraction of the Gunung Anyar Mangrove ecotourism area and processed mangrove products; and 4) Training in labor-intensive programs related to mangrove conservation.

Keywords: sustainable management strategies, community-based tourism, DPSIR, SWOT.

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1 Introduction

The development and growth of cities through development policies oriented towards economic growth spur environmental problems by decreasing environmental quality due to pollution from waste disposal produced by the industrial sector. The rapid conversion of land functions, especially the function of mangrove areas as life support, is threatened with sustainability due to the decreasing carrying capacity of land in supporting people's lives in urban areas, so it is necessary to increase the portion of sufficient green open space.

One of the mangrove ecosystems that are threatened and need to be protected in Indonesia are those on small islands. This is because small islands have limited carrying capacity and resources so that if they are disturbed or damaged it will be difficult to repair. It is feared that developing tourism tends towards mass tourism to have a negative impact on the surrounding ecosystem [1]. Therefore, good ecosystem management is needed through ecotourism programs. Mangrove forests provide quite high potential performance if managed as ecotourism Good [2]. This is because mangrove forests directly provide benefits to the community and the government and involve culture and the environment [3]. Mangroves have many direct benefits to human life, ranging from ecological benefits to being a source of food and medicine [4]. Apart from that, mangroves have socio-cultural functions, namely as conservation, education and ecotourism areas [5].

As an ecosystem found in coastal areas which is a transition between land and sea (marine) ecosystems, mangrove forests are clearly influenced by processes that occur on land and sea; including waste pollution, coastal development and all other natural and anthropogenic processes that have the potential to reduce the health and sustainability of mangroves. Based on Minister of Home Affairs regulation number 1 of 2007 concerning the arrangement of green open space in urban areas, it is stated that green open space in urban areas is part of the open space of an urban area which is filled with plants and vegetation to support ecological, social, cultural, economic benefits. and aesthetics [6]. The objectives of green open space in urban areas are to maintain harmony and balance in the urban environmental ecosystem, to create a balance between the natural environment and the artificial environment in urban areas, to improve the quality of the urban environment which is healthy, beautiful, clean and comfortable and one of its functions that needs attention, especially in urban areas, is securing the existence of protected urban areas.

Ecotourism has the function of protecting the ecosystem, providing environmental education to the community to preserve nature, protect and maintain the existence of nature, complete with the surrounding environment. As a nature conservation activity that involves material community participation. This community participation will be used to maintain biodiversity and develop biodiversity in ecotourism areas. Ecotourism activities will indirectly require the work of local communities to maintain and develop biodiversity and potential. Thus, this recreational activity plays a very important role in empowering the local community's economy.

It is hoped that the rapid development of the city of Surabaya will be synergistic with the existence and preservation of mangrove forests. In order to organize spatial

and regional planning and maintain the carrying capacity of the environment, the Surabaya City Regional Regulation Number 12 of 2014 concerning the Surabaya City Regional Spatial Plan for 2014-2034, which regulates the City Spatial Pattern [7]. One of them is a protected area in the form of a mangrove area on the east coast of Surabaya. The coastal border area which is forested with mangroves has been designated as a protected area in the form of a Nature Conservation Area which is integrated with ecotourism and science activities. As a Nature Conservation Area, the preservation of mangrove forests is something that absolutely must be maintained and/or improved. One of the real efforts to preserve mangrove forests is through monitoring the status of mangrove forests in accordance with statutory provisions and carrying out sustainable management of mangrove conservation areas. In managing mangrove ecotourism, various aspects must be considered, especially environmental, economic and social aspects. The aim of this research is to analyze environmental, economic and social aspects in tourism management in the Gunung Anyar Mangrove Ecotourism Area, identify indicators that influence tourism management in the Gunung Anyar Mangrove Ecotourism Area, and formulate sustainable management strategies in the Gunung Anyar Mangrove Ecotourism Area.

The DPSIR (Driving Force, Pressure, State, Impact, Response) analysis process in this research assumes that social, economic and environmental conditions are interconnected, so it is necessary to analyze each of these aspects in terms of management. tourism in the Gunung Anyar mangrove Ecotourism Area. The results of the DPSIR analysis of environmental, economic and social aspects will produce indicators which are then identified using SWOT analysis (Strength, Weakness, Opportunities, Threat with an external factor approach (EFAS) and internal factors (IFAS) to look for indicators that influence tourism management in the Gunung Anyar mangrove Ecotourism Area. Based on the results of the SWOT analysis, several strategies will also be produced for managing the Gunung Anyar Mangrove Ecotourism Area.

2 Research Methods

The research was conducted in the Gunung Anyar Ecotourism Area, which is located in Gunung Anyar Tambak Village, Gunung Anyar District, Surabaya City. The research period is planned for 3 months, starting from September to December 2023. The population in this research is the community around mangrove ecotourism, visitors to the Gunung Anyar mangrove ecotourism area, the Surabaya City Government as stakeholders, as well as experts related to the development of mangrove ecotourism.

The data analysis used to answer the first objective is to analyze environmental, economic and social aspects in tourism management in the Gunung Anyar Mangrove Ecotourism Area using DPSIR analysis. The DPSIR method describes cause and effect relationships between various components in sustainable development, namely economic, environmental and social [8]. In the DPSIR analysis there are 5 parts, namely:

1) Driving forces or what are called triggers, are things related to causes, related to human needs, such as economic conditions and social factors [8].
2) Pressure is human activity that puts pressure on environmental components which are divided into two large groups, namely environmental stressors and human behavior
3) States are everything that shows the current environmental conditions.
4) Impact is the impact that arises from the existence of problems and overcoming problems.
5) Response is a response from policy makers or the community to the impacts and conditions of the community's environment

The DPSIR model is used to find causal relationships between the environmental conditions of mangrove ecotourism and the management required, as well as helping policy makers understand the related information. The DPSIR analysis scheme is explained as in Figure 1 below.

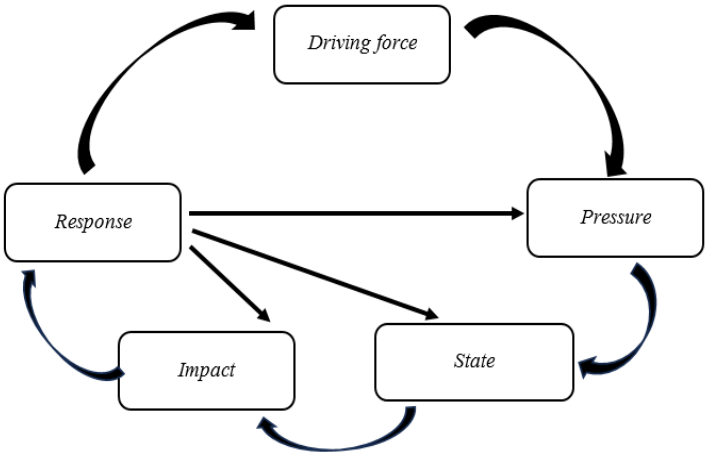

Fig. 1. DPSIR Framework

The data analysis technique to answer the second objective, namely identifying indicators that influence tourism management in the Gunung Anyar Mangrove Ecotourism Area, is to use SWOT analysis. 3 stages are carried out for SWOT analysis, namely identifying internal (IFAS/Internal Factor Analysis Summary) and external (EFAS/External Factor Analysis Summary) factors, analyzing internal and external factors, and creating a SWOT matrix [9]. In the SWOT matrix, as shown in Table 1, it will be explained how the external opportunities and threats faced can be adjusted to the strengths and weaknesses possessed, which are indicated by 4 possible alternative strategies used.

Table 1. SWOT Matrix

IFAS / EFAS	Strength Determine internal strength factors	Weakness Determine internal weakness factors
Opportunities Determine external opportunity factors	SO Strategy	WO Strategy
Threats Determine external threat factors	ST Strategy	WT Strategy

3 Results And Discussion

Activities of the Gunung Anyar Mangrove Botanical Garden is one of the Pamurbaya conservation areas. The area of this mangrove botanical garden, based on a letter from the regional secretariat of the Surabaya City Government Number 593/5894/436.6.18/2015 dated November 25 2015, is 32,761 m2. This Mangrove Botanical Garden is located on the Gunung Anyar Mangrove Tourism Road, Gunung Anyar Tambak Village, Gunung Anyar District. The Mangrove Botanical Garden is one of the East Coast Green Open Spaces in Surabaya. The role of mangrove forests in life is shown by the function of mangroves related to socio-ecological, socio-economic and socio-cultural aspects. The most prominent ecological function of mangrove forests is to protect the coastline and the life behind it from tsunami and wind attacks, prevent salination in the areas behind it, and as a habitat for aquatic biota [10]. Economically, the use of mangrove forests comes from their wood as building wood, firewood and paper materials as well as non-timber forest products, as well as being used as a natural coastal tourism area. Socially, mangrove forests also function to preserve social relationships with local communities, as a place to find fish, crabs, shrimp and medicinal ingredients [11]. The development of mangrove ecotourism aims to become a tourist destination that provides benefits to the community from social, economic, cultural and agribusiness aspects. In the tourism business sector, it is necessary to have a strategy to support the sustainability of the mangrove ecotourism area so that it becomes a destination that is of interest to both local and foreign tourists and can improve the standard of living for the surrounding community with the existence of Surabaya's new mountain mangrove ecotourism.

Based on the analysis using the DPSIR method approach to environmental, economic and social aspects in tourism management in the Gunung Anyar Mangrove Ecotourism Area, a DPSIR framework can be formed which focuses on 5 main components [12] as shown in Figure 2.

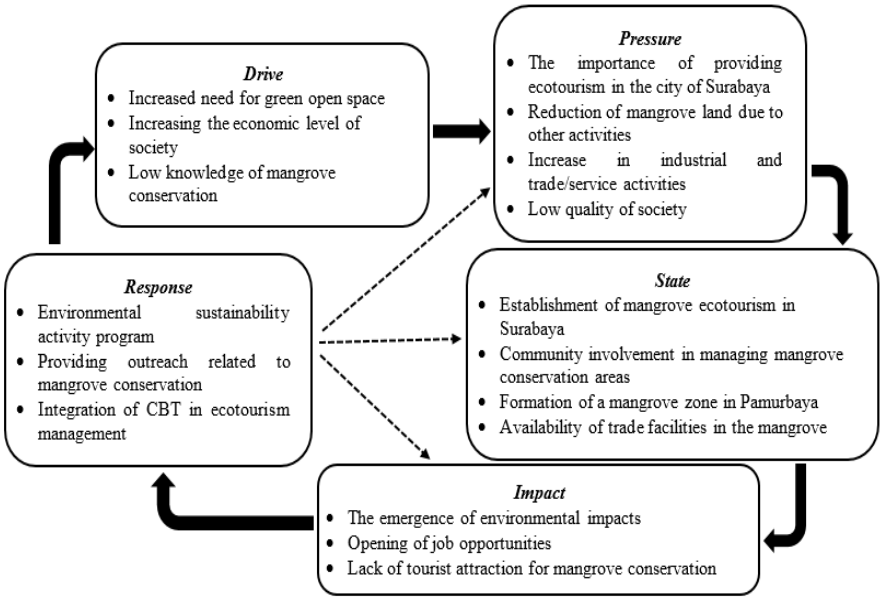

Fig. 2. DPSIR Framework for Management Strategy for Gunung Anyar Mangrove Ecotourism

The threat to the preservation of mangrove conservation land due to conversion of land to other activities creates pressure because of the push for the increasing population of the city of Surabaya, thereby increasing the need for housing for Surabaya residents. The importance of providing ecotourism in the city of Surabaya has been shifted by the need for industry and service trade, resulting in a reduction in land for mangrove cultivation. Apart from that, the low quality of the community puts pressure on people's attitudes towards mangrove areas. Limited knowledge regarding the importance of conserving mangroves has resulted in the existence of mangrove forests changing function, inappropriate use of mangroves, and uncontrolled destruction of mangrove forests.

Based on the analysis of the problems and impacts produced, several responses were implemented. Environmental sustainability activity programs can be implemented by planting mangroves which are carried out regularly and on schedule, both by the management and visitors who come. Apart from that, providing outreach related to mangrove conservation aims to promote the existing potential to increase tourist attraction, both through print and electronic media. Mangrove ecotourism management also needs to be supported by the involvement of local communities formed in a tourism management community (Community Based Tourism/CBT), which can be in the form of Pokdarwis (Tourism Awareness Group) or Pokwasmas (Community Monitoring Group).

Furthermore, to find out indicators that influence the management of mangrove ecotourism areas, it is necessary to identify them by considering internal and external control factors. After obtaining influential indicators, strategic management directions will then be determined using SWOT matrix analysis as shown in Table 2 below.

Table 2. SWOT Matrix

Internal Factors / **External Factors**	***Strength***	***Weakness***
	1. The importance of mangrove forests for coastal ecosystems 2. Good institutional support 3. Promotion of potential tourist attractions in mangrove ecotourism areas	1. Lack of supervision in the management of mangrove ecotourism areas 2. Limited recreational infrastructure in the mangrove ecotourism area 3. There is no waste processing unit produced
Opportunities	**S-O**	**W-O**
1. Alternatives to fulfill new tourism needs for the community 2. Opening up job opportunities and business opportunities for local communities 3. Providing education for visitors and local communities by related agencies 4. Providing education for visitors and local communities by related agencies	1. Organize a regular and scheduled mangrove planting activity program and coordinate with the Surabaya City Food Security and Agriculture Service; 2. Providing facilities used for educational programs for tourists in the form of a Smart Green House or mangrove planting house; 3. Open training in a laborintensive program related to mangrove planting which is attended by Pokdarwis members and other local communities; 4. Prioritize local communities as workers in the Gunung Anyar Mangrove Area; 5. Form a UPTD to manage mangrove ecotourism areas based on clear regulations.	1. Carry out independent supervision of visitors by community monitoring groups (Pokwasmas) who have been provided with educational assistance related to mangrove conservation; 2. Invite private stakeholders to develop the Gunung Anyar Mangrove Ecotourism area through a CSR program, in terms of adding supporting facilities, such as: a. Construction of playgrounds/play ground; b. Construction of adequate sanitation facilities, including toilets, prayer rooms, lactation rooms and rubbish bins in every corner of the area. c. Building an integrated waste processing unit, including a TPS (Temporary Storage Place) for waste, a Waste Water Treatment Plant, and a TPS for B3 Waste (Hazardous and Toxic Materials).

Threats	S-T	W-T
1. Competition for tourism service businesses with more attractive tourist attractions	1. Addition of public transport schedules and units with routes to the Gunung Anyar Mangrove Ecotourism area for tourists; 2. Promoting processed mangrove products such as processed mangrove syrup, local community craft products, and other local products from communities around the Gunung Anyar Mangrove Ecotourism area; 3. Organizing office activities and community activities in the Gunung Anyar Surabaya Mangrove Ecotourism Area, such as coloring competitions, office gatherings and exhibitions of processed mangrove products.	1. Addition of the Gunung Anyar Mangrove ecotourism route to the online application service for public transportation vehicles managed by the Surabaya City Transportation Department (WiraWiri or Suroboyo Bus feeder); 2. Deploy security officers to guard certain areas or around the mangrove ecotourism area; 3. Add writing advising visitors to maintain cleanliness and sustainability in the mangrove ecotourism area as well as sanctions if visitors take actions that could endanger or damage the mangrove ecotourism area; 4. Provide evacuation routes with clear signs in case of an emergency.
2. Limited public transportation to reach ecotourism areas		
3. Lack of awareness of visitors in maintaining public facilities in the mangrove ecotourism area		

Based on the SWOT matrix, there are 4 alternative strategies generated, namely:

1. The first strategy is the SO (Strength-Opportunities) strategy, namely making maximum use of strengths to obtain opportunities, including holding regular and scheduled mangrove planting activity programs and coordinating with the Surabaya City Food Security and Agriculture Service, providing the facilities used for educational programs for tourists in the form of a Smart Green House or mangrove planting house, opening training in labor-intensive programs related to mangrove conservation which are attended by Pokdarwis members and other local communities, prioritizing local communities as workers in the Gunung Anyar Mangrove Area, and forming a UPTD management mangrove ecotourism area based on clear regulations.
2. The second strategy is the ST (Strength-Threats) strategy, namely utilizing maximum strength to anticipate and overcome threats, including adding schedules and public transport units with routes to the Gunung Anyar Mangrove Ecotourism area for tourists, promoting processed mangrove products such as processed mangrove syrup, local community handicraft products, and other local products from the community around the Gunung Anyar Mangrove Ecotourism area, holding events for office activities and community activities in the Gunung Anyar Surabaya Mangrove Ecotourism Area, such as coloring competitions, office gatherings and exhibitions of processed mangrove products.
3. The third strategy is the WO (Weakness-Opportunities) strategy, namely minimizing weaknesses to obtain opportunities, including carrying out independent super-

vision of visitors by community supervisory groups (Pokwasmas) who have been provided with educational assistance related to mangrove conservation, inviting private stakeholders to developing the Gunung Anyar Mangrove Ecotourism area through the CSR program, in terms of adding supporting facilities

4. The fourth strategy is the WT (Weakness-Threats) strategy, namely minimizing weaknesses to avoid threats, in the form of adding the Gunung Anyar Mangrove ecotourism route to the online application service for public transport vehicles managed by the Surabaya City Transportation Department (WiraWiri or Suroboyo Bus feeder), placing security officers, who guard certain areas or around the mangrove ecotourism area, add written appeals to visitors to maintain cleanliness and sustainability in the mangrove ecotourism area as well as sanctions if visitors take actions that could endanger or damage the mangrove ecotourism area, and provide routes evacuation accompanied by clear signs in the event of an emergency.

4 Conclusion

This research aims to formulate a sustainable management strategy for the Gunung Anyar mangrove ecotourism area, through two stages of analysis, namely DPSIR analysis and SWOT analysis. The results obtained from this research are indicators that influence the management of mangrove ecotourism areas, mangrove conservation, accessibility, education for the community, empowerment of surrounding communities, and adequate infrastructure. Recommended strategies for managing these indicators include:1) Regular and sustainable mangrove planting activity program; 2) Providing public transportation on routes to the Gunung Anyar Mangrove Ecotourism area; 3) Promotion of the potential tourist attraction of the Gunung Anyar Mangrove ecotourism area and processed mangrove products; and 4) Training in labor-intensive programs related to mangrove conservation. There is a need for integrated management of the mangrove ecosystem area by prioritizing the involvement of local communities and supported by a good institutional system from policy makers and private stakeholders.

References

1. Putranto, A.: Pengembangan Pariwisata Bahari di Pulau Kecil Berbasis Masyarakat (Studi Kasus Pariwisata Bahari di Pulau Pari, Kepulauan Seribu, DKI Jakarta)
2. Amal, Side, Maru: Pengelolan Wilayah Pesisir dan Pulau-Pulau Kecil (Strategi Implementasi Pengelolaan Pengelolaan Mangrove Sebagai Hutan Produksi). Badan Penerbit UNM, Makassar (2020)
3. Prakoso, A.A., Irawati, N.: Performa Hutan Mangrove Wanatirta berbasis Ekowisata. Ecotourism STIPRAM. (2018)
4. Purnobasuki, H.: Potensi mangrove sebagai tanaman obat. J. Ilm. ilmu-Ilmu Hayati. 9, (2019)
5. Basyuni: Developing Comunity-based Mangrove Management Trough Eco-tourism in North Sumatera, Indonesia. Iop Conf. Ser. Earth Environ. Sci. 1–7 (2018)

6. Minister of Home Affairs regulation number 1 of 2007: Minister of Home Affairs regulation number 1 of 2007 concerning the arrangement of green open space in urban areas. Indonesia Goverment, Jakarta (2007)
7. Surabaya City Regional Regulation Number 12 of 2014: Surabaya City Regional Regulation Number 12 of 2014 concerning the Surabaya City Regional Spatial Plan for 2014-2034. Surabaya City Goverment, Surabaya (2014)
8. Bradley, Yee: Using the DPSIR Framework to Develop a Conceptual Model: Technical Support Document. USEPA, Washington DC (2015)
9. Rustiadi, E.: Strategy for Sustainable Food Agricultural Land Protection in Tangerang Regency. J. Reg. Dev. Manag. 8, (2016). https://doi.org/https://doi.org/10.29244/jurnal_mpd.v8i2.24827
10. Poedjirahajoe, E., Matatula, J.: The physiochemical condition of mangrove ecosystems in the coastal district of Sulamo, Kupang, East Nusa Tenggara, Indonesia. J. Manaj. Hutan Trop. 23, 173–184 (2019). https://doi.org/10.7226/jtfm.25.3.173
11. Wahyuni, E., Zulhafandi, Hendris, Jarin: Detection of Community Knowledge Level of Economic, Ecological Benefits and Causes of Damage to Mangrove Forest Ecosystems. IOP Conf. Ser. Earth Environ. Sci. 748, (2021). https://doi.org/10.1088/1755-1315/748/1/012017
12. Gari, S.R., Newton, A., Icely, J.D.: A review of the application and evolution of the DPSIR framework with an emphasis on coastal social-ecological systems. Ocean Coast. Manag. 103, 63–77 (2015). https://doi.org/10.1016/j.ocecoaman.2014.11.013