

Conservation-based mangrove forest management strategy in wosi Manokwari west Papua Indonesia

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Abstract

Degradation of mangrove forests in the Wosi region has negative consequences, including the loss of mangrove forest land and the disruption of marine biota and natural resources in the Doreri Bay region of Manokwari, West Papua. Sustainable tourism that does not harm the environment and ensures a reasonable standard of living for the local people can only be achieved if Mangrove Forest Areas are developed with an ecologically responsible philosophy. The researchers in this study set out to learn more about community involvement in mangrove area management programs and to develop a strategy for the care of tourist attraction artifacts in the mangrove area of Wosi, Manokwari district. Observational methods and case studies formed the basis of the investigation. The goal of this method of observation is to use a quantitatively descriptive approach to examine the interplay between economic, social, and population policies and environmental factors like the Wosi Mangrove Forest. Experts provide their insights on how Indonesia's Ministry of Environment and Forestry (KLHK) has implemented its protected forest rules. But this is not the case for the people who make their homes in the Wosi Mangrove Forest. Both the data on sustainable mangrove forest management policies and the policies themselves were subjected to a SWOT analysis. The SWOT analysis confirmed the importance of community participation in mangrove forest management for the promotion of educational tourism. Karang Taruna Caring for Waste Manokwari is in charge of organizing this educational tour. The Wosi mangrove forest region is hoped to benefit from this method.

Keywords: Mangroves; Educational tourism; Forest; Wosi

1. Introduction

Mangrove forest is a plant mostly found around estuary areas with a swampy soil structure. Mangrove is one of the solutions to overcoming the types of environmental problems caused by abrasion, animals, and plant pests. This damage not only has an impact on animals but also on humans. The use of mangrove forests for firewood, building materials, and as a place to find food (fish, crabs, shrimp), honey bees, and for hunting wild animals and medicinal plants has been carried out from generation to generation [1]. In Papua, many social and economic benefits are obtained directly from utilizing mangrove ecosystems, including compensation to customary rights owners, scholarships, construction of social facilities, and traditional ceremonies. [2] stated that the degradation of mangrove forests in the Wosi area has had a negative impact, namely a decrease in the area of mangrove forests and disruption to marine biota and natural resources around the Doreri Manokwari Bay area, West Papua. Mangrove forests are places where a recycling process occurs that produces oxygen (O₂), as an absorber of carbon dioxide [3; 4]. Mangrove ecosystems face high rates of deforestation, contamination, and loss of important habitats for various organisms [5]. Global degradation of mangrove ecosystems has occurred in the last few decades as a result of various development activities, land conversion for

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development, and fisheries [6; 7]. About 60% of recorded losses between 2000 and 2016 occurred due to human pressure through land conversion to aquaculture and farming activities [8; 9]. According to the Presidential Regulation of the Republic of Indonesia Number 73 of 2012 concerning the National Strategy regarding the management of Mangrove Ecosystems, mangroves are described as a system in supporting life and a wealth of natural resources. In this case, an effort is needed to protect, utilize and preserve the welfare of the community. Mangrove Forest Areas must be developed with an environmentally sound concept. so that sustainable tourism is realized, does not cause damage to the environment, and provides a guarantee of a decent life for the surrounding community, both now and for the future [10]. Forms of effort in realizing sustainable and sustainable management of mangrove ecosystems based on available resources from the national development planning system. The management and utilization of the system are directed to the welfare of the community so that it can be sustainable, it needs to be maintained and managed. Therefore, this research aims to formulate a strategy for managing tourist attraction objects in the mangrove area of Wosi Manokwari district and to study community participation in mangrove area management programs.

2. Material and methods

The research was conducted in the Wosi Village, West Papua Province, Indonesia. The research location is presented in Figure 1.

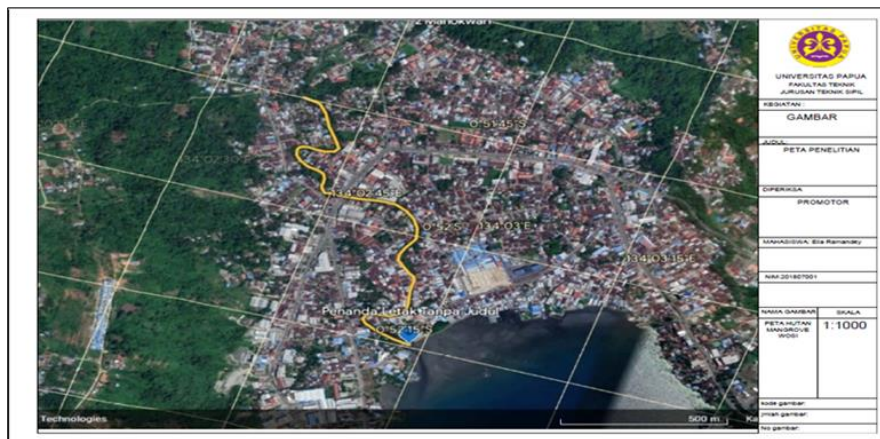


Figure 1 Research Locations

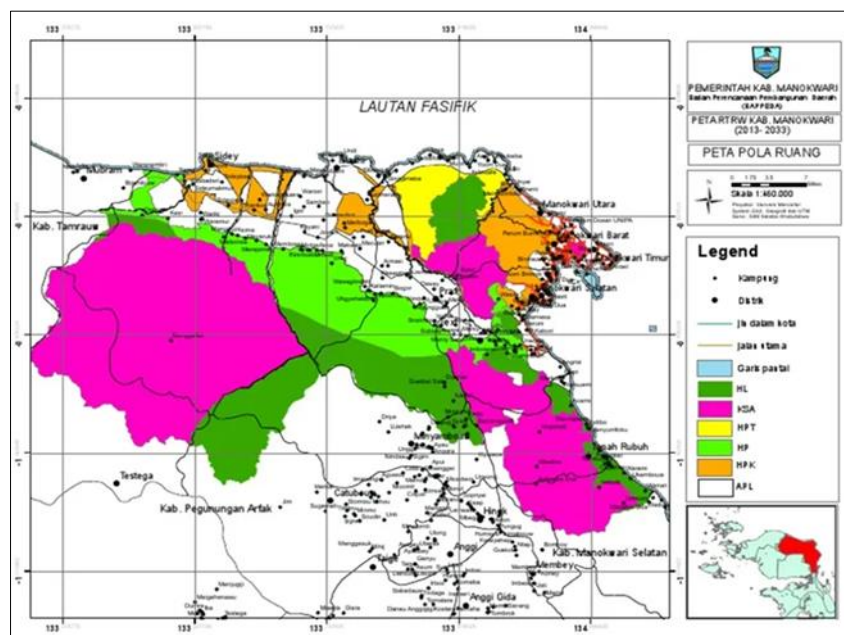


Figure 2 Spatial pattern map that has been designed by the Manokwari district Regional Development Planning Agency

Utilization of the Wosi mangrove forest based on the 2013-2033 Regional Spatial Plan (RTRW) for the Manokwari district, on the spatial pattern map (Figure 2) that has been designed by the Regional Development Planning Agency (Bappeda) of Manokwari district.

2.1. Method of collecting data

Research-based on observation techniques and case studies. The observation technique is to carry out an analysis of economic, social, and population policy variables as well as physical environmental variables such as the area of the Wosi mangrove forest and its effect on changes in the area by using a quantitative descriptive method. Observations from the experience of researchers based on the operationalization of protected forest policies in Indonesia nationally at the Ministry of Environment and Forestry (KLHK). Meanwhile, the case is the community that inhabits the Wosi mangrove forest area. The data collected includes land use and problems with the Wosi mangrove forest and its solutions, as well as suggestions and recommendations for future mangrove forests.

2.2. Stakeholder Role Analysis in Wosi Mangrove Forest Management

Sustainable Mangrove Forest Management Policy and Sustainable mangrove forest management policy analysis are based on the use of SWOT analysis. The management of natural resources in accordance with regional autonomy policies also applies to the management of mangrove forests [11]. Mangrove forests have the characteristics of shared resources and tend to be damaged because their rights are difficult to uphold. The parties involved in carrying out their roles must be optimal so that the condition of the mangroves does not continue to degrade [12]. Increasing the ability and awareness of mangrove forests as a life support system is an effort taken to involve stakeholders in mangrove forest management [13]. Stakeholders are parties who have direct contact with issues and problems that are currently occurring or developing in society [14], stakeholders can also assist in mobilizing local resources. Stakeholder role analysis aims to understand how the role of stakeholders in the management of Wosi Mangrove forests. Stakeholders referred to here are all parties involved who have a direct relationship with Wosi forest management efforts, namely: (1) policymakers, (2) planners, (3) executors, (4) facilitators, and (5) researchers.

3. Results and discussion

3.1. Regional government strategy in managing mangrove forests

Based on Government Regulation No. 6 of 2007, Forest Management Units (KPH) are forest management areas according to their main functions and designations that can be managed sustainably. These FMUs include conservation KPH (KPHK), protected KPH (KPHL), and production KPH (KPHP). Various parties have collaborated to prepare for the development of the Model KPH in Tanah Papua, both from the government, academics, and non-governmental organizations that are members of the Papua KPH Working Group [15]. Government strategies implemented include:

3.1.1. Developing a model for implementing an open-access forest policy for the community

Efforts to support the Wosi Forest Management Program to Become an Open Access Forest are by looking at the various problems that are developed into a model for implementing a policy. Problems The management of the Wosi mangrove forest is carried out by the community through the initiative of traditional institutions without the support of management institutions and funds. Management of the Wosi mangrove forest by the community is not supported by adequate human resources to plan community and government programs as well as the business world, for example, green markets, urban mangrove tourism, Mangrove Study Centers, green economy centers, and city parks. There are weaknesses in human resources such as the lack of expertise and knowledge of village officials in program preparation. Another weakness is that there is no good coordination between village officials and the local government regarding the preparation of plans, implementation, and evaluation of management programs. A number of policy prerequisites for area management have not been fulfilled, such as aspects of policy, institution, and forest area certainty. There is a threat of using the area for the development of basic infrastructure in a limited area and in a conservation area.

3.1.2. Implementation Efforts that can be implemented and developed

Implementation efforts that can be implemented and developed are described in Table 1.

Table 1 Conditions and implementation alternatives

Conditions towards a better or positive that must be developed or created	Alternative implementation/model development efforts
Collaborative planning of stakeholders from top to bottom	Develop a program involving all elements of society. Give priority to community program proposals
Strengthening supervision in program implementation	Involve the community in monitoring program implementation Involve related agencies and non-governmental organizations in supervising the implementation
Multi-stakeholder evaluation	Involve the community in evaluating the results of program activities Involve related agencies from non-governmental organizations in the program evaluation results.
Improving the function of community participation	Involve the community in the planning participation function Involve the community in the participatory maintenance function Involve the community in the management participation function
Increasing Intensity	Involve the community in decision-making in any proposed management program for area development

3.1.3. Wosi Mangrove Forest Development and Management Strategy

In order to get the appropriate strategy, a SWOT analysis is carried out as presented in Table 2.

Table 2 SWOT analysis to get the appropriate strategy

Strength (S)	Weakness (W)
Biodiversity potential of flora, fauna, and aquatic biota as well as the position of the area to support tourism development	The legality of the area is the legal basis for implementing educational tourism destination development programs
The area and strategic position of the area as well as the socio-economic and cultural potential of the community to support the development	The legality of management has not yet materialized in the form of nature tourism service business licenses and nature tourism facility service business licenses (IUP for Tourism Services and IUP for Tourism Facilities) as the basis for implementing management programs both planning, protection, preservation, utilization; and evaluation of function suitability.
A commitment of the community and the Regional Government of Manokwari Regency to developing a mangrove educational tourism program according to RIPAR Manokwari District	There is no management unit for mangrove tourism destination units yet
Perceptions of the value of education of people who are educated (57%) still exist at the high school level from the 78 respondents interviewed who support efforts to preserve forest areas	Lack of resources to support the management of mangrove tourism potential The management program based on the potential of natural resources in the area has not been maximized through community initiatives. Not optimal community empowerment activities and minimal effort
Opportunity (O)	Threat (T)

<p>West Papua Provincial government's commitment to tourism development. in Manokwari district as the capital of West Papua Province.</p> <p>The regional autonomy policy in managing natural resources provides an opportunity for local governments, both the Government of West Papua and Manokwari Regency, in managing human resources by collaborating on APBD and APBD funding sources and partner data.</p> <p>Support from stakeholders, both the government (District and Province) and universities, NGOs, and the community through collaborative management in supporting programs for the protection, preservation, and utilization of the potential of forest areas.</p> <p>Policy on conservation (protection, preservation, and utilization) of forest resources in synergy with the commitment of West Papua Province as a province of sustainable development as well as management of educational tourism destinations supported by policies in the environmental sector in Manokwari district</p>	<p>Area degradation due to high accessibility in strategic transportation routes</p> <p>Potential for area utilization.</p> <p>The dependence of the community around the Wosi forest area on the natural resource potential of this area.</p> <p>Increased land use as a consequence of the rate of population growth in Manokwari district and regional development.</p>
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SWOT analysis was carried out as a form of tourism development strategy for mangrove forest educational tourism objects through the identification of internal factors, namely strengths, weaknesses, opportunities, and threats.

First, the Strength (strength) possessed is the potential for the biodiversity of flora, fauna, and aquatic biota as presented in Figure 3; The area and strategic position of the area as well as the socio-economic and cultural potential of the community to support development. These other advantages are like a clean water system. This water source considered sufficient is close to the coastline directly opposite Doreri Bay or Sawaibu, an icon of the city of Manokwari. This is a distinct advantage because mangrove forests are able to turn salt water into fresh water. Another advantage is also in the waste management system is that dirty water is converted into clean water through several stages of liquid waste management through infiltration wells and then the septic tank solid liquid waste is processed into fertilizer or compost. Used production waste, solid waste is managed according to type and then reprocessed as firewood, fish food, and for daily needs.

The electricity network has also arrived at the development of the Manokwari cross-city route including around the mangrove forest. At the estuary of Wosi Beach as part of the mangrove forest, efforts have been made by the local government to procure trash bins with the aim of waste management by separating organic and inorganic waste.

Second, analysis of weaknesses. The legality of the area as a legal basis for implementing educational tourism destination development programs. The Manokwari Regional Government should issue a regional regulation on the protection and management of mangrove forests for the welfare of the community.

Third, analysis of opportunities. This mangrove forest has many opportunities that become the main attraction for tourism and its development. Through the strategies carried out, it can maintain the ecosystem and appreciation of the people who influence a program. This strategy can be an opportunity to develop conservation-based educational tourism in protecting mangrove forests from damage. This strategy is focused on the community and community empowerment groups.

Through a conservation-based tourism education development strategy, the community can participate in the construction and development of tourist attractions that are able to educate the public. Organizing conservation-based mangrove forest educational tours provides training in planting mangrove trees and providing mangrove plant seeds.

Various websites containing relevant information will attract people's interest in visiting mangrove tourism forests.

The Karang Taruna Cares for Waste group also has a strategy for improving facilities and infrastructure for the sustainability of mangrove educational tourism (Figure 4). There is the maintenance of the road to the location, provision of places to eat, and toilets and parking lots around the mangrove educational tour sites to make visitors

comfortable and interested in visiting again. This educational tour also provides information and knowledge about mangrove forests to tourists and visitors who come to learn about planting, conservation, and preserving the environment. Community involvement is very important in empowering and assisting tourists in the mangrove forest at Muara Kali Wosi Beach.



Figure 3 Several types of mangroves from Doreri Bay Wosi District, Manokwari, West Papua. A. *Avicennia alba*; B. *Sonneratia alba*; C. *Avicennia germinans*; D. *Cordia dichotoma*



(Source: Researcher Personal Documentation, 2021)

Figure 4 Locations for observing flora and fauna habitat research

Fourth, an analysis of threats, that is, this threat can be seen from the authority of the Manokwari Regency Government over the management of the Wosi beach environment, namely the absence of cooperation between the Manokwari Regency Government and the surrounding community in managing waste on Wosi beach. The coastal area of Wosi is directly adjacent to the mangrove forest and faces Doreri Bay and Wosi Forest. Everyone has to pass through the mangrove forest to reach the coastal area of Pantyai Wosi. However, the local government of Manokwari has not managed mangrove forests and Wosi Beach yet.

3.1.4. Community Participation in Forest Conservation Efforts

Community participation is shown by empowering a community monitoring group of 33 people with the task of managing mangroves with their respective duties, namely handling mangroves (11 people), caring for mangroves (11 people), and monitoring mangroves (11 people). Division of tasks and roles by the Maritime Affairs and Fisheries Service and Perhutani as a guide in supervising and fully supporting based on government directives. Counseling was also carried out to the community on forest management as a resource. Counseling aims to protect the mangrove ecosystem and motivate the community to accelerate the mangrove forest ecosystem.

Knowledge about the utilization of mangrove forests can be beneficial for fishing activities and seawater buffers. Increasing knowledge about the benefits of mangrove forests from extension activities can be beneficial for the continuation of fishing activities. This relates to the importance of the community in managing mangrove ecosystems. The community wants to be involved in managing the mangrove forest ecosystem. Communities want to be involved in making decisions and also have policies in management. This reason also influences the community to make decisions and carry out management policies so that they can be known by the community and support the management of mangrove forest ecosystem policies. Based on the research results, it can be seen that conservation can affect the social and cultural life of the Wosi sub-district community. The mangrove forest system has a good reciprocal relationship with the community because community participation is formed due to the impact of forest conservation efforts. These cultures are a form of tradition that exists in society and is closely related to mangrove forests. Traditions that are maintained by the community based on generations from their ancestors, the form of thought of the community does not rule out the possibility that forest conservation will run well and smoothly.

4. Conclusion

Based on the results of the SWOT analysis, it is necessary to involve the community in managing mangrove forests as a means of educational tourism. This educational tour is a strategy managed by Karang Taruna Caring for Waste Manokwari. This strategy is expected to bring about changes for the better in the Wosi mangrove forest area.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare no conflict of interest regarding the publication of this paper.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

- [1] Walters, B.B., P. Roonnbaack, J. M. Kovacs, B. Crona, S. A. Hussain, R. Badola, J.H.Primavera, E.B. Barbier, and F. Dahdouh-Guebas. (2008). Ethnobiology, socio-economics and management of mangrove forests:A review.Aquatic Botany89: 220–236.<https://doi.org/10.1016/j.aquabot.2008.02.009>.
- [2] Ramandey, E., Supriyantono, A., Wurarah, R.N. , Rouw, A. 2023. Damage to the Mangrove Forest Ecosystem in Wosi Village Manokwari Regency West Papua Indonesia. International Journal of Research and Innovation in Social Science (IJRISS). Volume VII Issue III: 847-855.

- [3] Jones, T.G., Ratsimba, H.R., Ravaoarinorotsihoarana, L., Glass, L., Benson, L., Teoh, M., Carro, A., Cripps, G., Giri, C., Gandhi, S. and Andriamahenina, Z., 2015. The dynamics, ecological variability and estimated carbon stocks of mangroves in Mahajamba Bay, Madagascar. *Journal of Marine Science and Engineering*, 3(3), pp.793-820.
- [4] Trettin, C.C., Dai, Z., Tang, W., Lagomasino, D., Thomas, N., Lee, S.K., Simard, M., Ebanega, M.O., Stoval, A. and Fatoyinbo, T.E., 2021. Mangrove carbon stocks in Pongara National Park, Gabon. *Estuarine, Coastal and Shelf Science*, 259, p.107432.
- [5] Spalding, M. (2010). *World atlas of mangroves*. Routledge.
- [6] Thomas, N., Lucas, R., Bunting, P., Hardy, A., Rosenqvist, A. and Simard, M., 2017. Distribution and drivers of global mangrove forest change, 1996–2010. *PloS one*, 12(6), p.e0179302.
- [7] Hamilton, S and Friess, D.A., 2018. Global carbon stocks and potential emissions due to mangrove deforestation from 2000 to 2012. *Nature Climate Change*. 8(3): 240-244.
- [8] Goldberg, L., Lagomasino, D., Thomas, N., Fatoyinbo, T. 2020. Global declines in human-driven mangrove loss. *Glob Change Biol*. 26:5844–5855.
- [9] Spalding, M. D. and Leal, M. (eds) *The State of World’s Mangroves 2021* (Global Mangrove Alliance, 2021)
- [10] Puryono, S.K.S, 2018. *Mangrove Forests and Participation of Coastal Communities*. Publisher Undip Press Semarang.
- [11] Ikhsanudin, N., Kusmana, C., Basuni, S. 2018. Analysis of Utilization of Mangrove Forests and the Role of Stakeholders in Indramayu District. *Agrica Journal*. 11(2): 47-58. DOI:10.31289/agrica.v11i2.1753.g1657
- [12] Ambinari, M., Darusman, D., Alikodra, H.S., Santoso, N. 2016. Structuring the Roles of Parties in Mangrove Forest Management in Urban Areas: A Case Study of Mangrove Forest Management in Jakarta Bay. *Journal of Policy Analysis*. 13(1): 29-40.
- [13] Muzani, 2014. Strategy for Increasing the Role of Stakeholders in Mangrove Management in Tangerang District. *SPATIAL*. 12(2): 21-27.
- [14] Kholek, A., dan Izzudin, M. 2021. Mapping the Strengths and Interests of Stakeholders in the Development of Mangrove Ecotourism on Baai Island Bengkulu. *SOSIOLOGI: Scientific Journal of Social and Cultural Studies* 23(2): 129-152
- [15] Karsudi, Soekmadi, R., dan Kartodihardjo, H. 2010. Institutional Development Model Formation of Forest Management Unit Areas in Papua Province. *JMHT*. XVI(2): 92-100,