# Land cover of Waranggui mangrove forest as a tourism destination

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# Land cover of Waranggui mangrove forest as a tourism destination

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## Abstract

This study aimed to provide a comprehensive description of Waranggui mangrove forest through a detailed analysis of its land cover. It was conducted using a descriptive method with satellite image overlay techniques, surveys, and recording of land cover conditions. The results showed that there were 7 types of land cover in Waranggui mangrove area dominated by 99.10% cover, followed by open areas resulting from logging activities, water body cover, boat mooring cover, and other indications of land use at 0.38%, 0.26%, 0.12%, and 0.10%, respectively. Additionally, garden cover in the form of coconut plants and sand at 0.02% and 0.01% were also observed in the mangrove forest area.

**Keywords:** Land Cover; Mangrove; Forest; Waranggui

## 1. Introduction

South Manokwari Regency is an area with significant potential as a tourism destination. According to [1], the regency is endowed with stunning and unique landscapes, which require comprehensive development planning to establish a reliable and appealing tourism destination. One of the areas of focus is the mangrove ecosystem, intensively managed to support sustainable development goals through tourism. The goal is to optimize the environmental quality index by increasing the protected areas by 47% (41,691 ha) from the current 46% (41,306 ha). This is stipulated in the Minister of Forestry Decree 783/2014 concerning the Function of Forest Areas and West Papua Waters Conservation). This strategy preserves the 4,791.29 km$^2$ (4.81%) and 3.2 million ha (22.4%) of West Papua and Indonesian mangrove forests, which are critical for controlling abrasion and tsunami, providing habitat for aquatic biota, and supporting community economic development.

According to data from the Directorate of Watershed Control and Protected Forest of the Ministry of Environment and Forestry in 2015, Indonesian mangrove ecosystem covers approximately 3,489,140 ha or around 21% (16,530,000 ha). This potential is distributed across 257 regencies/cities, encompassing 1.82 million ha in critical condition, and 1.67 million ha, including 0.55 million ha in good condition. The area comprises 1.36 million ha of forested land and 1.32 million ha outside of forested areas. This represents a decline from the previous years, with recorded areas of 9,361,957.59 ha, 7,758,410.60 ha, 3,750,000.00 ha, and 3,489,140.69 ha in 1980, 2006, 2010, and 2015, respectively. Furthermore, based on the 2019 national map, Indonesian mangrove forest covers approximately 3.31 million ha with a deforestation rate of 3 ha/year.

The degradation of mangrove ecosystems in recent years has resulted in a significant impact on their existence as a habitat for various types of aquatic biota and fishing grounds. Additionally, the lack of successful coastal community empowerment has led to a negative impact on the economic life of the community and the environment which is the basic capital in development.

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Ecologically, mangrove functions as coastal protectors, erosion buffers and sediment traps, nutrient cycles, guaranteeing fisheries productivity, reducing the rate of seawater intrusion, health buffers, biodiversity buffers, and reservoirs for other aquatic ecosystems [2],[3][4]. Therefore, proper management efforts are needed to support the preservation of the ecosystem. One way to utilize forest environmental services in an economically viable, ecologically benign, technically feasible, and socially acceptable manner is through tourism.

Waranggui mangrove forest area, covering approximately 384.9 ha, is expected to be managed intensively. This area is strategic in Manokwari, South Manokwari, Bintuni Bay, and Wondama Bay transportation routes and estimated to be rich in natural resources used for transportation, recreation, and tourism facilities. Communities around the mangrove mostly work as fishermen and use this area as a safe anchorage for their fishing fleets. On the other hand, the location in the middle of land and sea travel routes between districts is a potential for the existence of the area. Therefore, it is necessary to carry out study to show the potential of this area, particularly the land cover, as the foundation for planning tourism destinations. This is under Article 7 of Law Number 10 of 2009 concerning Tourism and Regulation of the Minister of Tourism Number 14 of 2016 concerning Guidelines for Sustainable Tourism Destinations. It includes the management of sustainable tourism destinations, economic utilization for local communities, cultural preservation for the community and visitors, and environmental preservation.

## 2. Material and methods

This study spanned a duration of 4 months, commencing from October 2021 until January 2022, and was conducted in Waranggui mangrove forest of Manokwari Regency. A descriptive method was employed, primarily relying on observation and survey techniques for data collection. Determining data on the condition of mangrove cover is performed by overlaying the land cover map of the Indonesian Ministry of Environment and Forestry in 2021. The analysis obtained information on various types of cover in the area, such as mangrove vegetation, open areas, and bodies of water. Furthermore, the data from the analysis was compiled with the results of recording the study area using hotogrammetry (drone). The analysis was intended to protect the area, and the mangrove land cover data were presented in the form of tables and figures.

## 3. Results and discussion

Based on the analysis of Landsat 8 OLI imagery from USGS (Path 105, Row 061 data recorded on January 26, 2023, there were 7 types of land cover in Waranggui mangrove area dominated by 99.10% cover, followed by open areas resulting from logging activities, water body cover, boat mooring cover, and other indications of land use at 0.38%, 0.26%, 0.12%, and 0.10%, respectively. Additionally, garden cover in the form of coconut plants and sand cover at 0.02% and 0.01% were also observed in the mangrove forest area.

According to [5], Waranggui forest spans an area of 376.86 ha (3,768,555.15 km) encompassing mangrove land cover, bodies of water, open land (logging), open land (land use), sand, coconut groves, and boat moorings. The study [5] suggested that the type of land cover remains largely unchanged from 2018 to 2021 due to intensive management efforts focused on protection. Consequently, there is no significant occurrence of land change that could alter the identified land cover. The dynamics of area changes towards rehabilitation are insignificant as they occur naturally.

The open land coverage, which shows indications of logging and covers an area of 1.480 ha, with other open land used for activities covering 0.394 ha, holds potential for proper management and must be considered while planning block management. The coverage of open land remains consistent with the previous study by [5] and does not show any significant natural changes. This is a separate consideration regarding regional development planning through the block management mechanism.

The water body land cover reaches 0.26% of Waranggui mangrove forest. It provides a medium for the existence of regional components (flora and fauna) and facilitates access to the area for surrounding communities. The water body plays a crucial role in the development of marine-based tourism, especially mangroves. Activities such as diving, canoeing, fishing, and other tourism-related activities involving biota objects are closely related to the development of marine-based tourism.

Besides water bodies, transitional areas of mangroves and lowland vegetation covered by moorings boats support the potential for developing the Oransbari area as the basic infrastructure of the region. The Oransbari area has pier facilities for moorings and fishing boats but the inner area of Waranggui mangrove area is preferred by the community due to its safety from waves.

Open land is the next land cover identified in the area, resulting from land use including soil, rock, and vegetation. The distribution of the locations is different from due to the construction of facilities and the utilization of natural resources. In the transitional section of the lowland vegetation, open land appears in the form of shrubs. Logging sections in the middle can be identified from the presence of land cover vegetation in the form of shrubs and open ground (without vegetation) in several locations.

Based on the results of the interviews, this location was formed due to land use related to plans for the development of facilities and the collection of land cover materials. According to [1], shrubs refer to dry land areas overgrown with various heterogeneous and homogeneous natural vegetation with low to rarely dense density levels. South Manokwari Regency is dominated by low (natural) vegetation and shrubs are areas of former forest clearing around cultivation areas.

**Table 1** Land Cover of Waranggui Mangrove Forest

| No | Land cover | Hectare (ha) | Percent (%) | Note |
|---|---|---|---|---|
| 1 | Mangrove | 381,430 | 99,10 | The location of mangrove forest vegetation is shown on the map with the appearance of the overall cover in Waranggui with indications of the dense density of primary mangroves and rare secondary mangroves. |
| 2 | Open area (logging) | 1,480 | 0,38 | The location of open land on the map is indicated by the appearance of open land with fallen tree stands and land conditions becoming barren and dry. |
| 3 | Water | 0.991 | 0,26 | The location shown on the map with the appearance of a river body. |
| 4 | Boat mooring | 0,478 | 0,12 | The location of the boat moorings is shown on the map with the appearance of the body of water in the river and some of the land that leads to the mainland can be seen with moorings boats used by local fishermen. |
| 5 | Open area | 0,394 | 0,10 | The location shown on the map with the appearance of open land only consists of land cover in the form of shrubs to grass. |
| 6 | Coconut plant | 0,095 | 0,02 | The location shown on the map with the appearance of a tree canopy in the form of a coconut plant. In some locations, coconut plants grow in the middle of a mangrove forest. |
| 7 | Sand/ coast | 0,030 | 0,01 | The location shown on the map with appearance of land close to the coast where mangroves do not grow and in the form of beach sand accumulation. |
| Total | | 384.90 | 100 | |

Observations showed that the thickets were abandoned and unmanaged land as a result of forest clearing and shifting cultivation activities. Shrubs are lands overgrown with grass and creeping plants having a fairly dense density. They cover the soil surface, functioning as barrier to erosion and increasing water absorption. The use of agricultural land converted into built-up areas will usually grow shrubs first. The types of shrubs in South Manokwari in general are reeds/grass and vines.

Another additional land cover found in the transitional areas of mangroves and lowland vegetation is the coconut plantation, which has long been used for consumption and sale, supporting the local economy. In the mainland forest area and the bordering mangrove vegetation, the existence of coconut groves is often accompanied by shrubs, ferns, and other vegetation.

The sand land cover plays a crucial role in Waranggui mangrove forest ecosystem. During low tide, several areas of the forest appear as deserts due to the sand substrate, often adorned with mud spots, thereby attracting visitors to the area. At low tide, this area looks like a desert and becomes a special attraction for people who visit this area.

According to [6], there was a difference in the area of mangrove forests in 2019, covering ± 49.98 ha, due to differences in image data sources used in land cover interpretation. Specifically, the Ministry of Environment and Forestry relied on Landsat 8 imagery with a resolution of 30 m/pixel, and land cover uses high-resolution satellite imagery with a spatial resolution of 60 cm/pixel. Another difference is related to the coastline, namely the KLHK land cover with the farthest and closest bias values to the coastline sourced from the 1:50,000 scale Indonesian Rupa Bumi (RBI) map from the Geospatial Information Agency in 2018. Meanwhile, the area of Oransbari mangrove is based on KLHK land cover data. In 2009, the area was 414,218 ha, with 361.5 ha and 52.7 ha of primary and secondary mangrove forests. The results of mapping using drones at the end of 2018 showed a decrease in the area to 384.76 ha, indicating a difference in Waranggui mangrove forest area of 29.46 ha.

Based on [5], about 7.35 ha of Waranggui mangrove forest has been subjected to degradation between 2009 and 2017, according to KLHK's land cover record. A comparison of the 2019 UPT Geospatial University of Papua Manokwari data with the 2009 and 2017 KLHK map indicated differences in the number of mangrove forest areas of 89.65 ha and 82.3 ha, respectively. The data has been cross-referenced with the results of study using DJI Phantom 4 Professional Drone technology. The drone was flown at a height of 200 m producing data with a resolution of 5.1 cm/pixel. The analysis of the data showed differences in the area of mangrove forest coverage between the referenced maps, due to the interpretation of the coastline, the identification of mangrove forest coverage, and the resolution of the map.

## 4. Conclusion

There are 7 types of land cover in Waranggui mangrove area dominated by 99.10% mangrove cover, followed by open areas resulting from logging activities, water body cover, boat mooring cover, and other indications of land use at 0.38%, 0.26%, 0.12%, and 0.10%, respectively. Additionally, garden cover in the form of coconut plants and sand at 0.02% and 0.01% were also observed in the 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 this study.

## References

[1] Sinery A, Dimara P, Wambrauw D, Saragih Y, Renwarin D, Beljai M, Arobaya A, Haluk H, Worabay M, Angrianto R, 2020. The South Manokwari District Tourism Development Master Plan. Deepublish Yigyakarta.

[2] Nybakken, J.W. 1992. Marine Biology. An Ecological Approach. Gramedia, Jakarta.

[3] Kusmana, C., and Onrizal, S. 2003. Types of Mangrove Trees in Bintuni Bay, Papua. Faculty of Forestry, Bogor Agricultural Institute and PT. Bintuni Utama Murni Wood Industries, Bogor

[4] Noor, YR., M. Khazali, and I N.N. Suryadiputra. 2012. Guide to Introduction of Mangroves in Indonesia. Second printing. PHKA/WI-IP, Bogor

[5] Amir, 2020. The Effect of Coastal Community Activities on the Oransbari Mangrove Forest. University of Papua Environmental Science Master thesis

[6] Imbiri F, 2021. Policy Strategy for Sustainable Mangrove Forest Management in the Coastal Area of the Oransbari District, South Manokwari Regency, West Papua Province. University of Papua Environmental Science Master thesis

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