

ANALYSIS OF CHANGES AREA OF TANJUNG PANJANG NATURAL RESERVATION FOR THE PERIOD OF 1990-2020 IN POHUWATO REGENCY, GORONTALO PROVINCE

by Dewi Wahyuni K. Baderan

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ANALYSIS OF CHANGES AREA OF TANJUNG PANJANG NATURAL RESERVATION FOR THE PERIOD OF 1990-2020 IN POHUWATO REGENCY, GORONTALO PROVINCE

Bambang Mamangkay¹, Jalipati Tuheteru², Dewi Wahyuni K Baderan³

^{1,3}Population and Environment Study Program, Post Graduate, Universitas Negeri Gorontalo, Jl. Jend. Sudirman, Gorontalo City, Gorontalo 96138, Indonesia. Telp (0435) 831984.

²JAPESDA Gorontalo Association, Jl Jakarta I, Huangobotu, Kec. Duingi, Gorontalo City 96139, Indonesia, Telp: +62-823-44022445

*Correspondence: dewibaderan14@gmail.com

ABSTRACT

According to Law No. 5 of 1990, a nature reserve is a nature reserve area that due to its natural conditions has the peculiarities of plants, animals, and their ecosystems or certain ecosystems that need to be protected and developed. takes place naturally, the condition of the Tanjung Panjang Nature Reserve is even more deadly with the model of mangrove degradation that occurs to restore the mangrove forest requires a large amount of time and resources. Data analysis by describing the results of changes in mangrove forest cover from community aquaculture interventions based on the last 3 decades and looking at the remaining area results in the form of percent through google earth and ArtGis image analysis from 1990 to 2020. This study aims to see the changes Tanjung Panjang Nature Reserve covers from 1990 to 2020. Changes in land cover in Tanjung Panjang Nature Reserve for approximately 3 decades are very severe because of an area of 2680 Ha in 1990 and in 2020 which has been converted into ponds, which is 2560 Ha, if it is presented from 100% of the Tanjung Panjang nature reserve in 1990 which has not been converted, only (\pm) 4.5% of the mangrove area is left in 2020 and the process or activity of mangrove forest degradation is still ongoing and if there is no firm and hard action it can be predicted that the Tanjung Panjang Nature Reserve will only be will be a concert area the dead protection vasi.

Keywords: land cover, Tanjung Panjang, mangrove, pond, Pohuwato Regency

1. INTRODUCTION

Tanjung Panjang Nature Reserve is a Nature Reserve Area located in Pohuwato district, Gorontalo Province whose main ecosystem is mangrove plants, which continue to be degraded to this day due to economic interests without regard to environmental sustainability. Tanjung Panjang Nature Reserve, which is in the Pohuwato area, has an area of 3000 hectares, ironically the current condition is that until 2018 there are approximately 600 hectares left. Most of them have changed from mangrove forests to community aquaculture business areas, now the condition of mangrove forests in Tanjung Panjang Nature Reserve is very dying (Amin, et al 2018).

Unfortunately, the mangrove ecosystem in Tanjung Panjang Nature Reserve has been eroded in the past 3 decades very quickly, it is important to know that mangrove forests are the main buffer in coastal areas. According to Ario, et al (2018), the Mangrove forest is a type of forest that grows in tidal areas, especially on beaches protected by lagoons and upstream rivers that stagnate at low and de whose plant communities tolerate salt water. Mangroves tend to form density and diversity of stand structures which play an important role as sediment traps and protection against erosion and tsunami disasters (Fitriah et al, 2013). This is confirmed by Arizona, et al (2009) Mangrove forests can be a damper to natural symptoms caused by abrasion, waves, storms, and other life support for biota.

The condition of the Tanjung Panjang Nature Reserve is even more deadly with the mangrove degradation model that occurs to restore the mangrove forest, which requires a large amount of time and resources, according to Setiawan et al (2015). The rehabilitation of mangrove



forests is carried out by various stakeholders with two targets, namely rehabilitation of river and coastal border areas and the planting of mangroves in ponds. Thus the nature reserve in Tanjung Panjang can slowly be restored to its mangrove ecosystem. According to Mohamad (2011), forest areas can be utilized in a form that takes into account nature.

Currently, the Tanjung Panjang Nature Reserve has areas of mangrove forest, swamp scrub, and dry land agriculture mixed with shrubs, ponds, open land, and bodies of water. based on the information bulletin from BPKH Triwahyudi (2016). Until 2014, the change in Tanjung Panjang Nature Reserve cover consisted of ponds covering an area of 2417.89 Ha or 77.31% of the total area of Tanjung Panjang Nature Reserve, Mangrove Forests 396.43 Ha or 12.69% of the total area of Tanjung Panjang Nature Reserve and another 10.01% consisting of shrubs, agricultural areas, open land, and bodies of water, the area of the Tanjung Panjang Nature Reserve continues to decrease until now due to the expansion of the pond area which cannot be dammed anymore. Based on the problems above, the purpose of this study is to see changes in the cover of the Tanjung Panjang Nature Reserve from 1990 to 2020.

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2. METHODOLOGY

2.1 Research Area

This research was conducted on May 5, 2022, in the Tanjung Panjang Nature Reserve, Pohuwato Regency, Gorontalo Province. Research location Administratively (Figure 1) in the north it is bordered by Patilanggio District, in the south by Tomini Bay, in the east by Randangan District and in the west by East Popayato District. Geographically, it is in the position of 121°46'38,16"E and 0027°09"N with an area of (3174.80.39 Ha).

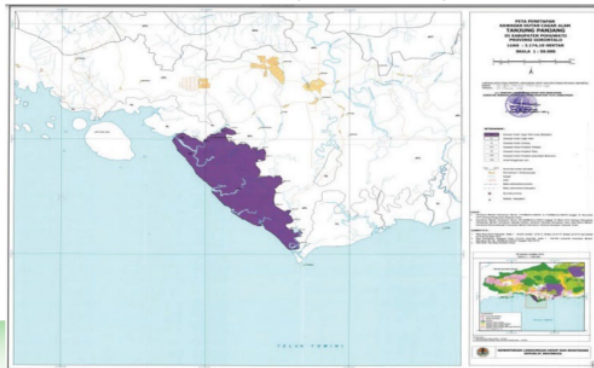


Figure 1. The area of the research location that is experiencing land degradation changes from a mangrove forest to the pond area and community land in the Tanjung Panjang Nature Reserve

2.2 Procedure

The procedure for collecting data was by conducting surveys and observations in the Tanjung Panjang Nature Reserve, Pohuwato Regency, Gorontalo Province. Then do image analysis on google earth and see changes in forest cover based on the last three decades from 1990 to 2020.

2.3 Data analysis

Data analysis by describing the results of changes in mangrove forest cover from community aquaculture interventions based on the last 3 decades and seeing the results of the remaining area in the form of percent through google earth and ArtGis image

analysis from 1990 to 2020. The data in this study are primary. and secondary data, where primary data was obtained through surveys and direct observations in the Tanjung Panjang Nature Reserve, Pohuwato Regency, Gorontalo Province, then secondary data was data from library studies and related agencies. With mapping: The equations used are:

$$\text{Total\% Area} = \frac{\text{Land Use Area}}{\text{Total Area}} \times 100\%$$

3. RESULTS AND DISCUSSION

3.1 Result

3.1.1 The trend of changing mangrove cover into aquaculture by the people in the Tanjung Panjang Nature Reserve

Tanjung Panjang Nature Reserve has an area of 3,000 ha. Geographically, Tanjung Panjang Nature Reserve is located at 0°25'28.93" - 0°30'1.93" North Latitude and 121°44'27.60" - 121°47'0.44" East Longitude (Figure 2). The status of this area is based on the determination of the Minister of Forestry through the Decree of the Minister of Forestry Number 573/Kpts-II/1995 dated October 30, 1995. Previously, the Tanjung Panjang Nature Reserve was designated as a permanent forest area with the function of a nature reserve based on the Decree of the Minister of Forestry Number 250/Kpts-II/1984 dated December 20, 1984, with an area of ± 3,000 ha. In the process, after being appointed as a conservation area with a nature reserve function based on the Decree of the Minister of Forestry No. 250/Kpts-II/1984 dated December 20, 1984, The aquaculture carried out in the Tanjung Panjang Nature Reserve is not only carried out by the local community but also by immigrant fishers. The current structure of the Tanjung Panjang community cannot be separated from a long, very dynamic process, along with the passage of time and the dynamics of the form of government, development, and socio-economic mobility of the people that take place in Tomini Bay. All circumstances can trigger and relate to each other like a domino effect, with backgrounds and consequences that cannot be simply simplified (Amin, et al. 2018).



Figure 2. The condition of the Tanjung Panjang Nature Reserve has become a pond area (Source: Husa, 2022).

3.1.2 Total Percentage of Tanjung Panjang Nature Reserve from 1984-2022

The rate of mangrove degradation in the Tanjung Panjang Nature Reserve indicates that some people are more concerned with economic benefits than the sustainability of the environment, this can be seen from the increasing fish farming activities where approximately

3,122 hectares of the degraded Nature Reserve area can be obtained from the equation used. the remaining area in percent form is as follows:

$$\text{Total\% Area} = \frac{\text{Land Use Area 2020}}{\text{Total Mangrove Area 1990}} \times 100\%$$

$$\text{Total\% Area} = \frac{2560 \text{ Ha}}{2680 \text{ Ha}} \times 100\% = 4.5\%$$

The results of the calculations from the above equation can be seen that the area of the Tanjung Panjang Nature Reserve where there is still a mangrove area remaining is only (\pm) 4.5% in 2020 now. This shows a very high level of degradation in the process of increasing the economy with aquaculture models in mangrove forests located in the Tanjung Panjang Nature Reserve. The current economic culture and development on the coast of Pohuwato, Tomini Bay, especially in the Tanjung Panjang area cannot be separated from 5 (five) main conditions. First, is the absence of authority and regularity in the management of the Tanjung Panjang Nature Reserve. Second, is the dominance of the migrant community which acts as the main manager of the Tanjung Panjang coastal area, with specific aquaculture businesses (milkfish and shrimp). Third, there is an increasingly open market-economic flow for aquaculture both in Sulawesi and beyond, with large consumer demand and increasingly competitive prices (Amin, et al. 2018).

3.1.3 Total Changes in Tanjung Panjang Nature Reserve area for the period 1990-2020

Tanjung Panjang Nature Reserve Area The status of this area is based on the stipulation of the Minister of Forestry through the Decree of the Minister of Forestry Number 573/Kpts-II/1995 dated October 30, 1995. With an area of 3174.80 hectares, the mangrove area was still quite large in that period, it can be seen on the map of google earth image analysis in 1990-2020 (Figure 3-5).

Table 1. Total Changes in Coverage Area of Tanjung Panjang Nature Reserve

Land Cover	Years (Area/Ha)		
	1990	2014	2020
Primary Mangrove Forest	466	-	-
Secondary Mangrove Forest	2.214	855	-
Shrub-Mixed Dryland Agriculture	43	43	-
Pond	294	1.936	2.560
Open Ground	37	69	-
Swamp Scrub	-	150	-
Total	3.102	3.102	2.560

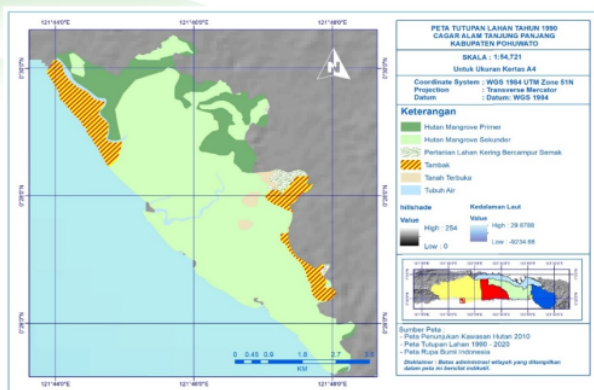
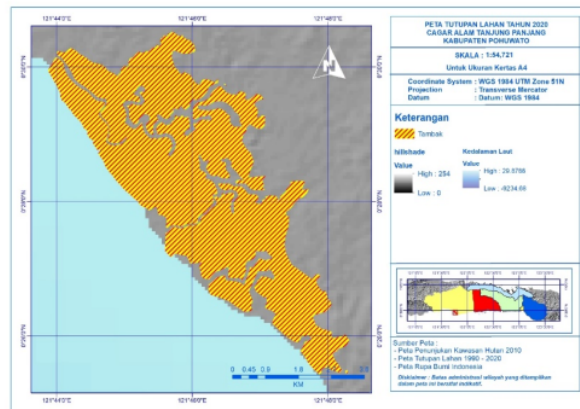
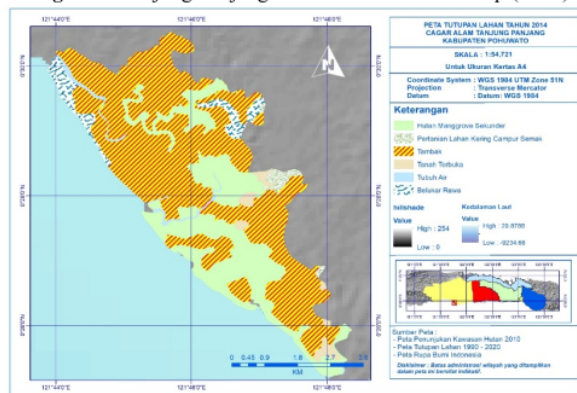


Figure 3. Tanjung Panjang Nature Reserve cover map (1990)**Figure 4.** Tanjung Panjang Nature Reserve cover map (2014)**Figure 5.** Tanjung Panjang Nature Reserve cover map (2020)

3.2 DISCUSSION

Damage to mangrove forests due to conversion to aquaculture areas can result in great risks to biodiversity and surrounding ecosystems and can result in environmental disasters ranging from soil damage to abrasion and tsunamis. Mangrove forests are forests that grow in tidal areas that have the characteristics of muddy or sandy soil and have excellent adaptability when the tidal area experiences the lowest ebb to the highest tide. Mangrove forests in aquatic ecosystems have a role that cannot be replaced because of their function and existence. Mangrove forest has physical, ecological, and economic functions (Purnama, et al. 2020). Mangrove forests are forests that grow in tidal areas that have the characteristics of muddy or sandy soil and have excellent adaptability when the tidal area experiences the lowest ebb to the highest tide. Mangrove forests in aquatic ecosystems have a role that cannot be replaced because of their function and their existence. Mangrove forest Mangrove fol, ecological, and economic functions (Purnama, et al. 2020). Mangrove forests are forests that grow in tidal areas that have the characteristics of muddy or sandy soil and have excellent adaptability when the tidal area experiences the lowest ebb to the highest tide. Mangrove forests in aquatic ecosystems have a role that cannot be replaced because

of their function and existence. Mangrove forest has physical, ecological, and economic functions (Purnama, et al. 2020).

Ecologically and economically, mangrove forests can support all of this if they are maintained, but if they only pay attention to the economic aspects, they can directly have an impact on environmental damage. The mangrove forest community has received a lot of attention from experts and the role of the unique and important mangrove ecosystem is widely known. From the point of view of the ecosystem, people see the use as a whole, including the littoral area and the surrounding coast, for various purposes and human welfare in addition to maintaining the integrity of the environment in general. Meanwhile, from the component point of view, some parts of the mangrove plant have long been used by humans, both for local needs and as industrial materials. Locally, mangrove plants have been used as a source of food, and medicine.

This is confirmed by Wei, et al (2001) Mangrove forests are groups of shrubs and trees that live in coastal intertidal zones in tropical and subtropical regions. Mangrove forests provide a unique ecological environment that can protect coastlines from flooding and tsunami waves, as well as filter pollutants from water. Mangrove forests are productive ecosystems that are breeding grounds for marine species, such as fish, shrimp, crabs, and other shellfish. They also provide fuel and building materials to local communities.

In addition to the use of fruit and trees by paying attention to the potential of mangrove resources, mangrove forests have the potential to increase the environment-based economy through ecotourism. Mangrove forests can be developed into an area that can provide benefits both in terms of ecology and in terms of economy. So to manage and conserve mangrove resources, it is very necessary to have research activities that can produce scientific information about the current state or condition of the location that can support it to be developed into a tourist area (Anthoni, et al. 2017).

The condition of the Tanjung Panjang Nature Reserve in Kab. Pohuwato is already very worrying, it is no longer seen as a nature reserve area. Milkfish and shrimp farming activities have significantly changed the condition and function of the area. The ponds that developed in the early 1990s have continued to grow until now despite the determination of the Tanjung Panjang Nature Reserve on October 30, 1995. It turns out that this area will legally be maintained as a permanent forest with the function of a nature reserve – by the Central Government and supported by local government policies. Therefore, it is very logical to consider efforts to restore its function (Massa, et al. 2014)

The dominance of the aquaculture area, which has been so massive, if it is emphasized that its function can be restored, requires time and large resources, but if this condition is allowed to continue, it can cause an environmental impact in the future, especially in these community aquaculture areas. According to Musqith, (2014) Shrimp farming activities that are applied to mangrove forest areas that have been converted to an intensive system will produce aquaculture waste that is wasted in the aquatic environment, and can significantly affect the quality of the coastal waters environment, directly and indirectly. pond waste on fisheries, namely the decline, the number of living creatures in coastal areas, damage to habitat, and the aquatic environment as a medium of life. In addition, another impact resulting from pond activities is the high use of feed for cultured organisms which results in eutrophication. Eutrophication is an impact of nitrate and phosphate pollution that can harm the community. The enrichment of these nutrients can lead to algae blooms which can make the oxygen levels in the water very thin it can result in the condition of the water in the environment of the pond location becoming polluted and resulting in the death of organisms around the pond (Harianja, et al. 2018).



The coastal area is indeed an ecotone area whose conditions are so complex because it becomes a transitional place for organisms both in water and on land. According to Xie, et al (2022), the peisis area holds the main function and is a complex and dynamic environment where physical, chemical, and biological interactions occur between two different ecosystems, namely water, and land. Therefore, it is very important to restore the core function of the Tanjung Panjang Nature Reserve which is a protected conservation area so that there are no more economic actions or activities that damage the ecosystem in the Tanjung Panjang Nature Reserve, indeed to restore and restore an environment takes a long time but it is a way out to make our environment recover. According to Debrot et al,(2022), Mangrove rehabilitation in coastal areas does require a very long time, but this must be done especially in the form of collective mangrove protection, integrated coastal area management to rebuild ecological and economic resilience by combining intelligent engineering and ecological rehabilitation, in conjunction with sustainable use of land and resources.

5. CONCLUSION

Based on the results and discussion above, it can be concluded that the change in land cover in the Tanjung Panjang Diving Nature Reserve for approximately 3 decades was very severe because of an area of ± 3000 Ha in 1984, and in 1990 it began to be degraded from the total remaining 2740 Ha of mangrove which had been converted, which was equal to 2560 Ha, if the percentage of the 100% mangrove area of Tanjung Panjang Nature Reserve which has not been converted, only (\pm) 4.5% remains. and the process or activity of land degradation in the Tanjung Panjang Nature Reserve is still ongoing if there is no firm and hard action, it can be predicted that the Tanjung Panjang Nature Reserve will only become a dead protected conservation area.

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REFERENCES

- Abdul Muqsih. 2014. The Impact of Intensive Shrimp Pond Activities on the Physical-Chemical Quality of Banyuputih waters, Situbondo Regency. *Journal of Fisheries Science*. Vol. 5(1):1-6.
- Adilphe O. Debrot, Anouk Plas, Herry Boeseno, Kukuh Prihantoko, Martin J. Baptist, Albertinka J. Murk and Femke H. Tonneijk. 2022. Increasing the Beginning of Coastal-Based Artisanal Fisheries in the Nature-Based Solutions Mangrove Rehabilitation Project on the North Coast of Java. *Elsevier*. (267).
- Agus Triwahyudi, 2016. Analysis of Land Cover in Tanjung Panjang Nature Reserve and Monitoring of Forest and Land Fires in Gorontalo Province. *Bulletin of Gofasa BPKH Region XV Gorontalo*. Gorontalo.
- Annice Anthoni, Joshian NW Schaduw, and Clvyn FA Sondak. 2017. Percentage of Mangrove Coverage and Community Structure along the North Shore of Bunaken National Park. *Journal of the Coastal and Tropical Seas*. Vol 2 (1): 13-21.

- Basri Amin, Rahman dako, Christopel Paino, Debora de Block, Ramli Utina, Abubakar Sidik Katili, Dewi Wahyuni K Baderan and Nurani Lapolo, 2018. Spatial Conflict in Tanjung Panjang (Dynamics of Mangrove Ecosystem Management in Gorontalo Province). *Idea Publisher*. Gorontalo.
- Dewi Wahyuni K. Baderan. 2017. Spatial Distribution and Area of Mangrove Forest Damage in the Kwandang Coastal Area, North Gorontalo Regency, Gorontalo. *Journal of Geo Eco*. Vol 3 (1): 1-8
- Eka Fitriah, Yuyun Maryuningsih, Edy Chandra and Asep Mulyani. 2013. Study on Mangrove Forest Management Analysis in Cirebon Regency. *Journal of Scientiae Education*. Volume 2 (2).
- Erik Kalaha. 2015. *Transfer of Mangrove Forest Function in Tanjung Panjang Nature Reserve Area, Pohuwato Regency*. [Thesis]. Hassanudin University. Makassar.
- Ervina yulianti Mohamad, Albertus sentot Sudarwanto and I Gusti Ketut Rachmi Handayani. 2017. Enforcement of Administrative Law Against the Transfer of Mangrove Forest Functions in Pohuwato Regency in Realizing Environmentally Friendly Development. *Journal of Law and Economic Development*, Vol 6 (2): 17-34.
- Meivy Arizona, Sunarto and Djalal Tanjung. 2009. Damage to the Mangrove Ecosystem Due to Land Conversion in Tobati Village and Nafri Village, Jayapura. *Indonesian Geography Magazine*. Vol 23 (3): 18-39.
- Muhsin Purnama, Rudhi Pribadi and Nirwani Soenardjo. 2020. Analysis of Mangrove Canopy Cover with Hemispherical Photography Method in Betahwalang Village, Demak Regency. *Journal of Marine Research*. Vol 9(3): 317-325.
- Raden Ario, Petrus Subardjo, and Gentur Handoyono. 2015. Analysis of Mangrove Damage at the Mangrove Restoration and Learning Center (PRPM), Pekalongan City. *Tropical Marine Journal*. Vol 18 (2): 64-69.
- Renal Husa, 2022. *Mangrove Destruction Report in Tanjung Panjang CA*. Japesda. Gorontalo.
- Ronitua Saut Marito Harianja, Sofia Anita and Mubarak. 2018. Analysis of the Pollution Load of Shrimp Ponds Around the Kembung River, Bantan Bengkalis District. *Indonesian Journal of Environmental Dynamics*. Vol 5 (1): 12-19.
- Shan Wei, Yinyi Lin, Luoma Wan, Guanghui Lin, Yuanzhi Zhang, and Honsheng Zhang. 2001. Developed a Grid-Based Association Rule Mining Approach to Measure the Impact of Urbanization on the Spatial Area of Mangroves in China. *Elsevier*. (102).
- SR, You L. 2008. Synthetic Escherichia coli predator-prey ecosystem. *Mol Syst Biol* 4: 187. www.molecularsystemsbiology.com
- Suhardjono. 2013. Mangrove Forest of Sempu Island Nature Reserve, East Java. *Indonesian Journal of Biology*. Vol 9 (1): 121-130.
- Yunianto Setiawan, Dietrich G. Bengen, Cecep Kusmana, and Setyo Pertiwi. 2015. Estimated Externality Value of Conversion of Mangrove Forest into Ponds in Delta Mahakam, Kutai Kartanegara Regency. *Journal of Plantation Forest Research*. Vol 12 (3): 201-210.



Yusran N Massa, Rahman Dako, Johanes Wiharisno, Ismail A Kadir, Basri Amin and Achmad Bahsoan. 2014. Tanjung Panjang Weaving Hope Nature Reserve. North Sulawesi BKSDA Hall. Manado.

Zhenglei Xie, Gaoru Zhu, Min Xu, Hua Zhang, Wenbin Yi, Yinguijiang, Minxuang Liang, and Zaifeng Wang. 2022. Heavy Metal Risk Assessment in a Typical Mangrove Ecosystem- A case study of the South China Shankou Mangrove National Reserve. *Elsevier*. (178).



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