



## Mangrove Sustainability Strategies Against Mangrove Land Trading Practices (Case Study: Mangrove and Crab Conservation Area in Tarakan City, Indonesia)

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### ABSTRACT

Illegal mangrove land trading is a significant problem exacerbated by poor governance, unclear land tenure systems, and increasing urban pressure. The Mangrove and Crab Conservation Area (KKMK) has experienced degradation due to mangrove land trading practices from 2017 to the present. The purpose of this study is to formulate policies on the prevention of mangrove land trading practices in the KKMK. The method used in this study is analytical and descriptive with a socio-legal approach that combines legal analysis with a social science perspective using two data sources, namely primary and secondary. The results of the study show that KKMK has been actively traded by the community on behalf of fishing groups at prices ranging from IDR 3,000,000 to IDR 35,000,000 per 10m x 20m plot. To date, 365 plots have been sold, and most of them have been developed with buildings or settlements. The strategy to address the issue of mangrove land trading must be multi-faceted and call for the preservation of the mangrove conservation area. Strategies that can be adopted include enforcing the legal framework and taking firm action against buyers, intermediaries, and sellers of conservation area land with severe criminal penalties and significant fines, providing economic incentives to communities that play a role in protecting and conserving mangrove forests, and involving local communities in the decision-making process regarding mangrove management.

### INTRODUCTION

The mangrove forests on the coast of Tarakan City are quite extensive and have a high diversity of species, dominated by *Rhizophora*, *Bruguiera*, *Sonneratia*, and

*Avicennia*. This ecosystem not only supports water productivity but also provides coastal stability and prevents abrasion. The mangrove forests in Tarakan City cover an area of approximately 1,587 ha, spread across Tarakan City and the surrounding small islands (**Siahaya *et al.*, 2016**). However, based on Tarakan City Regulation No. 03 of 2021, the area of mangrove forests continues to decline, leaving only about 627.60 ha. The existence of mangrove forests in Tarakan City continues to face multidimensional pressures such as conversion for settlements, ponds, industry, pollution, and illegal land sales. Cases of mangrove land sales often involve conflicts between short-term economic interests such as settlements, aquaculture, and agriculture, thereby reducing biodiversity and climate change mitigation (**Arifanti *et al.*, 2022**).

Economic needs are the main driving factor in the practice of buying and selling mangrove land, so it is important to raise public awareness of sustainable mangrove management in order to provide greater long-term economic benefits. The mangrove ecosystem in Majene Regency, West Sulawesi, serves as an important economic resource for local residents who derive direct and indirect benefits from its management and utilization, thereby meeting essential economic needs (**Gosari *et al.*, 2024**). Success in achieving a balance between economic development and mangrove conservation requires a data-driven and inclusive approach (**Ibharim *et al.*, 2024**).

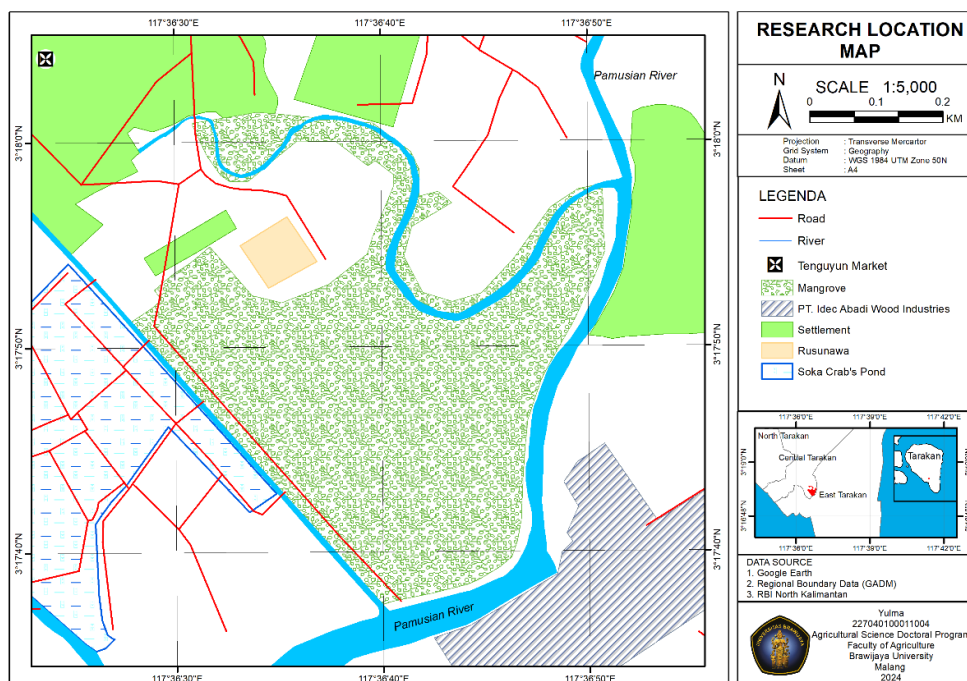
Land sales practices in Indonesia are regulated by laws that require the preservation of land rights through official deeds of sale drawn up by Land Deed Officials (PPAT) (**Laksmmono & Pria, 2023**). In the context of mangrove land sales, many transactions are conducted unofficially or ‘under the table’, often disregarding existing regulations and potentially leading to legal problems (**Purnamasari *et al.*, 2020**). Errors in the legality of mangrove land can also have an impact on the preservation of this ecosystem. For example, the conversion of mangrove land for aquaculture is often carried out in ways that are harmful to the environment, thereby accelerating the degradation of mangrove forests (**Sumarga *et al.*, 2022**).

The buying and selling of mangrove land has been occurring in the Tarakan City Mangrove and Crab Conservation Area (KKMK) since 2017. However, this area is a conservation area that was established in 2002 to protect mangrove biodiversity and as a coastal protection area covering 35 hectares, but currently only 25.19 hectares remain (**Yulma *et al.*, 2025**). The rampant practice of buying and selling mangrove land in the KKMK requires a multifaceted approach that includes clarification of land ownership, enforcement of environmental laws, and promotion of community-based mangrove ecosystem management. Conservation and restoration of mangrove ecosystems can increase fishery productivity and help local communities earn a better livelihood (**Permana *et al.*, 2024**). The purpose of this study is to formulate policies on preventing the buying and selling of mangrove land in the KKMK.

## MATERIALS AND METHODS

### 1. Research location

The research location is in the KKMK of Tarakan City at coordinates 3° 29' 65.33" North Latitude and between 117° 61' 06.30" East Longitude in North Kalimantan Province (Fig. 1). The location was chosen based on the consideration that KKMK is under high ecological pressure from community activities, both directly and indirectly, such as the conversion of land into settlements due to the high practice of buying and selling mangrove land.



**Fig. 1. Research location**

### 2. Methods

This research is analytical and descriptive in nature, using a socio-legal approach that combines legal analysis with a social science perspective. Research using a descriptive-analytical approach combines legal and sociological analysis to discuss various issues such as restorative justice (Wirawan & Budianto, 2023). This study uses two data sources, namely primary and secondary data. The primary data were derived from key informants, namely the community living in KKMK and the community living around KKMK. Additionally, supporting informants include the Tarakan City Government, the Environment Agency, Public Housing and Settlement Areas, and the Land Office. Furthermore, secondary data were obtained from relevant agencies and previous research results.

## RESULTS AND DISCUSSION

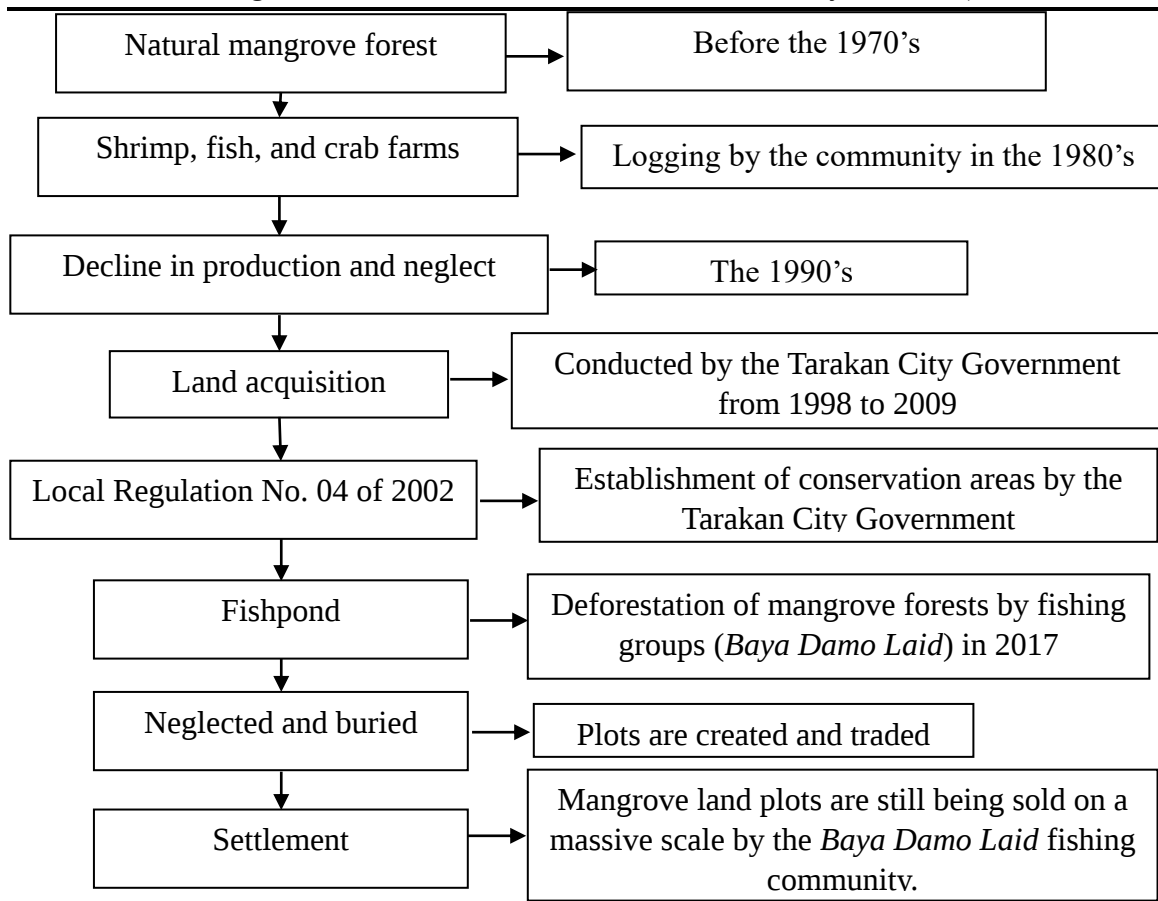
### 1. The practice of buying and selling mangrove land in KKMK

KKMK was designated as a conservation area based on Local Regulation No. 04 of 2002, with 19.29 ha (77.27%) in relatively good condition, while the remaining 5.67 ha (22.73%) consists of young mangrove vegetation of the *Rhizophora mucronata* species at the seedling and sapling stages, which are the result of planting. Efforts to plant mangrove seedlings in this area were first initiated in 2008 by the Tarakan City Government. These efforts were then continued by PT. Pertamina (Indonesia's fully state-owned oil and natural gas corporation), through a collaborative program with the Tarakan City Government's Mangrove Conservation Program. This program aims to preserve and increase the population of mud crabs (*Scylla serrata*) while maintaining the sustainability of the coastal ecosystem. The type of mangrove seedling used is *R. mucronata*, as this species is relatively easy to obtain and has better resistance to changes in environmental conditions.

Mangrove logging in KKMK was carried out by the “*Baya Damo Laid*” fishing group in 2017 and sold massively to its members. They purchased mangrove land from the fishing group without official land ownership certificates, based only on proof of sale and purchase receipts (Fig. 2). This indicates that the land ownership does not have strong legal force. The practice of buying and selling mangrove land is evidence of community non-compliance with existing regulations, even though their role is very much needed in protecting critical areas such as mangroves (Agil, 2023). In addition, many transactions are carried out without official documents, which causes legal problems in the future (Seirawan et al., 2024).

Currently, the KKMK land has 365 plots measuring 10m x 20m with prices ranging from IDR 3,000,000 to IDR 35,000,000 per plot. The buyers of land in KKMK are people who have long settled in Tarakan City by renting houses elsewhere. They prefer to buy land in KKMK because the price of plots tends to be cheaper than elsewhere and they no longer need to rent houses. As a general overview, the people who live and settle in KKMK are registered as members of the “*Baya Damo Laid*” fishing community, but none of them works as fisherman. This means that the practice of buying and selling land in KKMK is an illegal activity for the benefit of certain parties. The plots and settlements in the Mangrove and Crab Conservation Area (KKMK) are shown in Fig. (3).

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**Fig. 2.** Flowchart of mangrove land sale and purchase practices



**Fig. 3.** Plots of the KKMK area

## 2. Policy strategies to prevent mangrove land sales

Preventing the sale of mangrove land in conservation areas is an increasingly crucial governance challenge that requires a multi-faceted policy strategy. This strategy must integrate a legal framework, economic incentives, social engagement, and strong governance mechanisms. Enforcing mangrove conservation laws in Indonesia is a complex challenge that encompasses social, ecological, and economic issues (**Arifanti *et al.*, 2022**).

A solid legal framework is the foundation for protecting mangrove areas from exploitation and illegal sale. Effective legislation can curb the conversion of mangrove land for industrial, agricultural, or other purposes that can cause ecological degradation. The management of KKMK is inseparable from the role of the Tarakan City Government in issuing regulations related to the mangrove ecosystem in KKMK. The Department of Environment, Public Housing, and Settlement Areas and the Department of Environment report violations to the Tarakan Police. Local governments have a role in legally protecting mangrove forests from damage caused by land conversion practices, highlighting the level of ecological loss due to inadequate legal protection (**Prasetya, 2025**).

Economic incentives also play a crucial role in the multifaceted approach to mangrove land sales. Communities that protect mangroves can receive financial compensation for the environmental services they protect, such as erosion prevention, carbon storage, and marine life spawning. The provision of financial incentives can address mangrove loss by encouraging sustainable practices among local communities (**Pham *et al.*, 2022**). The lack of economic alternatives leads to mangrove degradation through conversion to economically profitable land uses such as aquaculture (**Arfiani *et al.*, 2021**). The implementation of initiatives such as ecotourism can provide economic benefits while promoting conservation (**Halim & Setiawan, 2023**).

Social involvement is crucial for successful governance in mangrove conservation. The strategy to achieve this success is to provide knowledge through the curriculum from elementary school to university levels regarding the importance of mangrove ecosystems. Additionally, it is necessary to provide education and training, as well as coordinate with the community, regarding mangrove ecosystem management. Active participation of local communities in decision-making processes regarding mangrove management can foster a sense of ownership and responsibility for the mangrove ecosystem. Efforts to raise awareness of the long-term ecological and economic value of mangroves (as coastal protection, carbon sinks, and fish breeding grounds) should be emphasized over the short-term benefits of land sales. Community knowledge influences conservation outcomes in that when local residents understand ecological significance, local beliefs and practices can significantly influence the sustainability of mangrove ecosystems, especially in enhancing community-led conservation efforts (**Johnson-Bhola, 2020**). In addition, it is necessary to form and

strengthen Community Monitoring Groups (Pokmaswas) to help monitor the area and report suspicious activities, as well as involve the community in the planning and management of conservation areas (**Yulma et al., 2025**).

Strengthening and enforcing the law are important aspects in addressing the issue of mangrove land trading practices. Strict law enforcement against perpetrators of mangrove destruction, based on applicable laws such as Law No. 32 of 2009 concerning Environmental Protection and Management, which can impose criminal penalties, including imprisonment and fines. Violations related to the sale and purchase of mangrove land in KKMK were reported by the Environment, Public Housing, and Settlement Agency and the Land Office to the Tarakan Resort Police in 2022. The case is being processed and is currently in the witness summons stage. However, the handling of this case is still relatively slow because no suspects have been named and no concrete criminal action has been taken. Collaboration between the government, law enforcement agencies, and the community is essential to ensure compliance with regulations and minimize violations in mangrove ecosystem management (**Subambang et al., 2024**). Furthermore, it is necessary to increase community compliance with regulations on mangrove ecosystem management through community-based management. The community-based management approach has proven effective in increasing compliance with mangrove management regulations. **Macamo et al. (2024)** explained that when communities are empowered to monitor and enforce regulations on mangrove ecosystems, they are more likely to support sustainable management practices.

## CONCLUSION

The Mangrove and Crab Conservation Area (KKMK) has experienced degradation due to the buying and selling of mangrove land by fishing communities. These transactions are illegal and have no legal force. Strategies to address the issue of mangrove land sales require a multi-faceted approach that integrates legal frameworks, economic incentives, social engagement, and governance mechanisms. Enforcement of the legal framework and strict punishment of perpetrators of destruction, including buyers, intermediaries, and sellers of conservation area land, with criminal sanctions and fines; provision of economic incentives to local communities that play a role in protecting and preserving mangrove forests; and involvement of the entire community in the decision-making process regarding mangrove management are all recommended.

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