



# Spatial Mapping of Mangrove Land Tenure Based on Local Community Participation in Bintan Island – Indonesia

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**Abstract.** One of the important aspects in the development of mangrove ecotourism is the status of land ownership that is clear and free from disputes. This information is important to reduce and prevent social conflict when utilizing mangrove ecosystems for the development of mangrove ecotourism in the future. Spatial mapping of land tenure has been carried out in 7 locations on Bintan Island which is spread across Bintan Regency and Tanjungpinang City. In Bintan Regency there are 4 villages that become a research area, which is Tembeling Village, Busung Village, Penaga Village, and Pengudang Village. Meanwhile in Tanjungpinang City there are 3 research areas namely Senggarang, Kampung Bugis, and Dompok. The method used in this research is a participatory approach using community local knowledge. Data was collected through in-depth interview and focus group discussion (FGD), and visualized spatially using Geographic Information System (GIS). The results of the study showed that the land tenure of mangrove forests in 7 locations of the research area was owned by several stakeholders which are the government, communities, and corporates. But the extent of land ownership in the mangrove area is different between the three parties in each location. In Pengudang Village, 90% of 45.9 ha of land are owned by the private sector. The community can only use the land without being able to own it. On the other hand, in Busung and Penaga Villages, 100% of mangrove forest is controlled by the community with an area of 166.41 ha and 449.86 ha, respectively. In Tembeling Village, 64% of 1896.12 ha of mangrove forest is controlled by the community, 32% is controlled by the local government, and only 0.5% that is controlled by the private sectors. The form of land tenure from the private sector is usually in the form of plantation use rights. Meanwhile, by the community, the

form of the land tenure for mangrove forest is community forestry. And by the government, the form of the land tenure is in the form of protected forest.

**Keywords:** spatial mapping · mangrove · land tenure · Bintan Island · local knowledge

## 1 Introduction

Getting the information from the local community is widely used by the researchers. It is known as local knowledge, local ecological knowledge, indigenous ecological knowledge, or traditional ecological knowledge [1]. Local knowledge usually was used when data and resources are lacking to expand our understanding of the environment [2]. It is also acknowledged as a valuable source of information and justified with scientific knowledge [3].

Many studies using local knowledge as a method to obtain the data, such as local knowledge of local community on seahorse [4], local ecological knowledge to investigate endangered baleen whale [5], also to mapping and know the existence of Dugong [6–8]. The local knowledge also used to develop the aquaculture at marine protected area [9].

In this study, local knowledge was used to obtain data on the land tenure of mangrove forest. As we know, mangrove forests have the potency to be developed as ecotourism object. But to develop mangrove as an ecotourism, the ownership of the land of mangrove forest must be clean and clear from disputes [10]. To develop ecotourism, it must also be carried out by pay attention into the sustainability of the ecosystem itself [11].

Bintan Island is one of the islands in Riau Island Province that has the potency of mangrove forests to be developed as ecotourism. This study aims to spatial mapping the land tenure of mangroves in Bintan Island based on the participation of local community using their local knowledge. This study was conducted to ensure that the ownership of the land of mangrove forest in the Bintan Island area is clean and clear from disputes. Data on mangrove land tenure on Bintan Island is important to obtain, because the information is used to reduce and prevent social conflict in utilizing mangrove ecosystems for the development of mangrove ecotourism in the future.

## 2 Method

Spatial mapping of land tenure has been carried out in 7 locations on Bintan Island which is spread across Bintan Regency and Tanjungpinang City. In Bintan Regency there are 4 villages that become a research area, which is Tembeling Village, Busung Village, Penaga Village, and Pengudang Village. Meanwhile in Tanjungpinang City there are 3 research areas namely Senggarang, Kampung Bugis, and Dompok.

The research was conducted in 2021. The method used in this research is a participatory approach using community local knowledge. Data was collected through in-depth interview and focus group discussion (FGD) from local communities and village government officials. The data was visualized spatially using Geographic Information System (GIS).

### 3 Results and Discussion

The results of the study showed that the land tenure of mangrove forests in 7 locations of the research area was owned by several stakeholders which are the government, communities, and corporates. But the extent of land ownership in the mangrove area is different between the three parties in each location.

In Pengudang Village, as we can see at the Fig. 1, 90% of 45.9 ha of land are owned by the private sector and the rest of the land own by the communities as Hak Guna Bangunan (HGB) [12]. It means that the community can only use the land without being able to own it nor to build permanent buildings. Through this day, the local community can still use land to make a living, but they are worried that they will be evicted at any time. And this is one of the reasons why the local people are reluctant to develop mangrove ecotourism. But until now the land owner of Pengudang Village has not used the land according to its designation. This condition provides an opportunity for the local community to develop the natural surroundings around them as a tourist destination.

On the other hand, in Busung 100% of mangrove forest is controlled by the community with an area of 166.41 ha. The mangrove area in the Busung Village is managed in the form of a community forest provided by the Ministry of Environment and Forestry (Fig. 2).

In Penaga Village, 97% of 449.86 ha mangrove forest also managed in the form of community forest (Fig. 3). And only 2.5% is managed by individual community. From

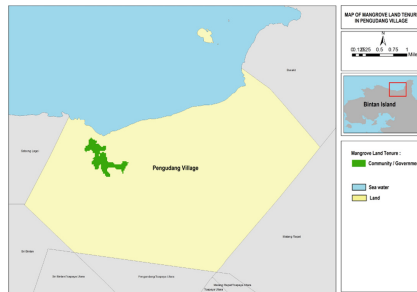
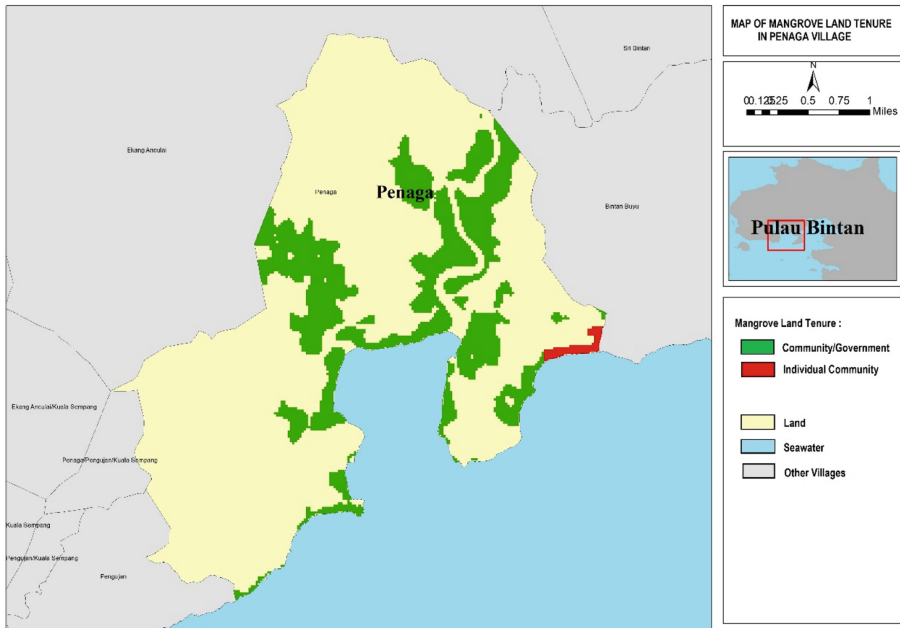


Fig. 1. Spatial Map of Mangrove Land Tenure in Pengudang Village.



Fig. 2. Spatial Map of Mangrove Land Tenure in Busung Village.



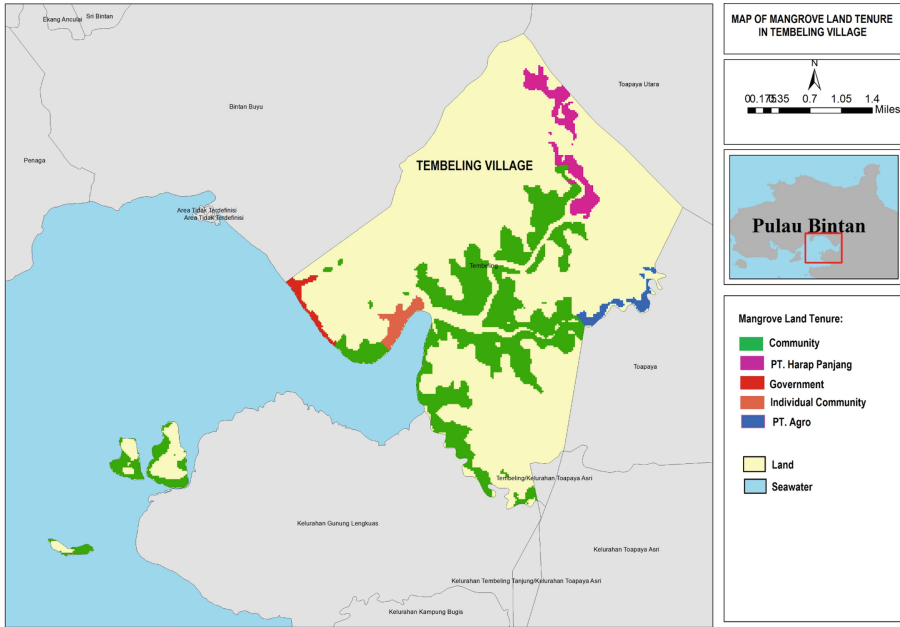
**Fig. 3.** Spatial Map of Mangrove Land Tenure in Penaga Village.

the Figs. 2 and 3 it can be seen that Busung and Penaga Villages have a large mangrove area that can be developed into ecotourism.

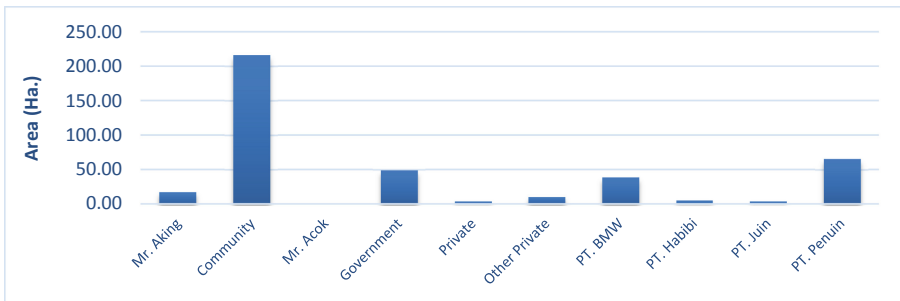
In Tembeling Village, 64% of 1896.12 ha of mangrove forest is controlled by the community, 32% is controlled by the local government, and only 0.5% that is controlled by the private sectors (Fig. 4). The form of land tenure from the private sector is usually in the form of plantation use rights. Meanwhile, by the community, the form of the land tenure for mangrove forest is community forestry. And by the government, the form of the land tenure is in the form of protected forest.

From the four research areas on Bintan Island above, we can see that the local community and the government of the village can still develop the mangrove land in the village become ecotourism. Because the coastal border area becomes a public space with an open access to anyone [13].

Another result of the study also showed that the extent of land tenure in Kampung Bugis Village mostly controlled by the local community. But there is a lot of private sector that also owned the mangrove area in Kampung Bugis. The percentage of mangrove forest owned by the private sectors reaches 35.48% of all mangroves in Kampung Bugis Village, with different land areas of each other (Graphic 1). Meanwhile in Senggarang Village, the private sector controls the majority of the existing mangroves in the village (Graphic 2). The corporation that owns the majority of mangrove land is the same private company as in Pengudang Village. Meanwhile, only 15.6% mangrove forests are controlled by the local community. It means that local community have to find other attractions to develop mangrove as ecotourism [14] (Figs. 5 and 6).

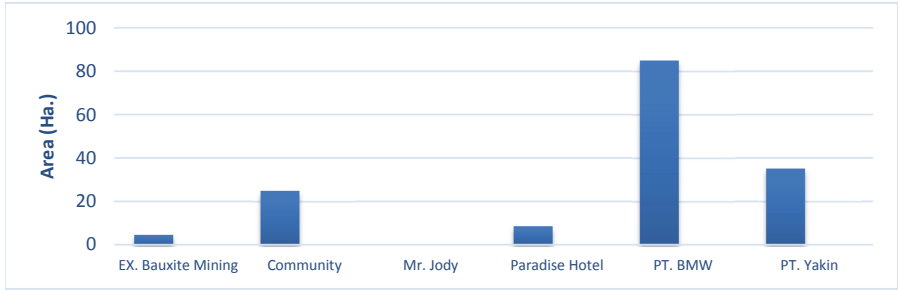


**Fig. 4.** Spatial Map of Mangrove Land Tenure in Tembeling Village.

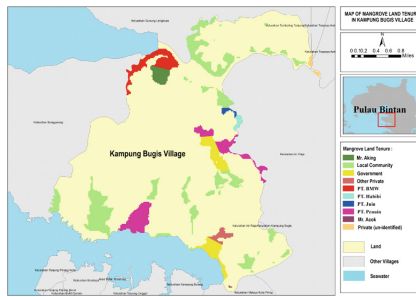


**Graphic 1.** Percentage of mangrove forest control in Kampung Bugis Village

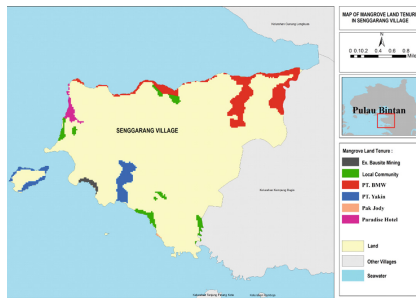
From the results, we can see that the land tenure of mangrove forests in the research areas is owned by several stakeholders including government ownership, community and corporate. However, the extent of the control of the three parties over each region is different. The results provide opportunities for the local communities to develop the nature become destination of the ecotourism. The local communities can also join together with all the parties in the village to develop the ecotourism with their own local wisdom [15–17]. But they have to make the rules to protect the nature, so the sustainability of the mangrove ecosystems can be maintained [18–21].



**Graphic 2.** Percentage of mangrove forest control in Senggarang Village



**Fig. 5.** Spatial Map of Mangrove Land Tenure in Kampung Bugis Village



**Fig. 6.** Spatial Map of Mangrove Land Tenure in Senggarang Village

### 4 Conclusion

The land tenure of mangrove forests in 7 locations of the research area was owned by several stakeholders which are the government, communities, and private sector. The extent of land ownership in the mangrove area is different between the three parties in each location. The form of land tenure from the private sector is usually in the form of plantation use rights. Meanwhile, by the community, the form of the land tenure for mangrove forest is community forestry. And by the government, the form of the land tenure is in the form of protected forest.

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