

Original Article

Spatial Utilization Planning of Mangrove Conservation Area at Tinjul Village, Lingga Regency

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ABSTRACT

The Indonesian Coastal Conservation Foundation (Yakopi) has successfully planted 82.24 hectares of mangroves in Tinjul Village, Lingga Regency. However, mangrove planting efforts need to be complemented with mangrove zoning mapping and the establishment of village regulations for mangrove protection. This research employs a qualitative approach using the Participatory Rural Appraisal (PRA) method, with data collection through Focus Group Discussions (FGD), participatory mapping, and documentation. The analysis method used is descriptive. The results indicate that (1) the first FGD led to an agreement on conducting mangrove zoning mapping and formulating village regulations, (2) a field survey via participatory mapping produced a mangrove zoning map, (3) the second FGD resulted in consensus on the mangrove zoning maps and village regulations regarding mangrove protection, and (4) the third FGD led to the ratification and handover of the mangrove zoning maps and Tinjul Village Regulation No. 002 of 2024 on mangrove protection to village government officials. The study concludes that community-based mangrove management can be sustainable, contributing to the balance of the existing ecosystem.

KEYWORDS

mangrove conservation; planning; spatial utilization

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INTRODUCTION

Indonesia is endowed with coastal resources, including mangrove forest ecosystems, which span a total area of 3,364,076 hectares (Ministry of Environment and Forestry, 2021). Presidential Regulation of the Republic of Indonesia No. 73 of 2012 concerning the national strategy for managing mangrove ecosystems defines mangrove ecosystems as a unified entity consisting of mangrove vegetation communities associated with fauna and microorganisms, which can grow and develop along coastal areas, particularly in sheltered tidal regions, river estuaries, and lagoons with mud or sandy mud substrates, thereby contributing to a sustainable environmental balance. Mangrove ecosystems serve numerous functions, such as 1) providing breeding grounds for marine life, 2) offering products like firewood, charcoal materials, dyes, and syrup, 3) absorbing carbon dioxide, and 4) supporting ecotourism (Hiariey, 2009; Natsir et al., 2022; Pattimahu, 2013; Salim & Hartoni, 2014; Senoaji & Hidayat, 2014).

Mangroves represent an essential biological resource for Indonesia's coastal regions, existing across the Indonesian Archipelago, from Sumatra in the west to Papua in the east (Suwanto et al., 2021). These forests are primarily located in flat, low-lying coastal areas, which can positively impact the economy of coastal communities. However, converting mangrove forests for economic purposes often leads to habitat destruction. One of the adverse effects of mangrove destruction is that coastal communities living near mangrove forests become more vulnerable to ocean waves and the risk of sea snakes entering areas (Daulay et al., 2023).

Mangrove destruction can result from both natural and human factors (Nanlohy & Masniar, 2020). The degradation of mangrove areas has occurred globally and nationally due to rapid development, which has led to a significant reduction in critical ecosystem services, particularly in terms of climate change mitigation (Gevaña et al., 2018). Indonesia, with the world's largest mangrove cover, has also experienced alarming rates of deforestation and degradation, mainly due to mangrove conversion for aquaculture (Basyuni et al., 2018). Continuous degradation will result in the loss of a unique ecosystem that provides significant ecological, social, and economic benefits. Given the importance of mangroves in protecting and preserving coastal and marine ecosystems in Indonesia, the sustainable management of mangrove ecosystems is crucial (Majesty & Fadmastuti, 2018).

Community involvement in mangrove management, known as community-based mangrove management, is vital in minimizing human disturbances and achieving sustainable use of mangrove resources (Syahputra et al., 2018). Community-based management emphasizes the active participation of local communities in resource identification, development priority setting, and technology selection and adaptation for sustainable management practices (Fatonah et al., 2022). Community participation is critical to the success of mangrove management (Nugraheni et al., 2024).

Tinjul Village, located in Lingga Regency, Riau Islands Province, possesses relatively vast mangrove expanses. However, there has yet to be a comprehensive spatial utilization plan to optimize the conservation functions of this mangrove area. A proper spatial utilization plan is necessary to preserve the mangrove ecosystem and improve the local community's welfare. This planning must integrate ecological, economic, social, and cultural aspects to ensure the sustainable use of natural resources in the mangrove conservation area (Arifanti et al., 2022).

From an ecological perspective, spatial planning must ensure the integrity of the mangrove ecosystem (Kasman & Astuti, 2020). This can be achieved by designating core zones, which are strictly protected areas, buffer zones serving as transitional areas, and utilization zones where limited human activity is permitted. These zones aim to restrict and monitor human activities, minimizing negative environmental impacts. Spatial utilization planning should also consider the needs and aspirations of various stakeholders, including local governments, academics, environmental activists, and other interested parties in the mangrove areas. Community involvement in decision-making, particularly concerning village regulations related to spatial planning in mangrove areas, is essential (Rahmadi et al., 2023). A participatory planning process involving all stakeholders will result in more informed and widely accepted decisions (Sulistiyowati et al., 2021).

An effective and sustainable spatial utilization plan is crucial for conserving mangrove conservation areas. Such a plan should consider various factors, including natural resource conservation, local economic development, community participation, and climate change risk mitigation. This study aims to formulate a spatial utilization policy for the mangrove conservation area in Tinjul Village, integrating environmental preservation efforts and improving community welfare. The research outcomes are expected to serve as a

reference for local governments and communities in sustainably managing the mangrove conservation area. The entire formulation process was accompanied by academics to ensure that the resulting policies received academic justification and were relevant for implementation within the authority of Tinjul Village

METHOD

This research was conducted in Tinjul Village, West Singkep District, Lingga Regency, from January 2024 to April 2024. The research approach related to mangrove conservation is qualitative, using the Participatory Rural Appraisal (PRA) method. PRA is an approach that

accommodates the differing perspectives of researchers and communities while validating local knowledge (Chambers, 1994). The data collection techniques used include Focus Group Discussions (FGDs), participatory mapping, and documentation. In detail, this research consists of several series of FGDs and field surveys. These data collection methods are characteristic of qualitative research, which focuses on understanding social phenomena or behaviors, with society as the subject (Ratnaningtyas, 2023). The data analysis technique employed is descriptive analysis. Through this data collection series, it is expected to provide a comprehensive picture of community involvement in managing and protecting mangroves in Tinjul Village, Lingga Regency.

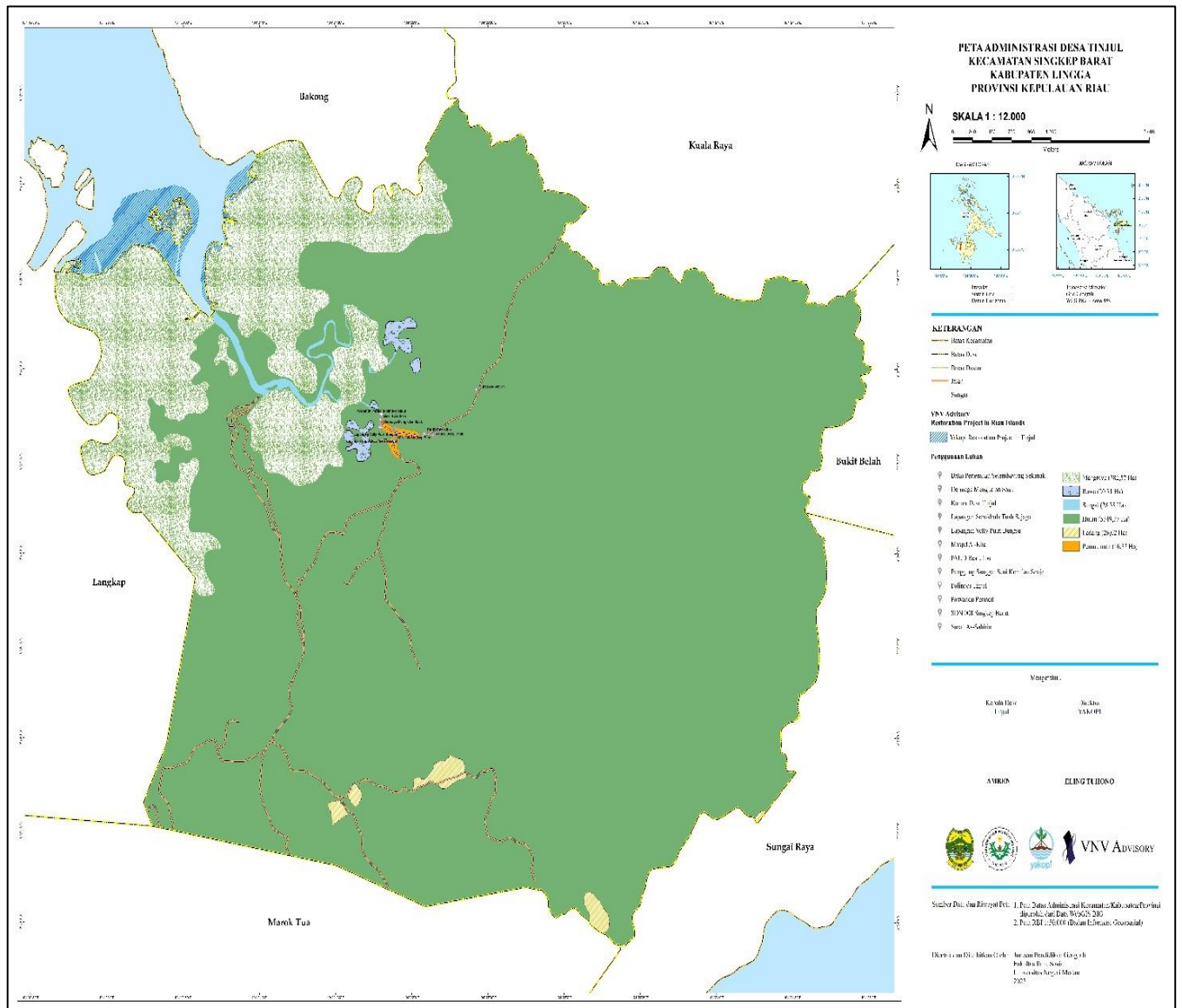


Figure 1. Tinjul Vilage Map

RESULTS AND DISCUSSION

This research is divided into several activities that complement each other, detailed as follows: (1) FGD I, aimed at socializing and aligning the community's understanding of mangrove zoning mapping and village regulations related to mangrove conservation, (2) Field

Survey, aimed at directly mapping the mangrove zoning, (3) FGD II, aimed at presenting the draft mangrove zoning map and draft village regulation on mangrove conservation, followed by formulating the village regulation with the community, and (4) FGD III, aimed at ratifying and handing over the mangrove zoning map and the village regulation on mangrove conservation. The research flow can be seen in Figure 2.

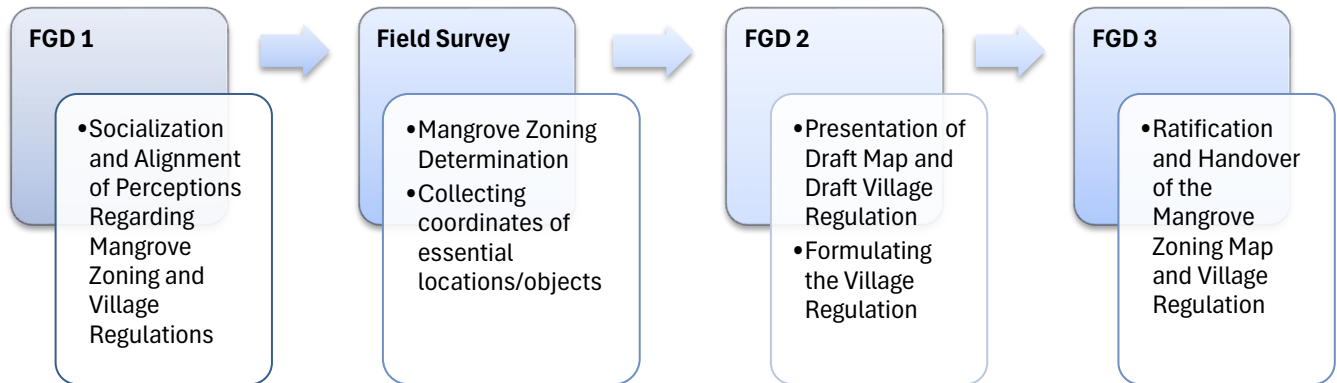


Figure 2. Workflow of Mangrove Protection Activities in Tinjul Village

First Focus Group Discussion (FGD I)

This FGD was held on Monday, January 29, 2024, at the Tinjul Village Office, West Singkep District. The main objective of FGD I was to socialize and align the community's understanding of the mangrove zoning map and village regulations related to mangrove conservation. The FGD was attended by the village apparatus, consisting of the village head, village secretary, village affairs head, Babinsa (village security), Bhabinkamtibmas (community security), the Village Consultative Body (BPD), Forest Farmer Groups, and representatives from the local community. During the FGD, participants were provided with a presentation on

the benefits of mangroves, mangrove degradation, and strategies for controlling mangrove exploitation. This introduction was concluded with an emphasis on the urgency of zoning the mangrove area and drafting village regulations on mangrove protection. According to Hilmi et al. (2023), a strong understanding of the ecological functions and benefits of mangrove ecosystems is a fundamental prerequisite for conservation efforts and sustainable management. While communities may be familiar with the existence of mangroves, academic support is essential to enhance understanding of the protection efforts comprehensively. Documentation from FGD I is shown in Figure 3.



Figure 3. First Focus Group Discussion

The presentation and discussion process proceeded smoothly, marked by participants exchanging views and experiences regarding the utilization and management of mangroves. Government representatives expressed openness and acceptance of the mangrove conservation efforts, as these activities aim to maintain a balance between development and environmental preservation. Academics reinforced the ecological benefits of mangroves from a scientific perspective, supporting the sustainability of Yakopi's practical program. Community representatives also voiced the interests and aspirations of the local population in the sustainable management of natural resources. The ongoing discussion enriched the understanding of all parties regarding the challenges and opportunities in achieving sustainable mangrove forest management, particularly in Tinjul Village.

Through open dialogue, participants reached a consensus on the importance of protecting mangrove forests as a natural defense against environmental threats such as coastal erosion, storms, and tidal waves. Mangrove forests play a vital role in maintaining soil fertility, providing habitats for wildlife, and serving as a livelihood source for coastal communities through the responsible use of biological resources (Karimah, 2017). Sustainable mangrove management can be achieved through comprehensive cooperation between village governments, academics, and local communities in drafting the village spatial plan, supported by a concrete legal framework in the form of village regulations. According to Rohiani (2021), with a proper spatial plan, infrastructure and settlement development can proceed while preserving mangrove forests and minimizing negative environmental impacts. Village regulations serve as the legal foundation and guidelines for the community, the village government, and other stakeholders in protecting, utilizing, and rehabilitating mangrove forests responsibly.

The outcome of the first Focus Group Discussion (FGD) was an agreement to establish the boundaries of

hamlets and villages as a basis for spatial planning, particularly for mangrove zoning, and to formulate village regulations. This agreement was supported by village officials, forest farmer groups, and all elements of the Tinjul Village community. The collective agreement also represents the active involvement of all Tinjul Village residents in protecting and preserving the mangroves from various threats and supporting the mangrove planting activities carried out by the Indonesian Coastal Conservation Foundation in Tinjul Village, West Singkep District, Lingga Regency.

Field Survey

The field survey was conducted on Tuesday, January 30, 2024, by the Yakopi team, experts, and village officials. The purpose of the survey was to collect the coordinates of the hamlet boundaries, village boundaries, and other important landmarks in Tinjul Village. The examination of several observation points aimed to determine the village's jurisdictional boundaries, serving as a reference for creating the mangrove zoning map and village regulations based on the territorial limits of the area. One of the mapping techniques was derived from the input of village officials regarding the territorial boundaries and significant locations, reflecting the local community's knowledge.

Key information gathered by the survey team during this activity included environmental conditions, the presence of community settlements, local economic activities, and potential threats to the sustainability of the mangrove forest. Each detail of this information served as a reference in developing the comprehensive village spatial plan. The local community possesses indigenous wisdom in managing and preserving the surrounding environment, including the mangrove forest. By combining spatial data and local community insights, the survey team was able to obtain a more complete and contextual understanding of Tinjul Village. Some photographs of the survey activities are shown in Figure 4.



Figure 4. Field Survey

The process of developing the village spatial plan involves delineating territorial boundaries (Ridwan, 2016). These boundaries include village limits, hamlet boundaries, rivers, bridges, public facilities, and other landmarks. Defining these boundaries is intended to help the community recognize the village limits, hamlet boundaries, strategic locations, and the positions of rivers and bridges, as well as public facilities. The accuracy of these boundary determinations serves as the foundation for establishing the mangrove conservation spatial plan.

The mangrove spatial arrangement in Tinjul Village is divided into three zones: the core zone, the buffer zone, and the utilization zone. The core zone is a protected area



that cannot be exploited, serving as the primary habitat for wildlife and maintaining the stability of the mangrove ecosystem. The core zone of Tinjul Village mangroves covers 82.24 hectares. The buffer zone functions as a protective area surrounding the core zone and plays a role in maintaining environmental quality and preventing coastal erosion. In this zone, human activities are limited to minimize negative impacts on the core zone. The buffer zone encompasses 75.98 hectares. The utilization zone is an area that can be utilized by the community for activities such as fish and shrimp farming and ecotourism while ensuring the preservation of the mangrove ecosystem. The utilization zone covers 22.79 hectares.

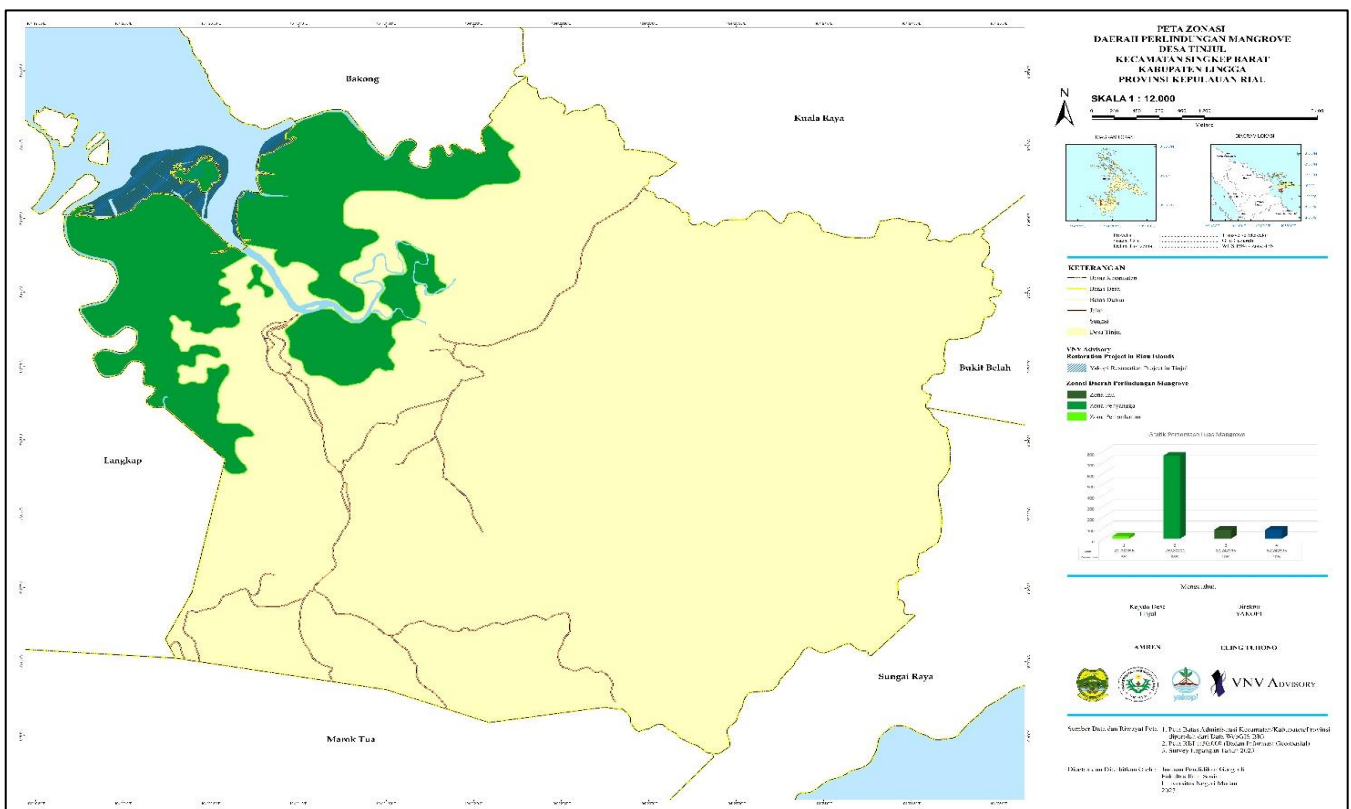


Figure 5. Mangrove Protection Zoning Map of Tinjul Village

Second Focus Group Discussion (FGD II)

FGD II was conducted on Thursday, February 1, 2024, at the Tinjul Village Office, West Singkep District. The participants included the Tinjul Village Head, Village Secretary, heads of village departments, representatives from Babinsa (Village Supervisory Non-Commissioned Officer) and Bhabinkamtibmas (Community Security and Public Order Officer), members of the Village Consultative Body (BPD), the head of the Mangrove Farmers Group, and local community representatives.

The field survey team presented the results in the form of a carefully drafted mangrove zoning map. They detailed the division of zones, including the core zone, buffer zone, and utilization zone, as well as the scientific studies supporting the spatial planning. Subsequently, the expert team presented the draft village regulation on mangrove conservation, which was prepared considering

various ecological, economic, social, and cultural aspects. This regulation will serve as the legal basis for the community and the village government in sustainably managing the mangrove forests.

FGD II discussed the condition of the mangrove forests and the utilization of these forests by the community for activities such as building houses, tourism facilities, and docks. The results from FGD II will be incorporated into the Tinjul Village Regulation concerning the Mangrove Protection Area, which includes: (1) a utilization area that can be used by the community for accessing mangroves along the settlement area and harvesting dead mangroves, (2) formulating penalties for community members who damage mangroves, and (3) collectively protecting the mangroves for sustainable interests. For further details, FGD II can be seen in Figure 6 below.



Figure 6. Second Focus Group Discussion

The outcomes of FGD II, involving Yakopi, village stakeholders, and community members, produced an administrative map of the village that serves as a reference for creating the mangrove zoning map and village regulation regarding mangrove protection. The administrative map was derived from the field survey results, including the village boundaries, hamlet boundaries, and several important landmarks in the village, serving as the basis for creating additional maps.

According to information from village officials, Tinjul Village is divided into two hamlets: Hamlet I and Hamlet II. The village borders are adjacent to several other villages, namely Langkap Village, Marok Tua Village, Sungai Raya Village, Bukit Belah Village, Kuala Raya Village, and Bakong Village.

The mangrove protection zoning map was developed based on the field survey results and

discussions from FGD II. The agreed-upon mangrove zoning map is divided into three sections: the core zone (planting), buffer zone, and utilization zone. In relation to the mangrove conditions, village officials noted the presence of docks and community-owned fields adjacent to existing mangroves, highlighting key points from FGD II. The Village Regulation on Mangrove Protection was formulated to safeguard the mangrove area from various threats and excessive utilization, ensuring that the mangroves can thrive and provide maximum benefits, particularly for human livelihoods (Pitaloka, 2023).

FGD II resulted in an agreement on the mangrove zoning and Tinjul Village Regulation No. 002 of 2024 regarding the Protection of the Mangrove Area. This regulation serves as a strong legal foundation for the community and the village government in their conservation efforts. The village regulation outlines

various aspects related to mangrove forest management, such as prohibitions that must be adhered to, mechanisms for monitoring and enforcement, and community involvement in conservation efforts. The regulation also specifies strict penalties for any violations, thereby providing a deterrent and preventing further damage to the mangrove ecosystem.

The mangrove zoning and village regulation represent the sustainable management of natural resources. The community can enhance their welfare through the wise use of mangrove resources, while future generations will also benefit from a thriving mangrove ecosystem. This agreement reflects a solid spirit of cooperation and participation among various stakeholders. The village government, community members, and academics have synergized to achieve the shared goal of maintaining the balance between development and environmental preservation in Tinjul Village.

Third Focus Group Discussion (FGD III)

After a lengthy process involving various stakeholders, the efforts to achieve sustainable mangrove forest management culminated in a final agreement during FGD III. This session was held on Tuesday, April 30, 2024, with the primary agenda of ratifying the mangrove zoning map and the village regulation on mangrove protection. The ratification was marked by the signing and handover of both documents

by the Village Head, Village Secretary, and members of the Village Consultative Body (BPD), witnessed by the community of Tinjul Village. Documentation of the FGD activities is visualized in Figure 6.

It is anticipated that the existence of the Village Regulation will increase community awareness regarding mangrove protection. The drafted Village Regulation does not conflict with existing legislation (Awaluddin et al., 2023). The objectives outlined in Tinjul Village Regulation No. 002 of 2024 regarding the Protection of the Mangrove Area, as stated in Article 2, include: (1) maintaining the sustainability of the mangrove area; (2) protecting the biota within the mangrove area from extinction threats; (3) safeguarding migratory bird species; (4) preventing land conversion; (5) preventing illegal logging; and (6) reducing global warming.

The regulation's goals aim to enhance the economic welfare of the community while preserving the mangrove area through monitoring and supervision, as well as strict enforcement against those who damage the mangroves. The preservation of mangrove areas requires support from the village government, encompassing development, utilization, and management of mangrove natural resources, along with training for village residents and rehabilitation efforts. Meanwhile, the monitoring of mangrove areas involves the participation of Babinsa, Bhabinkamtibmas, and the community of Tinjul Village. Provisions regarding penalties for mangrove damage are stipulated in Article 12 of the village regulation.



Figure 7. Third Focus Group Discussion



CONCLUSION

Based on the series of previous activities, several conclusions and outputs have been summarized as follows: The first Focus Group Discussion (FGD I)

focused on socialization and aligning perceptions regarding village spatial planning, particularly mangrove zoning and village regulations related to mangrove conservation. The outcome was an agreement to establish the boundaries of hamlets and villages,

determine mangrove zoning, and formulate the village regulation.

The field survey involved collecting coordinates for the outer boundaries, hamlet and village limits, and other important landmarks within the village, resulting in an administrative map that serves as a reference for creating the mangrove zoning map.

The second Focus Group Discussion (FGD II) concentrated on presenting the zoning map document and the draft village regulation concerning mangrove conservation. This formulation engaged village officials and community members, leading to a consensus on both the zoning map and the draft regulation regarding mangrove conservation.

The third Focus Group Discussion (FGD III) revolved around the signing and handover of Tinjul Village Regulation No. 002 of 2024, which addresses the protection of the mangrove area. This was accompanied by the official handover of the mangrove zoning map.

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Conflict of interest: The author has no competing interests to declare that are relevant to the content of this article.

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