



Enhancing the Capacity of Tourism Awareness Groups in Climate Change Adaptation and Mitigation at the Tanjung Batu Mangrove Ecotourism, Sekotong Tengah Village, West Lombok Regency

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Abstract: Mangrove Ecotourism in Tanjung Batu is one of the unique tourist attractions on Lombok Island, featuring a scenic 11-hectare mangrove area with dense vegetation coverage. The site is equipped with several facilities, including a 417-meter wooden bridge, several gazebos, selfie spots, a homestay, and a café. The ecotourism management is handled by the Tourism Awareness Group (Pokdarwis) of Sekotong Tengah Village. This destination is quite popular, with no fewer than 300 tourists visiting each month. However, this area is prone to climate-related disaster risks such as tidal floods, strong winds, high waves, floods, and droughts. Additionally, the ecotourism management has mainly focused on physical aspects and lacks sufficient managerial skills for implementing a sustainable governance system. The proposed solution is to strengthen the Pokdarwis management to improve ecotourism governance, optimizing its potential to deliver greater social, economic, and environmental value while contributing to climate change adaptation and mitigation efforts. The conclusion from the community service activity is that to address these challenges, the community is committed to preserving the mangrove ecosystem, preventing disturbances from both internal and external factors, and managing ecotourism in a way that benefits the surrounding community by reducing climate-related disaster risks. Priority activities include mangrove rehabilitation and enrichment, beach cleanup, monthly management meetings, semi-annual evaluations, and promptly developing plans to strengthen the fishermen's economy through involvement in marine tourism packages.

Keywords: Ecotourism; Mangrove; Climate risks; Tanjung Batu Lombok

Introduction

Ecotourism is a significant potential that can be relied upon as a strategy to achieve the forestry vision of sustainable forests and prosperous communities (Indonesian Ministry of Environment and Forestry 1999). As the potential of timber forest products declines, the development of non-timber forest products (NTFPs) becomes increasingly urgent (Suradireja et al. 2018). Good ecotourism management

has been proven to increase community income, as can be observed from the management of ecotourism in several locations on Lombok Island (Salmah et al., 2021).

Sekotong Tengah Village has a tourist attraction known as the Mangrove Ecotourism, located in Tanjung Batu Hamlet (Markum, 2023). This mangrove ecotourism offers stunning landscapes, covering an area of approximately 30 hectares with well-preserved mangrove coverage (Webliana et al., 2022). The location

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is equipped with several facilities, including a wooden bridge of approximately 417 meters, gazebos, toilets for men and women, a canteen, and selfie spots. The tourist attraction is managed by the Tourism Awareness Group (Pokdarwis) in collaboration with the Village-Owned Enterprises (BUMDes) of Sekotong Tengah Village

Mangrove ecotourism has been sporadically visited by tourists since 2000. Due to the potential it holds, Sekotong Tengah Village is included as one of the tourist villages in West Lombok Regency. The promoted tourist activities include beach scenery and trekking routes into the mangrove. Pokdarwis was formed to accommodate the management of ecotourism because, while the area has potential, it remains underexplored. Moreover, learning from other regions, good mangrove ecotourism management can provide economic and environmental benefits and contribute to climate change mitigation (Farista & Virgota, 2021).

The mangrove ecotourism site in Tanjung Batu, Sekotong Tengah Village, can be reached by land from Mataram in approximately 45 minutes, with an average speed of 50 km/h. The road access is good, with a paved road and clear directional signs. This ecotourism area has been improved since 2015, with infrastructure being developed since 2018. Support for these facilities was obtained from the Ministry of Villages, Disadvantaged Regions, and Transmigration, along with village fund allocations. In 2022, the village fund allocations amounted to IDR 96,953,700.

Interviews with Pokdarwis Tanjung Batu indicated that tourist visits are approximately 300–500 people per month, mostly local tourists and youth groups. Visits are generally busier on Saturdays and Sundays. According to the head of Tanjung Batu Hamlet, the number of tourists could be further increased since the location is already quite well-known.

Despite the supporting factors and potential mentioned above, several issues need to be addressed to achieve better management. These problems include: (1) the mangrove management system has not been optimized, particularly in orienting toward disaster mitigation and climate change adaptation, such as coastal flooding, strong winds, and beach erosion, and (2) management is still focused on physical aspects, without sufficient managerial capacity in terms of institutional systems, planning, collaboration, and market promotion.

The goal of community service activities is to strengthen Pokdarwis administrators to optimize the potential of ecotourism, making it more valuable

socially, economically, and environmentally, as an effort to adapt to and mitigate climate disaster risks.

Method

The activities employ a participatory approach, involving the active participation of the Pokdarwis management, who are the primary beneficiaries, in the processes organized by the community service team. The service activities utilize field observation, counseling, and workshop techniques. Field observation is necessary to directly identify group practices in institutional and business management. Counseling is conducted in a classroom setting, presenting materials relevant to the activity's urgency, and delivered by a team of experts according to their fields of expertise. The counseling sessions are directed toward the beneficiaries, including the Pokdarwis management and small business owners around the tourism site.

The materials covered in the community service activities include: (1) the principles of sustainable and climate-adaptive ecotourism management, (2) the role of the community and institutions in climate change adaptation and mitigation efforts, and (3) planning and strategies to enhance community resilience to the impacts of climate change.

Participants involved include the Pokdarwis management, the local community around the tourist site, village government staff, students, and the community service team from the University of Mataram (Unram). A total of 25 participants will join the activities. The discussion process will be facilitated by a member of the Unram team. Speakers for the event will include members of the Unram community service team and the head of Pokdarwis.

Results and Discussion

Overview of the mangrove ecotourism site

The mangrove ecotourism site is located in Tanjung Batu Hamlet, Sekotong Tengah Village, Sekotong District, West Lombok Regency. Access to this tourist destination is relatively easy, as it is situated along a provincial road with excellent road quality. The travel time from Mataram City to the site is approximately one hour, at an average speed of 60 km/h, and around 30 minutes from Gerung, the capital of West Lombok Regency. Due to its location along the main road and its visible and prominent presence, the site is appealing to tourists. The number of daily visitors ranges from 50 to 100 people.



Figure 1. Location of the mangrove ecosystem

The mangrove area managed by Pokdarwis covers approximately 11 hectares. This area consists of both naturally grown mangroves and those rehabilitated in 2004. The mangrove species are predominantly *Rhizophora* sp, which makes up about 80% of the population, with smaller portions of *Avicennia* sp and *Bruguiera* sp. The condition of the mangroves remains healthy, with dense vegetation cover. This robust mangrove ecosystem contributes to the creation of a favorable microclimate in the Tanjung Batu ecotourism area (Permata Sari et al., 2022).



Figure 2. Mangrove condition and 417 meters long tracking path

Research findings indicate that the mangroves in the Sekotong area are predominantly composed of *Rhizophora* sp, with good vegetation cover and biomass (Diniyatushoaliha et al., 2023).

Overview of POKDARWIS Sekotong Tengah

The ecotourism in Tanjung Batu is managed by POKDARWIS (Tourism Awareness Group), which was established by the village in 2019. The management structure consists of 15 members, including a Chairperson, Vice Chairperson, Treasurer, Secretary, and additional divisions responsible for security and equipment. This relatively lean organization was formed to meet the needs and ensure budget efficiency. The roles of Pokdarwis include planning, management, security, and supervision.

In terms of financial management, revenue from the ecotourism business is distributed proportionally for ecotourism development, operational costs, and village allocation. The proportions are 35% for business development, 35% for operational costs, and 30% for village income. Based on the 2023 business results, the total income was IDR 43 million annually. From this, the amount allocated for tourism development is IDR 15 million (35% of 43 million), for operational management (incentives and staff salaries) IDR 15 million, and the remaining IDR 13 million goes to the village's income.

Pokdarwis generates income from entry tickets and parking fees. The entrance fee is IDR 5,000 per visitor, which includes motorcycle parking. However, those arriving by car are charged an additional parking fee of IDR 5,000 per vehicle. Funding for investments has come from the village fund, amounting to IDR 150 million, and support from PLN and the Ministry of Villages,

Development of Disadvantaged Regions, and Transmigration.

Availability of ecotourism facilities

The facilities provided for tourists are quite comprehensive. These include amenities built both through self-funding and external support. The facilities funded through self-generated resources come from the

35% of the revenue allocated for such purposes. These facilities include low-cost amenities such as photo spots and trash bins. For larger investments, such as the mangrove tracking bridge, bungalows, and gazebos, funding has been sourced from the Ministry of Villages, the Village Government, and PLN. Here is an overview of the infrastructure at the ecotourism site, reflecting various conditions

Table 1. Infrastructure Completeness at the Mangrove Ecotourism Site

Infrastructure name	Quantity	Condition	Description
Wooden Mangrove Tracking Bridge	1	Good	A wooden bridge, 417 meters long
Bungalow Homestay	1	Good	Elevated wooden house for tourist accommodation
Cafe	1	Fairly good	Located centrally, approximately 4 x 6 meters, offering food and beverages
Toilet	1	Fairly good	Made of zinc and lightweight steel
Berugak	3	Good	Wooden structures, 2 x 2 meters in size
Photo Spots	5	Good	Various designs, made of wood
Trash Bins	3	Good	Made of plastic, portable
Information Boards	2	Fairly good	Located at the entrance, near the ticket counter for information
Ticket Counter	1	Fairly good	Made of zinc, 1 x 1 meter in size, located at the front



Figure 3 Supporting Facilities (Gazebos, Homestay)

A distinctive feature of the tourist site is the mangrove tracking bridge, which extends 417 meters into the mangrove area and protrudes into the sea. Constructed from wooden planks supported by wooden pillars, the bridge has a width of 1.5 meters, providing ample space for tourists to pass each other comfortably while walking along the track.

Vulnerability to Climate Disasters and Impacts

The coastal area in Tanjung Batu Hamlet is susceptible to several climate-related hazards. Common disasters include tidal flooding, flooding, strong winds, and drought (Markum, 2023; Nabila Afifah Azuga, 2021) (Table 2).

Table 2. Completeness of Mangrove Ecotourism Infrastructure

Infrastructure Name	Quantity	Condition	Information
Wooden Mangrove Tracking Bridge	1	Good	A wooden bridge, 417 meters long
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Climate-related disasters pose significant challenges for the community's livelihoods. The majority

of residents in Tanjung Batu Hamlet are fishermen, who also work as day laborers and engage in gold panning through small-scale mining activities.

Strengthening the Capacity of Pokdarwis Management

The community service activities are designed to enhance the knowledge and skills of the management team in two key areas: adaptation and mitigation strategies to reduce climate-related risks faced by the Tanjung Batu community, and specifically for the Mangrove Ecotourism Area. The training will cover the following topics: (1) principles of sustainable and climate-adaptive ecotourism management; (2) the role of mangrove preservation and rehabilitation; and (3) implementation of mangrove reforestation practices.



Figure 4. Capacity building

Capacity building for the implementation of sustainable mangrove ecotourism management principles in addressing the impacts of climate change

In the effort to implement sustainable mangrove ecotourism management principles to mitigate the impacts of climate change, several guidelines are presented that must be followed, as described below.

Empowerment and involvement of local communities, through (1) Environmental education and awareness about the importance of mangroves in climate change mitigation and coastal protection and (2) Mangrove-

based business development: encouraging communities to develop mangrove-based enterprises, such as environmentally friendly mangrove-derived products (mangrove coffee and mangrove fruit flour).

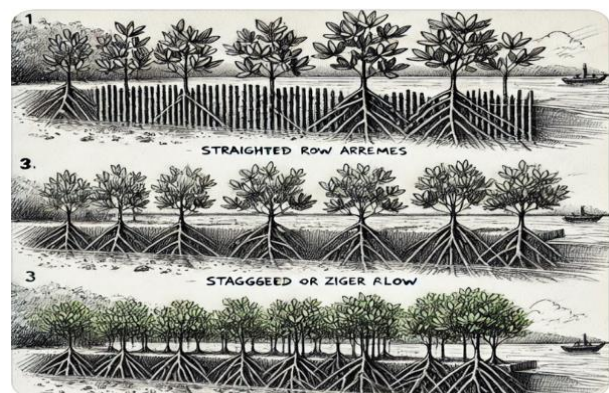
Tourist management and education, by implementing (1) Conservation-based tourism guidelines: developing guides and educational programs focused on mangrove conservation, such as educational tours that explain the role of mangroves in climate change mitigation. (2) Knowledge-based tourism: designing tourist attractions that highlight local wisdom in the management and utilization of mangrove ecosystems and (3) Creating a visitor code of ethics: implementing rules for visitors to prevent damage to mangrove habitats, such as prohibitions on littering or picking plants.

Capacity building for the conservation and rehabilitation of mangrove ecosystems, through (1) Mangrove rehabilitation programs involve implementing planting and restoration initiatives for damaged or degraded mangrove areas, with the active participation of local communities and tourists. (2) Control of mangrove resource utilization: establishing rules for the wise use of mangrove resources, such as prohibitions on illegal logging and destructive fishing practices and (3) Monitoring mangrove ecosystem conditions through regular assessments of ecosystem health, including water quality, vegetation density, and biodiversity.

Capacity building for the implementation of mangrove planting rehabilitation practices, in mangrove ecotourism locations, there are areas with open conditions and sparse coverage. These conditions need to be addressed through replanting initiatives using rehabilitation and enrichment patterns for mangroves. In general, there are three mangrove planting patterns: (1) Straight Row: Suitable for structured areas. (2) Zigzag (Staggered/Zigzag): Optimizes natural water flow. (3) Cluster Planting: Effective for areas affected by wave impact



(A)



(B)

Figure 5. Mangrove plantation pattern with straight line (A) and zigzag (B)

Capacity building for the institutional governance of Community-Based Tourism Groups (POKDARWIS)

The institutional structure of the Tanjung Batu Pokdarwis, in terms of its organizational structure and personnel, is relatively lean, aligning with the task requirements and budgetary capacity. In the institutional governance of POKDARWIS, further strengthening is needed in the area of effective planning. Therefore, in community service activities, training is provided on techniques for planning and managing mangrove ecotourism. Here is the process and results of developing a mangrove ecotourism management plan:

Conducting a situation and condition analysis: based on discussions, the current conditions requiring further planning have been identified as follows: (1) ongoing waste influx from other areas into the tourism site, (2) limited income sources for fishermen due to frequent cases of tidal flooding, storms, and high waves, (3) substantial funding needed for maintaining ecotourism infrastructure, particularly the trekking paths, (4) lack of promotional media for visualizing information to tourists, such as information displays, leaflets, and signs for mangrove species, and (5) absence of guidelines or rules for visitors.

Determining the priority scale of activities, based on the situation analysis, a priority scale for activities was established. The prioritization considers the level of difficulty and funding requirements. Accordingly, the management has determined the following priority activities: (1) Regularly conducting waste cleanup at the ecotourism site, (2) preparing informational media such as information displays and leaflets, (3) developing simple rules for visitors, (4) repairing and renovating the trekking infrastructure that needs immediate attention, and (5) developing steps to involve fishermen in ecotourism activities to mitigate the economic risks to households due to frequent disruptions in fishing activities.

Building partnerships and collaborations with stakeholders, Given the limited revenue from ticket sales and parking, coupled with the high maintenance costs for infrastructure, the management will take steps to build networks with various stakeholders. Potential partners identified for supporting tourism activities include government agencies (such as the Tourism Office and the Community and Village Empowerment Office), private sector entities (such as PLN, CSR initiatives from Bank BNI, Bank Mandiri, and Bank NTB), and PT (Universitas Mataram) to assist in creating promotional videos for uploading to YouTube, TikTok, and Instagram.

Conducting monitoring and evaluation, It has been agreed that, to maintain the quality of ecotourism management, the management team will hold meetings at least once every six months for monitoring and evaluation (M&E). The M&E process will involve village government representatives and, if necessary, will invite academics to provide objective insights.

Discussion

During the discussion process, several questions were raised by participants regarding mangrove rehabilitation techniques and tourism management. Some of the questions and the corresponding responses from the team are as follows:

In mangrove rehabilitation efforts, why does the species *Rhizophora sp.* experience a high mortality rate, up to 50%? What are the causes? Several causes of mangrove seedling mortality include: (1) poor seedling quality leading to unhealthy growth, (2) improper site selection, such as areas frequently exposed to large waves or prolonged inundation, which can uproot seedlings or disrupt their respiration processes, (3) errors in planting techniques, such as incorrect planting depth, spacing that is too close or too far apart, or planting during inappropriate times (e.g., during high wave seasons), which can result in seedling failure, (4) extreme weather conditions, and (5) disturbances from pests and human activities, such as frequent boat traffic.



Figure 6. Discussion Process with Participants

How to increase the number of tourist visit? Several ways to increase tourist visits include: (1) Providing more appealing facilities, such as clean restrooms, photo spots, additional gazebos, and informational signs, (2) Incorporating local cultural attractions on specific days, (3) Enhancing market promotion through social media and print media, and (4) Maintaining a clean and comfortable environment.

Are there ways to process mangrove fruits into sellable products? There are several opportunities for utilizing mangrove fruits: (1) mangrove flour for baking ingredients, (2) mangrove syrup and mangrove coffee, (3) mangrove chips and snacks. In addition to food

products, mangrove fruits are also used in herbal remedies, soap, and beauty products.

Conclusion

The conclusions drawn from the community service process at the Tanjung Batu Mangrove Ecotourism site in Sekotong Tengah Village are that the tourist attraction has positive potential, evidenced by the availability of access roads, infrastructure, and the appeal of the mangrove habitat. However, it faces challenges related to climate-related disasters, including tidal flooding, strong winds, flooding, and drought. To address these conditions, it is essential to enhance the community's knowledge and skills for adaptation and mitigation through measures such as: mangrove rehabilitation and enrichment, educating the community and visitors about climate change, and strengthening the institutional capacity of the Community-Based Tourism Groups (Pokdarwis). As part of efforts to enhance adaptation and mitigation, it is recommended that further guidance be provided to the community to diversify their businesses by processing mangrove fruits into food products, medicinal items, and other uses.

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References

- Diniyatushoaliha, A., Idrus, A., & Santoso, D. (2023). Carbon Content Potential of Mangrove Species in Gili Sulat, East Lombok. *Jurnal Biologi Tropis*, 23, 392–400. <https://doi.org/10.29303/jbt.v23i3.5275>
- Farista, B., & Virgota, A. (2021). Serapan Karbon Hutan Mangrove di Bagek Kembar Kecamatan Sekotong Kabupaten Lombok Barat. *Bioscientist : Jurnal Ilmiah Biologi*, 9(1), 170. <https://doi.org/10.33394/bjib.v9i1.3777>
- Markum. (2023). *Report on Social Economic Study and Vulnerability to Climate Change Disasters in the Coastal Areas in Lombok*.
- Nabila Afifah Azuga. (2021). Kajian Kerentanan Kawasan Pesisir Terhadap Bencana Kenaikan Muka Air Laut (Sea Level Rise) Di Indonesia. *Jurnal Riset Kelautan Tropis (Journal Of Tropical Marine Research) (J-Tropimar)*, 3(2), 65–76. <https://doi.org/10.30649/jrkt.v3i2.41>
- Permata Sari, D., Syaputra, M., & Webliana B, K. (2022). Biomassa dan Serapan Karbon Hutan Mangrove Tanjung Batu, Desa Sekotong Tengah, Kabupaten Lombok Barat. *Journal of Forest Science Avicennia*, 5(2), 95–103. <https://doi.org/10.22219/avicennia.v5i1.20569>
- Salmah, E., Yuniarti, T., Astuti, E., Agustiani, E., & Fatimah, S. (2021). Model Partisipasi Masyarakat Lokal Dalam Ekowisata Mangrove di Desa Lembar Selatan, Kecamatan Lembar, Kabupaten Lombok Barat. *Journal of Economics and Business*, 7, 223–238. <https://doi.org/10.29303/ekonobis.v7i2.78>
- Webliana, K., Andi Chairil Ichsan, Irwan Mahakam Lesmono Aji, Maiser Syaputra, Diah Permata Sari, & Wihelmus Jemarut. (2022). Perencanaan Kawasan Wisata Edukasi Mangrove Tanjung Batu, Sekotong Tengah. *Jurnal Pengabdian Magister Pendidikan IPA*, 5(1 SE-Artikel), 30–34. <https://doi.org/10.29303/jpmppi.v5i1.1150>