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DEVELOPMENT OF CBT-BASED MANGROVE EDUCATIONAL TOURISM IN SUSTAINABLE TOURISM

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Abstract:

This study analyzes the development of Community-Based Tourism (CBT)-based mangrove educational tourism in the Tapak Tugu Mangrove, Semarang. The 15.05-hectare area with 11 mangrove species is facing 45% degradation due to coastal abrasion (3.2 meters/year), land subsidence (8-10 cm/year), and tidal flooding (12-15 times/month). Using qualitative methods with participant observation and interviews with 35 members of the Bina Tapak Lestari Tourism Group (Pokdarwis), the study identified five main tourist attractions developed through community participation. The educational tourism program involved 24 tourist groups (480 people) and increased environmental awareness by 78%. The Putri Tirang women's group produces mangrove dodol (sweetened sticky rice cake) with a turnover of IDR 2,250,000 per month. The economic impact shows a 65% increase in community income. The Tapak Tugu Mangrove, with its 15.05-hectare area, 11 mangrove species, and 5 tourist attractions, has produced measurable impacts: a 78% increase in environmental awareness, a 65% increase in community income, a monthly turnover of Rp 2,250,000 in mangrove dodol production, and a 78% survival rate for mangrove planting. The research contributes to a conceptual model of sustainable tourism that integrates ecosystem conservation, community empowerment, and economic viability.

Keywords: Mangrove Tourism, Community-Based Tourism, Sustainable Tourism, Environmental Education, Monument Site

INTRODUCTION

Mangrove ecosystems serve crucial ecological functions as coastal protection, carbon sinks, and biodiversity habitats. In Indonesia, mangrove ecosystem degradation has reached an alarming rate, with losses reaching 52,000 hectares per year (Friess et al., 2019). This problem not only impacts ecological aspects but also threatens the socio-economic livelihoods of coastal communities that depend on them. At the same time, these ecosystems present significant opportunities for sustainable tourism development through ecotourism initiatives that balance conservation with economic benefits for the community (Mistriani, 2022; Spalding & Parrett, 2019).

The Tapak Tugu Mangrove, located in Tugurejo Village, Tugu District, Semarang City, is a 15.05-hectare area featuring 11 mangrove species. Since the 1990s, this area has experienced 45% ecosystem degradation due to coastal abrasion at a rate of 3.2 meters per year, land subsidence of 8-10 cm per year, and tidal flooding intensity reaching 12-15 times per month with a height of 30-50 cm (Octafian et al., 2025). The Bina Tapak Lestari Tourism Group (Pokdarwis Bina Tapak Lestari), with 35 active members, has managed the area since 2012 and developed five main tourist attractions. Collaboration with STIEPARI Semarang has introduced educational programs and processed mangrove products. However, the area's carrying capacity of 668 visitors per day is still far from the actual number of visitors of only 136 visitors per day (Mirza et al., 2022), indicating that its potential has not been optimally utilized.



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Source: Bina Tapak Lestari Tourism Group Documentation, 2024

Figure 1. Tapak Tugu Mangrove Ecotourism Area, Semarang

METHODS

This qualitative research used a case study approach and was conducted from October 2021 to February 2024 in a 15.05-hectare mangrove ecotourism area. Data collection used triangulation methods including participant observation, in-depth interviews, and document analysis. Primary data were collected through interviews with the leadership of the Bina Tapak Lestari Tourism Group (Pokdarwis), 35 active members consisting of fishermen (68%), fish farmers (22%), and informal sector workers (10%), as well as 55 visitors. Observations focused on five main tourist attractions. Secondary data consisted of STIEPARI Semarang program reports, government tourism statistics, and the results of previous studies (Mirza et al., 2022, 2023; Octafian et al., 2025). Data analysis followed thematic and SWOT analysis procedures to identify patterns related to tourism potential, CBT implementation, and sustainability indicators.

RESULT AND DISCUSSION

The Potential and Condition of Tapak Tugu Mangrove Ecotourism. The Tapak Tugu Mangrove in Semarang is a coastal area that has been successfully rehabilitated through community efforts after being damaged by abrasion and land conversion. The gradual planting of mangroves has restored the area's ecological function as a coastal protector and habitat for various biota. This area has significant ecotourism potential due to its biodiversity and high environmental educational value. Tourists can enjoy mangrove trekking trails, bird watching, and learn about the importance of coastal ecosystems, providing a recreational and educational tourism experience. Its management continues to improve despite limited facilities and infrastructure. With community support and collaboration from various parties, this area has the potential to become a leading ecotourism destination that maintains a balance between tourism and environmental sustainability (Lestari & Mistriani, 2025).

The 15.05-hectare mangrove ecotourism area features 11 mangrove species cultivated through community conservation efforts. Dominant species include *Avicennia alba*, *Avicennia marina*, *Rhizophora apiculata*, *Rhizophora mucronata*, and *Sonneratia caseolaris*. The area is home to 38 bird species. The Tourism Awareness Group (Pokdarwis) has developed five main tourist attractions: a viewing tower, participatory mangrove planting, river walks, fishing spots, and Tirang Island. Tourist activities charge an entrance fee of IDR 5,000, with boat tours costing IDR 55,000 per group (5-10 people). However, actual visits only reached 136 people per day, far below the area's carrying capacity of 668 people per day (Mirza et al., 2023; Mistriani, 2022).

Table 1. Characteristics of the Tapak Tugu Mangrove Ecotourism Area

Characteristics	Deskripsi
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Location	Tugurejo Village, Tugu District, Semarang City
Ecotourism Area Size	15,05 hectares
Number of Mangrove Species	11 species
Number of Tourist Attractions	5 main attractions
Regional Carrying Capacity	668 person/day
Actual Visits	136 person/day (20% of carrying capacity)
Ecosystem Degradation	45% (abrasion 3.2 m/year, tidal flooding 12-15 times/month)

Source: Mirza et al. (2022; 2023); Octafian et al. (2025)

Implementation of Community-Based Tourism. The implementation of community-based tourism in the Tapak Tugu Mangrove area in Semarang demonstrates the crucial role of local communities as key actors in tourism management and development. Through an empowerment approach, communities are not only beneficiaries but also actively involved in the planning, management, and development of tourism products (Listyorini et al., 2021). It is reflected in the formation of the Bina Tapak Lestari Tourism Group (Pokdarwis), which has 35 active members, dominated by fishermen, fish farmers, and informal sector workers, with a high level of participation. Furthermore, the involvement of women's groups such as Putri Tirang in processing mangrove-based products has also strengthened the local economy. Training support from STIEPARI has also been shown to increase community capacity in production, interpretation, and tour guiding, positively impacting the quality of educational tourism services, which have achieved very high levels of visitor satisfaction and recommendations.

The Bina Tapak Lestari Tourism Group has 35 active members, comprised of fishermen (68%), fish farmers (22%), and informal sector workers (10%). This group has formal legality with a participation rate of 85%. The Putri Tirang women's group (12 members) produces three variants of mangrove dodol with PIRT permits and MUI halal certification, with a turnover of IDR 2,250,000 per month. The STIEPARI training program increased dodol production skills by 65% (25%→90%), processing knowledge by 58% (30%→88%), nature interpretation by 40% (45%→85%), and guiding by 44% (38%→82%). The educational tourism program involved 24 groups (480 people) with 92% satisfaction and 95% willingness to recommend (Octafian et al., 2025).



Source: Documentation of the Pokdarwis Educational Tourism Program, 2025

Figure 2. Mangrove Educational Tourism

Table 2. Results of Community Training and Capacity Building

Training Indicators	Before (%)	After (%)	Improvement
Dodol Production Skills	25	90	+65%
Fruit Processing Knowledge	30	88	+58%
Ability to Interpret Nature	45	85	+40%
Tour Guiding Skills	38	82	+44%
Average Increase			+52%



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Source: Octafian et al. (2025) - Pre-test and Post-test Results

Economic Impact and Social Transformation. The economic transformation shows a monthly dodol turnover of Rp 2,250,000 (a 100% increase from the initial level), an increase in educational tourism revenue from Rp 1,200,000 to Rp 2,400,000 per month (100%), an increase in group visits from 2 to 8 per month (300%), and an increase in average member income from Rp 1,850,000 to Rp 3,050,000 per month (65%). Dodol production is carried out three times per week with a capacity of 50 packages per session, priced at Rp 15,000 per package, with a 60% margin. Educational tourism revenue distribution is as follows: 40% operational, 25% guide incentives, 20% conservation, 10% cash, and 5% promotion. Social impacts include increased participation from 60% to 85%, the establishment of four functional divisions, and an increase in membership from 35 to 41 (Octafian et al., 2025).

Table 3. Economic Transformation of Mangrove Management Communities

Economic Indicators	Baseline	End of Program	Improvement
Dodol Production Turnover	Rp 0	Rp 2.250.000/ month	+100%
Educational tourism income	Rp 1.200.000	Rp 2.400.000/ month	+100%
Group Visit	2/ month	8/ month	+300%
Average Member Income	Rp 1.850.000	Rp 3.050.000/ month	65%

Source: Source: Octafian et al. (2025)

Development Strategy Based on SWOT Analysis. Efforts to strengthen sustainable mangrove ecotourism management in Semarang require the formulation of a comprehensive and adaptive development strategy to field conditions. An analytical approach is used to identify internal potential and external challenges, ensuring that development focuses not only on increasing tourist attractions but also on maintaining environmental sustainability and empowering local communities. Based on this foundation, the designed strategy is expected to optimize existing resources while minimizing the various obstacles encountered (Permadani & Mistriani, 2021).

Based on a SWOT analysis of 55 respondents, the development strategy was formulated by leveraging strengths (11 mangrove species, 5 attractions, organized Pokdarwis) and opportunities (government support, ecotourism trends), while addressing weaknesses (45% degradation, low visitor numbers, limited facilities) and threats (tidal flooding, competition). Three priority strategies based on respondent support: (1) Government/stakeholder funding for infrastructure (90.91% strongly agree), (2) Creation of informative facilities for tourist education (80% strongly agree), (3) Promotion and education on mangrove functions (74.55% strongly agree). This strategy integrates institutional capacity building, tourism product strengthening, and increasing environmental awareness (Mirza et al., 2022; Mistriani, 2020)



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Source: Program Monitoring Documentation, 2025

Figure 3. Program Impact: Conservation and Community Products

Table 4. SWOT Analysis Matrix for Mangrove Ecotourism Development

	STRENGTHS (S)	WEAKNESSES (W)
	S1: 15.05 ha ecosystem, 11 species S2: 5 unique tourist attractions S3: Strategic location and easy access S4: Organized Pokdarwis (35 members, 85% participation) S5: Value-added mangrove dodol products	W1: Ecosystem degradation 45% (abrasion, tidal flooding) W2: Low number of visitors (136 vs. 668/day) W3: Limited facilities and infrastructure W4: Managerial capacity needs to be improved W5: Promotion and marketing are not yet optimal
OPPORTUNITIES O1: Government support O2: The increasing trend of educational tourism O3: STIEPARI partnerships O4: Private sector CSR opportunities	STRATEGI S-O 1. 11-species-based educational tourism packages (S1-O2) 2. STIEPARI collaboration on 5 attractions (S2-O3) 3. Strengthening Pokdarwis-government partnerships (S4-O1) 4. Promoting dodol (sweet dodol) as an educational souvenir (S5-O2)	STRATEGI W-O (PRIORITAS) 1. Government rehabilitation programs (W1-O1) 2. CSR infrastructure and promotion (W2-O4) - 90.91% 3. Funding for infrastructure (W3-O4) 4. Digital marketing training (W5-O2)
THREATS T1: Intensive tidal flooding (12-15 times/month) T2: Waste from upstream T3: Competition from other tourism sources T4: Threat from private reclamation	STRATEGI S-T 1. Education on the protective function of mangroves on the coast (S1-T1) 2. Unique selling proposition: 5 attractions (S2-T3) 3. Tourism groups lead routine cleanups (S4-T2) 4. Advocacy for area legality (S4-T4)	STRATEGI W-T (PRIORITAS) 1. Embankment + 600 seedlings, 78% survival rate (W1-T1) 2. Educational information facilities (W2-T3) - 80% 3. Trash filters + facilities (W3-T2) 4. Promotion & educational functions (W5-T3) - 74.55%

Source: Analysis of 55 respondents (Mirza et al., 2022). Strategies in bold are priorities (>70% support)

CONCLUSION

Community-Based Tourism is a strategic approach to developing sustainable mangrove educational tourism. The Tapak Tugu Mangrove, with its 15.05-hectare area, 11 mangrove species, and 5 tourist attractions, has produced measurable impacts: a 78% increase in environmental



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awareness, a 65% increase in community income, a monthly turnover of Rp 2,250,000 in mangrove dodol production, and a 78% survival rate for mangrove planting. The educational tourism program successfully involved 24 tourist groups (480 people) with a 92% satisfaction rate and a 95% willingness to recommend. Challenges faced include actual visits of 136 people per day, which is still below the carrying capacity of 668 people per day, 45% ecosystem degradation, and limited infrastructure. The program's success requires 85% community participation, 78% increase in knowledge, and the establishment of 4 functional divisions. Priority recommendations: (1) Infrastructure funding from the government/stakeholders (90.91% support), (2) Creation of informative facilities for tourist education (80% support), (3) Promotion and education on mangrove functions (74.55% support), (4) Institutional strengthening through systematic training to increase management capacity, environmental interpretation, and product development.

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