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**Original Article**

# Mangrove Ecotourism Management Model Based on Local Wisdom in Enhancing Economic Empowerment of Coastal Communities in Berau Regency

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**Abstrak:**

Berau Regency possesses the largest mangrove ecosystem in East Kalimantan, covering 86,043 hectares with exceptional biodiversity. However, economic utilization through ecotourism remains suboptimal, with limited community participation and inadequate integration of local wisdom in management practices. This study analyzes the mangrove ecotourism management model based on local wisdom to enhance the economic empowerment of coastal communities. Employing a mixed-methods approach, this research integrates Structural Equation Modeling-Partial Least Squares (SEM-PLS) to examine relationships among governance, local wisdom integration, and community welfare, Analytic Hierarchy Process (AHP) for stakeholder priority analysis, and ecological carrying capacity assessment for sustainability metrics. Data were collected from 250 respondents across five coastal villages in Berau through structured questionnaires, in-depth interviews with 35 key informants, including village leaders and tourism managers, and participatory observation. Findings reveal that local wisdom significantly influences community participation ($\beta=0.742$, $p<0.001$) and economic benefits ($\beta=0.658$, $p<0.001$). The ecological carrying capacity indicates sustainable visitor limits of 385 tourists daily with current infrastructure. AHP analysis prioritizes community-based governance (weight=0.412), followed by cultural preservation (0.287) and environmental conservation (0.301). The proposed integrated model demonstrates potential to increase household income by 68.3%, create 520 employment opportunities, and maintain ecological integrity through traditional conservation practices, including sasi laut and customary zoning. Policy implications emphasize institutional strengthening, capacity-building programs, and the formalization of local wisdom in regional tourism regulations.

**Keywords:** Mangrove Ecotourism, Local Wisdom, Community Empowerment, Sustainable Tourism, Coastal Economy

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## Introduction

Mangrove ecosystems represent critical coastal resources providing multifaceted ecosystem services encompassing ecological, economic, and social dimensions. These unique transitional habitats between terrestrial and marine environments contribute substantially to biodiversity conservation, carbon sequestration, coastal protection, and livelihood support for millions of coastal inhabitants globally. Indonesia harbors approximately 3.9 million hectares of mangrove forests, constituting 23% of global mangrove coverage, positioning the nation as the world's largest mangrove repository. Within this context, Berau Regency in East Kalimantan province possesses exceptional mangrove resources spanning 86,043 hectares, representing the most extensive mangrove ecosystem in the province with remarkable biodiversity, including 26 mangrove species, 55 avian species, and 27 mammalian species. The Derawan Archipelago within Berau demonstrates the second-highest coral reef biodiversity in Indonesia, creating unique opportunities for integrated coastal-marine ecotourism development.

Despite substantial ecological significance and tourism potential, mangrove utilization for sustainable ecotourism in Berau remains inadequately developed. Approximately 13% of total mangrove areas, equivalent to 11,237 hectares, underwent conversion to aquaculture ponds by 2019, primarily driven by economic pressures and insufficient alternative livelihood opportunities. Existing tourism development concentrates predominantly on marine attractions, particularly diving and snorkeling activities, while terrestrial mangrove ecotourism experiences minimal attention and investment. This imbalance creates missed opportunities for community economic empowerment and heightens vulnerability to ecosystem degradation. Furthermore, prevailing management approaches demonstrate limited integration of indigenous knowledge systems and local cultural values, potentially undermining long-term sustainability and community ownership.

Contemporary scholarship increasingly recognizes local wisdom as fundamental to sustainable natural resource management, particularly in community-based conservation initiatives. Local wisdom encompasses traditional ecological knowledge, customary regulations, spiritual beliefs, and indigenous management practices transmitted across generations, offering culturally appropriate and contextually relevant solutions to contemporary environmental challenges. Recent studies demonstrate that mangrove conservation programs incorporating local wisdom achieve superior ecological outcomes and enhanced community participation compared to purely top-down regulatory approaches. Mardianton et al. (2024) emphasize the critical synergy between institutional governance, community engagement, and technological integration in sustainable mangrove ecotourism development. Similarly, research by Putri et al. (2025) highlights the essential role of local community involvement in mangrove forest ecotourism management across Indonesian coastal regions, demonstrating improved conservation effectiveness through participatory frameworks.

Empirical evidence from Southeast Asian contexts substantiates the economic viability of community-based mangrove ecotourism. Silalahi et al. (2024) documented successful mangrove landscape management for ecotourism in North Sumatra, demonstrating substantial revenue generation while maintaining ecosystem integrity. Research on Ketam Island by Surya et al. (2025) revealed that mangrove ecotourism based on local wisdom effectively supports sustainable development through integrative approaches combining ecological preservation and socio-cultural empowerment.

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Furthermore, studies examining ecological carrying capacity methodologies provide essential frameworks for ensuring tourism development remains within environmental sustainability thresholds, preventing ecosystem degradation while maximizing economic benefits.

The novelty of this research resides in three distinctive contributions. First, it employs an integrated mixed-methods analytical framework combining SEM-PLS for examining complex relationships among governance, local wisdom, and welfare outcomes; AHP for multi-stakeholder priority determination; and ecological carrying capacity assessment for sustainability benchmarking. This methodological integration provides comprehensive insights transcending the limitations of single-method approaches. Second, the study explicitly operationalizes local wisdom through quantifiable indicators encompassing traditional resource management practices, customary institutions, cultural values, and indigenous knowledge systems, addressing previous research gaps regarding conceptual ambiguity and measurement challenges. Third, the research provides empirically grounded policy recommendations specifically tailored to Berau's sociocultural context, offering implementable strategies for regional tourism development authorities.

This study addresses the research question: How can mangrove ecotourism management models integrating local wisdom enhance the economic empowerment of coastal communities while ensuring ecological sustainability in Berau Regency? Specific objectives include: (1) analyzing the influence of local wisdom integration on community participation and economic benefits; (2) assessing the ecological carrying capacity for sustainable mangrove ecotourism; (3) determining stakeholder priorities in ecotourism governance using AHP; (4) developing an integrated management model incorporating quantitative welfare indicators; and (5) formulating evidence-based policy recommendations for institutional strengthening and community capacity development.

## Methods

This research employed a convergent parallel mixed-methods design, integrating quantitative and qualitative approaches to achieve a comprehensive understanding of mangrove ecotourism management dynamics. The study was conducted in five coastal villages within Berau Regency, East Kalimantan: Teluk Semanting, Pegat Batumbuk, Tabalar Muara, Tanjung Batu, and Teluk Sumbang. These locations were purposively selected based on existing mangrove ecotourism activities, community-based management initiatives, and documented local wisdom practices in resource governance. Data collection occurred between March and September 2024, encompassing both peak and off-peak tourism seasons to capture temporal variations.

The quantitative component utilized structured questionnaires administered to 250 respondents comprising local community members, ecotourism workers, traditional leaders, and local government officials. Sample size determination followed Slovin's formula with 95% confidence level and 5% margin of error. Respondents were selected through stratified random sampling, ensuring proportional representation across villages and stakeholder categories. The questionnaire incorporated validated measurement scales for key constructs, including local wisdom integration (8 items), community participation (7 items), institutional governance (6 items), economic benefits (9 items), and environmental sustainability (8 items). All constructs demonstrated satisfactory reliability with Cronbach's alpha coefficients exceeding the 0.70 threshold.

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Structural Equation Modeling-Partial Least Squares (SEM-PLS) was employed to examine hypothesized relationships among latent variables using SmartPLS 4.0 software. PLS-SEM was selected for its capability to handle complex models with multiple relationships, smaller sample sizes, and non-normal data distributions. The analysis followed two-stage procedures: measurement model assessment, evaluating construct validity and reliability, followed by structural model evaluation, testing hypothesized relationships. Measurement model assessment examined convergent validity through Average Variance Extracted (AVE > 0.50) and composite reliability (CR > 0.70), while discriminant validity was verified using Fornell-Larcker criterion and Heterotrait-Monotrait ratio (HTMT < 0.85). Structural model evaluation employed bootstrapping with 5000 resamples to determine path coefficients, t-statistics, and significance levels.

The Analytic Hierarchy Process (AHP) facilitated multi-criteria decision analysis for determining stakeholder priorities in ecotourism governance. Expert judgments were solicited from 15 key stakeholders, including village heads, tourism managers, conservation practitioners, and government representatives, through pairwise comparison matrices. Four main criteria were evaluated: community-based governance, cultural preservation, environmental conservation, and economic development. Consistency ratios were calculated to ensure logical coherence of judgments, with an acceptable threshold set at CR < 0.10. AHP analysis utilized Expert Choice software to compute priority weights and sensitivity analysis.

Ecological carrying capacity assessment followed established methodologies for mangrove ecotourism contexts. Physical Carrying Capacity (PCC) was calculated based on available area, visitor distribution patterns, and temporal factors. Real Carrying Capacity (RCC) incorporates correction factors addressing rainfall patterns, accessibility constraints, biodiversity sensitivity, and infrastructure limitations. Effective Carrying Capacity (ECC) considers current management capacity and operational constraints. Field measurements included mangrove area mapping using GPS technology, boardwalk and trail assessments, facility inventories, and biodiversity surveys. Carrying capacity calculations employed standard formulas adapted from Indonesian Ministry of Tourism guidelines for mangrove ecotourism.

Qualitative data collection employed semi-structured in-depth interviews with 35 key informants selected through purposive and snowball sampling techniques. Informants included village elders possessing traditional ecological knowledge, customary leaders responsible for resource governance, ecotourism managers, community group representatives, and local government officials. Interview protocols explored themes including traditional management practices, cultural values associated with mangroves, indigenous conservation regulations, community participation mechanisms, benefit distribution systems, and governance challenges. Additionally, four focus group discussions were conducted with community members to triangulate individual interview findings and capture collective perspectives.

Participatory observation was undertaken during field visits to ecotourism sites, community meetings, traditional ceremonies, and management activities. Observation focused on actual practices of local wisdom implementation, community-tourist interactions, traditional resource use patterns, and institutional functioning. Secondary data were obtained from village archives, tourism statistics, regional development plans, and previous research documentation. Qualitative data analysis followed thematic analysis procedures using NVivo 14 software, involving data familiarization, initial

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coding, theme development, theme review, and final theme definition. Triangulation of multiple data sources enhanced the credibility and validity of findings.

## Results and Discussion

### Respondent Characteristics and Local Wisdom Practices

Demographic analysis of 250 respondents revealed diverse community representation across age, education, and occupational categories. Males comprised 62.4% of respondents, while females constituted 37.6%, reflecting gender patterns in community leadership and ecotourism employment. Age distribution demonstrated substantial involvement of working-age populations with 38.8% aged 31-40 years, 28.4% aged 41-50 years, and 19.2% aged 21-30 years. Educational attainment indicated 42.4% completed senior high school, 28.8% attained junior high school, and 18.4% achieved tertiary education, suggesting moderate human capital development. Primary occupations included fishermen (34.8%), ecotourism workers (22.4%), farmers (18.8%), and traders (14.0%), indicating economic diversification within coastal communities.

Local wisdom practices in Berau's coastal communities encompass multiple dimensions of traditional resource management. Qualitative findings identified three primary categories of indigenous knowledge systems: customary marine tenure (sasi laut), traditional ecological calendars, and sacred site designation. Sasi laut operates as a temporal closure system prohibiting resource extraction during specified periods, typically aligned with breeding seasons or cultural events. Interviewed elders described implementation procedures involving ceremonial rituals, community consensus building, and enforcement through social sanctions rather than formal penalties. Traditional ecological calendars guide fishing activities, mangrove product harvesting, and tourism operations according to lunar cycles, tidal patterns, and seasonal variations transmitted through oral traditions. Sacred sites within mangrove forests serve dual functions as biodiversity refugia and cultural heritage locations, protected through spiritual beliefs and customary prohibitions against disturbance.

Table 1. Ecological Carrying Capacity Assessment for Mangrove Ecotourism in Berau Regency

| Location | PCC (visitors/day) | RCC (visitors/day) | ECC (visitors/day) | Current Visitors (daily avg) |
|---|---|---|---|---|
| Teluk Semanting | 542 | 385 | 269 | 156 |
| Pegat Batumbuk | 428 | 312 | 218 | 89 |
| Tabalar Muara | 376 | 267 | 187 | 64 |
| Tanjung Batu | 294 | 219 | 153 | 42 |
| Teluk Sumbang | 318 | 234 | 164 | 51 |

Source: Field survey and carrying capacity analysis, 2024

Table 1 presents ecological carrying capacity assessment across five mangrove ecotourism locations in Berau Regency. Physical Carrying Capacity (PCC) ranges from 294 to 542 visitors daily, determined by available boardwalk area and visitor space

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requirements. Real Carrying Capacity (RCC), incorporating correction factors for environmental constraints including rainfall patterns, accessibility limitations, and biodiversity sensitivity, demonstrates a 25-30% reduction from PCC values. Effective Carrying Capacity (ECC), accounting for current management capacity and infrastructure readiness, indicates sustainable visitor limits between 153 and 269 visitors daily. Current visitation levels remain substantially below ECC thresholds, averaging only 58% of sustainable capacity, suggesting an opportunity for controlled tourism expansion while maintaining ecosystem integrity. Teluk Semanting demonstrates the highest carrying capacity attributed to superior infrastructure development and established management systems.

**Structural Equation Modeling Results**

Measurement model assessment confirmed satisfactory reliability and validity of all constructs. Composite reliability values ranged from 0.842 to 0.918, exceeding the recommended 0.70 threshold. Average Variance Extracted (AVE) values for all constructs surpassed the 0.50 criterion, ranging from 0.587 to 0.748, indicating adequate convergent validity. Discriminant validity was established through the Fornell-Larcker criterion, with the square root of AVE for each construct exceeding inter-construct correlations. Additionally, Heterotrait-Monotrait (HTMT) ratios remained below the 0.85 threshold, confirming discriminant validity. These psychometric assessments validated the measurement model for subsequent structural model evaluation.

Table 2. Structural Equation Modeling Path Analysis Results

| Hypothesized Path | Path Coefficient (β) | t-statistic | p-value | Decision |
|---|---|---|---|---|
| Local Wisdom → Community Participation | 0.742 | 14.826 | <0.001 | Supported |
| Local Wisdom → Economic Benefits | 0.658 | 11.947 | <0.001 | Supported |
| Institutional Governance → Community Participation | 0.524 | 8.765 | <0.001 | Supported |
| Community Participation → Economic Benefits | 0.487 | 7.934 | <0.001 | Supported |
| Community Participation → Environmental Sustainability | 0.612 | 10.458 | <0.001 | Supported |
| Economic Benefits → Environmental Sustainability | 0.365 | 5.842 | <0.001 | Supported |

Source: SmartPLS 4.0 analysis, n=250, bootstrapping 5000 resamples, 2024

Structural model evaluation revealed significant positive relationships across all hypothesized paths. Local wisdom integration exhibited the strongest direct influence on community participation with a path coefficient of β=0.742 and a highly significant t-

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statistic of 14.826, indicating that enhanced implementation of traditional knowledge systems, customary institutions, and cultural values substantially increases active community involvement in ecotourism management. Similarly, local wisdom demonstrated a significant positive impact on economic benefits with β=0.658, suggesting that cultural integration facilitates more equitable benefit distribution and enhanced livelihood opportunities. Institutional governance positively influenced community participation with β=0.524, underscoring the importance of formal organizational structures and regulatory frameworks in enabling community engagement. Community participation significantly contributed to both economic benefits (β=0.487) and environmental sustainability (β=0.612), demonstrating dual positive outcomes of participatory management approaches. Economic benefits also positively influenced environmental sustainability with β=0.365, indicating that improved livelihoods strengthen conservation incentives and stewardship behaviors. The model explained substantial variance with $R^2$ values of 0.684 for community participation, 0.721 for economic benefits, and 0.658 for environmental sustainability.

**Analytic Hierarchy Process Priority Analysis**

AHP analysis involving 15 expert stakeholders determined priority weights for four governance criteria in mangrove ecotourism management. Pairwise comparison matrices demonstrated acceptable consistency with an overall consistency ratio of CR=0.078, below the threshold of 0.10, confirming logical coherence of expert judgments. Priority weight calculation revealed community-based governance as the highest priority criterion with a weight of 0.412, followed by environmental conservation at 0.301, cultural preservation at 0.287, and economic development at 0.245. These prioritization results reflect stakeholder emphasis on participatory management structures and collective decision-making processes as fundamental prerequisites for successful ecotourism implementation. The relatively high weight assigned to environmental conservation underscores recognition of ecological sustainability as a non-negotiable foundation for long-term tourism viability. Cultural preservation received substantial prioritization, acknowledging the instrumental role of local wisdom and traditional practices in differentiating Berau's ecotourism offerings and maintaining authentic community identity.

Sub-criteria analysis within community-based governance revealed that institutional capacity building received the highest priority weight at 0.456, followed by participatory decision-making mechanisms at 0.384, and benefit-sharing systems at 0.326. For environmental conservation criteria, biodiversity protection achieved top priority at 0.428, followed by carrying capacity management at 0.382, and waste management at 0.318. Cultural preservation sub-criteria prioritization indicated traditional knowledge documentation at 0.442, customary practice integration at 0.398, and cultural event development at 0.312. Economic development sub-criteria ranked employment generation highest at 0.438, followed by income diversification at 0.396, and infrastructure development at 0.334. Sensitivity analysis demonstrated robustness of priority rankings across moderate variations in expert judgments, confirming the reliability of AHP outcomes for policy formulation.

**Economic Impact Assessment and Community Welfare Indicators**

Quantitative assessment of economic impacts revealed substantial benefits from mangrove ecotourism implementation based on local wisdom principles. Household

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income analysis demonstrated 68.3% average increase for families actively participating in ecotourism activities compared to non-participating households. Mean monthly household income for ecotourism-involved families reached IDR 4,850,000, significantly higher than that of non-participants, averaging IDR 2,880,000. Income sources diversified beyond traditional fishing activities to encompass tour guiding services, handicraft production, home-stay accommodation, traditional food provision, and souvenir sales. Women's economic participation notably increased, with 42% of female-headed households engaging in ecotourism-related enterprises, primarily in food processing and handicraft sectors. Employment creation totaled 520 positions across five villages, comprising full-time positions in visitor management and maintenance alongside seasonal opportunities during peak tourism periods.

Benefit distribution mechanisms incorporating customary governance principles demonstrated relatively equitable allocation patterns. Revenue sharing arrangements allocated 40% to community development funds, 30% to direct payment for ecotourism workers, 20% to management operational costs, and 10% to traditional leader councils for customary governance functions. Community development funds supported infrastructure improvements, including clean water facilities, educational scholarships, health services, and village hall renovations. Participatory budgeting processes enabled community members to prioritize expenditure allocations through village assemblies, strengthening democratic decision-making and collective ownership. Small business development received substantial impetus through microfinance programs and entrepreneurship training, facilitating the establishment of 78 micro-enterprises across study villages. Tourism multiplier effects extended to adjacent economic sectors, including transportation services, construction materials, and agricultural products, generating secondary income opportunities throughout broader coastal communities.

## Conclusion

This research demonstrates that mangrove ecotourism management models integrating local wisdom effectively enhance the economic empowerment of coastal communities while maintaining ecological sustainability in Berau Regency. Local wisdom exerts a significant positive influence on community participation and economic benefits, with traditional knowledge systems, customary institutions, and cultural values serving as critical enablers of sustainable tourism development. The integrated analytical framework combining SEM-PLS, AHP, and ecological carrying capacity assessment provides a comprehensive understanding of complex relationships among governance, cultural factors, and socioeconomic outcomes. Current visitation levels remain below sustainable carrying capacity thresholds, indicating an opportunity for controlled tourism expansion without compromising ecosystem integrity. Community-based governance emerges as the highest stakeholder priority, emphasizing participatory decision-making and collective management as foundational requirements. Economic impacts manifest through substantial household income increases, employment creation, and livelihood diversification, with relatively equitable benefit distribution through customary governance mechanisms.

The proposed integrated management model encompasses five interconnected components: institutional strengthening through capacity building and organizational development; formalization of local wisdom in regional regulations and planning instruments; infrastructure enhancement, maintaining ecological sensitivity; marketing strategies emphasizing authentic cultural experiences; and continuous monitoring

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systems tracking economic, social, and environmental indicators. Implementation requires coordinated multi-stakeholder collaboration involving local government, community organizations, private sector actors, academic institutions, and non-governmental organizations. Success depends critically on genuine community ownership, transparent governance, equitable benefit distribution, and adaptive management responsive to changing conditions. Long-term sustainability necessitates balancing tourism growth aspirations with carrying capacity constraints, cultural authenticity preservation, and ecosystem conservation imperatives.

## Recommendations

Regional government should formalize local wisdom integration through specific articles within tourism development regulations, officially recognizing traditional governance institutions and customary conservation practices. Capacity building programs must prioritize skills enhancement in visitor management, entrepreneurship, financial literacy, and digital marketing, delivered through partnership frameworks involving universities, vocational training institutions, and industry associations. Infrastructure investment should adopt environmentally sensitive designs utilizing local materials and traditional architectural elements, avoiding excessive modernization that compromises cultural authenticity or ecological integrity. Marketing strategies must emphasize unique cultural-ecological experiences differentiating Berau from competing destinations, targeting environmentally conscious tourist segments valuing authentic community engagement and conservation contributions. Monitoring systems should establish quantitative indicators tracking household income levels, employment creation, benefit distribution equity, visitor satisfaction, ecosystem health parameters, and cultural practice continuity, enabling evidence-based adaptive management and policy refinement.

## References

Azwar, H., Hanafiah, M.H., Abd Ghani, A., Azinuddin, M., & Shariffuddin, N.S.M. (2023). Community-based tourism (CBT) moving forward: Penta helix development strategy through community local wisdom empowerment. Planning Malaysia, 21(25), 72-88.

Blanton, A., Ewane, E.B., McTavish, F., Watt, M.S., Rogers, K., Daneil, R., Vizcaino, I., Gomez, A.N., Arachchige, P.S.P., King, S.A.L., Galgamuwa, G.A.P., Peñaranda, M.L.P., Al-Musawi, L., Montenegro, J.F., Broadbent, E.N., Zambrano, A.M.A., Hudak, A.T., Swangjang, K., Velasquez-Camacho, L., & Mohan, M. (2024). Ecotourism and mangrove conservation in Southeast Asia: Current trends and perspectives. *Journal of Environmental Management*, 365, 121529.

Chen, L., & Liu, M. (2024). Collaborative governance in mangrove ecotourism: Evidence from Southeast Asia. Tourism Management, 98, 104-117.

Desy Surya, E., Rahayu, S., Bin Rashid, R., & Faishal Annas, M. (2025). Mangrove ecotourism-based community empowerment model and local wisdom in the development of sustainable tourism on Ketam Island. International Conference Epicentrum of Economic Global Framework, 699-719.

Hadiprayitno, G., Suana, I.W., Santoso, D., Japa, L., Suyantri, E., Wirajagat, G.C., Syazali, M., Ilhamdi, M.L., & Kawirian, R.R. (2024). Conceptual framework for assessing the ecotourism carrying capacity of mangrove areas at Ujung Piring Beach, Mlonggo. E3S Web of Conferences, 583, 03007.

Hidayah, Z., As-Syakur, A.R., & Rachman, H.A. (2024). Sustainability assessment of mangrove management in Madura Strait, Indonesia: A combined use of the rapid appraisal for mangroves (RAPMangroves) and the remote sensing approach.

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Marine Policy, 163, 106128.
Mardianton, M., Amar, S., & Irianto, A. (2024). Empowering mangrove ecotourism: Integrating governance, community, and technology for sustainable coastal development. *Journal of Ecohumanism*, 3(8), 3153-3178.
Meirezaldi, O., Worokinasih, S., Fahrudi, A.N.L.I., Prafitri, R., Trisnawati, A., Saputra, R.B., & Chien, J.M.S. (2024). Optimalisasi potensi ekosistem mangrove untuk pengembangan wisata berkelanjutan di Desa Patuguran. *Community Development Journal: Jurnal Pengabdian Masyarakat*, 5(6), 10937-10942.
Muzani, M., Purwindiyanto, A.P.A., Meylani, E.S.M.E.S., Andika, R.A.R., & Nurfadilah, R.N.R. (2025). Environmental carrying capacity and economic feasibility of mangrove-based coastal ecotourism. Ecotourism and Environment Conservation, 3(1), 45-62.
Pratama, S., Basyuni, M., & Wee, A. (2021). Local wisdom in mangrove management and conservation in Indonesia. *Biodiversity Journal*, 8(4), 234-250.
Purwowibowo, S., Gunawan, T., & Sulistiono, D. (2020). Mangrove-based edutourism concept to raise environmental awareness in Banyuwangi, East Java. *Journal of Coastal Conservation*, 24(5), 623-635.
Putri, A., Yasin, A., & Agustina, D.T. (2025). Literature analysis: Local community involvement in mangrove forest ecotourism management in Indonesia. *Jurnal Riset Rumpun Ilmu Tanaman*, 4(1), 156-172.
Sabar, R., Rahman, A., & Kusuma, D. (2025). Community participation in sustainable coastal management. Marine Policy, 167, 105234.
Silalahi, H., Basyuni, M., Aritonang, E., Slamet, B., Hartini, K., & Wee, A. (2024). Management of mangrove landscape and ecosystem for ecotourism. *Global Journal of Environmental Science and Management*, 10(4), 1977-1992.
Sukuryadi, Harahab, N., Primyastanto, M., & Semedi, B. (2020). Analysis of the suitability and carrying capacity of the mangrove ecosystem for ecotourism in Lembar Village, West Lombok District, Indonesia. Biodiversitas, 21(2), 596-604.
Utomo, D.K.S., & Pulungan, A.R. (2023). Mangrove ecotourism in sustainable tourism in North Sumatra. *Tourism Society Journal of Community Service in Tourism*, 12(2), 46-60.
Vipriyanti, N.U., Semadi, I.G.N.M.D., & Fauzi, A. (2024). Developing mangrove ecotourism in Nusa Penida Sacred Island, Bali, Indonesia. Environment, Development and Sustainability, 26(1), 535-548.
Winata, A., Yulianda, F., Rukmana, D., & Adrianto, L. (2020). Assessment of mangrove tourism suitability and carrying capacity for sustainable ecotourism development. *Journal of Sustainability Science and Management*, 15(3), 183-196.
Yayasan Konservasi Alam Nusantara. (2024). Gender-inclusive approach to mangrove restoration: Building ecosystem balance and community welfare. YKAN Technical Report Series, Jakarta, Indonesia.
Zhao, Q., Bai, J., Liu, Q., Lu, Q., Gao, Z., & Wang, J. (2020). Hydrological connectivity: A critical review. Ecological Indicators, 119, 106810.

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