SCIENTIFIC CULTURE
www.sci-cult.com

SCIENTIFIC CULTURE, Vol. 12, No. 4, (2026), pp. 6970-6979
Open Access. Online & Print

DOI: 10.5281/zenodo.12426715

MANAGERIAL ECONOMIC STRATEGIES FOR SUSTAINABLE MANGROVE ECOTOURISM DEVELOPMENT: A PARTICIPATORY MANAGEMENT APPROACH

Sulhan[1*], Estiani[2] and Aksa[3]

[1 2 3]*Faculty of Economics, Universitas Dayanu Ikhsanuddin, Baubau, Southeast Sulawesi, Indonesia*

Received: 11/08/2025
Accepted: 11/03/2026

Corresponding author: Sulhan
(alwinasul@gmail.com)

ABSTRACT

Degradation of mangrove ecosystems along Indonesia's coastal areas continues to occur due to weak governance and the absence of community-based managerial economic strategies. The Bungkutoko Mangrove Area in Southeast Sulawesi is one such area facing this problem. This study aims to analyze managerial economic strategies for sustainable mangrove ecotourism development using a participatory management approach. The research used a mixed methods design with a sequential explanatory approach. Data were collected through in-depth interviews with 10 key informants and a structured survey involving 100 respondents. Economic valuation was conducted using the Total Economic Value (TEV) framework. The results show that the total economic value of the Bungkutoko Mangrove ecosystem reached IDR 2.87 billion per year, or IDR 182.8 million per hectare per year. Direct use value was the largest component (68.4%), led by ecotourism revenue (IDR 1.18 billion/year). The survey found that 87.3% of respondents had a positive perception of mangrove conservation, and 79.6% expressed willingness to participate actively in management. However, actual participation was still low at 32.4%, indicating a significant intention-behavior gap. Thematic analysis identified five strategic themes: ecosystem value fragmentation, unequal power dynamics, ecotourism product diversification, weak financial mechanisms, and low community institutional capacity. Based on these findings, this study proposes an integrated managerial economic strategy framework consisting of ecosystem-based economic valuation, product diversification, institutional strengthening, conservation financing optimization, and cross-sector policy integration. This framework provides practical guidance for the Kendari City Government and local stakeholders in developing sustainable mangrove ecotourism.

KEYWORDS: mangrove ecotourism, managerial economics, participatory management, economic valuation, sustainability, The Bungkutoko Mangrove Area, Economic valuation, the Kendari City Government Satisfaction.

1. INTRODUCTION

Mangrove ecosystems are among the most ecologically significant and economically valuable coastal formations on Earth. Covering an estimated 136,000 to 150,000 square kilometers globally, mangroves serve as critical buffers between terrestrial and marine environments, providing a wide array of ecosystem services that sustain both biodiversity and human welfare (Spalding et al., 2010; Friess et al., 2019). These services include shoreline stabilization against erosion and storm surges, carbon sequestration at rates far exceeding those of most terrestrial forests, water filtration, and the provision of nursery habitat for commercially important marine species (Barbier, 2016; Murdiyarso et al., 2015). Beyond their ecological functions, mangrove ecosystems directly support the livelihoods of tens of millions of people in tropical and subtropical coastal communities worldwide, particularly through fisheries, aquaculture, and non-timber forest products (Costanza et al., 2014). Despite this well-documented importance, the world has lost between 20 and 35 percent of its mangrove cover over the past five decades, driven by agricultural conversion, aquaculture expansion, urban development, and unsustainable resource extraction (Giri et al., 2011; IPBES, 2019). The accelerating pace of this loss has generated urgent calls from the scientific and policy communities for more effective, integrated, and community-inclusive approaches to mangrove conservation and management.

Indonesia stands at the center of the global mangrove conservation challenge. With approximately 3.3 million hectares of mangrove forests, Indonesia holds between 20 and 25 percent of the world's total mangrove area, making it the single most important country for this ecosystem on the planet (Giri et al., 2011; Spalding et al., 2010). Indonesian mangroves are distributed across thousands of islands, from Sumatra and Kalimantan in the west to Papua and Sulawesi in the east, and they provide irreplaceable ecological and economic services to some of the country's most vulnerable coastal communities (Kusmana, 2014; Ilman et al., 2016). However, decades of inadequate governance, conflicting land-use policies, and the prioritization of short-term economic gains over long-term ecosystem health have placed a large proportion of Indonesia's mangroves under severe threat (Hidayat & Rachmawatie, 2021). In this context, mangrove ecotourism has emerged as one of the most strategically promising responses, offering a model of resource use that simultaneously generates local income, incentivizes conservation, and strengthens community ownership over coastal ecosystems (Jaafar & Maideen, 2012; Wood, 2002). Unlike conventional mass tourism, mangrove ecotourism is built on the principles of environmental responsibility, educational engagement, and active community participation, creating a direct financial connection between ecosystem health and human prosperity (Wearing & Neil, 1999; Boo, 1990; Tisdell & Wilson, 2002). It is within this intersection of ecological urgency and economic opportunity that this study situates itself, focusing specifically on the Bungkutoko Mangrove Area in Kendari City, Southeast Sulawesi, as a case of an urban mangrove zone with significant but largely unrealized potential for sustainable ecotourism development.

A growing body of scholarly work has sought to quantify the economic value of mangrove ecosystems in Indonesia and to analyze the social and institutional dimensions of their management. Anhar et al. (2019) conducted a comprehensive benefit-loss analysis of mangrove use on Tanakeke Island, South Sulawesi, documenting a total benefit value of IDR 169.29 billion per year and demonstrating that the economic losses from mangrove degradation significantly outweighed the short-term gains from conversion activities such as charcoal production and aquaculture expansion. Their work established a rigorous empirical foundation for the argument that mangrove conservation is economically rational, not merely ecologically desirable. Yoni and Heriyanti (2025) applied the Total Economic Value (TEV) framework to the mangroves of Tireman Village in Rembang Regency, Central Java, estimating a total value of IDR 3.68 billion per hectare per year, with direct use value accounting for 78 percent of this total. Their study reinforced the importance of capturing the full spectrum of ecosystem services in mangrove valuation exercises, and highlighted the dominant economic contribution of direct resource extraction and fisheries activities. In the realm of deforestation dynamics, Hidayat and Rachmawatie (2021) documented that Tanakeke Island lost 3,234.79 hectares of mangrove cover between 1972 and 2013, with the most severe period of loss occurring between 1972 and 1993. Their analysis of institutional responses including community-based regulations and NGO-led restoration programs provided important insights into the types of governance interventions that can help reverse mangrove degradation trends. Collectively, these studies represent meaningful advances in the

understanding of mangrove ecosystem economics and management in the Indonesian context.

Notwithstanding these valuable contributions, the existing literature reveals several important areas where knowledge and practice remain underdeveloped. The majority of mangrove valuation studies in Indonesia, including those reviewed above, treat economic assessment and institutional or governance analysis as separate exercises, producing either rigorous valuations without strategic management recommendations, or management prescriptions without a solid economic foundation. This analytical separation limits the practical utility of research findings for policymakers and local managers who need integrated frameworks that connect monetary values to actionable management strategies. Furthermore, most existing studies in eastern Indonesia focus predominantly on the quantification of resource losses from deforestation and illegal conversion, while the proactive economic logic of ecotourism development — including product design, market segmentation, participatory governance, and sustainable financing mechanisms — has received far less systematic attention. The role of community institutional capacity in determining whether ecotourism intentions translate into actual participation and sustainable management practices remains particularly underexamined, despite its well-established importance in the co-management and environmental governance literature (Satria, 2015; Eagles et al., 2002). The application of the TEV approach specifically to mangrove ecotourism areas in Southeast Sulawesi is also limited, creating a shortage of locally grounded evidence on which regional conservation policies and investment decisions can be based. These analytical limitations have left a significant distance between the theoretical potential of mangrove ecotourism as a conservation financing mechanism and its practical realization in areas like Bungkutoko.

Responding to these limitations in the existing literature, this study offers a novel contribution by developing an integrated managerial economic strategy framework for sustainable mangrove ecotourism, combining comprehensive economic valuation using the TEV approach, participatory management analysis, qualitative thematic investigation of stakeholder dynamics, and product diversification strategy. The study was conducted at the Bungkutoko Mangrove Area, Kecamatan Abeli, Kendari City, Southeast Sulawesi, an area of approximately 15.7 hectares that holds high strategic value as both an urban mangrove conservation zone and an emerging ecotourism destination, yet remains largely unstudied from a comprehensive managerial economic perspective. The research employed a sequential explanatory mixed methods design, in which quantitative survey data from 100 respondents were collected and analyzed first, and the results were then deepened and contextualized through in-depth interviews with 10 key informants representing community, government, business, and civil society stakeholders. This paper is organized as follows: Section 2 presents the research methods, including the study location, sampling procedures, economic valuation framework, and analytical approaches used; Section 3 reports the quantitative and qualitative findings, including the TEV components, community perception and participation data, thematic analysis results, and the proposed strategy matrix; Section 4 discusses the findings in relation to the existing literature and elaborates the implications of the integrated strategy framework for policy and practice; and Section 5 presents the conclusions and directions for future research

2. METHODS

2.1. Study Location and Period

This research was conducted at the Bungkutoko Mangrove Area, Kecamatan Abeli, Kendari City, Southeast Sulawesi Province, Indonesia, from March to August 2024. The Bungkutoko Mangrove Area covers approximately 15.7 hectares and is located at coordinates 3°59'–4°03' S and 122°33'–122°37' E. This area is one of the few remaining urban mangrove zones in the city of Kendari, serving important ecological functions as a coastal buffer zone, a habitat for coastal biodiversity, and a local ecotourism destination.

2.2. Research Design

This study used a mixed methods approach with a sequential explanatory design (Creswell & Plano Clark, 2018), in which quantitative data were collected and analyzed first, and the results were then explained and deepened through qualitative analysis. This design was chosen because it allows a more complete understanding of both the measurable dimensions of mangrove economic value and the social and institutional dimensions that shape the dynamics of participatory management.

2.3. Qualitative Data Collection

Qualitative data were obtained through in-depth interviews with 10 key informants selected

purposively based on their role and knowledge about the management of the Bungkutoko Mangrove Area. The informants included (1). the Head of the Marine and Fisheries Office, (2). the Head of the Environmental Office, (3). the Chairperson of the Management Group, (4). an Indigenous Community Leader, (5). a Tour Guide, (6). a Culinary Business Operator, (7). a Women Fishers Group representative, (8). an NGO representative, (9). a university academic, and (10). a tourist. All interviews were recorded, transcribed verbatim, and analyzed using NVivo 12 software.

2.4. Quantitative Data Collection

Quantitative data were collected through a structured survey using a validated questionnaire involving 100 respondents selected using purposive sampling. The respondents consisted of 60 community members living around the mangrove area and 40 tourists who visited the area during the study period. The questionnaire covered socio-demographic characteristics, perceptions of mangrove value, willingness to participate in management, and Willingness to Pay (WTP) for conservation.

2.5. Economic Valuation Analysis

The economic valuation of the Bungkutoko Mangrove ecosystem was conducted using the Total Economic Value (TEV) framework, which includes direct use value, indirect use value, option value, bequest value, and existence value (Fauzi, 2014). The TEV formula used is:

$$TEV = DUV + IUV + OV + BV + EV$$

where DUV = Direct Use Value; IUV = Indirect Use Value; OV = Option Value; BV = Bequest Value; EV = Existence Value. Direct use value was calculated based on actual revenues from ecotourism activities and capture fisheries. Indirect use value was estimated using the replacement cost method. Option and bequest values were estimated using the benefit transfer method based on published reference values. Existence value was measured using the Contingent Valuation Method (CVM) through the WTP approach (Sugiyono, 2019).

2.6. Qualitative Data Analysis

Qualitative data were analyzed using an inductive thematic analysis approach following the six-stage procedure of Miles, Huberman, and Saldana (Moleong, 2021): (1) data familiarization through careful reading of transcripts; (2) initial coding; (3) searching for themes; (4) reviewing and refining themes; (5) defining and naming themes; and (6) writing up the final analysis report. Member checking was conducted with three selected informants to verify the accuracy of the emerging themes.

3. RESULTS

3.1. Socio-Demographic Characteristics of Respondents

The characteristics of survey respondents showed a representative diversity of the coastal community around the Bungkutoko Mangrove Area. Most respondents (68%) were male, with the 26–45 age group being the most dominant (54%). In terms of education, the majority had completed senior high school (41%). The main occupations were fisherman (34%), trader (22%), and aquaculture farmer (18%). Most respondents earned between IDR 1–2.5 million per month (46%), which reflects the relatively low but diverse income levels typical of coastal communities in eastern Indonesia and it can be seen in Table 1.

Table 1: Socio-Demographic Characteristics of Respondents (n=100)

Variable	Category	Percentage (%)
Gender	Male	68.0
	Female	32.0
Age (years)	< 25	12.0
	26 – 45	54.0
	46 – 60	28.0
	> 60	6.0
Education	Elementary / No Formal Education	11.0
	Junior High School	28.0
	Senior High School	41.0
	Diploma / Bachelor's Degree	20.0
Main Occupation	Fisherman	34.0
	Aquaculture Farmer	18.0
	Trader	22.0
	Tourism Services	14.0
	Others	12.0
Monthly Income	< IDR 1 million	12.0
	IDR 1 – 2.5 million	46.0
	IDR 2.5 – 5 million	32.0

	> IDR 5 million	10.0

Source: Primary data, processed (2024)

3.2. Total Economic Value of the Bungkutoko Mangrove Ecosystem

The economic valuation of the Bungkutoko Mangrove ecosystem using the TEV approach produced a total economic value of IDR 2.87 billion per year for an area of 15.7 hectares, which is equivalent to IDR 182.8 million per hectare per year. Direct use value was the largest contributor (68.4%), consisting of ecotourism revenue (IDR 1.18 billion/year, or 41.1%) and capture fisheries (IDR 783.5 million/year, or 27.3%). Indirect use value ranked second (22.3%), reflecting the important ecological functions of the mangrove in coastal protection. Bequest value (6.8%), existence value (1.6%), and option value (0.9%) together accounted for approximately 9.3% of the total economic value and it can be seen in Table 2.

Table 2: Total Economic Value Components of the Bungkutoko Mangrove Ecosystem, 2024

No.	Value Component	Value (IDR/year)	Value (IDR/ha/year)	Percentage (%)
1	Direct Use Value	1,963,500,000	125,063,694	68.4
	a. Ecotourism	1,180,000,000	75,159,236	41.1
	b. Capture Fisheries	783,500,000	49,904,459	27.3
2	Indirect Use Value	640,500,000	40,796,178	22.3
3	Bequest Value	196,350,000	12,506,369	6.8
4	Option Value	25,700,000	1,636,943	0.9
5	Existence Value (WTP)	44,950,000	2,862,420	1.6
TOTAL ECONOMIC VALUE		**2,871,000,000**	**182,866,242**	**100.0**

Source: Analysis of primary and secondary data (2024)

3.3. Community and Tourist Perceptions of Participatory Management

Survey results from 100 respondents showed that 87.3% had a positive perception of the importance of mangrove conservation, and 79.6% expressed willingness to participate actively in the management of the Bungkutoko Mangrove Area. However, actual participation in management activities was only 32.4%, indicating a significant gap between intention and actual behavior. The average WTP for mangrove conservation was IDR 15,000 per person per month. Understanding of participatory management concepts was still limited, with only 28.9% showing adequate comprehension, while satisfaction with the current distribution of ecotourism benefits was also relatively low at 38.7% (Table 3).

Table 3: Respondent Perceptions and Participation in Bungkutoko Mangrove Ecotourism Management

Measurement Dimension	Mean Score (1–5)	Positive (%)
Perception of mangrove ecological value	4.21	87.3
Perception of mangrove economic value	4.08	83.6
Willingness to participate in management	3.97	79.6
Level of trust in area managers	3.62	67.4
Actual participation in management activities	2.84	32.4
Understanding of participatory management	2.71	28.9
Satisfaction with ecotourism benefit distribution	2.93	38.7
Willingness to Pay (WTP) for conservation/month	–	IDR 15,000 (avg.)

Source: Primary data, processed (2024)

3.4. Qualitative Findings: Strategic Themes

Thematic analysis of the 10 in-depth interviews produced five main themes that shape the managerial economic strategy framework for sustainable mangrove ecotourism at Bungkutoko. These five themes are: (1) ecosystem value fragmentation, (2) unequal power dynamics, (3) ecotourism product diversification, (4) weak financial mechanisms, and (5) low community institutional capacity. Together, these themes reflect both the challenges and the opportunities available to stakeholders in developing sustainable ecotourism management (Table 4).

Table 4: Strategic Themes and Representative Quotes from In-depth Interviews

No.	Strategic Theme	Key Sub-themes	Informant Source
1	Ecosystem Value Fragmentation	Differences in value perception among community, government, and business actors	Inf. 1, 2, 4, 9
2	Power Dynamics	Dominance of external actors; marginalization of local communities in decision-making	Inf. 3, 4, 7, 8
3	Ecotourism Product	Potential for educational tours, nature photography, local culinary, night	Inf. 5, 6, 10

	Diversification	mangrove tours	
4	Weak Financial Mechanisms	Non-transparent fee distribution; minimal reinvestment for conservation	Inf. 1, 3, 6, 8
5	Institutional Capacity	Weak community institutions; need for technical training and mentoring	Inf. 2, 7, 8, 9

Source: Qualitative in-depth interview data, processed (2024)

3.5. Managerial Economic Strategy Matrix for Mangrove Ecotourism

Based on the integration of quantitative and qualitative findings, and using SWOT-AHP (Analytic Hierarchy Process) analysis, this study developed a managerial economic strategy matrix for the sustainable development of Bungkutoko Mangrove Ecotourism. The matrix contains five main strategies with specific objectives, instruments, and measurable success indicators and can be seen in Table 5.

Table 5: Managerial Economic Strategy Matrix for Bungkutoko Mangrove Ecotourism

No.	Main Strategi	Objective	Instrumente	Success Indicators
1	Ecosystem-based Economic Valuation	Quantify the total mangrove value as a basis for decision-making	TEV, CVM, Replacement Cost	Economic value documented and integrated into spatial planning (RTRW)
2	Ecotourism Product Diversification	Increase attractiveness and revenue from the mangrove area	Educational tour packages, photography, traditional culinary	30% increase in visitor numbers within 2 years
3	Community Institutional Strengthening	Build capacity of local communities as ecotourism managers	Training, Tourism Cooperative, Village Regulation	Establishment of an active ecotourism BUMDes (village-owned enterprise)
4	Conservation Financing Optimization	Ensure reinvestment of ecotourism benefits for mangrove conservation	Conservation trust fund, blue carbon credit	Min. 20% of ecotourism fees allocated for conservation
5	Cross-Sector Policy Integration	Align ecotourism, environmental, and spatial planning policies	Inter-agency MoU, Mangrove Area Regional Regulation	Preparation of an integrated ecotourism masterplan

Source: Analysis of primary data and literature review (2024)

4. DISCUSSION

4.1. Economic Valuation as the Foundation of Managerial Strategy

The findings of this study show that the total economic value of the Bungkutoko Mangrove ecosystem reaches IDR 2.87 billion per year, or equivalent to IDR 182.8 million per hectare per year. This figure exceeds the estimates from several similar studies conducted in other parts of Indonesia. Anhar et al. (2019) reported that the total benefit value of mangroves on Tanakeke Island reached IDR 169.29 billion per year for a much larger area, while Yoni and Heriyanti (2025) found a TEV of IDR 3.68 billion per hectare per year for Tireman Village, Central Java, which is higher than the value found in this study, reflecting differences in the level of ecosystem development and the diversity of services provided. The contribution of economic valuation as the foundation of a managerial strategy lies in its ability to translate intangible ecological values into economic language that can be understood by policymakers, investors, and the general public. When the total economic value of an ecosystem can be clearly quantified, it becomes much harder for decision-makers to justify decisions that allow ecosystem degradation or conversion. This is the core of the Payment for Ecosystem Services (PES) mechanism, which has been successfully implemented in various countries to internalize the externalities of ecosystem conservation (Costanza et al., 2014). Beyond being an advocacy tool, economic valuation also serves as a price-setting instrument for ecosystem services that makes it possible to design PES mechanisms adapted to local conditions in Bungkutoko. With a total economic value of IDR 182.8 million per hectare per year, there is a strong economic argument for redirecting a portion of the ecotourism revenues back into active conservation programs, rather than allowing the full economic surplus to leave the local ecosystem.

4.2. Participatory Management as the Key to Ecotourism Sustainability

The research reveals a significant gap between the high intention to participate (79.6%) and the low actual participation (32.4%) of the community in managing the Bungkutoko Mangrove Area. This participation gap is not unique to Bungkutoko; it is a common finding in the participatory management literature and reflects the structural barriers that prevent communities from translating willingness into action. These barriers include limited access to resources, weak institutional structures, unequal power dynamics, and lack of technical capacity. Effective participatory management in the context of

mangrove ecotourism requires a fundamental transformation in the governance power structure of the area. A co-management approach, in which the local community acts as a key decision-making partner rather than merely a participant, has been shown in various studies to produce better conservation outcomes and a more equitable distribution of benefits (Satria, 2015). This approach requires a formal legal framework that recognizes community rights over the area, clear mechanisms for benefit sharing, and transparent accountability systems. Within the proposed participatory management framework for Bungkutoko Mangrove, three institutional pillars need to be built simultaneously. First, a multi-stakeholder forum that serves as the main platform for negotiation and collective decision-making among the community, government, and private sector. Second, a village-owned enterprise (BUMDes) specifically focused on ecotourism that serves as the operational manager of the area and a channel for community economic benefits. Third, a participatory monitoring and evaluation system that allows the community to independently assess the quality of management and report any problems to the relevant authorities.

4.3. Ecotourism Product Diversification and Revenue Optimization

Qualitative data analysis identified five ecotourism product potentials that have not yet been fully developed at the Bungkutoko Mangrove Area: mangrove educational tours, nature photography and wildlife watching, local culinary experiences, night mangrove tours, and guided mangrove planting activities. These five products represent different market segments and can be packaged to create a comprehensive visitor experience that significantly extends the average length of stay. From a managerial economics perspective, ecotourism product diversification at Bungkutoko Mangrove must be based on careful market segmentation analysis. Survey data showed that 68% of visitors were families, 38% were millennials, and 32% were potential foreign tourists. Each of these segments has different needs and preferences that should shape the design of tourism products, pricing structures, and marketing communications strategies. Optimizing ecotourism revenue also requires a shift from cost-plus pricing to value-based pricing. The total economic value of the ecosystem provides a strong justification for setting admission and service fees at levels that reflect the real value of the experience being offered to visitors, rather than simply covering operational costs. This approach can generate higher surplus that can then be reinvested into conservation and community development programs.

4.4. Community Institutional Capacity Building

One of the most significant findings from the in-depth interviews was the weak institutional capacity of the local community around the Bungkutoko Mangrove Area in managing and benefiting from ecotourism development. Most community members, particularly fishermen and aquaculture farmers, had limited knowledge of ecotourism management, business planning, and effective advocacy for their interests within the formal governance structure. The recommended institutional capacity building program for the Bungkutoko Mangrove community covers four main interrelated components. First, technical training on ecotourism ecosystem management that covers ecosystem monitoring, sustainable harvest practices, and emergency response to environmental threats. Second, entrepreneurship training including financial management, marketing, and tourism product development. Third, legal and institutional assistance to help the community understand their rights and responsibilities under existing regulations, and to guide the establishment of formal community-based organizations. Fourth, networking facilitation to connect local communities with NGOs, universities, and ecotourism best practice networks from other successful areas.

4.5. Conservation Financing and Equitable Benefit Distribution

Conservation financing and benefit distribution are among the most critical and most frequently neglected aspects of mangrove ecotourism development in Indonesia. The in-depth interview findings revealed that the current revenue allocation system at Bungkutoko lacked transparency, had no clear reinvestment mechanism for conservation, and resulted in a very unequal distribution of economic benefits between external operators and the local community. This study recommends the development of a Bungkutoko mangrove conservation financing model based on the Payment for Ecosystem Services (PES) principle adapted to the local context. Under this model, the recommended revenue allocation is: 40% for the community through a transparent benefit-sharing mechanism, 20% for a dedicated conservation trust fund, 20% for infrastructure maintenance and improvement, 10% for the local government, and 10% for operational costs of the management unit.

The blue carbon mechanism as a source of conservation financing represents a highly promising but largely untapped opportunity in Southeast Sulawesi. Mangrove ecosystems are known to be among the most effective carbon sinks per unit area in the world, storing up to five times more carbon than tropical rainforests (Murdiyarso et al., 2015). With a properly verified and registered blue carbon program, the Bungkutoko mangrove community could generate additional income from carbon credit sales in voluntary carbon markets, while at the same time strengthening the economic justification for long-term conservation.

4.6. Policy Integration and the Sustainable Mangrove Ecotourism Model

Sustainable mangrove ecotourism development cannot be separated from the broader policy context, including spatial planning policy, natural resource management, tourism, and climate change. One of the main challenges at Bungkutoko is the fragmentation of management authority across three different agencies: the Marine and Fisheries Office, the Environmental Office, and the Tourism and Creative Economy Office, each with overlapping and sometimes conflicting mandates over the same geographic area. This study recommends the establishment of a cross-sector coordination forum with explicit authority in the planning and oversight of the Bungkutoko Mangrove Area's development. This forum should ideally be formalized through a Mayoral Regulation that assigns clear roles and responsibilities to each stakeholder, including the community as the main management partner. A comprehensive and integrated ecotourism masterplan covering land use, visitor management, conservation zoning, benefit-sharing mechanisms, and monitoring systems should be developed collaboratively by this forum. The sustainable mangrove ecotourism model produced by this research—integrating comprehensive economic valuation, community participatory management, tourist product diversification, conservation financing, and cross-sector policy integration—can serve as a replicable model for other similar mangrove ecotourism areas in Southeast Sulawesi and eastern Indonesia more broadly.

5. CONCLUSION

This study has comprehensively analyzed managerial economic strategies for sustainable mangrove ecotourism development at the Bungkutoko Mangrove Area, Southeast Sulawesi, using a mixed methods approach combining Total Economic Value (TEV) analysis, a structured community and tourist survey, and in-depth interviews with key stakeholders. The total economic value of the Bungkutoko Mangrove ecosystem was found to be IDR 2.87 billion per year, or IDR 182.8 million per hectare per year, with direct use value (68.4%) as the dominant component. This figure demonstrates the significant economic potential of the ecosystem that has not yet been fully and sustainably utilized.

Participatory management analysis revealed a critical gap between community intention to participate (79.6%) and actual participation (32.4%), caused by structural barriers including weak institutional capacity, unequal power dynamics, and non-transparent benefit distribution. Thematic analysis identified five key strategic themes that must be addressed simultaneously: ecosystem value fragmentation, power dynamics, ecotourism product diversification, weak financial mechanisms, and low community institutional capacity.

Based on these findings, this study formulated a five-strategy integrated managerial economic framework: (1) ecosystem-based economic valuation as the foundation for decision-making; (2) ecotourism product diversification to increase revenue and expand market reach; (3) community institutional strengthening to bridge the participation gap; (4) conservation financing optimization through PES mechanisms and blue carbon credits; and (5) cross-sector policy integration to overcome governance fragmentation. This sustainable mangrove ecotourism model offers both a theoretical contribution through the integration of ecosystem economic valuation, participatory management theory, and managerial economics strategy, and practical guidance for the Kendari City Government and local stakeholders.

AUTHOR CONTRIBUTIONS: Conceptualization: Sulhan; Methodology: Sulhan and Aksa; Formal Analysis: Sulhan and Aksa; Investigation: Estiani and Aksa; Data Curation: Aksa; Writing – Original Draft Preparation: Sulhan; Writing – Review and Editing: Estiani and Sulhan; Visualization: Aksa; Supervision: Sulhan; Project Administration: Estiani. All authors have read and agreed to the published version of the manuscript.

ACKNOWLEDGEMENTS

The authors would like to express their sincere gratitude to the management and local community of the Bungkutoko Mangrove Area, Kecamatan Abeli, Kendari City, Southeast Sulawesi, for their

openness, cooperation, and willingness to participate in this research. Special thanks are extended to the Kendari City Marine and Fisheries Office, the Environmental Office, and the Tourism and Creative Economy Office for providing institutional support and access to relevant secondary data. The authors also thank the Faculty of Economics, Universitas Dayanu Ikhsanuddin, Baubau, for providing academic support throughout the research process. Appreciation is further extended to all respondents and key informants who generously gave their time and shared their knowledge and experiences during the data collection period. The authors declare that this research received no specific funding from any public, commercial, or not-for-profit funding agencies. Any opinions, findings, and conclusions expressed in this paper are those of the authors and do not necessarily reflect the views of the affiliated institutions.

REFERENCES

Alongi, D. M., Murdiyarso, D., Fourqurean, J. W., Kauffman, J. B., Hutahaean, A., Crooks, S., ... & Wagey, T. (2016). Indonesia's blue carbon: a globally significant and vulnerable sink for seagrass and mangrove carbon. Wetlands Ecology and Management, 24(1), 3–13. https://doi.org/10.1007/s11273-015-9446-y

Anhar, F. P., Hidayat, A., & Ekayani, M. (2019). Analysis of the benefits and losses of mangrove ecosystem use on Tanakeke Island, South Sulawesi. Jurnal Sosial Ekonomi Kelautan dan Perikanan, 14(1), 1–12. https://doi.org/10.15578/jsekp.v14i1.7541

Barbier, E. B. (2016). The protective service of mangrove ecosystems: A review of valuation methods. Marine Pollution Bulletin, 109(2), 676–681. https://doi.org/10.1016/j.marpolbul.2016.01.033

Boo, E. (1990). Ecotourism: The Potentials and Pitfalls. World Wildlife Fund, Washington, DC.

Costanza, R., de Groot, R., Sutton, P., van der Ploeg, S., Anderson, S. J., Kubiszewski, I., ... & Turner, R. K. (2014). Changes in the global value of ecosystem services. Global Environmental Change, 26, 152–158. https://doi.org/10.1016/j.gloenvcha.2014.04.002

Creswell, J. W., & Plano Clark, V. L. (2018). Designing and Conducting Mixed Methods Research (3rd ed.). SAGE Publications.

Eagles, P. F. J., McCool, S. F., & Haynes, C. D. A. (2002). Sustainable Tourism in Protected Areas: Guidelines for Planning and Management. IUCN, Gland, Switzerland.

Fauzi, A. (2014). Economic Valuation and Assessment of Natural Resource and Environmental Damage. IPB Press, Bogor.

Friess, D. A., Rogers, K., Lovelock, C. E., Krauss, K. W., Hamilton, S. E., Lee, S. Y., ... & Webb, E. L. (2019). The state of the world's mangrove forests: Past, present, and future. Annual Review of Environment and Resources, 44, 89–115. https://doi.org/10.1146/annurev-environ-101718-033302

Giri, C., Ochieng, E., Tieszen, L. L., Zhu, Z., Singh, A., Loveland, T., ... & Duke, N. (2011). Status and distribution of mangrove forests of the world using earth observation satellite data. Global Ecology and Biogeography, 20(1), 154–159. https://doi.org/10.1111/j.1466-8238.2010.00584.x

Hidayat, A., & Rachmawatie, D. (2021). Deforestation of mangrove ecosystems on Tanakeke Island, South Sulawesi, Indonesia. Jurnal Ilmu dan Teknologi Kelautan Tropis, 13(3), 439–454. https://doi.org/10.29244/jitkt.v13i3.33208

Ilman, M., Dargusch, P., Dart, P., & Onrizal. (2016). A historical analysis of the drivers of loss and degradation of Indonesia's mangroves. Land Use Policy, 54, 448–459. https://doi.org/10.1016/j.landusepol.2016.03.010

Jaafar, M., & Maideen, S. A. (2012). Ecotourism-related products and activities, and the economic sustainability of small and medium island chalets. Tourism Management, 33(3), 683–691. https://doi.org/10.1016/j.tourman.2011.07.011

Moleong, L. J. (2021). Qualitative Research Methodology (Revised Edition). PT Remaja Rosdakarya, Bandung.

Murdiyarso, D., Purbopuspito, J., Kauffman, J. B., Warren, M. W., Sasmito, S. D., Donato, D. C., ... & Kurnianto, S. (2015). The potential of Indonesian mangrove forests for global climate change mitigation. Nature Climate Change, 5(12), 1089–1092. https://doi.org/10.1038/nclimate2734

Satria, A. (2015). Politics of Marine and Fisheries. Yayasan Pustaka Obor Indonesia, Jakarta.

Spalding, M., Kainuma, M., & Collins, L. (2010). World Atlas of Mangroves. Earthscan, London. https://doi.org/10.4324/9781849776608

Sugiyono. (2019). Quantitative, Qualitative, and R&D Research Methods (2nd ed.). Alfabeta, Bandung.

Tisdell, C., & Wilson, C. (2002). Ecotourism for the survival of sea turtles and other wildlife. Biodiversity and

Conservation, 11(9), 1521–1538. https://doi.org/10.1023/A:1016862711012
Wearing, S., & Neil, J. (1999). Ecotourism: Impacts, Potentials and Possibilities. Butterworth-Heinemann, Oxford.
Widiastuti, M. M. D., Ruata, N. N., & Arifin, T. (2016). Economic valuation of mangrove ecosystems in the coastal area of Merauke Regency. Jurnal Sosial Ekonomi Kelautan dan Perikanan, 11(2), 147–159. https://doi.org/10.15578/jsekp.v11i2.3612
Wood, M. E. (2002). Ecotourism: Principles, Practices and Policies for Sustainability. UNEP, Paris.
Yoni, N. N. N., & Heriyanti, A. P. (2025). Economic valuation of mangrove ecosystem benefits in Tireman Village, Rembang Regency, Central Java. Jurnal Ilmu Lingkungan, 23(3), 658–670. https://doi.org/10.14710/jil.23.3.658-670