Egyptian Journal of Aquatic Biology & Fisheries
Zoology Department, Faculty of Science,
Ain Shams University, Cairo, Egypt.
ISSN 1110 – 6131
Vol. 29(4): 2107 – 2123 (2025)
www.ejabf.journals.ekb.eg

Toward a Green Economy: Stakeholder Perspectives on Sustainable Mangrove Ecotourism

Lukman Daris[1*], Andi Nur Apung Massiseng[1], Andi Ummung[1], Wahyuti[1] , Dini Anggraeni[2]

[1]Study Program of Fisheries Agrobusiness, Faculty of Fisheries, Cokroaminoto Makassar University, Tamalanrea Km.11, Makassar, South Sulawesi 90245, Indonesia
[2]Study Program of Public Relations, Faculty of Social Sciences, Economics and Humanities, Cokroaminoto Makassar University, Jl. Perintis Kemerdekaan KM.11, Makassar 90245, South Sulawesi, Indonesia

[*]Corresponding Author: daris.lukman70@gmail.com

ARTICLE INFO

Article History:
Received: May 28, 2025
Accepted: July 17, 2025
Online: Aug. 2, 2025

Keywords:
Green economy,
Stakeholder,
Perspective analysis,
Mangrove ecotourism,
Sustainability

ABSTRACT

Mangrove ecosystems are not only composed of distinctive plant communities but also have critical ecological and socio-economic functions in coastal regions. They provide natural protection against waves and tsunamis and serve as vital habitats for diverse flora and fauna. An emerging function of mangroves is their role in ecotourism, contributing to environmental conservation and supporting the growth of a green economy. This study aimed to analyze stakeholder positions and identify key actors involved in the sustainable management of the Lantebung mangrove ecotourism area, located in Bira Sub-district, Tamalanrea, Makassar, South Sulawesi, Indonesia. Conducted from May to July 2023, the research employed structured interviews and utilized Interpretive Structural Modeling (ISM) with ISM Professional 2.0 software, along with Participatory Prospective Analysis (PPA). The findings indicate that the Ministry of Marine Affairs and Fisheries of the Republic of Indonesia (KKP RI) holds a central role, characterized by high influence and low dependence, making it the key actor in the governance framework. Other significant stakeholders include the Makassar City Office of Fisheries and Agriculture, the local ecotourism management group (JEKOMALA), the Bira Sub-district Government, and local fishing communities. These actors exhibit both substantial influence and mutual interdependence, reinforcing collaborative and sustainable governance. The study's practical implications highlight that KKP RI's involvement—evidenced by the construction of a 110-meter mangrove tracking path, installation of gazebos, and collaboration with the International Fund for Agricultural Development (IFAD) for coastal community empowerment—has fostered institutional synergy. These initiatives, coupled with strong local engagement, demonstrate the potential for enhanced multi-level cooperation in ecotourism development. Such collaboration is essential for improving local livelihoods, fostering environmental stewardship, and advancing sustainable, community-based green economy initiatives in coastal area.

INTRODUCTION

Mangroves are salt-tolerant shrubs and trees that thrive in the intertidal zones of tropical and subtropical coastal regions, particularly along sheltered coastlines, river estuaries, and deltas. These ecosystems develop in muddy, nutrient-rich substrates characterized by minimal wave action and regular tidal inundation **(Feng *et al.*, 2021; Prihantono *et al.*, 2023)**. Through specialized physiological, anatomical, and molecular adaptations, mangrove species tolerate high salinity and low oxygen environments, making them ecologically distinct and vital for coastal resilience, biodiversity conservation, and carbon sequestration **(Menendez *et al.*, 2020; Su & Gasparatos, 2021; Blanton *et al.*, 2024)**.

Mangrove-based ecotourism is gaining prominence in coastal areas due to its dual ecological and economic benefits. These ecosystems serve as natural attractions that promote environmental stewardship while contributing to local livelihoods. In locations such as Lantebung, ecotourism incorporates mangrove forests and marine resources into sustainable tourism models, emphasizing community participation, conservation, and income generation. Active involvement of local communities in the planning, management, and implementation of ecotourism initiatives enhances social capital and economic resilience **(Nurhayati *et al.*, 2023; Elfina *et al.*, 2025)**. Typically practiced through independent or small-scale models, such tourism minimizes environmental impact while increasing public ecological awareness **(Saefullah *et al.*, 2021; Kurniawati *et al.*, 2022)**.

Lantebung mangrove ecotourism is emerging as a key destination in Makassar, encompassing approximately 20 hectares along the Makassar Strait in Bira Village, Tamalanrea District, South Sulawesi. Located just 30 minutes from the city center, it attracts frequent weekend visitors and functions as an accessible urban green space **(Muslim *et al.*, 2024; Wulandari *et al.*, 2024)**. However, its proximity to dense residential areas and high visitor traffic presents challenges such as pollution, overcrowding, and habitat degradation. Ensuring the sustainability of this ecosystem requires a comprehensive management approach that incorporates five key dimensions: 1) planning integration, 2) knowledge integration, 3) stakeholder integration, 4) sectoral integration, and 5) ecological integration **(Saleh *et al.*, 2022)**.

This study focuses specifically on stakeholder integration, recognizing its pivotal role in the sustainable governance of the Lantebung mangrove ecotourism area. Stakeholders are defined as actors with vested interests in the ecosystem, including government bodies, NGOs, local communities, and private sector entities. Prior studies, such as those of **Wondirad *et al.* (2020)** and **Mardianton *et al.* (2024)** on the Baluno Mangrove Learning Center (MLC) in Majene, identified nine key stakeholders fulfilling 27 distinct roles. In that context, NGOs and provincial environmental agencies were instrumental in promoting collaboration and avoiding conflicts of interest, thus ensuring

program success. Building on such insights, the current study aimed to map stakeholder positions and identify the key actors influencing the effective and sustainable management of the Lantebung mangrove area **(Zhou *et al.*, 2023)**.

Mangrove-based ecotourism plays a strategic role in advancing the green economy by linking environmental preservation with sustainable livelihood opportunities. As nature-based tourism, it generates economic returns while maintaining the ecological integrity of sensitive coastal ecosystems. Within the green economy framework, the participation of diverse stakeholders—government institutions, NGOs, private actors, and local communities—is essential to align social and economic outcomes with environmental sustainability **(Arfan *et al.*, 2022)**. Effective integration of these stakeholders through shared planning, inter-sectoral collaboration, knowledge exchange, and community engagement ensures long-term viability and ecological balance **(Salman *et al.*, 2024)**.

This study addressed a research gap by examining stakeholder dynamics in a local ecotourism context, specifically the Lantebung mangrove area in Makassar, Indonesia. The findings aim to support the development of a community-based ecotourism management model that reflects green economy principles and is adapted to the socio-ecological realities of coastal communities.

MATERIALS AND METHODS

1. Study area

This study was conducted in the Lantebung mangrove ecotourism area, located in Bira Sub-district, Biringkanaya District, Makassar City, South Sulawesi Province. The site was selected purposively, since it represents an urban mangrove ecotourism area with active ecotourism management and established partnerships with various stakeholders for the development of mangrove ecotourism in the region. The research was carried out over a two-month period, from May to July 2023. The study location is illustrated in Fig. (1).

Fig. 1. Research location map

2. Types and sources of data

This research relied on primary data, collected directly through field observations and interviews with designated informants, rather than through secondary sources. Data were obtained via direct measurements, structured observations, and systematic interviews with respondents selected based on criteria aligned with the study's objectives. A descriptive quantitative approach was adopted, employing closed-ended questionnaires to facilitate structured data collection. These questionnaires provided a standardized format by presenting respondents with predefined questions and multiple-choice options, ensuring consistency across responses.

Respondents were selected purposively, targeting individuals with direct involvement in mangrove ecotourism activities and specific roles in the planning, management, or operations of the Lantebung mangrove area. Selection criteria included:

1. Representation of key stakeholder groups (e.g., local communities, NGOs, tourism operators, and government agencies);

2. Active engagement in ecotourism development or mangrove conservation programs;
3. Relevant knowledge of policy frameworks, local management practices, or social dynamics of the area.

In addition to surveys, field observations were conducted to complement and contextualize the quantitative data, offering deeper insights into stakeholder behavior, site conditions, and sustainability practices at the Lantebung ecotourism location.

3. Data analysis

The study utilized Interpretive Structural Modeling (ISM) for data analysis, implemented via ISM Professional 2.0 software. ISM is a strategic decision-support tool grounded in expert judgment and is particularly suitable for analyzing complex, multidimensional systems. It facilitates the identification and interpretation of contextual relationships among key variables, enabling the construction of a hierarchical model that reveals influence and dependency among system components.

The ISM methodology comprises three key stages:

1. Identification of relevant elements and the contextual relationships between them;
2. Data processing using ISM Professional 2.0 to develop structural self-interaction matrices and graphical models;
3. Interpretation of results to analyze stakeholder roles, interactions, and structural dynamics.

The final ISM output includes a quadrant matrix that categorizes stakeholders into four classifications based on their levels of influence and dependence:

- Autonomous (low influence, low dependence)
- Dependent (low influence, high dependence)
- Linkage (high influence, high dependence)
- Independent/Driver (high influence, low dependence)

This typology provides a clearer understanding of stakeholder roles, power dynamics, and potential leverage points for collaborative governance.

ISM has proven to be a robust methodological tool in stakeholder analysis, especially within socio-environmental contexts such as ecotourism and natural resource governance. It supports the translation of qualitative insights into structured models that enhance **evidence-based decision-making** and **participatory planning**. Recent applications have demonstrated ISM's utility across a range of fields, including knowledge risk management **(Foli, 2022)**, marine conservation **(Tranter *et al.*, 2022)**, mangrove restoration **(Nesha Dushani *et al.*, 2023)**, ecotourism adaptation **(Trang *et al.*, 2023)**, and digital transformation **(Favoretto *et al.*, 2024)**.

In this study, ISM is employed to map the structural relationships among stakeholders engaged in managing the Lantebung mangrove ecotourism area. The insights derived are intended to inform the development of a participatory, community-based ecotourism governance model, aligned with the principles of the green economy.

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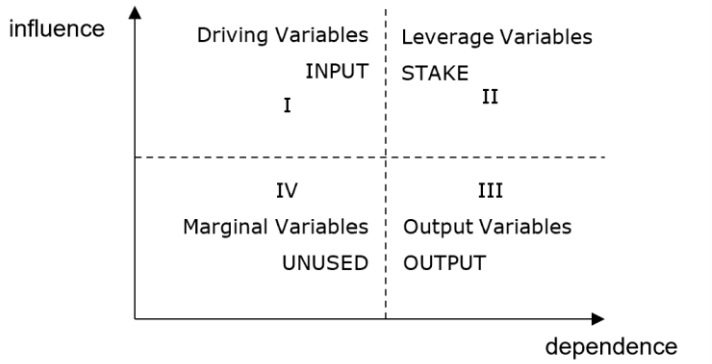

Fig. 2. Quadrant/matrix of influence and dependence

Description:

- Quadrant I, known as the Input Quadrant or Driving Variables, comprises elements that exert a high level of influence while maintaining minimal dependence on other elements.
- Quadrant II, referred to as the Stake Quadrant or Leverage Variables, consists of elements that exhibit both high influence and high dependency within the system.
- Quadrant III, identified as the Output Quadrant or Dependent Variables, contains elements that are heavily dependent on others but contribute relatively little influence themselves.
- Quadrant IV, called the Unused Quadrant or Independent Variables, includes elements that have both low influence and low dependency in the system.

Bourgeois and Jesus (2004) identify two general types of element distribution in influence-dependence diagrams:

1. A pattern clustering from Quadrant IV to II indicates an unstable system dominated by marginal or leverage variables, making strategic planning difficult.
2. A pattern clustering from Quadrant I to III suggests a stable system with strong linkages, where driving variables effectively control outputs, enabling easier and more strategic scenario development.

RESULTS AND DISCUSSION

1. Stakeholder analysis

Participatory prospective analysis (PPA) is a structured, forward-looking methodology applied during the planning stages of environmental and conservation initiatives to systematically assess stakeholder perspectives and anticipate future dynamics. Unlike conventional stakeholder analysis, which often focuses on static assessments, PPA emphasizes active participation to inform strategic decision-making in complex socio-ecological systems **(Massiseng *et al.*, 2023)**. It is particularly effective in mapping stakeholders' potential roles, expectations, and power relations, offering a deeper understanding of how stakeholder interactions may evolve over time.

Typical stakeholders in such initiatives include local government authorities, private sector representatives, researchers, NGOs, and community members with either direct or indirect interests in natural resource management. These stakeholders are analyzed using two key dimensions:

1. Influence – the extent to which they can affect project outcomes; and
2. Interest – the degree to which they are impacted by those outcomes.

Based on these criteria, stakeholders are commonly categorized into four quadrants:

- Subjects (low influence, high interest)
- Key players (high influence, high interest)
- Context setters or decision-makers (high influence, low interest)
- Marginal stakeholders or bystanders (low influence, low interest)

This classification serves as a strategic framework for designing stakeholder engagement approaches, ensuring that all relevant actors are appropriately represented in decision-making processes. PPA thereby contributes to the formulation of inclusive and adaptive governance models, enhancing alignment between institutional strategies, community needs, and long-term sustainability objectives.

Based on stakeholder identification and expert interviews, the key actor elements involved in the governance of Lantebung mangrove ecotourism are presented in Table (1).

Table 1. Stakeholder (actor) elements in Lantebung mangrove ecotourism

Symbol	Element Stakeholder (Actors)
A1	Ecotourism Management (JEKOMALA)
A2	Ministry of Marine Affairs and Fisheries of the Republic of Indonesia (KKP RI)
A3	Ministry of Environment and Forestry of the Republic of Indonesia (KLHK RI)
A4	South Sulawesi Provincial Marine and Fisheries Office

Symbol	Element Stakeholder (Actors)
A5	Makassar City Office of Fisheries and Agriculture
A6	Makassar City Tourism Office
A7	South Sulawesi Provincial Environmental Office
A8	Makassar City Environmental Office
A9	South Sulawesi Provincial Forestry Office
A10	Bira Sub-district Government
A11	Bank Indonesia
A12	Pertamina
A13	Universities / Higher Education Institutions
A14	Youth Nature Enthusiast Community
A15	Fishermen Community Group
A16	Fish Processing Community Group
A17	Fish Farming Community Group
A18	Business Actors
A19	Industry Actors

Based on the identification of stakeholders (actors) involved in the management of Lantebung mangrove ecotourism (Table 1), a participatory prospective analysis (PPA) was subsequently conducted to assess the extent of stakeholder involvement and their direct or indirect influence. The stakeholder elements in the management of Lantebung mangrove ecotourism come from diverse backgrounds, including local community groups, youth organizations, government agencies at the village, district, provincial, and national levels, state-owned enterprises (SOEs), academics, and private entrepreneurs. The quadrant-based analysis results are presented as follows :

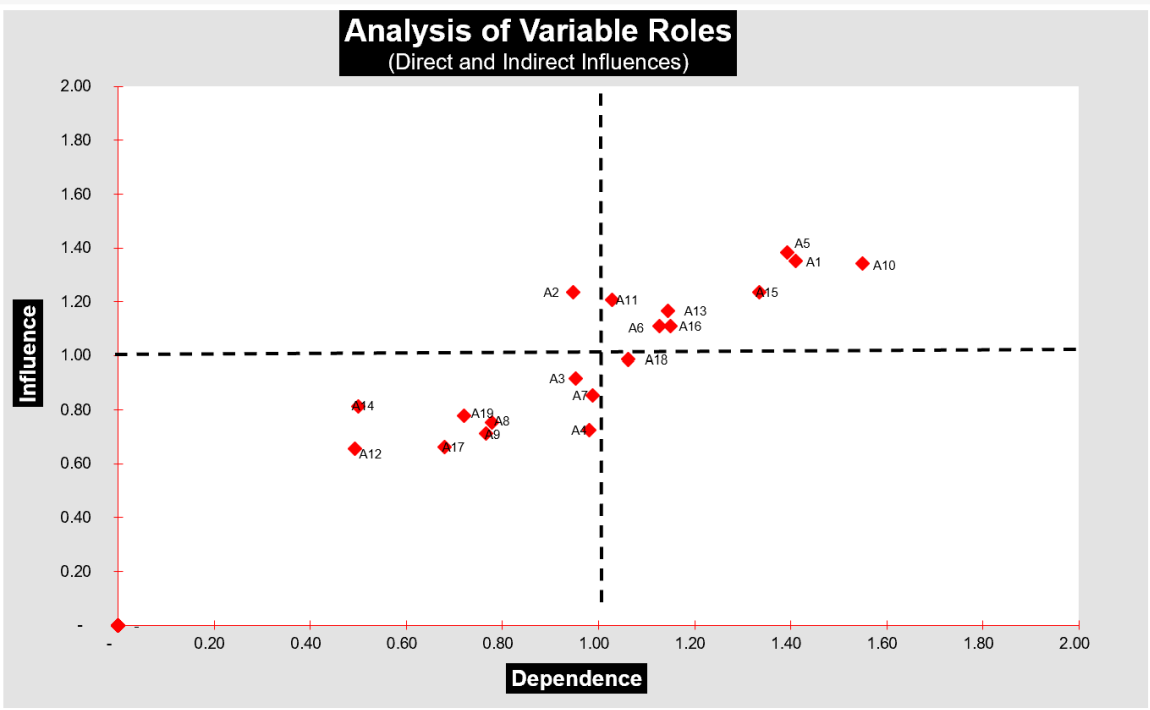

Fig. 3. Influence and dependence quadrant of actors in Lantebung mangrove ecotourism

The results of the prospective analysis of actor elements show that the Ministry of Marine Affairs and Fisheries (KKP RI) is identified as the main actor or key element in the management of Lantebung mangrove ecotourism, as it possesses strong influence and low dependence. Based on the influence and dependence quadrant/matrix, the findings are as follows:

- Quadrant I is the Input Quadrant or Driving Variables Quadrant. This quadrant includes elements with high influence but low dependence on other elements. Based on the PPA analysis, the stakeholder in Quadrant I of Lantebung mangrove ecotourism is the Ministry of Marine Affairs and Fisheries (A2).
- Quadrant II is the Stake or Leverage Variables Quadrant. It includes elements with both high influence and high dependence on other elements. According to the PPA analysis, the stakeholders in Quadrant II are Jekomala (A1), the Makassar City Fisheries and Agriculture Office (A5), the Makassar City Tourism Office (A6), Bira Subdistrict Government (A10), Bank Indonesia (A11), Universities (A13), Fishermen's Community Group (A15), and Processing Community Group (A16).
- Quadrant III is the Output Quadrant or Dependent Variables Quadrant. It contains elements with low influence but high dependence on other elements. The PPA analysis identifies Business Actors (A18) as the stakeholder in Quadrant III.
- Quadrant IV is the Unused or Marginal Variables Quadrant. It includes elements with both low influence and low dependence on other elements. The stakeholders

in this quadrant, based on the PPA analysis, are the Ministry of Environment and Forestry (A3), the South Sulawesi Provincial Marine and Fisheries Office (A4), the South Sulawesi Provincial Environmental Office (A7), the Makassar City Environmental Office (A8), the South Sulawesi Provincial Forestry Office (A9), Pertamina (A12), Nature-Loving Youth Community (A14), Aquaculture Community Group (A17), and Industrial Actors (A19).

Justification for stakeholder positioning in each quadrant :

- The categorization of stakeholders into the four quadrants is informed by their relative degrees of influence—referring to their ability to impact decisions, mobilize resources, or implement regulations—and dependence, meaning the extent to which their roles and interests are shaped by the actions of other stakeholders.
- Stakeholders placed in Quadrant I function as key drivers of policy and coordination efforts. Their influence is substantial, yet their operations exhibit minimal reliance on other actors, which supports the classification of the Ministry as a dominant stakeholder in this category.
- In Quadrant II, stakeholders are characterized by a high degree of both influence and interdependence. Their effectiveness often hinges on collaborative networks, financial support, or technical assistance, reinforcing their critical role in operational execution and multi-actor engagement.
- Quadrant III comprises stakeholders with limited influence but considerable reliance on external inputs. For instance, Business Actors fall into this group due to their operational dependency on permits, regulatory frameworks, and access provided by other actors within the ecotourism system.
- Finally, stakeholders assigned to Quadrant IV demonstrate minimal influence and dependence. Their involvement in ecotourism governance is currently marginal, possibly due to low levels of engagement or institutional barriers, despite their potential relevance in future developments.

2. Stakeholder roles

The sustainability of mangrove ecotourism is increasingly understood to depend not solely on ecological factors, but more critically on inclusive and collaborative governance involving a diverse array of stakeholders **(Daris *et al.*, 2023)**. **Ramadesta and Sukana (2022)** emphasize that active participation from government institutions, local communities, academia, and the private sector—aligned within the Penta-helix model—is essential for the effective implementation of mangrove ecotourism initiatives. These actors contribute complementary resources, legitimacy, and diverse perspectives, thereby strengthening the comprehensiveness and adaptability of management strategies.

Similarly, **Nasution *et al.* (2025)** argue that integrating environmental policy frameworks with stakeholder collaboration offers a strategic pathway for aligning conservation goals with local socio-economic development. In this context, cross-sectoral cooperation and meaningful community engagement are identified as key enablers of ecotourism that is both environmentally sustainable and economically inclusive.

Expanding on this perspective, **Wondirad *et al.* (2020)** highlight that in the Global South, the development of sustainable ecotourism is closely tied to the quality of stakeholder collaboration. Their findings underscore the importance of involving NGOs, local authorities, and grassroots actors in participatory decision-making processes, fostering governance structures that are both equitable and effective.

Taken together, these studies reinforce the imperative of stakeholder synergy in advancing sustainable mangrove ecotourism. Effective collaboration across institutional boundaries is not simply advantageous, but foundational to achieving long-term ecological integrity and socio-economic resilience within coastal tourism systems.

Table 2. Stakeholder roles in lantebung mangrove ecotourism

Stakeholder symbol	Stakeholder roles
A1	- Managing the Lantebung mangrove ecotourism area - Managing mangrove seedling nurseries - Conducting regular mangrove planting activities - Providing environmental education for students - Establishing partnerships with other stakeholders - Conducting regular waste clean-up activities at the Lantebung mangrove ecotourism site
A2	- Constructing a 110-meter-long mangrove tracking pathway - Building gazebos for visitors - Collaborating with one of the United Nations financial institutions, namely IFAD (International Fund for Agricultural Development), through a coastal community empowerment program delegated to the Department of Fisheries and Agriculture of Makassar City.
A3	- Conducting mangrove planting in the Lantebung mangrove ecotourism area - Awarding the Kalpataru Award in 2020 to the head of the Lantebung mangrove ecotourism management as a representative of South Sulawesi
A4	- Melakukan penanaman mangrove di kawasan ekowisata mangrove Lantebung - Melakukan pelatihan peningkatan kapasitas kelompok

	masyarakat di kawasan ekowisata mangrove Lantebung
A5	- Constructed a 100-meter mangrove tracking path with a budget of IDR 100 million through the IFAD program - Built an information hut with a budget of IDR 75 million through the IFAD program - Established the Lantebung Mangrove Ecotourism Management Group (Jekomala / Lantebung Mangrove Ecotourism Network) - Formed community groups within the mangrove ecotourism area and provided funding of IDR 50 million per group - Developed a mangrove seedling nursery and conducted mangrove planting with a budget of IDR 50 million - Conducted capacity-building training for community groups - Coordinated with the Ministry of Marine Affairs and Fisheries (KKP RI) for assistance in ecotourism facilities and infrastructure
A6	- Promoting the Lantebung Mangrove Ecotourism - Recognizing Jekomala as a tourism-aware group through an official decree by the Head of the Makassar City Tourism Office - Conducting regular training sessions related to ecotourism
A7	- Conducting mangrove planting in the Lantebung mangrove ecotourism area - Supporting the head of the Lantebung mangrove ecotourism management group as a recipient of the 2020 Kalpataru Award
A8	- Conducting mangrove planting in the Lantebung mangrove ecotourism area.
A9	- Conducting mangrove planting in the Lantebung mangrove ecotourism area.
A10	- Promoting Lantebung mangrove ecotourism - Establishing the information hut as a coordination center for the Lantebung community and other stakeholders - Regularly holding coordination meetings between the village government and the Lantebung mangrove ecotourism management - Supporting the ecotourism managers in building partnerships with other stakeholders
A11	- Constructing a mangrove tracking path, gazebo, and photo spots with a total value of IDR 373 million - Procuring tourist boats
A12	- Empowering youth in the mangrove ecotourism area - Establishing a waste bank in Lantebung

A13	- Construction of facilities and provision of clean water infrastructure in the ecotourism area - Conducting regular community service programs as part of an adopted village initiative - Creating photo spots - Training the community to process waste into ecobricks - Assisting with environmental sanitation through student community service (KKN) activities
A14	- Conducting regular environmental clean-up activities in the Lantebung mangrove ecotourism area - Raising youth awareness about the importance of environmental conservation - Initiating "Camping of the Day" activities for youth in the ecotourism area
A15	- Conducting mangrove seedling cultivation - Selling mangrove seedlings to the ecotourism management - Working on self-help projects related to the development of the Lantebung mangrove ecotourism area - Joining the management team of the Lantebung mangrove ecotourism initiative
A16	- Processing fishery products for sale to visitors - Producing tea made from mangrove plants
A17	- Conducting aquaculture activities around the mangrove ecotourism area - Collecting crab seeds from the wild
A18	- Selling goods around the Lantebung mangrove ecotourism area - Purchasing plastic waste within the Lantebung mangrove ecotourism environment
A19	- Purchasing mangrove seedlings from the ecotourism managers and planting them within the Lantebung mangrove ecotourism area.

As shown in Table (2), all identified stakeholders demonstrate meaningful involvement in the governance of the Lantebung mangrove ecotourism area. Their roles vary in function—some overlapping, others complementary—while a few hold a more dominant position in the governance structure. The Ministry of Marine Affairs and Fisheries of the Republic of Indonesia (KKP RI) emerges as the principal stakeholder, exerting the highest level of influence with minimal dependency on other actors. This positioning places KKP RI in Quadrant I of the influence–dependence matrix, identifying it as a key actor in the sustainable management of the site.

Several other stakeholders are positioned in Quadrant II, characterized by both high influence and high dependence. This placement indicates their critical roles in enabling collaborative governance. These include:

- The Department of Fisheries and Agriculture of Makassar City, which functions as a regulatory and technical body, supporting capacity building and ensuring alignment with municipal fisheries and coastal policies.
- Jekomala (the Lantebung Mangrove Ecotourism Management Network), which acts as a coordinating platform, facilitating community-based initiatives and serving as an intermediary between government agencies and grassroots actors.
- The Bira Subdistrict Government, which holds administrative authority and ensures that ecotourism efforts are integrated with subdistrict-level planning and resource allocation.
- The local fishermen community group, which contributes traditional ecological knowledge and ensures that tourism activities align with sustainable resource use and local livelihoods.

The positioning of these stakeholders in Quadrant II reflects a high degree of interdependence, underscoring the need for multi-level coordination, joint decision-making, and mutual support in areas such as policy implementation, community engagement, and adaptive management of coastal ecosystems. Their collaborative involvement is essential for the long-term success and resilience of mangrove-based ecotourism in Lantebung.

CONCLUSION

This study emphasizes the critical importance of collaborative stakeholder engagement in ensuring the sustainable governance of mangrove ecotourism in Lantebung. Based on structural prospective analysis (PPA), the Ministry of Marine Affairs and Fisheries of the Republic of Indonesia (KKP RI) emerged as the most influential stakeholder, characterized by high influence and low dependency. This strategic positioning highlights KKP RI's pivotal role in shaping integrative and sustainable ecotourism governance frameworks, establishing it as a key actor in policy implementation and ecosystem management. In addition to KKP RI, several other stakeholders play significant roles in supporting ecotourism development, including the Makassar City Office of Fisheries and Agriculture, the local ecotourism management group (JEKOMALA), the Bira Sub-District Government, and community-based fisher groups. Their involvement is not merely representative of individual interests but reflects a collective effort to establish inclusive, participatory governance mechanisms. Stakeholder contributions manifest through various activities such as mangrove reforestation, environmental education, ecotourism infrastructure development, and local community empowerment. The integration of actors from government, academia, civil

society, the private sector, and media—aligned with the Penta-Helix model—serves as a foundational pillar for achieving ecological sustainability while simultaneously improving community livelihoods. In conclusion, the success of mangrove ecotourism governance in Lantebung is contingent upon the synergistic roles and sustained commitment of both key and supporting stakeholders. Their long-term collaboration is essential for building a resilient coastal socio-ecological system capable of adapting to present and future environmental challenges For policymakers, this study underscores the need for inclusive policy frameworks that promote coordination among government, local institutions, and civil society. Formal partnerships, capacity-building, and dedicated funding are key to effective implementation. For ecotourism managers, fostering participatory governance through training, community monitoring, and fair benefit-sharing will strengthen local ownership. Integrating scientific and traditional knowledge through adaptive management can further enhance sustainability and resilience

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