The Tangible and Intangible Benefits of Mangrove Forests as a Factor Affecting Community Participation in Mangrove Management

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ABSTRACT

Community participation has been identified as a key factor in ensuring the long-term sustainability and effective governance of these valuable ecosystems. The three pillars of sustainable protected area management are forms of ecological, social and economic management that enhance the function of protected areas and can support human life. Mangrove forests play a crucial role in coastal ecosystems, providing numerous ecological, economic, and socio-cultural benefits to local communities. Understanding the diverse range of tangible and intangible benefits associated with mangrove forests is essential for comprehending the motivations and incentives that encourage community engagement in their conservation and sustainable management. The review highlights the complex interplay between tangible and intangible benefits and their influence on community participation in mangrove management. The review underscores the importance of recognizing and valuing both types of benefits, as they are intertwined and shape the attitudes, behaviors, and decision-making processes of local communities. Interdisciplinary studies that incorporate ecological, economic, social, and cultural dimensions is needed to comprehensively understand the multifaceted benefits of mangrove forests and their role in driving community participation in mangrove management. Such insights can inform policy and management strategies that promote sustainable development and effective conservation of mangrove ecosystems, ultimately contribute to the well-being of both coastal communities and the environment.

Keywords: Community-Based, Forest Management, Mangrove

INTRODUCTION

Mangrove forests are highly productive and diverse coastal ecosystems found in tropical and subtropical regions around the world. These unique forests provide a wide array of benefits to both human communities and the environment. Mangroves have been under considerable pressure, mainly from anthropogenic activities and natural factors. FAO (2007). and Thomas *et al.* (2017) stated that the decline in mangrove forest cover and quality has occurred for a long time, mainly due to conversion to ponds and agricultural land During 1996 and 2010 the anthropogenic activities that had the greatest impact on mangrove conversion were ponds (aquaculture) and agriculture. Based on Thomas *et al.* (2022)

anthropogenic activities of deforestation are the main factor in reducing the area of mangroves until 2020. In addition, the results of research by Thomas *et al.* (2017) show that logging is a fairly prominent activity in the Southeast Asian region.

According to the FAO report (2007), Indonesia is a country with the widest mangrove ecosystem in the world. However, between 1982 and 2000, Indonesia had lost more than half of its ecosystem, from 4.2 million hectares to only 2 million hectares. Polidoro *et al.* (2010) stated that shrimp ponds accounted for 38% of overall mangrove loss, while other types of ponds contributed 14%. The loss of mangrove cover is exacerbated by natural factors such as coastal abrasion. Kusmana *et al*. (2003) and Sala (2014). Damage to mangroves in Indonesia is caused by several factors, including land conversion, deforestation, area clearing, and pollution

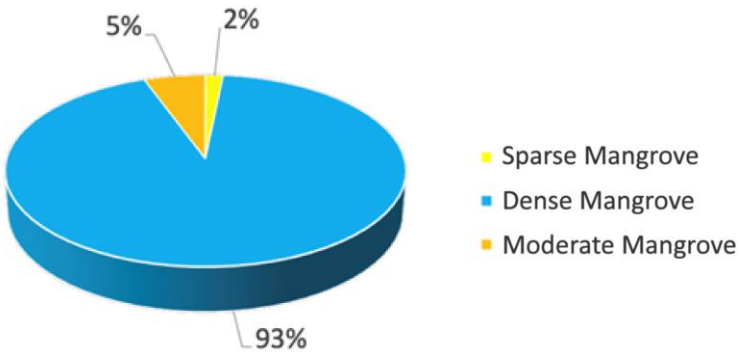

Figure 1. Circle diagram showing the proportion of existing mangroves based on density levels

Based on the national mangrove mapping of 2021, the total area of existing mangroves is 3,364,080 hectares, and the potential habitat area for mangroves is 756,183 hectares. This means that the total mangrove ecosystem area in Indonesia is 4,120,263 hectares, which is the sum of the existing mangrove area and potential habitat for mangroves. Therefore, the composition of existing mangroves and potential mangrove habitat in relation to the overall mangrove ecosystem in Indonesia is 82% and 18%, respectively.

Table 1. The area of existing mangroves in Indonesia

No.	Density Class	Area (Ha)	%
1.	Dense Mangrove	3,121,240	92.78
2.	Moderate Mangrove	188,366	5.60
3.	Sparse Mangrove	54,474	1.62
	Total	3,364,080	100.00

The area of existing mangroves can be further categorized based on the density classes of dense, moderate, and sparse, with their respective areas presented in Table 1 and depicted in the pie chart in Figure 1. Based on Figure 1, it can be seen that the current condition of existing mangroves is predominantly dense mangroves (93%), followed by moderate mangroves (5%) and sparse mangroves (2%).

In recent years, there has been a growing recognition of the crucial role that local communities play in the management and conservation of mangrove forests. Community participation has been identified as a key factor in ensuring the long-term sustainability and

effective governance of these valuable ecosystems. A number of studies showing the importance of community involvement, especially in mangrove management, include those presented by Amal and Baharuddin (2016), Brown *et al.* (2014), Pribadiningtyas *et al.* (2012), Purnamasari *et al.* (2015) and Tanjung *et al.* (2017) who argue that the level of High community involvement is recommended as the best approach in mangrove management and rehabilitation. Roy (2016) suggests that communities contribute to conservation through their involvement in forest planning and management programs. Datta *et al.* (2012) stated that one of the main factors identified as determining institutional sustainability in mangrove management is ensuring community participation in decision-making and distribution of natural resources. Active participation from the community is also needed for the sustainability of mangrove management (Ounvichit and Yoddumnernattig, 2018).

Dasgupta and Shaw (2017) said that it is very important for the active participation of the community in making human-environment relations sustainable for mangrove habitats. Management of mangrove forest ecosystems involving the community is a dynamic and sustainable process that brings many interests, knowledge, and management as well as sector and public interests (Iswahyudi *et al.,* 2019).

One that can be a determining factor for the success of mangrove forest management is community participation. Understanding the factors that drive community participation in mangrove management is essential for developing successful conservation strategies. One significant aspect that motivates and incentivizes local communities to engage actively in mangrove management is the recognition of the tangible and intangible benefits associated with these forests. The relationship between the tangible and intangible benefits of mangroves with community participation in mangrove forest management is to be discussed in the following descriptions.

METHODS

The method used in this writing is a literature review which is a systematic, explicit and reproducible method for identifying, evaluating and synthesizing works of research results and ideas that have been produced by researchers and practitioners (Okoli and Schabram, 2011). There four stages in making this literature review are (1) selecting topics to be reviewed, (2) tracking and selecting suitable/relevant articles, (3) conducting literature analysis and synthesis and (4) organizing review writing. This literature review explores the tangible and intangible benefits of mangrove forests and their influence on community participation in mangrove management. The review synthesizes existing research to understand how the recognition of these benefits affects the engagement of local communities in conservation and sustainable management efforts. By analyzing the findings of various studies, this review highlights the significance of considering both tangible and intangible benefits to foster effective community participation in mangrove conservation.

RESULTS AND DISCUSSION

Sustainable Mangrove Forest Management

Mangrove forests represent a distinctive ecosystem where the terrestrial and marine environments intertwine. This ecosystem thrives in challenging environmental conditions, including high salinity, elevated temperatures, muddy sediments, strong tides, and anaerobic

soils. Given their unique characteristics, mangroves offer diverse ecological services that are vital to the livelihoods of coastal communities. These services encompass protection against storms and tsunamis, provision of habitats for various aquatic species, regulation of water systems, biodiversity and wood resources, and visually appealing landscapes for tourism. Notably, mangroves play a significant role in carbon storage and sequestration, particularly in tropical regions. In the management of coastal areas, the primary focus of the local government has leaned more towards achieving maximum economic objectives rather than considering the ecological consequences, despite the recognition that ecological losses ultimately result in economic setbacks. For instance, Purwanto (2005) stated that the erosion leading to the reduction in the size of ponds and the accumulation of sandy sediments along the coast has the effect of diminishing the quality and fertility of these pond areas, ultimately resulting in reduced productivity.

To ensure the sustainable management of mangrove forests, Kusmana (2003) suggests optimizing the economic, social, and ecological benefits derived from these ecosystems to meet the current generation's needs while safeguarding resources for future generations. The Food and Agriculture Organization (FAO) and the United States Forest Service Tropical Forestry define sustainable mangrove management as the application of biological, managerial, technical, economic, and social knowledge to ensure the sustainable use of mangrove resources, benefiting the maximum number of people while preserving the environment.

The FAO has proposed various recommendations to achieve sustainable mangrove management, including the development of integrated management plans and the active involvement of local communities residing near mangrove areas. The International Tropical Timber Organization (ITTO) defines sustainable forest management as the practice of managing forests based on scientific knowledge and local expertise, allowing multiple goals to be achieved without degrading forest resources and ecosystem quality. These definitions emphasize the crucial role of community residents in attaining sustainability in mangrove forest management.

Hernawati *et al.* (2023) stated that environmental guidance and education focused on the sustainable conservation as a means to enhance community awareness and attitudes is necessary. Furthermore, it is imperative to inspire and encourage the community to actively uphold the mangrove ecosystem. The provision of motivation will significantly contribute to boosting the community's commitment to safeguarding the forest.

Community Participation in Sustainable Mangrove Forest Management

Community-based mangrove management has been widely practiced in various parts of the world. Countries such as Bangladesh, Indonesia, the Philippines and Vietnam are known for their efforts to rehabilitate mangroves with diverse backgrounds. Most of the planting in Bangladesh is done within the framework of afforestation on new lands whereas Indonesia and the Philippines are replanting due to clear-cutting, opening of ponds and population growth pressures. In the case of Vietnam, the impact of the war caused the damage to be multiplied Field (1998).

Conservation of mangrove ecosystems continues to be improved until today. This is supported by several related regulations as well as NGO and community activities and assistance. According to Amri (2005), Prayudha (2014), Damastuti and Groot (2017), mangrove conservation initiatives originating from community awareness, both groups and individuals, can be found in several areas such as Indramayu, South Sulawesi, Demak, Tarakan. In carrying out various capacity-building activities, the community is supported by

short and long term programs originating from corporate social responsibility or donors/grants.

Community-based mangrove management (CBMM) is seen as an alternative to sustainable management of mangrove ecosystems which have experienced a drastic decline in many parts of the world. Datta *et al* (2012) reviewed various CBMM practices in several countries including Indonesia. CBMM practice in Indonesia started around the 1980s and was categorized as high in achieving program success. What stands out in this success is that various activities were carried out by NGOs and research institutions first, then followed by government initiatives.

As previously mentioned, the active engagement of local communities in managing mangrove forests plays a crucial role in fostering the sustainable utilization of mangrove resources and advancing conservation efforts. Tang-Lee (2016) provides a definition of "public participation" (PP) as intentional involvement of the general public or its representatives in decision-making processes, rather than decisions emerging solely from grassroots efforts. The International Association for Public Participation (IAP2) views PP as a process that incorporates public input, including opinions, demands, knowledge, skills, and experiences, to facilitate better decision-making.

The Ministry of Forestry of the Republic of Indonesia (2013) states that community-based management of mangrove ecosystems is part of the national mangrove ecosystem management strategy to increase community income and support sustainable development. Mangrove management must follow the following principles: (1) Transparency. This aspect can be seen by all parties to review. (2) Participative type. This can be implemented in a participatory manner, taking into account the commitment of all stakeholders. (3) Socialized, comprehensive, scientifically researched and traceable accountability. (4) Responsiveness, regarding the ability to predict changes in regional, national, and global commitments to mangrove ecosystems. (5) Efficiency, regarding the ability to harmonize policies (central and regional); (6) Effective, that can be right on target, both by stakeholders and community stakeholders. (7) Justice, that can be done in accordance with the responsibilities of each party involved. In addition, awareness of local wisdom is another important factor that needs to be considered in sustainable mangrove management. According to Law 32/2009, to protect and manage the environment in a sustainable manner, we need to revive the noble values that apply to our society.

The basic principle of conservation management aims to increase the use of protected areas in the long term. Community participation has been identified as a key factor in ensuring the long-term sustainability and effective governance of these valuable ecosystems. The three pillars of sustainable protected area management are forms of ecological, social and economic management that enhance the function of protected areas and can support human life. Mangrove forest management must pay attention to its relationship with the surrounding ecosystem so that it is not too oriented.

Sustainable management of mangrove forests refers to the concept of sustainable development described in UU No 32 of 2009 about Environmental Protection and Management, which is a conscious and planned effort that integrates environmental, social, and economic aspects into a development strategy to guarantee environmental integrity as well as safety, capability, welfare and quality of life for present and future generations. It turns out that it is important to integrate the three pillars of the concept of sustainable development: economic, ecological and social aspects to ensure the existence of mangroves for all generations on this earth.

Management of mangroves in an integrated manner refers to UU No. 27 of 2007 about the Management of Coastal Areas and Small Islands, which explains a management

that integrates such activities: (a) between the Government and Regional Governments; (b) between Regional Governments; (c) between sectors; (d) between the Government, the business community and the public; (e) between terrestrial ecosystems and marine ecosystems; and (f) between science and management principles. Another important factor to consider in sustainable mangrove management is recognition of indigenous peoples and their local wisdom.

The strategy that can be applied in the management of mangrove forests is a community-based management strategy. The implementation of mangrove forest management cannot be separated from community participation because the direct users of mangrove benefits are the surrounding community. The community is involved in every stage of program implementation. According to Cohen and Uphoff (1980) these stages including planning, implementing, monitoring and evaluating, and enjoying the results.

In the realm of community participation in sustainable mangrove forest management, it is imperative to consider local community members as pivotal stakeholders who should actively participate in such initiatives. This is due to their possession of essential resources, including local knowledge, an understanding of community environments, insights into the current conditions of the community and mangrove forests, and awareness of prevailing challenges and demands. Moreover, their abilities, such as fishing expertise, planting skills, and weather prediction capabilities, have the potential to significantly contribute to the project's success.

Djosetro and Behagel (2020) emphasize that the roles played by local community members, in conjunction with non-governmental organizations, play a crucial role in achieving sustainability in managing mangrove forests. Likewise, Adeel *et al.* (2012) explain that the participation of local community members can lead to a fair distribution of benefits from mangrove resources, enhance compliance with protection and conservation measures, and facilitate the development of plans or programs that support local livelihoods.

Mbeche *et al.* (2021) investigated the factors influencing community involvement in various phases of participatory forest management, such as encompassing the planning, implementation, and monitoring stages. (1) Community participation in project planning: Local community members can collaborate with businesses and other stakeholders to participate in decision-making, creating rules and agreements for mangrove forest restoration and conservation. Encouraging community participation in decision-making about rights, responsibilities, and resources for managing mangrove forests is essential. Reed *et al.* (2009) highlighted that involving diverse community stakeholders in planning ensures their needs, priorities, concerns, and interests are considered throughout project implementation. Providing significant information, such as objectives, locations, activities, etc., through community participation in planning helps alleviate anxiety. Moreover, community involvement in planning enhances their capacities, including knowledge about efficient mangrove resource use and rehabilitation techniques such as growth conditions and effective planting methods. (2) Community participation in implementation: Local community members play an active role in fulfilling their responsibilities as outlined in the plans or agreements. For example, they participate in mangrove planting activities and encourage others to join in such efforts. Community members also take on the responsibility of educating tourists and outsiders on ways to protect mangrove ecosystems and prevent harm. (3) Community participation in monitoring: The monitoring stage involves assessing whether the main goals and objectives, such as improving local livelihoods and forest conditions, have been achieved during the project implementation. Community members can actively conduct regular and periodic monitoring of on-going activities in mangrove restoration and conservation. They also play a vital role in identifying and addressing problems that may

arise during these activities and seeking appropriate solutions. Monitoring results help in making adjustments or changes to action plans.

The local community's roles in sustainable mangrove forest management are crucial as they reside in these areas and possess the readiness and potential to contribute effectively to mangrove forest management. They stand to gain diverse benefits from the restoration and conservation of mangrove forests.

Principles of Community-Based Mangrove Forest Management

a) Participation and Empowerment: CBMFM emphasizes the active involvement of local communities in decision-making processes, allowing them to shape management strategies based on their traditional knowledge, needs, and priorities. This participatory approach empowers communities to become stewards of their mangrove resources.
b) Co-Management and Collaboration: CBMFM often involves collaboration between local communities, government agencies, NGOs, and other stakeholders. Co-management arrangements facilitate the sharing of responsibilities, resources, and expertise, promoting sustainable mangrove management.
c) Adaptive Management: CBMFM adopts adaptive management practices, allowing for flexible and responsive approaches to changing environmental conditions and community needs. Continuous learning and feedback loops help improve management strategies over time.

Outcomes and Benefits of Community-Based Mangrove Forest Management

a) Improved Conservation: CBMFM has been associated with enhanced mangrove forest conservation and reduced rates of deforestation. Community engagement fosters a sense of stewardship and leads to more effective protection measures against illegal logging and encroachment.
b) Sustainable Livelihoods: Involvement in CBMFM provides communities with alternative livelihood opportunities, such as eco-tourism, sustainable fisheries, and non-timber forest product enterprises. Diversification of income sources reduces dependence on destructive practices.
c) Social Cohesion and Empowerment: CBMFM strengthens social ties and community cohesion, fostering a collective sense of responsibility for the well-being of the mangrove ecosystem. Increased participation empowers marginalized groups, such as women and indigenous communities.

Challenges and Limitations of Community-Based Mangrove Forest Management

a) Resource Conflicts: Competition over resource access and use may arise among community members, potentially leading to conflicts that challenge effective management.
b) External Pressures: CBMFM initiatives may face challenges from external actors, such as powerful interests pushing for unsustainable resource exploitation or top-down conservation policies that undermine local autonomy.
c) Capacity and Funding Constraints: Limited technical expertise, financial resources, and institutional support may hinder the implementation and long-term success of CBMFM projects.

Community-Based Mangrove Forest Management is a promising approach for achieving sustainable mangrove conservation and socio-economic development. By empowering local communities as active partners in decision-making, CBMFM enhances the effectiveness of conservation efforts while promoting livelihood opportunities and social cohesion. However, challenges such as resource conflicts, external pressures, and capacity constraints need to be addressed to ensure the continued success of CBMFM initiatives. As a holistic and participatory approach, CBMFM holds great potential for promoting the coexistence of thriving mangrove ecosystems and empowered coastal communities. Future research should focus on further understanding the long-term impacts of CBMFM.

Tangible and Intangible Benefits of Mangrove Forest as Participant-Related Factors to Participate in Mangrove Management Activities

Community members' essential resources and personal drive to engage in mangrove management initiatives are influenced by participant-related factors. Literature reviews suggests that tangible and intangible benefits are one of the factors related to participant in forest management activities.

The motivation for participating in ecological management projects among community members is heavily influenced by the benefits they anticipate receiving from their involvement. According to Adhikari *et al*. (2014), incentives play a vital role in driving community participation in community forest management in Nepal. Similarly, Araral (2009) and Coulibaly-Lingani *et al*. (2011) found that community members' engagement in dry forest resource conservation activities is greatly influenced by the direct and indirect benefits they expect to gain from their participation.

Hsu and Lin discovered that consumers' perceived benefits directly or indirectly shape their attitudes, which in turn affect their intentions and behaviors. Adhikari *et al.* (2014) also highlighted that community members may have various types of expectations regarding benefits. For example, those whose livelihoods rely on forest products are more likely to participate in forest conservation management. Additionally, community members who decide to engage in community resource management may expect to strengthen community relations. Therefore, community members assess the perceived benefits of mangrove forest project to determine its value and their willingness to participate.

Community members are more inclined to engage in the project if the benefits they perceive align with their personal expectations. The current research has categorized the potential expected benefits into two distinct groups: tangible benefits and intangible benefits. Tangible benefits arising from participation encompass higher income, secure job opportunities, and improved working skills. On the other hand, intangible benefits include strengthened community relations, enhanced environmental quality within the community, and opportunities to expand social connections.

Tangible benefits refer to the direct and measurable advantages that mangrove forests provide to local communities. These benefits include provision of timber and non-timber forest products, support for fisheries and aquaculture, and contributions to local livelihoods, income generation, and food security. a) Timber and Non-Timber Forest Products: Mangroves offer valuable timber resources for construction, fuelwood, and charcoal production. Additionally, non-timber forest products such as honey, medicinal plants, and traditional handicraft materials contribute to local economies and cultural practices. b) Fisheries Support: Mangrove forests provide essential nursery grounds and habitats for a wide variety of marine species, including commercially important fish and crustaceans. They enhance fishery productivity and support the livelihoods of coastal communities dependent

on fishing. Tangible benefits offer practical incentives for community members to participate in mangrove conservation and sustainable management efforts.

On the other hand, intangible benefits are more subjective and difficult to quantify but hold significant value for local communities. These benefits encompass coastal protection against storms and erosion cultural and spiritual values, sense of place and belonging, recreational opportunities, and the overall well-being and resilience of the community. Intangible benefits create a sense of pride, attachment, and emotional connection to the mangrove forests, which can enhance community engagement and stewardship. Intangible benefits (perceived) are values that are primarily related to ecosystem functions (environmental resources) including water regulation, supporting tourism and recreation, genetic diversity, and creating jobs.

a) Coastal Protection: Mangroves act as a natural buffer against storms, tsunamis, and coastal erosion, reducing the vulnerability of adjacent communities and infrastructure. They dissipate wave energy, stabilize shorelines, and protect coastal areas from the impacts of climate change.
b) Carbon Sequestration: Mangrove forests are highly efficient in sequestering carbon dioxide from the atmosphere, making them significant contributors to climate change mitigation. Their dense root systems trap organic matter and sediment, storing carbon for extended periods.
c) Cultural and Spiritual Values: Mangroves hold cultural and spiritual significance for many communities worldwide. They are often associated with traditional practices, folklore, and beliefs, forming an integral part of local cultural heritage and identity.
d) Sense of Place and Recreation: Mangrove forests offer unique recreational opportunities, such as ecotourism, birdwatching, and nature-based activities. They provide spaces for relaxation, education, and reconnecting with nature, enhancing the well-being and quality of life for nearby communities and visitors.
e) Biodiversity Conservation: Mangroves harbor diverse ecosystems and support numerous species, including endemic and endangered ones. Preserving mangrove forests contributes to the conservation of biodiversity and the protection of vulnerable and rare species.
f) Climate Resilience and Adaptation: Mangroves play a crucial role in enhancing the resilience of coastal communities to climate change impacts. Their ability to absorb storm surges and stabilize shorelines helps mitigate the effects of sea-level rise and coastal flooding.

Forest values based on the benefits of forest resources are grouped as follows: a) The benefit value for consumption purposes is in the form of timber and non-timber forest products, b) Recreational/tourist value, c) Protection value of various hydrological functions such as protection against erosion, water regulation, and so on, d) The values of ecological processes such as nutrient cycling, micro and macro climate regulation, formation of soil formations and global life support, e) The value of biodiversity as a genetic resource, protection of species diversity and ecosystems, f) The value of education and research, g) Non-consumable benefit values such as cultural, historical, spiritual and religious benefits, h) The value of the benefits that are likely to be obtained in the future. The value of forest resources itself comes from various benefits that are obtained by the community.

Communities who receive direct benefits will have a positive perception of the value of forest resources and this can be shown by the high value of these forest resources. This may be different from the perception of people who live far from the forest and do not receive direct benefits.

While several studies have investigated the tangible and intangible benefits of mangrove forests, there is a need to synthesize and critically evaluate the existing literature to gain a comprehensive understanding of their role in driving community participation in mangrove management. By exploring the range of tangible and intangible benefits, their interconnections, and their influence on community attitudes and behaviors, this literature review aims to provide valuable insights for policymakers, researchers, and practitioners working in the field of mangrove conservation and management. By examining the findings, trends, and knowledge gaps in the literature, we can gain a deeper understanding of the factors that contribute to community participation in mangrove management. This review will also highlight the importance of considering both tangible and intangible benefits when designing effective strategies for mangrove conservation and sustainable development.

The Influence of Tangible and Intangible Benefits in Community Participation

According to Sattayapanich *et al.* (2022), the tangible and intangible benefits that local people get from the mangrove ecosystem can greatly influence their motivation to participate in all stages of management due to the fact that most of the livelihoods of community members are related to the utilization of mangrove resources, such as livelihoods related to ecotourism in the area, fisheries and fisheries-related activities. Nurhikmah *et al*. (2021) stated that there is a relationship between knowledge and attitudes towards respondents' characteristics such as gender, profession, and study area in the efforts of conservation.

Zulfa (2023) developed a questionnaire and used it as a research tool for data collection. To assess all the research variables, the questionnaire items were sourced from previous relevant studies or created based on pertinent concepts. Each item was rated on a five-point Likert scale, ranging from 1 to 5, representing strong disagreement to strong agreement or never participating to regularly participating.

Table 2. T-Test for the Influence of Benefits in Community Participation

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	56.144	17.061		3.291	.001
	Benefit	3.770	1.738	.213	2.169	.032

a. Dependent Variable: Participation Level

From the results of the statistical test (Table 2), it is known that the Sig. value for the (partial) influence of the Benefit variable (X) perceived on the Participation Level variable (Y) is 0.032 < 0.05, and the calculated t-value of 2.169 > the tabulated t-value of 1.983. Therefore, it can be concluded that H1 is accepted, which means there is an influence of Benefit (X) on Community Participation Level (Y).

Remarkably, the participants' intangible benefits such as perceived ecological values emerged as the most potent predictor of involvement across all stages. This implies that local community members will actively engage in sustainable mangrove forest management at all levels if they recognize the significance of the ecosystem services provided by mangroves. This finding aligns with Sattayapanich *et al.*'s research, and also Zhang *et al.*'s research, which demonstrated that farmers' perceived values of farmland significantly influenced their participation in ecological environmental protection on farmland. Likewise, Hernes and

Metzger (2017) found that stakeholders' active participation in biosphere management and conservation activities was greatly influenced by their perceived environmental values, such as appreciation for wildlife and the beauty of nature.

The expectation of monetary-related benefits (tangible benefits) which was the second strongest power to predict participation, had a significant impact on community members' involvement in the planning stage. This suggests that community members' initial decision to participate in the planning stage was primarily driven by their expectation of improving their economic situation through increased income and stable job opportunities. In areas with degraded ecological systems, local people's jobs linked to the use of natural resources, such as fisheries and ecotourism services, may be at risk. Therefore, individuals construct their expectations around monetary gains from the environmental project and prioritize participation in the planning phase.

The local community members' perception of the direct and indirect values of mangrove ecosystems could profoundly impact their motivation to participate in all management stages, especially considering that many members rely on mangrove resources for their livelihoods, including careers in ecotourism, fisheries, and related activities. Moreover, recognizing that regulating mangrove ecosystem services can mitigate potential natural disasters in the area and safeguard community land, those community members who comprehend these values may be more driven to participate actively in all stages of the management project.

Amal and Baharuddin (2016) and Sofli (2016) stated that access to direct and indirect beneficiaries from mangrove forest management must be openly distributed to local communities. The aim is to increase the well-being of society. By being open, this access will increase public awareness of the importance of mangrove forest management. With the existence of public awareness of the importance of mangrove forests can ensure the sustainability of these resources. The level of community participation is generally low due to the lack of involvement of community members in institutional management activities, such as planning, setting borderline, implementing activities and monitoring evaluations as stated by Tanjung *et al.* (2017). Community participation can be the key to successful management of natural resources, so that these resources can still be utilized and their sustainability is maintained. In other words, it is important to place community participation in mangrove forest management as an effort to achieve prosperity for the community.

The tangible and intangible benefit that local people feel from the mangrove ecosystem can greatly influence their motivation to participate in all stages of management due to the fact that most of the livelihoods of community members are related to the utilization of mangrove resources, such as careers related to ecotourism in the area, fishing and fishery-related activities. Most importantly, managing mangrove ecosystem services can reduce the likelihood of natural disasters in the area and protect community lands, community members who can understand this type of value can be more motivated to participate in all phases of a management project according to Sattayapanich *et al.* (2022).

CONCLUSION

The importance of recognizing both tangible and intangible benefits of mangroves to enhance community participation in mangrove management and calls for further research in this field. The tangible and intangible benefit that local people feel from the mangrove ecosystem can greatly influence their motivation to participate in all stages of management due to the fact that most of the livelihoods of community members are related to the

utilization of mangrove resources. While community involvement remains crucial in managing mangroves, ensuring economic benefits for the local population from planted mangroves and newly established lands becomes essential for sustaining such programs. The tangible and intangible benefits of mangroves influence the utilization, conservation, and management of mangroves. Given the long-term commitment required for mangrove conservation, it becomes imperative to address the local community's expectations regarding both short-term and long-term economic gains from these efforts. By doing so, we can achieve sustainable management of natural resources in coastal areas.

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