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Economic Benefits and Community Support for Mangrove Conservation: Evidence from Sungai Bakau Village

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Abstract: Economic Benefits and Community Support for Mangrove Conservation in Sungai Bakau Village examines the role of mangrove ecosystems as ecological resources that provide economic benefits and support coastal community welfare. This study focuses on coastal communities in Sungai Bakau Village, Kumai District, Kotawaringin Barat Regency, Central Kalimantan, Indonesia, with the objective of analyzing direct and indirect economic benefits of mangrove ecosystems and determining their influence on community support for mangrove conservation programs. This research employed a quantitative survey method involving 25 respondents selected through quota accidental sampling. Data were collected through field observations, structured interviews, and questionnaires using a Likert scale, then analyzed using descriptive analysis and multiple linear regression. The results showed that communities had positive perceptions of mangrove economic and ecological benefits, with indirect economic benefits obtaining the highest mean score (54.48), followed by direct economic benefits (47.48) and community support for conservation programs (46.84). However, the statistical analysis indicated that economic benefits did not significantly influence community support for mangrove conservation programs. The findings conclude that sustainable mangrove conservation requires not only economic approaches but also strengthening environmental awareness, community participation, institutional capacity, and collaborative management.

Keywords: Mangrove ecosystem, Economic benefits, Community support, Mangrove conservation, Environmental economics.

INTRODUCTION

Mangrove ecosystems are among the most productive coastal ecosystems and provide a wide range of ecosystem services that are essential for maintaining coastal environmental sustainability. Besides serving as critical habitats for fish, shrimp, crabs, and other marine organisms, mangroves function as natural coastal barriers against erosion, storm surges, and seawater intrusion (Ferreira et al., 2024). They also represent one of the most important blue carbon ecosystems due to their ability to store and sequester substantial amounts of carbon, contributing significantly to climate change mitigation. Previous studies have demonstrated that

mangroves possess high carbon storage capacity compared with many terrestrial ecosystems, making them an important component in supporting sustainable development goals, particularly those related to climate action, marine ecosystem protection, and biodiversity conservation (Koundouri et al., 2023). Therefore, the conservation of mangrove ecosystems has become a global priority due to their ecological importance and contribution to human well-being.

Indonesia possesses one of the largest mangrove areas in the world, covering approximately 3.4 million hectares or nearly 20% of the global mangrove extent. These extensive mangrove resources contribute significantly to coastal ecosystem resilience while supporting the livelihoods of millions of people living in coastal communities. Mangrove ecosystems provide multiple benefits, including biodiversity conservation, coastal protection, fisheries support, and economic opportunities for local communities. Recognizing their strategic importance, the Indonesian Government has prioritized mangrove rehabilitation and restoration programs aimed at strengthening ecosystem resilience while promoting sustainable economic development in coastal regions (Sasmito et al., 2023). However, despite these efforts, mangrove ecosystems continue to face various pressures, including land conversion, unsustainable resource exploitation, environmental pollution, and climate change.

Beyond their ecological significance, mangrove ecosystems generate substantial economic benefits that can be classified into direct and indirect economic values. Direct economic benefits are obtained from activities such as fisheries, crab harvesting, shrimp seed collection, non-timber forest products, and mangrove-based ecotourism. Meanwhile, indirect economic benefits originate from ecosystem services, including coastal protection, erosion control, carbon sequestration, environmental quality improvement, and habitat provision for coastal organisms. These two categories represent important components of the Total Economic Value approach, which has been widely applied in environmental economics to assess the contribution of natural ecosystems to human welfare (Raihan, 2023; Zhang et al., 2022). Understanding these economic benefits is important because economic appreciation of ecosystem services may influence public perceptions and potentially encourage greater community involvement in conservation programs.

Despite their considerable ecological and economic value, the sustainability of mangrove conservation programs depends not only on ecological restoration efforts or government policies but also on active community participation. Local communities are the primary users and beneficiaries of mangrove resources; therefore, their support is considered a key determinant of successful conservation implementation. Previous research has indicated that effective mangrove management requires strong community involvement, institutional support, and collaborative governance mechanisms (Walker et al., 2022). However, the relationship between ecosystem benefits perceived by communities and their willingness to support conservation programs remains complex. Economic benefits may encourage conservation behavior, but social values, environmental awareness, institutional trust, and local leadership may also influence community decisions.

Sungai Bakau Village, located in Kumai District, Kotawaringin Barat Regency, Central Kalimantan, represents a coastal area with significant ecological and economic potential derived from mangrove ecosystems. Local communities depend on mangrove resources through fishing activities, crab harvesting, shrimp seed collection, and the development of mangrove-based ecotourism. Furthermore, several mangrove rehabilitation and conservation initiatives have been implemented through collaboration among local governments, community organizations, private companies, and environmental institutions. The success and continuity of these conservation initiatives largely depend on sustained community support to ensure the preservation of both ecological functions and economic benefits provided by mangrove ecosystems.

Previous studies have extensively examined mangrove ecosystems from ecological, economic, and social perspectives. Ebeler et al. (2025) emphasized that economic valuation of

mangrove ecosystems provides an important foundation for conservation policies by demonstrating their contribution to community welfare. Sathiyamoorthy & Sakurai (2024) highlighted that community participation is a critical factor influencing the effectiveness of mangrove conservation programs. More recently, Du et al. (2025) argued that contemporary mangrove management requires integration of ecological, economic, social, and climate perspectives to achieve long-term sustainability. Nevertheless, previous studies have generally examined ecological functions, economic valuation, and community participation as separate dimensions. Limited empirical studies have simultaneously investigated how direct economic benefits and indirect economic benefits influence community support for mangrove conservation programs, particularly at the village level in Indonesian coastal areas such as Kotawaringin Barat Regency.

Based on this research gap, this study proposes a conceptual framework that integrates the economic valuation perspective of mangrove ecosystems with community conservation support. The framework assumes that direct economic benefits and indirect economic benefits generated by mangrove ecosystems may influence community support for conservation programs. However, this relationship needs to be empirically examined because economic benefits alone may not always translate into conservation commitment. The conceptual framework of this study is presented in Figure 1.

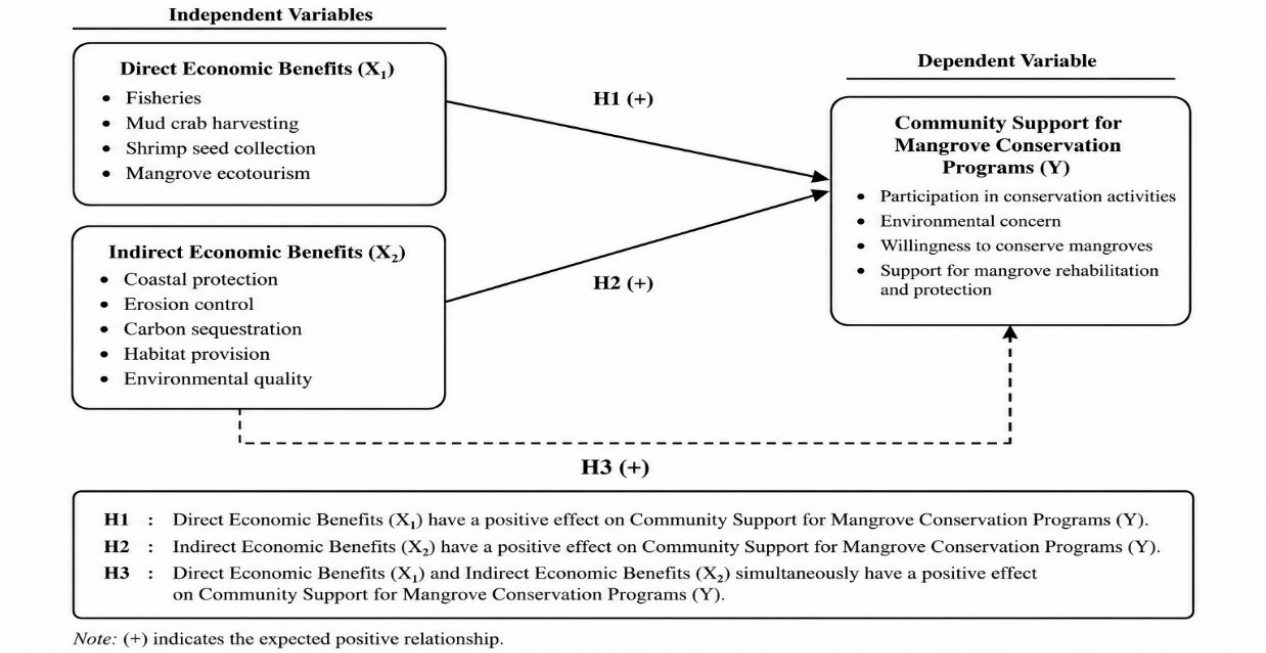

Figure 1. Conceptual Framework of the Influence of Direct and Indirect Economic Benefits of Mangrove Ecosystems on Community Support for Mangrove Conservation Programs

Based on the conceptual framework, this study aims to analyze the direct and indirect economic benefits generated by mangrove ecosystems and examine their influence on community support for mangrove conservation programs in Sungai Bakau Village, Kotawaringin Barat Regency. The novelty of this study lies in integrating the Total Economic Value perspective, through direct and indirect economic benefits, with community conservation support within a village-level empirical framework. Theoretically, this study contributes to environmental economics literature by extending the application of ecosystem valuation approaches to explain community conservation behavior. Practically, the findings provide evidence-based recommendations for policymakers, conservation organizations, and coastal communities in developing more effective mangrove management strategies that integrate

economic benefits, environmental awareness, community empowerment, institutional strengthening, and collaborative governance.

METHOD

This study employed a quantitative research approach using a survey design to analyze the economic benefits of mangrove ecosystems and examine their influence on community support for mangrove conservation programs in Sungai Bakau Village, Kumai District, Kotawaringin Barat Regency, Central Kalimantan Province, Indonesia. A quantitative approach was selected because it enables the objective measurement of relationships among research variables through statistical analysis and hypothesis testing (Gul, 2023). The research was conducted from July to September 2025 in Sungai Bakau Village, a coastal area where local communities actively utilize mangrove resources through fisheries activities, mud crab harvesting, shrimp seed collection, and mangrove-based ecotourism. The research design was developed to examine whether economic benefits derived from mangrove ecosystems contribute to strengthening community support for conservation programs.

The population of this study consisted of coastal community members whose livelihoods were directly associated with mangrove ecosystems. The population included fishermen, shrimp seed collectors, mud crab harvesters, mangrove ecotourism operators, and community members involved in mangrove conservation activities. Based on official village records, the total population consisted of 50 individuals. Due to the relatively homogeneous characteristics of the population, this study applied a non-probability sampling technique using quota sampling to ensure representation of different livelihood groups. Subsequently, respondents within each quota were selected using accidental sampling based on availability and willingness to participate during field data collection. A total of 25 respondents met the inclusion criteria and participated in this study, which was considered appropriate for exploratory research using multiple linear regression analysis with a limited population size.

Primary data were collected through field observations, structured interviews, questionnaires, and documentation. The questionnaire instrument used a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) to measure respondents' perceptions regarding mangrove benefits and conservation support. Secondary data were obtained from relevant institutional reports, including publications from Statistics Indonesia, the Ministry of Environment and Forestry, the Government of Kotawaringin Barat Regency, scientific publications, and other documents related to mangrove ecosystem management. The use of multiple data sources was intended to strengthen the reliability of information regarding the ecological and economic conditions of the research area.

The research variables consisted of three main components: Direct Economic Benefits (X_1), Indirect Economic Benefits (X_2), and Community Support for Mangrove Conservation Programs (Y). Direct Economic Benefits refer to economic benefits obtained directly from mangrove resource utilization, including fisheries production, mud crab harvesting, shrimp seed collection, non-timber forest products, and mangrove ecotourism. Indirect Economic Benefits refer to ecological services provided by mangrove ecosystems that generate economic value, including coastal protection, erosion control, habitat provision, carbon sequestration, and environmental quality improvement. Meanwhile, Community Support for Mangrove Conservation Programs refers to the willingness of local communities to participate in and support conservation activities through rehabilitation participation, environmental awareness, willingness to preserve mangrove ecosystems, and support for sustainable management.

Table 1. Operational Definitions and Measurement of Research Variables

Variable	Operational Definition	Indicators	Measurement Scale
Direct Economic Benefits (X_1)	Economic benefits directly obtained from the utilization of mangrove ecosystem resources	Fisheries production, mud crab harvesting, shrimp seed collection, non-timber forest products, mangrove ecotourism	Five-point Likert Scale (1 = Strongly Disagree to 5 = Strongly Agree)
Indirect Economic Benefits (X_2)	Ecological services provided by mangrove ecosystems that generate indirect economic value	Coastal protection, erosion control, habitat provision, carbon sequestration, environmental quality improvement	Five-point Likert Scale (1 = Strongly Disagree to 5 = Strongly Agree)
Community Support for Mangrove Conservation Programs (Y)	Community willingness to support and participate in mangrove conservation activities	Participation in rehabilitation, environmental awareness, willingness to preserve mangroves, support for sustainable management	Five-point Likert Scale (1 = Strongly Disagree to 5 = Strongly Agree)

The economic valuation of mangrove ecosystems was conducted using the Total Economic Value framework, which categorizes ecosystem benefits into Direct Use Value and Indirect Use Value (Gargaran et al., 2024). The total economic value was calculated using the equation:

$$TEV=DUV+IUV$$

The Direct Use Value was estimated using the market value approach:

$$DUV=\sum(Pi\times Qi)$$

Where DUV represents Direct Use Value (IDR/year), Pi represents the market price of commodity *i* (IDR), and Qi represents annual production quantity of commodity *i* (units/year). Meanwhile, the Indirect Use Value was estimated using the Replacement Cost Method, which evaluates ecosystem services based on the estimated cost required to replace mangrove ecological functions with artificial infrastructure such as seawalls, coastal embankments, or other coastal protection structures.

Before conducting hypothesis testing, the research instrument was evaluated through validity and reliability assessments. Validity testing was performed using Pearson Product-Moment correlation, while reliability testing was conducted using Cronbach's Alpha. Furthermore, classical assumption tests, including normality, multicollinearity, and heteroscedasticity tests, were performed to ensure that the regression model met statistical requirements (Osemeke et al., 2024). Data analysis was conducted using IBM SPSS Statistics Version 26.

The influence of direct and indirect economic benefits on community support for mangrove conservation programs was analyzed using multiple linear regression. The regression model applied in this study was formulated as follows:

$$Y=\alpha+\beta1X1+\beta2X2+\varepsilon$$

Where Y represents community support for mangrove conservation programs, X_1 represents direct economic benefits, X_2 represents indirect economic benefits, α represents the constant value, β_1 and β_2 represent regression coefficients, and ε represents the error term. Hypothesis testing was conducted using the t-test to determine the partial effect of each independent variable, the F-test to examine the simultaneous effect of independent variables, and the coefficient of determination (R^2) to measure the explanatory capability of the regression model. All statistical analyses were performed at a significance level of 5% ($\alpha = 0.05$).

RESULTS AND DISCUSSION

Study Area and Respondent Profile

Sungai Bakau Village is a coastal village located in Kumai District, Kotawaringin Barat Regency, Central Kalimantan Province, Indonesia. The area is predominantly characterized by mangrove ecosystems with gently sloping coastlines, relatively calm coastal waters, and tidal influences. These environmental characteristics support various coastal ecosystems, including mangrove forests, nipa palm (*Nypa fruticans*), seagrass beds, and seasonal seaweed vegetation. In addition to their ecological functions, these ecosystems provide important economic opportunities for local communities through fisheries activities, mud crab harvesting, shellfish utilization, and the development of mangrove-based ecotourism.

The majority of households in Sungai Bakau Village depend on fisheries, agriculture, plantations, livestock farming, and small-scale trading activities as their main sources of livelihood. Among these activities, blue swimming crab (*Portunus pelagicus*) harvesting represents one of the important fisheries commodities contributing to household income. This condition demonstrates that mangrove ecosystems have a strategic role in supporting local economic activities while maintaining ecological stability.

The mangrove forest in Sungai Bakau Village covers approximately 7 hectares and remains in relatively good ecological condition. The dominant vegetation consists of *Rhizophora* spp. and *Nypa fruticans*, which contribute significantly to coastal ecosystem stability. Mangrove management in this area is implemented through collaborative efforts involving local communities, the Government of Kotawaringin Barat Regency, environmental agencies, and private-sector stakeholders. These collaborations focus on mangrove rehabilitation, ecosystem conservation, and community empowerment.

The respondents involved in this study consisted of 25 coastal community members who directly depended on mangrove ecosystem resources for their livelihoods. The respondents included fishermen, mud crab harvesters, shrimp seed collectors, mangrove ecotourism operators, and community members actively participating in conservation activities. Although detailed demographic characteristics were not collected, all respondents had practical experience related to mangrove resource utilization and were therefore considered capable of providing relevant information regarding economic benefits and conservation support.

According to interviews with representatives of the Environmental Agency, collaborative management has become an important approach for maintaining mangrove ecosystem integrity while simultaneously improving coastal community livelihoods through sustainable resource utilization.

Descriptive Statistics of Research Variables

Table 2 presents the descriptive statistics of the three research variables, including Direct Economic Benefits (X_1), Indirect Economic Benefits (X_2), and Community Support for Mangrove Conservation Programs (Y). The analysis includes the number of respondents, minimum value, maximum value, mean score, and standard deviation to describe respondents' perceptions regarding mangrove ecosystem benefits and conservation support.

Table 2. Descriptive Statistics of the Study Variables

Variable	N	Minimum	Maximum	Mean	Standard Deviation
Direct Economic Benefits (X_1)	25	43	49	47.48	1.558
Indirect Economic Benefits (X_2)	25	47	58	54.48	3.584
Community Support for Mangrove Conservation Programs (Y)	25	45	49	46.84	0.850

Based on Table 2, all research variables obtained relatively high mean scores, indicating that respondents had positive perceptions regarding the economic benefits of mangrove ecosystems and their importance for conservation efforts. The highest mean score was recorded for Indirect Economic Benefits (54.48), indicating that respondents strongly recognized the ecological services provided by mangrove ecosystems, particularly coastal protection, erosion control, habitat provision, and environmental sustainability.

Meanwhile, Direct Economic Benefits (47.48) also showed a high perception score, indicating that communities acknowledged the contribution of mangrove ecosystems to their livelihoods through fisheries activities, mud crab harvesting, shrimp seed collection, and mangrove-based ecotourism. Furthermore, Community Support for Mangrove Conservation Programs (46.84) demonstrated that respondents generally showed positive attitudes toward conservation initiatives.

The relatively low standard deviation values indicate that respondents' perceptions were relatively consistent across all variables. These findings suggest that local communities have developed a strong understanding of both the economic and ecological importance of mangrove ecosystems.

Community Perceptions of Mangrove Conservation Programs

The perception analysis was conducted to understand community responses regarding the economic, ecological, participatory, and sustainability aspects of mangrove conservation programs. The results indicate that communities generally possess positive attitudes toward mangrove conservation and recognize the importance of maintaining ecosystem functions.

Community Perceptions of Economic Impacts

The results showed that all respondents (100%) agreed that mangrove conservation provides positive economic impacts for local communities. This perception indicates that communities recognize mangrove ecosystems as valuable economic resources that contribute to household income. The economic benefits identified by respondents mainly include capture fisheries, blue swimming crab harvesting, shrimp seed collection, and mangrove-based ecotourism activities. These findings reinforce the role of mangrove ecosystems as important livelihood-supporting resources for coastal communities.

Community Perceptions of Ecological Impacts

Approximately 96% of respondents strongly agreed that mangrove conservation provides substantial ecological benefits. This high level of agreement demonstrates that communities understand the ecological functions of mangrove ecosystems. The ecological benefits recognized by respondents include coastal protection against erosion, carbon sequestration, water quality improvement, and habitat provision for coastal and marine organisms. These findings indicate that environmental awareness regarding mangrove functions has developed positively among residents of Sungai Bakau Village.

Community Participation in Mangrove Conservation

The majority of respondents (88%) agreed that community participation is essential for successful mangrove conservation. This result highlights the importance of community involvement in supporting sustainable ecosystem management. Community participation includes activities such as mangrove planting, ecosystem rehabilitation, environmental education, and community-based monitoring. These findings indicate the presence of social capital that supports community-based conservation initiatives.

Perception of Long-Term Sustainability of Conservation Programs

A total of 96% of respondents agreed that mangrove conservation programs should be implemented continuously. This finding reflects community expectations that conservation efforts should not only maintain ecological functions but also support sustainable livelihoods and reduce future coastal risks. Therefore, conservation programs need to integrate ecological sustainability with socio-economic development to ensure long-term effectiveness.

Multiple Linear Regression Analysis

Multiple linear regression analysis was conducted to examine the influence of Direct Economic Benefits (X_1) and Indirect Economic Benefits (X_2) on Community Support for Mangrove Conservation Programs (Y). The analysis included the coefficient of determination (R^2), simultaneous significance testing using the F-test, and partial significance testing using the t-test. The analysis was performed using IBM SPSS Statistics.

Table 3. Model Summary of Regression Analysis

Model	R	R Square (R^2)	Adjusted R Square	Std. Error
1	0.124	0.015	-0.073	0.879

The correlation coefficient (R) value of 0.124 indicates a very weak relationship between Direct Economic Benefits and Indirect Economic Benefits with Community Support for Mangrove Conservation Programs. The coefficient of determination (R^2) value of 0.015 indicates that the independent variables included in this study explain only 1.5% of the variation in community support. The remaining 98.5% is influenced by other factors outside the research model. The Adjusted R Square value of -0.073 indicates that the regression model has limited explanatory capability and should therefore be interpreted carefully.

Discussion

The findings of this study demonstrate that the community of Sungai Bakau Village has a highly positive perception of both the economic and ecological benefits provided by mangrove ecosystems. The descriptive analysis showed that Indirect Economic Benefits obtained the highest mean score (54.48), followed by Direct Economic Benefits (47.48) and Community Support for Mangrove Conservation Programs (46.84). These findings indicate that local communities recognize mangrove ecosystems not only as sources of livelihood through fisheries activities, blue swimming crab harvesting, shrimp seed collection, and mangrove-based ecotourism, but also as important ecological systems that provide coastal protection, erosion control, habitat provision, carbon storage, and environmental quality improvement. This finding supports the Total Economic Value framework introduced by Brander et al. (2024), which explains that ecosystem value consists of both direct use values and indirect use values that contribute to human welfare and environmental sustainability. The high appreciation of indirect benefits suggests that communities increasingly understand that mangrove ecosystems provide long-term ecological services beyond immediate economic utilization.

The strong recognition of indirect ecological benefits observed in this study is consistent with recent studies emphasizing the multifunctionality of mangrove ecosystems. (Akram et al., 2023) highlighted that modern mangrove management should not only focus on economic exploitation but also consider ecosystem resilience, climate change adaptation, biodiversity protection, and social benefits. Similarly, Lovelock et al. (2024) emphasized that mangroves represent important nature-based solutions because they simultaneously support climate mitigation, coastal protection, and community resilience. Therefore, the high perception score of indirect economic benefits in Sungai Bakau Village indicates that conservation programs, environmental education, and community engagement activities may have contributed to increasing ecological awareness among local residents. This condition suggests that mangrove conservation has gradually been perceived not merely as an environmental obligation but as a long-term investment for sustaining coastal livelihoods.

However, although communities demonstrated positive perceptions regarding mangrove benefits, the regression analysis revealed that Direct Economic Benefits and Indirect Economic Benefits did not have a statistically significant influence on Community Support for Mangrove Conservation Programs. The coefficient of determination showed that the two independent variables explained only 1.5% ($R^2 = 0.015$) of the variation in community support, while the remaining variation was influenced by other factors outside the research model. Furthermore, the simultaneous test showed that economic benefits did not significantly affect conservation support (Sig. = 0.946), while partial tests also confirmed that Direct Economic Benefits (Sig. = 0.654) and Indirect Economic Benefits (Sig. = 0.749) were not significant predictors of community support. These results indicate that the recognition of ecosystem benefits does not automatically translate into stronger conservation behavior. In other words, awareness of economic and ecological values alone may be insufficient to explain why communities participate in conservation programs.

This finding provides an important theoretical implication because it challenges the assumption within environmental economic perspectives that higher perceived economic value will naturally create stronger incentives for conservation. According to the Total Economic Value framework, communities who receive greater benefits from ecosystems are theoretically expected to have stronger motivation to protect those resources. However, the results from Sungai Bakau Village demonstrate that conservation behavior is more complex and cannot be explained solely through economic rationality. One possible explanation is that economic benefits generated by mangrove ecosystems have become part of the community's daily livelihood system, causing these benefits to be perceived as normal conditions rather than additional incentives for conservation. Consequently, economic dependence on mangrove resources does not necessarily create a direct motivation for conservation unless supported by social, institutional, and cultural factors.

The findings are more consistent with the Value-Belief-Norm Theory proposed by Naseer & Chaudhary (2022), which explains that environmentally responsible behavior is influenced by environmental values, personal beliefs, social norms, and moral responsibility rather than economic incentives alone. Recent empirical studies have also shown that successful mangrove conservation depends strongly on governance capacity, community participation, institutional trust, and stakeholder collaboration (Ahmed et al., 2023). In the context of Sungai Bakau Village, community support for mangrove conservation may have developed through social learning processes, collective awareness, and direct involvement in conservation activities rather than through economic benefits alone. Therefore, the absence of a significant relationship between economic benefits and conservation support does not indicate a lack of community commitment but rather demonstrates that conservation motivation is shaped by broader social and institutional mechanisms.

The empirical conditions in Sungai Bakau Village support this interpretation. Mangrove conservation activities in the area have involved collaboration among local communities,

government institutions, environmental agencies, private-sector stakeholders, and community organizations. Activities such as mangrove rehabilitation, planting programs, environmental education, and community empowerment initiatives have contributed to strengthening collective responsibility toward ecosystem protection. According to Nijamdeen et al. (2023), collaborative governance is an essential component of sustainable mangrove management because conservation outcomes depend on interactions among ecological systems, communities, and institutions. Therefore, the positive conservation attitudes observed in this study may reflect the influence of institutional support and community engagement mechanisms that were not included as variables in the regression model.

From a policy perspective, the findings indicate that mangrove conservation strategies should not rely exclusively on increasing economic benefits for local communities. Although economic incentives remain important for improving livelihoods, long-term conservation success requires integrated strategies that strengthen environmental education, community organizations, institutional capacity, and participatory governance. Conservation programs should encourage active community involvement through rehabilitation activities, monitoring programs, environmental awareness campaigns, and collaborative decision-making processes. Such approaches are expected to generate stronger and more sustainable conservation commitment compared with strategies based only on economic compensation.

This study also contributes theoretically to environmental economics and coastal resource management by demonstrating the limitation of using economic valuation alone to explain conservation behavior. The integration of the Total Economic Value perspective with community support analysis provides a broader understanding that ecosystem values must be examined together with social and institutional dimensions. The findings extend previous studies by providing empirical evidence from an Indonesian coastal village that positive perceptions of ecosystem benefits do not necessarily result in higher conservation support. Therefore, future environmental economic models should incorporate additional explanatory variables, including environmental awareness, social capital, institutional trust, leadership capacity, and community participation, to better explain conservation behavior.

Several limitations should be acknowledged. First, this study was conducted in only one coastal village with a relatively small sample size of 25 respondents, which may limit the generalization of findings to other mangrove areas. Second, the regression model only included direct and indirect economic benefits as explanatory variables, while other important social and institutional factors were not incorporated. Future studies should involve larger samples across multiple coastal regions and apply more comprehensive analytical approaches, such as Structural Equation Modeling, to examine complex relationships among economic, social, institutional, and behavioral factors. Comparative studies between different mangrove management systems are also recommended to provide deeper insights into the determinants of sustainable mangrove conservation.

Overall, this study confirms that mangrove ecosystems in Sungai Bakau Village possess substantial economic and ecological value and are positively perceived by local communities. Nevertheless, community support for conservation programs is influenced more strongly by social and institutional factors than by economic benefits alone. These findings highlight that sustainable mangrove management requires a multidimensional approach integrating economic valuation, ecological protection, community participation, institutional strengthening, and collaborative governance to achieve long-term ecosystem sustainability while improving coastal community welfare.

CONCLUSION

This study concludes that mangrove ecosystems in Sungai Bakau Village provide substantial ecological and economic benefits that are positively perceived by local communities. Direct economic benefits are mainly obtained from fisheries activities, blue

swimming crab harvesting, shrimp seed collection, and mangrove-based ecotourism, while indirect economic benefits include coastal protection, erosion control, habitat provision, environmental quality improvement, and climate regulation. The findings indicate that indirect economic benefits received the highest perception score, reflecting the community's strong recognition of the ecological functions of mangrove ecosystems. However, the regression analysis demonstrated that direct and indirect economic benefits did not significantly influence community support for mangrove conservation programs, indicating that conservation support cannot be explained solely through economic valuation. This study contributes to environmental economics and coastal resource management by extending the application of the Total Economic Value framework through integration with community conservation behavior analysis, demonstrating that social and institutional dimensions also play an important role in shaping conservation support. The findings suggest that sustainable mangrove management should incorporate not only economic incentives but also environmental education, community participation, institutional strengthening, and collaborative governance to improve long-term conservation outcomes. Nevertheless, this study is limited by its single research location and relatively small sample size, as well as the limited number of explanatory variables included in the model. Future research should involve broader study areas, larger samples, and additional social and institutional factors to provide a more comprehensive understanding of community support for mangrove conservation programs.

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