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A Comparison of Public Perceptions of Mangrove Ecotourism Management in Urban Coastal Areas: A Case Study of Tangerang, Jakarta, and Bekasi

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Keywords
community perception; mangrove ecotourism; coastal management; mangrove conservation.

Abstract
Mangrove ecotourism is one of the efforts to manage coastal areas based on conservation involving local communities. This study aims to analyze and compare public perceptions of mangrove ecotourism management in Ketapang Urban Aquaculture, TWA Angke Kapuk, and Saung Alas. The study used a descriptive quantitative method by distributing questionnaires to 135 respondents using the Likert scale. The data were analyzed descriptively to determine the level of public perception of the management, knowledge, participation, and attitude of the community towards mangrove ecotourism. The results of the study showed that Ketapang Urban Aquaculture obtained the highest perception value of 72.96%, followed by Saung Alas at 72.29%, and TWA Angke Kapuk at 70.89%. All three regions are included in the high perception category. The public generally has a positive perception of mangrove conservation, the ecological function of mangroves, and the development of sustainability-based ecotourism. However, community involvement in decision-making is still relatively low in some areas. In general, the high public perception shows support for sustainable mangrove ecotourism management in urban coastal areas.

INTRODUCTION

Mangrove ecosystems are one of the coastal resources that have ecological, economic, and social functions that are very important for the sustainability of coastal areas. Mangrove forests play a role as coastal protectors from abrasion, habitats of various types of biota, carbon sinks, and support the economic activities of coastal communities through the fisheries and nature-based tourism sectors (Hamilton and Friess 2017). The existence of mangroves also has strategic value in supporting environmental conservation in urban coastal areas that face increasing pressure of development and urbanization (Rahmawati and Rachman 2024).

In recent years, the development of mangrove ecotourism has become one of the approaches to coastal area management that has developed in Indonesia. Mangrove ecotourism not only aims to increase tourist visits, but also integrates aspects of environmental conservation, education, and empowerment of local communities (Restuadi and Tamami 2023). The concept of ecotourism is considered to be able to create a balance between economic utilization and environmental preservation so as to support sustainable tourism development (Winata *et al.* 2023).

The success of mangrove ecotourism management is greatly influenced by the involvement of local communities as one of the main stakeholders (Sri) *et al.* 2023). Public perception of tourism area management is an important factor because it can affect the level of participation, support, and sustainability of the management programs carried out. People who

have a positive perception of the benefits of ecotourism tend to be more supportive of conservation activities and environment-based tourism development. On the contrary, negative perceptions can be an obstacle to the implementation of sustainable ecotourism management (Restuadi and Tamami 2023).

According to Rahmawati and Rachman (2024) that public perception of mangrove ecotourism is influenced by various factors, such as education level, socioeconomic conditions, level of community participation, economic benefits obtained, and the effectiveness of tourism area management. The community hopes that the development of ecotourism will be able to improve the economic welfare and quality of human resources of the local community.

The development of mangrove ecotourism in urban coastal areas has more complex challenges than non-urban coastal areas. Development pressures, pollution, land conversion, and high economic activity in urban areas cause mangrove ecosystems to be vulnerable to environmental degradation (Ahdarrijal *et al.* 2025). This condition requires effective and sustainability-based area management so that the ecological function of mangroves is maintained while providing economic benefits for the surrounding community.

Coastal areas in Tangerang, Jakarta, and Bekasi has a mangrove ecotourism area with different management characteristics. These differences include management actors, forms of community participation, government support, and orientation for the development of tourist areas. Mangrove areas in Jakarta tend to develop through urban and private conservation-based management, while in Tangerang and Bekasi management involves more local governments and local communities. These differences in management models have the potential to affect public perception of the effectiveness and sustainability of mangrove ecotourism management (Preliminary) *et al.* 2020).

Research related to public perception of mangrove ecotourism management has been conducted in various regions in Indonesia. According to Ahdarrijal *et al.* (2025) That the public's perception of mangrove ecotourism is relatively good, but the level of community participation is still in the moderate category, so it is necessary to increase community empowerment in the management of tourist areas. Other research has also shown that community support for ecotourism development is influenced by the economic, social, and environmental benefits felt directly by local communities.

Public perception of mangrove ecotourism Most of the research still focuses on one specific location and not many have compared public perceptions between urban coastal areas with different management characteristics (Rahmawati *et al.* 2025). A comparative study is needed to find out how different management systems can affect public perception of mangrove ecotourism management. Therefore, this study has a novelty value because it compares the perception of the community in three urban coastal areas with different management models.

The novelty of this study is fourfold: (1) it provides the first comparative analysis of public perception across three urban coastal mangrove ecotourism sites in the Jakarta metropolitan area (Tangerang, Jakarta, Bekasi) with different management models; (2) it systematically measures perception across three dimensions (response/opinion, knowledge, attitude) using a 15-item Likert questionnaire; (3) it links empirical findings to Community Participation Theory, Stakeholder Theory, and Sustainable Tourism Theory; and (4) it identifies specific gaps (low regulatory knowledge, low decision-making involvement) that are

consistent across all three sites despite different management models, suggesting systemic issues rather than location-specific problems.

Based on this description, this study aims to analyze and compare public perceptions of mangrove ecotourism management in Tangerang, Jakarta, and Bekasi. The results of the research are expected to be recommendations for the government, regional managers, and the community in formulating a more participatory, sustainable, and environmental conservation-based mangrove ecotourism management strategy in urban coastal areas.

METHOD

Research Location and Time

This research was conducted in three locations, namely Tangerang (Ketapang Urban Aquaculture/KUA), Jakarta (Angke Kapuk Mangrove Nature Park/TWA Angke Kapuk), and Bekasi (Saung Alas Mangrove Ecotourism), as presented in Figure 1. This research was conducted during the period from May to June 2025. Each research location has a different mangrove area, covering about 14.5 ha in Tangerang (Yanuadi *et al.* 2024), 99.82 ha in Jakarta, and 193.81 ha in Bekasi (Rain) *et al.* 2021). These locations were chosen because of their different management characteristics, urbanization rates, and stakeholder involvement in mangrove ecotourism management.

This research was carried out in mangrove ecotourism areas in Tangerang, Jakarta, and Bekasi. The research uses a descriptive quantitative approach with the aim of analyzing and comparing public perceptions of mangrove ecotourism management in the three regions. The descriptive approach is used to provide a systematic overview of the condition of the research object through the preparation of data in the form of tables, figures, and interpretation of research results (Rahmawati *et al.* 2014).

The number of respondents in this study was 135 people, with each region consisting of 45 respondents (Sigh, 2019). Respondents came from the community around the mangrove ecotourism area. This number is considered sufficient to provide an overview of public perception of mangrove ecotourism management in each research area.

The research instrument used was in the form of a closed questionnaire using the Likert scale. In this study, 15 questions were prepared related to public perception of mangrove ecotourism management. According to (Stuart 2016), the Likert scale is used to measure individual or group responses/opinions, knowledge, and attitudes towards a social phenomenon. The variables to be measured are described into several research indicators which are then developed into statements in the questionnaire.

The assessment scale in this study consists of:

Strongly agree/Very knowing: score 4

Agree/Know: score 3

Disagree/Don't know: score 2

Strongly disagree/Very ignorant: score 1

Data Analysis

Each statement is calculated by multiplying the score obtained by the number of respondents, so that the total score for each criterion is obtained. This total score is considered the interpretive value of each statement seen in Figure 2.

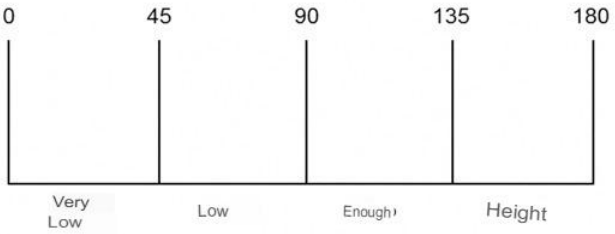

Figure 1. Score with interpretation of each criterion

Then, it calculates the overall score and determines the level of public perception, multiplying the score, number of respondents, and the number of statements for all criteria. The result score of the entire statement is then interpreted in the form of a score. Presented in figure 3.

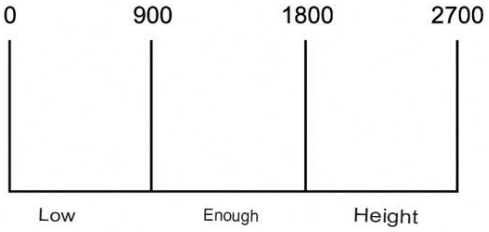

Figure 2. Score with overall interpretation

Furthermore, the data analysis method used is descriptive analysis. Within the framework of this statistical analyst, the formula applied refers to Lindaan *et al*. (2016), namely the percentage of the level of public perception obtained by multiplying the number of scores from data collection 100% divided by the overall score. Presented in Figure 4.

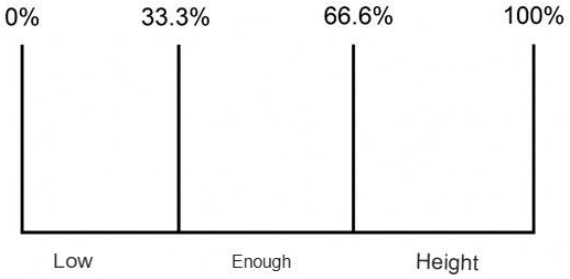

Figure 3. The level of public perception

RESULTS AND DISCUSSION

Distribution of Mangrove Types

The distribution of mangroves in the Ketapang Urban Aquaculture (KUA) area is located in Ketapang Village, Mauk District, Tangerang Regency, Banten. The types of mangroves found in this area are dominated by *Rhizophora sp., Avicennia sp.*, and *Sonneratia sp.* which are spread across conservation areas, tourist tracking routes, and mangrove nursery areas (Azahra *et al.* 2024). Furthermore, the distribution of mangroves in the Angke Kapuk Nature Tourism Park (TWA) area is in the coastal area of North Jakarta, precisely in Kapuk

Muara Village, Penjaringan District. Mangrove vegetation in the TWA Angke Kapuk area is dominated by *Rhizophora mucronata*, *Rhizophora apiculata*, *Avicennia sp.*, *Sonneratia caseolaris*, and *Bruguiera gymnorhiza*. In addition, this area is also an important habitat for various types of waterbirds and other coastal fauna so that it has high ecological value in the urban area of Jakarta (Sofian *et al.* 2019). Then for the Saung Alas Mangrove ecotourism is located in Simple Beach Village, Muara Gembong District, Bekasi Regency. Mangrove vegetation in the Muara Gembong area, including Saung Alas, is dominated by *Rhizophora apiculata*, *Avicennia marina*, *Sonneratia alba*, *Bruguiera gymnorrhiza*, and *Nypa fruticans*. The distribution of mangroves in this area serves as a coastal protector from abrasion, coastal biota habitat, and supports the development of community-based ecotourism (Hilmy Rahman and Samadi 2024).

Public Perception

Responses/Opinions

The management of mangrove ecotourism in this region still needs to be improved.

The community has hopes for the development of ecotourism that can be carried out in each ecotourism area. This can be seen in the following table 1.

Table 1. The management of mangrove ecotourism in this region still needs to be improved.

Mangrove Ecotourism Area	Answer	Score	Number of Respondents	Percentage of respondents	Total Score (score x respondents)
Ketapang Urban Aquaculture	Strongly agree	4	4	9%	16
	Agree	3	40	89%	120
	Disagree	2	1	2%	2
	Strongly Disagree	1	0	0%	0
	Total		45	100%	138
TWA Angke Kapuk	Strongly agree	4	5	11%	20
	Agree	3	40	89%	120
	Disagree	2	0	0%	0
	Strongly Disagree	1	0	0%	0
	Total		45	100%	140
São Paulo Resort	Strongly agree	4	2	4%	8
	Agree	3	29	64%	87
	Disagree	2	13	29%	26
	Strongly Disagree	1	1	3%	1
	Total		45	100%	122

Based on Table 1, it shows that TWA Angke Kapuk obtained the highest total score of 140 which is included in the high category, followed by Ketapang Urban Aquaculture with a total score of 138 which is also in the high category, while Saung Alas obtained a total score of 122 which is included in the medium category. These results show that the people in TWA Angke Kapuk and Ketapang Urban Aquaculture have a higher level of agreement on the importance of improving mangrove ecotourism management than the people in Saung Alas. The difference in the level of public perception is suspected to be influenced by the conditions of area management, tourism facilities, the level of community participation, and the economic and environmental benefits felt by the surrounding community. The results of this study are in line with research that states that public perception of mangrove ecotourism management is influenced by environmental, economic, and community involvement in the management of

tourist areas (Restuadi and Tamami 2023). Good management of mangrove tourism areas can increase community support for mangrove ecotourism conservation and sustainability activities (Sri) *et al.* 2023).

Mangrove forest rehabilitation needs to be carried out to preserve the environment.

The public's perception of the importance of mangrove forest rehabilitation to maintain environmental sustainability in each mangrove ecotourism area can be seen in Table 2.

Table 2. Mangrove forest rehabilitation needs to be carried out to preserve the environment.

Mangrove Ecotourism Area	Answer	Score	Number of Respondents	Percentage of respondents	Total Score (score x respondents)
Ketapang Urban Aquaculture	Strongly agree	4	5	11%	20
	Agree	3	36	80%	108
	Disagree	2	4	9%	8
	Strongly Disagree	1	0	0%	0
	Total		45	100%	136
TWA Angke Kapuk	Strongly agree	4	7	16%	28
	Agree	3	38	84%	114
	Disagree	2	0	0%	0
	Strongly Disagree	1	0	0%	0
	Total		45	100%	142
São Paulo Resort	Strongly agree	4	7	16%	28
	Agree	3	37	82%	111
	Disagree	2	1	2%	2
	Strongly Disagree	1	0	0%	0
	Total		45	100%	141

Based on Table 2, TWA Angke Kapuk obtained the highest total score of 142, followed by Saung Alas with 141, and Ketapang Urban Aquaculture with 136. These results show that people in the three regions have a high level of awareness and support for mangrove rehabilitation activities as an effort to preserve the coastal environment. The high level of public approval is suspected to be influenced by the public's understanding of the importance of the ecological function of mangroves as coastal protectors, aquatic biota habitats, and support for the sustainability of mangrove ecotourism. The results of this study are in line with the research (Rahmawati and Rachman 2024) which states that the community tends to support the development and preservation of mangroves if it provides environmental and economic benefits for the surrounding community. In addition, the research (Riana Oktavia and Rahayu 2005). It shows that the community has a high perception of the importance of mangrove rehabilitation because people are beginning to feel the ecological and economic benefits of the existence of mangroves

Mangroves serve as coastal protection from abrasion, waves, and storm winds.

Public perception of the function of mangroves as coastal protection from abrasion, waves, and hurricanes in each mangrove ecotourism area can be seen in Table 3.

Table 3. Mangroves serve as coastal protection from abrasion, waves, and storm winds.

Mangrove Ecotourism Area	Answer	Score	Number of Respondents	Percentage of respondents	Total Score (score x respondents)
Ketapang Urban Aquaculture	Strongly agree	4	6	13%	24
	Agree	3	35	78%	105
	Disagree	2	4	9%	8
	Strongly Disagree	1	0	0%	0
	Total		45	100%	137
TWA Angke Kapuk	Strongly agree	4	9	20%	36
	Agree	3	36	80%	108
	Disagree	2	0	0%	0
	Strongly Disagree	1	0	0%	0
	Total		45	100%	144
São Paulo Resort	Strongly agree	4	5	11%	20
	Agree	3	39	87%	117
	Disagree	2	1	2%	2
	Strongly Disagree	1	0	0%	0
	Total		45	100%	139

Based on Table 3, public perception of the function of mangroves as coastal protectors from abrasion, waves, and hurricanes showed high results in all study areas. TWA Angke Kapuk obtained the highest total score of 144 which was included in the high category, followed by Saung Alas with a total score of 139 and Ketapang Urban Aquaculture of 137 which was also in the high category. The results show that most communities in the three regions have understood the importance of the ecological function of mangroves in protecting coastal areas from environmental damage such as abrasion and ocean waves. The high level of public approval is suspected to be influenced by public knowledge of the direct benefits of mangroves for the coastal environment and the experiences of people living around mangrove areas. The results of this study are in line with research that states that coastal communities generally have a positive perception of the ecological function of mangroves as coastal protectors and buffers of coastal ecosystems (Sahid Sujiwo *et al.* 2022).

Mangroves function as habitats and breeding grounds for aquatic biota.

In this section, the community gives opinions related to the function of mangroves as habitats and breeding places in the three ecotourism areas. Respondents gave answers that showed that mangroves do have this function in Table 4.

Table 4. Mangroves function as habitats and breeding grounds for aquatic biota.

Mangrove Ecotourism Area	Answer	Score	Number of Respondents	Percentage of respondents	Total Score (score x respondents)
Ketapang Urban Aquaculture	Strongly agree	4	7	16%	28
	Agree	3	28	62%	84
	Disagree	2	10	22%	20
	Strongly Disagree	1	0	0%	0
	Total		45	100%	132
TWA Angke Kapuk	Strongly agree	4	4	9%	16
	Agree	3	41	91%	123
	Disagree	2	0	0%	2
	Strongly Disagree	1	0	0%	0
	Total		45	100%	139

São Paulo Resort	Strongly agree	4	3	7%	12
	Agree	3	40	89%	120
	Disagree	2	2	4%	4
	Strongly Disagree	1	0	0%	0
	Total		45	100%	136

Based on Table 4, public perception of the function of mangroves as habitats and breeding grounds for aquatic biota shows high results in all research areas. TWA Angke Kapuk obtained the highest total score of 139 which was included in the high category, followed by Saung Alas with 136 and Ketapang Urban Aquaculture with 132 which were in the medium to high category. These results show that most people have understood the importance of the existence of mangroves as a natural habitat for various aquatic biota such as fish, shrimp, and crabs. The high level of community approval in TWA Angke Kapuk and Saung Alas is suspected to be influenced by the condition of the mangrove ecosystem which is still quite good so that the ecological benefits can be felt directly by the surrounding community. Meanwhile, the value of Ketapang Urban Aquaculture is relatively lower than the other two areas because there are still respondents who do not understand the ecological function of mangroves on aquatic life. According to Donato *et al.* (2011) which states that the mangrove ecosystem has an important role as a *Nursery Ground*, *Spawning Ground*, and habitats of various aquatic organisms that support the productivity of coastal fisheries.

Ecotourism activities help preserve the mangrove environment.

Communities in mangrove ecotourism areas in the three regions have an important role in supporting ecotourism activities that can help preserve the mangrove environment through participation in the sustainable management, conservation, and utilization of the area. The following are the opinions of the community regarding mangrove ecotourism activities in table 5.

Table 5. Ecotourism activities help preserve the mangrove environment.

Mangrove Ecotourism Area	Answer	Score	Number of Respondents	Percentage of respondents	Total Score (score x respondents)
Ketapang Urban Aquaculture	Strongly agree	4	5	11%	20
	Agree	3	39	87%	117
	Disagree	2	1	2%	2
	Strongly Disagree	1	0	0%	0
	Total		45	100%	139
TWA Angke Kapuk	Strongly agree	4	6	13%	24
	Agree	3	39	87%	117
	Disagree	2	0	0%	0
	Strongly Disagree	1	0	0%	0
	Total		45	100%	141
São Paulo Resort	Strongly agree	4	1	2%	4
	Agree	3	43	96%	129
	Disagree	2	1	2%	2
	Strongly Disagree	1	0	0%	0
	Total		45	100%	135

Based on Table 9, it shows relatively high results in all research areas. TWA Angke Kapuk obtained the highest total score of 141 which was included in the high category,

followed by Ketapang Urban Aquaculture of 139 which was also in the high category, while Saung Alas obtained a total score of 135 which was included in the medium to high category. These results show that most people believe that ecotourism activities can have a positive impact on the preservation of the mangrove environment through increasing public awareness, conservation activities, and sustainable use of the area. The high level of community approval in TWA Angke Kapuk and Ketapang Urban Aquaculture is suspected to be influenced by the more organized management of tourist areas and the environmental benefits that are directly felt by the surrounding community. Meanwhile, Saung Alas' slightly lower score shows that there are still some people who have not fully felt the contribution of ecotourism to the preservation of the mangrove environment. Conservation-based ecotourism can improve the protection of coastal ecosystems through community involvement and environmental education (Friess 2017).

Knowledge

The community understands the meaning of mangroves

The level of public knowledge of mangrove ecosystems, in this section, identifies the community's understanding of the meaning and function of mangroves as an important part of conservation-based ecotourism management. Community knowledge of mangroves can be seen in table 6.

Table 6. The community understands the meaning of mangroves

Mangrove Ecotourism Area	Answer	Score	Number of Respondents	Percentage of respondents	Total Score (score x respondents)
Ketapang Urban Aquaculture	Strongly agree	4	3	7%	12
	Agree	3	42	93%	126
	Disagree	2	0	0%	0
	Strongly Disagree	1	0	0%	0
	Total		45	100%	138
TWA Angke Kapuk	Strongly agree	4	1	2%	4
	Agree	3	44	98%	132
	Disagree	2	0	0%	0
	Strongly Disagree	1	0	0%	0
	Total		45	100%	136
São Paulo Resort	Strongly agree	4	0	0%	0
	Agree	3	41	91%	123
	Disagree	2	4	9%	8
	Strongly Disagree	1	0	0%	0
	Total		45	100%	131

Based on Table 6, the public's perception of the statement *"The community understands the meaning of mangroves"* showed high results in all research areas. Ketapang Urban Aquaculture obtained the highest total score of 138 which was included in the high category, followed by TWA Angke Kapuk of 136 which was also in the high category, while Saung Alas obtained a total score of 131 which was included in the medium to high category. These results show that most people in the three regions have a good understanding of the meaning of mangroves as an important ecosystem in coastal areas. The high level of public understanding is suspected to be influenced by ecotourism activities, environmental education, and direct interaction of the community with mangrove areas in daily life. Ketapang Urban Aquaculture and TWA Angke Kapuk have a higher level of understanding than Saung Alas because the

people in both areas are more involved in tourism activities and mangrove area management. According to Attack *et al.* (2025) that environmental education through conservation and ecotourism activities can increase public knowledge of the importance of mangrove ecosystems.

There are regulations related to the use of mangrove forests in this area.

The level of public understanding of the institutional and management aspects of the area can be identified through public knowledge regarding the existence of regulations related to the use of mangrove forests in ecotourism areas. An understanding of the regulations is presented in table 7.

Table 7. There are regulations related to the use of mangrove forests in this area.

Mangrove Ecotourism Area	Answer	Score	Number of Respondents	Percentage of respondents	Total Score (score x respondents)
Ketapang Urban Aquaculture	Strongly agree	4	0	0%	0
	Agree	3	7	16%	21
	Disagree	2	19	42%	38
	Strongly Disagree	1	19	42%	19
	Total		45	100%	78
TWA Angke Kapuk	Strongly agree	4	1	2%	4
	Agree	3	16	36%	48
	Disagree	2	0	0%	0
	Strongly Disagree	1	28	62%	28
	Total		45	100%	80
São Paulo Resort	Strongly agree	4	0	0%	0
	Agree	3	0	0%	0
	Disagree	2	24	53%	48
	Strongly Disagree	1	21	47%	21
	Total		45	100%	69

Based on Table 7, public perception of the existence of regulations related to the use of mangrove forests showed relatively low results in all study areas. TWA Angke Kapuk obtained the highest total score of 80 which was included in the low category, followed by Ketapang Urban Aquaculture with 78 and Saung Alas with 69 which was also in the low category. These results show that most of the people in the three regions still do not know or understand the regulations related to the use and management of mangrove forests in their respective ecotourism areas. The low level of public understanding of institutional and regulatory aspects is allegedly caused by a lack of socialization, lack of community involvement in the decision-making process, and limited access to information on mangrove management policies. Although TWA Angke Kapuk has the highest score compared to other regions, the level of public understanding of mangrove management regulations is still relatively low. The low public understanding of mangrove management regulations and policies can be an obstacle in supporting the success of community-based mangrove conservation, because the community has not fully understood the goals, rules, and benefits of sustainable mangrove management. The existence of mangrove forests affects the catch of fish, shrimp, and crabs (Salminah and Alviya 2019).

The existence of mangrove forests affects the catch of fish, shrimp, and crabs.

Public perception of the ecological benefits of mangroves can be known through public views on the influence of the existence of mangrove forests on fish, shrimp, and crab catches in coastal areas. Table 8 presents community knowledge about the benefits of mangrove forests.

Table 8. The existence of mangrove forests affects the catch of fish, shrimp, and crabs.

Mangrove Ecotourism Area	Answer	Score	Number of Respondents	Percentage of respondents	Total Score (score x respondents)
Ketapang Urban Aquaculture	Strongly agree	4	6	13%	24
	Agree	3	36	80%	108
	Disagree	2	3	7%	6
	Strongly Disagree	1	0	0%	0
	Total		45	100%	138
TWA Angke Kapuk	Strongly agree	4	12	27%	48
	Agree	3	32	71%	96
	Disagree	2	1	2%	2
	Strongly Disagree	1	0	0%	0
	Total		45	100%	146
São Paulo Resort	Strongly agree	4	1	2%	4
	Agree	3	41	91%	123
	Disagree	2	2	4%	4
	Strongly Disagree	1	1	2%	1
	Total		45	100%	132

Based on Table 8, it shows high results in most of the research areas. TWA Angke Kapuk obtained the highest total score of 146 which was included in the high category, followed by Ketapang Urban Aquaculture of 138 which was also in the high category, while Saung Alas obtained a total score of 132 which was included in the medium to high category. These results show that most people in the three regions realize that the existence of mangroves has an important influence on the productivity of coastal fisheries because mangroves function as habitats, places to forage, and breeding grounds for various aquatic biota. The high level of community approval in TWA Angke Kapuk is suspected to be influenced by the community's understanding of the direct benefits of mangroves for fishery resources and the economic life of coastal communities. Meanwhile, Saung Alas' slightly lower score shows that there are still some people who do not fully understand the relationship between mangrove ecosystems and fishery catches. The results of this study are in line with the research WorldFish which states that the existence of mangroves contributes to increasing the productivity of coastal fisheries through their ecological function as a habitat for marine life. In addition, research by Manson *et al.* (2005) It also explained that the destruction of mangrove ecosystems can reduce fish catches and disrupt the sustainability of fishery resources of coastal communities.

The existence of mangrove forests affects the results of pond cultivation.

The ecological benefits of mangroves can be known through the community's view of the influence of the existence of mangrove forests on the results of pond cultivation in coastal areas. Perceptions of the influence of mangroves on pond cultivation products are seen in table 9.

Table 9. The existence of mangrove forests affects the results of pond cultivation.

Mangrove Ecotourism Area	Answer	Score	Number of Respondents	Percentage of respondents	Total Score (score x respondents)
Ketapang Urban Aquaculture	Strongly agree	4	6	13%	24
	Agree	3	25	56%	75
	Disagree	2	13	29%	26
	Strongly Disagree	1	1	2%	1
	Total		45	100%	126
TWA Angke Kapuk	Strongly agree	4	5	11%	20
	Agree	3	37	82%	111
	Disagree	2	3	7%	6
	Strongly Disagree	1	0	0%	0
	Total		45	100%	137
São Paulo Resort	Strongly agree	4	5	11%	20
	Agree	3	36	80%	108
	Disagree	2	3	7%	6
	Strongly Disagree	1	1	2%	1
	Total		45	100%	135

Based on Table 9, the results of the study show that TWA Angke Kapuk obtained the highest total score of 137 which is included in the high category, followed by Saung Alas with 135 and Ketapang Urban Aquaculture with 126 which is in the medium to high category. These results show that most people believe that the existence of mangroves has a positive influence on the results of pond cultivation, especially in maintaining the quality of the aquatic environment and the balance of coastal ecosystems. The high level of community approval in TWA Angke Kapuk is suspected to be influenced by the community's understanding of the ecological benefits of mangroves in maintaining water quality, reducing abrasion, and supporting the productivity of fishery cultivation. Meanwhile, Ketapang Urban Aquaculture has a lower score compared to the other two regions because there are still people who have not fully felt the direct influence of mangroves on pond cultivation results. According to Witomo (2018) Mangrove ecosystems have an important relationship with the sustainability of pond cultivation through their ecological function in maintaining the quality of the coastal environment.

The community has been directly involved in mangrove ecotourism activities in this region.

Community involvement in area management can be known through community participation in mangrove ecotourism activities in the area. Community engagement is presented in the following table 10.

Table 10. The community has been directly involved in mangrove ecotourism activities in this region.

Mangrove Ecotourism Area	Answer	Score	Number of Respondents	Percentage of respondents	Total Score (score x respondents)
Ketapang Urban Aquaculture	Strongly agree	4	7	16%	28
	Agree	3	32	71%	96
	Disagree	2	6	13%	12
	Strongly Disagree	1	0	0%	0
	Total		45	100%	136

Mangrove Ecotourism Area	Answer	Score	Number of Respondents	Percentage of respondents	Total Score (score x respondents)
TWA Angke Kapuk	Strongly agree	4	1	2%	4
	Agree	3	7	16%	21
	Disagree	2	37	82%	74
	Strongly Disagree	1	0	0%	0
	Total		45	100%	99
São Paulo Resort	Strongly agree	4	9	20%	36
	Agree	3	18	40%	54
	Disagree	2	18	40%	36
	Strongly Disagree	1	0	0%	0
	Total		45	100%	126

Based on Table 10, community involvement in mangrove ecotourism activities showed different results in the three study areas. Ketapang Urban Aquaculture obtained the highest total score of 136 which was included in the high category, while Saung Alas obtained a total score of 126 and TWA Angke Kapuk of 99 which was in the medium category. These results show that the community in Ketapang Urban Aquaculture has a higher level of involvement in mangrove ecotourism activities than the other two areas. The high level of community participation in the region is suspected to be influenced by community involvement in management, conservation, and tourism activities that provide direct economic benefits. Meanwhile, the low level of community involvement in TWA Angke Kapuk shows that the surrounding community has not been directly involved in mangrove ecotourism activities, which may be influenced by a more centralized area management system. Saung Alas is in the medium category because the community is quite involved in tourism and conservation activities, although it is not evenly distributed to all surrounding communities. Local community involvement is an important factor in supporting the successful management of sustainable ecotourism.

Attitude

Illegal activities that damage mangroves need to be eradicated.

Efforts to preserve the mangrove ecosystem can be supported through the community's view of the importance of eradicating illegal activities that have the potential to damage mangrove areas. The attitude of the community towards illegal activities is presented in table 11.

Table 11. Illegal activities that damage mangroves need to be eradicated.

Mangrove Ecotourism Area	Answer	Score	Number of Respondents	Percentage of respondents	Total Score (score x respondents)
Ketapang Urban Aquaculture	Strongly agree	4	16	36%	64
	Agree	3	29	64%	87
	Disagree	2	0	0%	0
	Strongly Disagree	1	0	0%	0
	Total		45	100%	151
TWA Angke Kapuk	Strongly agree	4	7	16%	28
	Agree	3	38	84%	114
	Disagree	2	0	0%	0
	Strongly Disagree	1	0	0%	0
	Total		45	100%	142

Mangrove Ecotourism Area	Answer	Score	Number of Respondents	Percentage of respondents	Total Score (score x respondents)
São Paulo Resort	Strongly agree	4	8	18%	32
	Agree	3	36	80%	108
	Disagree	2	1	2%	2
	Strongly Disagree	1	0	0%	0
	Total		45	100%	142

Based on Table 11, the community's view of the eradication of illegal activities that damage mangroves shows high results in all research areas. Ketapang Urban Aquaculture obtained the highest total score of 151 which was included in the high category, while TWA Angke Kapuk and Saung Alas each obtained a total score of 142 which was also in the high category. The results show that most of the communities in the three regions strongly support efforts to eradicate illegal activities that have the potential to damage mangrove ecosystems, such as illegal logging and uncontrolled use of the area. The high level of public approval is suspected to be influenced by increasing public awareness of the importance of preserving mangroves as a protector of the coastal environment and supporting the sustainability of fishery resources. Ketapang Urban Aquaculture has the highest score because the people in the region show more answers in complete agreement than other regions. In addition, the success of mangrove conservation is greatly influenced by regional supervision and public awareness of the impact of mangrove damage on the environment and the socio-economic life of coastal communities.

Illegal logging of mangrove wood damages environmental sustainability.

The community's view on environmental sustainability can be known through an assessment of the impact of illegal logging of mangrove wood on the destruction of the mangrove ecosystem. Opinions on illegal logging can be seen in table 12.

Table 12. Illegal logging of mangrove wood damages environmental sustainability.

Mangrove Ecotourism Area	Answer	Score	Number of Respondents	Percentage of respondents	Total Score (score x respondents)
Ketapang Urban Aquaculture	Strongly agree	4	14	31%	56
	Agree	3	31	69%	93
	Disagree	2	0	0%	0
	Strongly Disagree	1	0	0%	0
	Total		45	100%	149
TWA Angke Kapuk	Strongly agree	4	9	20%	36
	Agree	3	36	80%	108
	Disagree	2	0	0%	0
	Strongly Disagree	1	0	0%	0
	Total		45	100%	144
São Paulo Resort	Strongly agree	4	14	31%	56
	Agree	3	31	69%	93
	Disagree	2	0	0%	0
	Strongly Disagree	1	0	0%	0
	Total		45	100%	149

Based on Table 12, the community's view of the impact of illegal logging of mangrove wood on environmental sustainability shows high results in all research areas. Ketapang Urban

Aquaculture and Saung Alas obtained the highest total score of 149 which was included in the high category, while TWA Angke Kapuk obtained a total score of 144 which was also in the high category. The results show that most of the communities in the three regions have realized that illegal logging of mangroves can cause damage to coastal ecosystems, such as coastal abrasion, reduced aquatic habitat, and decreased environmental quality. The high level of public approval is suspected to be influenced by the increasing public understanding of the importance of the ecological function of mangroves in maintaining the balance of the coastal environment. Ketapang Urban Aquaculture and Saung Alas have higher scores because the people in the region give more answers to their questions than TWA Angke Kapuk. According to Aida *et al.* (2016) Mangrove damage due to illegal logging can lead to a decline in the quality of coastal ecosystems and threaten the sustainability of fishery resources.

Maintaining the preservation of mangrove forests is important.

The importance of environmental conservation can be known through community assessments of the importance of preserving mangrove forests as a sustainable coastal ecosystem. The results of the assessment are presented in table 13.

Table 13. Maintaining the preservation of mangrove forests is important.

Mangrove Ecotourism Area	Answer	Score	Number of Respondents	Percentage of respondents	Total Score (score x respondents)
Ketapang Urban Aquaculture	Strongly agree	4	8	18%	32
	Agree	3	37	82%	111
	Disagree	2	0	0%	0
	Strongly Disagree	1	0	0%	0
	Total		45	100%	143
TWA Angke Kapuk	Strongly agree	4	2	4%	8
	Agree	3	41	92%	123
	Disagree	2	2	4%	4
	Strongly Disagree	1	0	0%	0
	Total		45	100%	135
São Paulo Resort	Strongly agree	4	7	16%	28
	Agree	3	38	84%	114
	Disagree	2	0	0%	0
	Strongly Disagree	1	0	0%	0
	Total		45	100%	142

Based on Table 13, the community's view on the importance of preserving mangrove forests shows high results in all research areas. Ketapang Urban Aquaculture obtained the highest total score of 143 which is included in the high category, followed by Saung Alas with 142 and TWA Angke Kapuk with 135 which is in the medium to high category. These results show that most of the people in the three regions have a good awareness of the importance of preserving mangroves as part of the sustainability of the coastal environment and the lives of the surrounding community. The high level of public approval is allegedly influenced by the increasing public understanding of the ecological and economic benefits of mangroves, such as coastal protection, aquatic biota habitats, and supporting ecotourism activities. Ketapang Urban Aquaculture has the highest score because the people in the region give more unanimous answers than other regions. The preservation of mangrove ecosystems is very important in

maintaining the balance of coastal ecosystems and supporting the sustainability of natural resources (Murtaza 2011).

The community feels involved in decision-making related to ecotourism management.

Community involvement in area management can be known through community assessments of involvement in decision-making related to ecotourism management. The data is presented in Table 14.

Table 14. The community feels involved in decision-making related to ecotourism management.

Mangrove Ecotourism Area	Answer	Score	Number of Respondents	Percentage of respondents	Total Score (score x respondents)
Ketapang Urban Aquaculture	Strongly agree	4	0	0%	0
	Agree	3	5	11%	15
	Disagree	2	40	89%	80
	Strongly Disagree	1	0	0%	0
	Total		45	100%	95
TWA Angke Kapuk	Strongly agree	4	0	0%	0
	Agree	3	2	4%	6
	Disagree	2	33	74%	66
	Strongly Disagree	1	10	22%	10
	Total		45	100%	82
São Paulo Resort	Strongly agree	4	1	2%	4
	Agree	3	33	74%	99
	Disagree	2	10	22%	20
	Strongly Disagree	1	1	2%	1
	Total		45	100%	124

Based on Table 14, the level of community involvement in decision-making related to ecotourism management showed different results in the three study areas. Saung Alas obtained the highest total score of 124 which was included in the medium category, while Ketapang Urban Aquaculture obtained a total score of 95 and TWA Angke Kapuk of 82 which was in the low category. These results show that most people in the three regions still feel less involved in the decision-making process related to mangrove ecotourism management. However, the community in Saung Alas has a better level of involvement than the other two regions, which is allegedly influenced by the participation of local communities in the management and development of tourist areas. The low level of community involvement in Ketapang Urban Aquaculture and TWA Angke Kapuk shows that area management still tends to be dominated by certain parties so that community participation in decision-making is not optimal. In addition, Pomeroy and Douvere (2008) It also explains that low community participation in the decision-making process can affect the effectiveness of coastal resource management and reduce community support for environmental conservation programs.

The community is willing to contribute to maintaining the mangrove area.

Community participation in environmental conservation efforts can be known through the community's willingness to contribute to protecting mangrove areas. The data is presented in Table 15.

Table 15. The community is willing to contribute to protecting the mangrove area.

Mangrove Ecotourism Area	Answer	Score	Number of Respondents	Percentage of respondents	Total Score (score x respondents)
Ketapang Urban Aquaculture	Strongly agree	4	7	16%	28
	Agree	3	30	67%	90
	Disagree	2	8	18%	16
	Strongly Disagree	1	0	0%	0
	Total		45	100%	134
TWA Angke Kapuk	Strongly agree	4	4	9%	16
	Agree	3	26	58%	78
	Disagree	2	11	24%	22
	Strongly Disagree	1	4	9%	4
	Total		45	100%	120
São Paulo Resort	Strongly agree	4	2	4%	8
	Agree	3	37	82%	111
	Disagree	2	4	9%	8
	Strongly Disagree	1	2	4%	2
	Total		45	100%	129

Based on Table 15, the level of community willingness to contribute to maintaining mangrove areas showed different results in the three study areas. Ketapang Urban Aquaculture obtained the highest total score of 134 which is included in the medium to high category, followed by Saung Alas with 129 and TWA Angke Kapuk with 120 which is also in the medium category. These results show that most of the people in the three regions have the desire to contribute to preserving the mangrove area, although the level of willingness still varies between regions. Ketapang Urban Aquaculture has the highest score because the people in the region give more yes and strongly agree than other regions. Meanwhile, TWA Angke Kapuk has the lowest score because there are still people who are less willing to be directly involved in mangrove conservation activities. The difference in the level of community willingness is suspected to be influenced by the level of community participation, perceived economic benefits, and community involvement in mangrove area management activities. According to Walters *et al.* (2008) The involvement and contribution of local communities is one of the important factors in supporting the success of sustainable conservation of coastal ecosystems.

Public perception of mangrove ecotourism development

Based on the final results of the analysis of public perception of mangrove ecotourism management, it is known that Ketapang Urban Aquaculture obtained the highest perception score of 72.96%, followed by Saung Alas at 72.29%, and TWA Angke Kapuk at 70.89%. The three regions are included in the high category based on the criteria of the level of public perception, which is 66.7–100%. These results show that the community in the three mangrove ecotourism areas has a positive perception of the management, preservation, and sustainability of mangrove ecotourism. The high level of public perception is suspected to be influenced by public understanding of the ecological and economic benefits of mangroves, community involvement in ecotourism activities, and public awareness of the importance of preserving the coastal environment. Although the entire region is in the high category, Ketapang Urban Aquaculture has a higher perception value than other regions, which shows that the people in

the region have a better level of support and understanding of mangrove ecotourism management.

CONCLUSION

In general, the results of the study show that people in Ketapang Urban Aquaculture, TWA Angke Kapuk, and Saung Alas have a high level of perception of mangrove ecotourism management. This condition indicates a good understanding and support of the community for efforts to manage, conserve, and develop sustainability-based mangrove ecotourism in coastal areas.

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