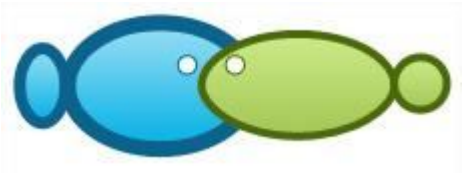

Coastal area management strategy priority of mangrove ecotourism in Makassar city and its impact on aquatic organisms

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Abstract. The management of coastal areas becomes a challenge along with the increasing pressure on these areas, both in urban areas development and coastal and marine tourism areas, including mangrove ecotourism. One of the mangrove ecotourism attractions in Makassar is Lantebung. This study aimed to formulate the coastal area management strategy of mangrove ecotourism in Makassar. The researchers implemented a study case approach. The study was conducted in Lantebung mangrove ecotourism area. The local communities and visitors as respondents were interviewed. The data were analyzed by using A'WOT analysis (embedded method of SWOT and AHP). The researchers found that the primary strategy in managing the mangrove ecotourism is optimizing a group of people who manage Lantebung mangrove ecotourism by taking the opportunities to utilize ecotourism location as a development area in Makassar. The strategy will give more space to ecosystems and organisms to grow and develop, where the communities that are the main benefits of mangroves can be controlled, so that the pressure that occurs during this time becomes reduced and even lost.
Key Words: A'WOT, coast, ecotourism, mangrove, strategy.

Introduction. The integrated management of coastal areas should always be implemented along with the coastal areas' high pressure. There is some utilization in this area, including; a) fishery sectors (capture fishery, mariculture, aquaculture pond), b) tourism sector (coastal tourism, underwater tourism, and mangrove ecotourism), c) transportation sector (river and sea transportation). Meanwhile, the number of stakeholders involved in coastal areas' management causes a high potential for conflict. It is in line with Daris et al (2019, 2020), who stated that coastal areas have a very high possibility of conflict, both vertical conflict with the government and horizontal conflict among the stakeholders (users/actors) of the coastal and marine resources. Moreover, Demmallino et al (2020) stated that there are many communities in the coastal area based on the type of utilization, such as *Pakkaja, Pallawa, Passompe* (the names of the communities). The presence of these communities will directly impact the resources and ecosystems, both in mangrove ecosystems and to aquatic organisms contained in. Furthermore, El Fajri et al (2020) stated that the sustainability of fishery resource management is very important because the resources involve many aspect and actors.

One of the coastal areas experiencing rapid development and having the potential to experience degradation from the high pressure is Lantebung mangrove ecotourism area, located in Bira, Biringkanaya, Makassar. It is near to the downtown of Makassar. Along with the increasing number of visitors in Lantebung mangrove ecotourism area, the waste, mainly plastic waste, also increases. The waste, especially plastic waste, will have a huge impact on mangrove ecosystems and organisms in it. This is as stated by El Fajri et al (2021) that one of the factors causing the poor condition of fish resources in Sungai Apit Subdistrict is caused by several factors, including pollution or waste. Similarly,

Eddiwan et al (2021) stated that high pressure through simulation of increased shrimp farming efforts up to 70% will also have a high impact on the resources. The research results of Massiseng et al (2020) revealed that the condition of Lantebung mangrove ecosystem management requires serious handling, especially to the management of plastic waste that is found in the region. Furthermore, Yusuf et al (2015) stated that the presence of plastic waste will cause a decrease in fishermen's income, which stems from a decrease in fishing.

Pollution is a condition in which there is the addition of various materials from human activities into the environment, which have harmful effects and damage the environment's original properties, both physical, chemical, and biological (Palar 2008). Generally, the visitors' waste is plastic waste, such as food and beverage package or plastic bag. Plastic is a synthetic organic polymer, and its materials compatible for daily use (Derraik 2002). Jambeck et al (2015) stated that the utilization of plastic material, such as food and beverage package, is the leading cause of a large amount of plastic waste. Besides, Yusuf et al (2015) stated that the level of pollution in coastal areas is generally caused by waste in residential areas.

A large amount of waste is generally caused by littering, the absence of comprehensive and integrated waste management in all aspects, and the absence of integration in some parts, such as the legal aspect, by giving a penalty to the perpetrator littered. The increasing population and development activity turns waste into the central environmental issue (Djaguna et al 2019). Household waste, waste from any activity done in Lantebung, which also comes from visitors, causes the increasing number of waste in Lantebung. The waste includes plastic, textile, foam, styrofoam, glass, ceramic, metal, paper, and rubber (Tseng et al 2019). These wastes will continue to accumulate along with the growing population and number of visitors in Lantebung. As a result, the pollution load increases in the coastal area and causes the decreasing number of carrying capacity of the environment that will threaten coastal resources' sustainability. According to Yusuf et al (2016), several factors could build the coastal area more sustainable. They are institutional facility, property rights, population density, and technology used to utilize coastal resources. Therefore, it is essential to study the coastal area management strategy of mangrove ecotourism in Makassar to maintain or make more sustainable coastal area management.

Material and Method

Location and time of the study. The study is a case study. It was conducted in Lantebung mangrove ecotourism area, Bira, Biringkanaya Sub-District, Makassar city, South Sulawesi Province from June to August 2020.

Data type and source. The data type was primary data taken from a number of questionnaires that have been systematically compiled and given to the respondents. The respondents involved; 1) 30 (thirty) locals and visitors of Lantebung mangrove ecotourism area, 2) 5 (five) experts, which involved 2 (two) academics from university, 2 (two) people from local government (policymakers), and 1 (one) person from a non-governmental organization (NGO). The researchers chose the locals and visitors as respondents based on Gay & Diehl (1992) theory in Yusuf et al (2020). They stated that the sample size of descriptive research is 10% of the population, correlational research is at least 30 samples, casual-comparative research is 30 elements per group, and experimental research is 15 elements per group. Furthermore, the experts were chosen based on Hora (2004), who stated that 3 (three) to 6 (six) or 7 (seven) experts are enough or have high precision. It is also in line with Clemen & Winkler (1985) that (3) three to (5) five experts are enough.

Data collection method. The data collection method of the study was based on the data type and source. The local communities and visitors were interviewed by using an unstructured questionnaire, where the respondents were given the freedom to answer the questions. Meanwhile, the data obtained from the experts were taken through a

structured interview. Nasution (2003) stated that a structured interview is an interview that is done systematically and comprehensively, in which the answer to the question is available. It is also a formal interview. In contrast, an unstructured interview is an interview that does not need an interview guideline that has been listed systematically and comprehensively. The questions are based on the outline of the issues to be asked (Nazir 2004).

Data analysis method. This study used A'WOT to analyze the data. According to Yusuf et al (2020), A'WOT analysis is an analysis tool for strategic policy and a hybrid tool of two analysis methods: AHP (Analytical Hierarchy Process) and SWOT (Strength Weakness Opportunities Threat) analysis. Futhermore, Kangas et al (2001) stated that A'WOT analysis covers the lack of SWOT and increases the strategic planning process's information base.

Further, Yusuf et al (2020) divided two stages of A'WOT analysis, including the first stage is drafting a policy strategy by using the SWOT approach. The first stage consists of some steps, such as a) internal and external factors identification, b) internal and external strategic factor analysis, c) internal-external matrix analysis, d) space matrix analysis, and e) SWOT matrix analysis. Meanwhile, the second stage is determining strategic priority using the AHP approach. This second stage also involves some steps, including a) build a model structure/hierarchy, b) pairwise comparison, c) decision making and evaluation. The stages of A'WOT analysis for this present study are detailed as follows:

- internal and external factors identification was intended to obtain an overview of the study's internal (strengths and weaknesses) and external (opportunities and threats) factors. The identification was conducted using a survey method (interview);

- internal and external strategic factor analysis was used to know the factors of strengths, weaknesses, opportunities, and threats in formulating strategic policies;

- internal-external matrix analysis was intended to analyze the policy position in more detail and the suitable strategy to be implemented;

- space matrix analysis aimed to sharpen the strategy to be implemented. Rangkuti (1998) stated that the space matrix is used to determine the position and direction of further development. Moreover, Marimin (2004) stated that strategic policy position is divided into four quadrants: Quadrant I – an offensive or aggressive strategy, Quadrant II – competitive strategy, Quadrant III – defensive strategy, Quadrant IV – conservative strategy;

- SWOT matrix analysis was intended to determine the strategy and policy plan. Rangkuti (2015) stated that SWOT matrix analysis could systematically show various factors to formulate policy strategies. The analysis was based on a logic that maximizes the strength and opportunity and minimizes the weaknesses and threats;

- formulating an alternative strategy aimed to draw the various alternative plan. David (2006) stated that at least four types of strategies would be drawn, namely Strengths-Opportunities (hereafter, SO strategy), Weaknesses-Opportunities (hereafter, WO), Strengths-Threats (hereafter, ST), Weaknesses-Threats (hereafter, WT);

- determining strategy priority was intended to determine the priority of various alternative strategies using the AHP approach.

Results and Discussion

Internal and external factors identification. Based on the results of interview with local communities and visitors in Lantebung mangrove ecotourism area, the researchers identified the internal and external factors on plastic waste management strategy as follows in Table 1.

Table 1

The result of internal and external factors identification

No.	*Factors*	*Factor identifications*
1	The existence of a group of people to manage the ecotourism area	Strength
2	The restructuring program of the ecotourism area	Strength
3	The program of clean area	Strength
4	The program of community education	Strength
5	The object of research and community dedication	Strength
6	No penalty	Weakness
7	Lack of waste disposal facilities	Weakness
8	Lack of information to dispose of the trash	Weakness
9	No control	Weakness
10	The tourist area is close to a residential area	Weakness
11	The development area in Makassar	Opportunity
12	City Tourism concept	Opportunity
13	Pilot area	Opportunity
14	Research development area	Opportunity
15	Assisted area	Opportunity
16	The rapid growth of the population	Threat
17	The increasing number of tourists/visitors	Threat
18	Environmental degradation	Threat
19	Pollution level	Threat
20	Conflict	Threat

Internal and external strategic factor analysis. It was a stage of assessment (weight and rate) of both internal factors (strengths and weaknesses) and external factors (opportunities and threats), which was obtained from the identification results. The preparation of matrices in internal and external strategic factor analysis (IFAS – EFAS) was intended to determine the level of importance indicated by a significant weight and rate. The details are presented in Table 2.

The internal strategic factors evaluation result was 2.7241, including the strength factor in 1.9310 and the weakness factor in 0.7931. Meanwhile, the result of external strategic factors evaluation was at 2.6774, involving the opportunity factor in 1.8387 and the threat factor at 0.8387. These scores show that the level of internal and external waste management factors in Lantebung mangrove ecotourism area is classified as strong (> 2.5). It is in line with Wheelen et al (2018) who stated that it is classified as strong if its score is more than 2.5, and it is weak if it is less than 2.5. Thus, internal and external factors have a strong impact on developing Lantebung mangrove ecotourism area. The analysis also shows that the strength factor has the most significant impact among the other factors. The details are depicted in Figure 1.

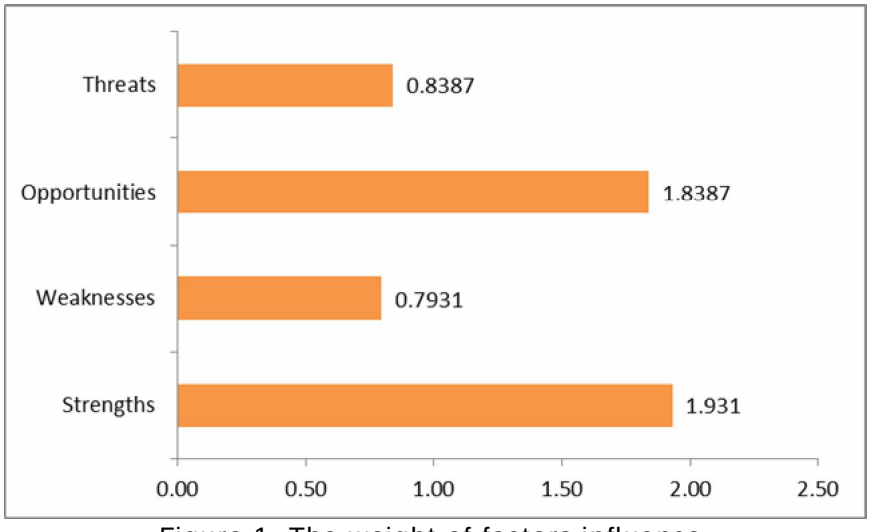

Figure 1. The weight of factors influence.

Table 2

IFAS – EFAS matrix

No	*Internal – external strategic factors*	*Weight*	*Rate*	*Score*
A	*Strengths*			
1	The existence of a group of people to manage the ecotourism	0.1379	4	0.5517
2	The restructuring program of the ecotourism area	0.1379	3	0.4138
3	The program of clean area	0.1034	4	0.4138
4	The program of community education	0.0690	4	0.2759
5	The object of research and community dedication	0.0690	4	0.2759
	Sub total A			1.9310
B	*Weaknesses*			
1	No punishment	0.1034	1	0.1034
2	Lack of waste disposal facilities	0.1379	2	0.2759
3	Lack of information on the environmental awareness	0.1034	2	0.2069
4	No control from supervisor	0.0690	2	0.1379
5	The tourist area is close to a residential area	0.0690	1	0.0690
	Sub total B			0.7931
	Sum of internal factors	1.0000		2.7241
C	*Opportunities*			
1	The development area in Makassar	0.1290	4	0.5161
2	City Tourism concept	0.0968	4	0.3871
3	Pilot area	0.0968	3	0.2903
4	Research development area	0.0645	4	0.2581
5	Assisted area	0.0968	4	0.3871
	Sub total C	0.4839		1.8387
D	*Threats*			
1	The rapid growth of population	0.1290	2	0.2581
2	The increasing number of tourists/visitors	0.1290	2	0.2581
3	Environmental degradation	0.0968	1	0.0968
4	Pollution level	0.0968	1	0.0968
5	A high potential for conflict	0.0645	2	0.1290
	Sub total D			0.8387
	Sum of external factors			2.6774

Internal – external matrix analysis. It was intended to position the program of the study into a matrix of 9 cells. The internal-external matrix consists of two dimensions: the IFE matrix's total score on the X-axis and the EFE matrix on the Y-axis (Harrison 2010). If these two factors were analyzed in internal-external analysis, then both factors were in the 5th Quadrant (cell), namely cell growth. The details are presented in Figure 2.

1 GROWTH Concentration through vertical integration	*2 GROWTH* Concentration through horizontal integration	3 *RETRENCHMENT* Turn around
4 STABILITY Cautious	5 *GROWTH* Stability	*6 RETRENCHMENT* Divestment
7 *GROWTH* Concentric diversification	8 *GROWTH* Conglomerate diversification	9 *RETRENCHMENT* Bankruptcy or liquidation

Figure 2. The position of plastic waste management strategy in IE matrix.

Based on the analysis of internal and external strategic factors, the internal factors score is 2.7241, and the external factors score is 2.6774. It means that both scores are in the median. These analysis results show that the waste management strategy of the Lantebung mangrove ecotourism area was relatively strong. Furthermore, it can be seen

that the position in the IE matrix quadrant was in the 5th cell (growth). Inglott et al (2016) stated that V-cells are Hold and Maintain Cells, in which the general strategies can be applied such as market penetration, product, and market development. Thus, it is necessary to penetrate the broader policies, such as improving cleanliness awareness, infrastructure facilities (procurement of trash cans), and providing education to the local communities and visitors through appeals and supervision and other development strategies.

Space matrix analysis. The space matrix analysis was intended to determine the position of the plastic waste management strategy of Lantebung mangrove ecotourism area and the further development. IFAS and EFAS matrices are used as the parameters. They are the differences in the internal strategic factors (strengths – weaknesses) and external factors (opportunities – threats) scores (Kamiske 2015). The details are presented in Table 3.

Table 3

Estimation score in space matrix

Factors	*Scores*	*Differences*
Strengths-Weaknesses	1.9310-0.7931	1.1379
Opportunities-Threats	1.8387-0.8387	1.0000

The results of internal (strengths-weaknesses) and external (opportunities-threats) estimation factors show that the position of Lantebung mangrove ecotourism area management strategy was in Quadrant I or called aggressive strategy (Figure 3).

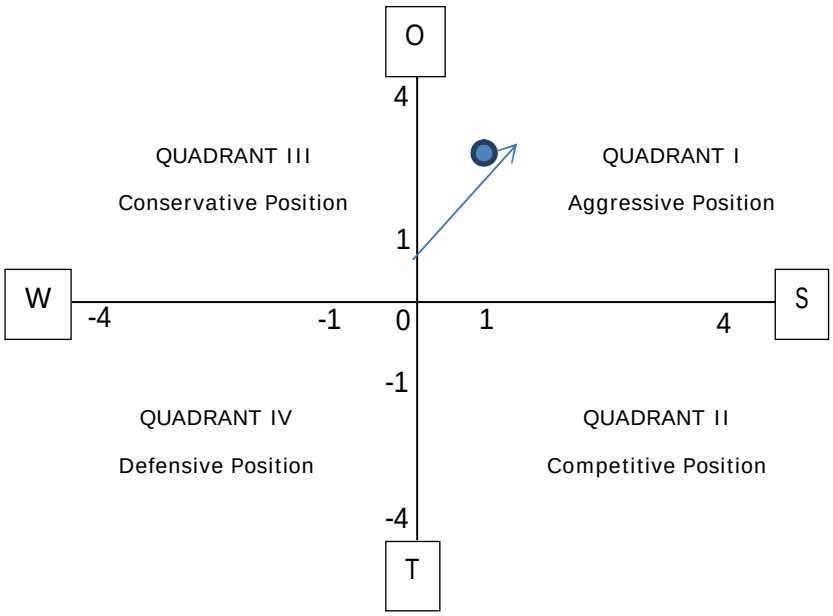

Figure 3. Internal and external strategies in diagram space.

It was a stable position and could be more aggressive (comprehensive). According to Marimin (2004), strategy in Quadrant I is an aggressive strategy, where taking the opportunity and optimizing the strengths must be done. In this case, the opportunity factor was Lantebung mangrove ecotourism's location that becomes a part of the development area in Makassar. This may bring the most significant opportunity in developing ecotourism-based coastal areas, particularly Lantebung mangrove ecotourism area. Insani et al (2019) stated that coastal ecotourism area needs to be developed through an environmental-sound concept to create tourism sustainability, not harm the environment, and ensure local communities' well-being, both today and in the future. Meanwhile, the strength factor was the existence of a group of people who manage the

Lantebung mangrove ecotourism area. Therefore, the primary strategy that can be done in optimizing people's role is to maximize the location's opportunity to be part of the development area in Makassar.

SWOT matrix analysis. The factors that affect the management strategy were identified through internal and external factors. Internal matrix is a method to identify and evaluate the internal program. Internal factors that were observed include the strengths and weaknesses of Lantebung mangrove ecotourism area. Meanwhile, the external matrix is used to identify and evaluate the external program involving the opportunities and threats. The following is a SWOT matrix analysis of plastic waste management in Lantebung mangrove ecotourism area (Table 4).

Table 4

Matrix SWOT analysis

	Strengths	**Weaknesses**
	1. The existence of a group of people to manage the ecotourism; 2. The restructuring program of the ecotourism area; 3. The program of clean area; 4. The program of community education; 5. The object of research and community dedication.	1. No punishment; 2. Lack of waste disposal facilities; 3. Lack of information to dispose of a trash; 4. No control from supervision; 5. The ecotourism area is close to a residential area.
Opportunities 1. A part of the development area in Makassar; 2. City Tourism concept; 3. Pilot area; 4. Research development area; 5. Assisted area.	**SO**: Strategy to optimize the role of a group of people who manage the Lantebung mangrove ecotourism area through taking the opportunities to utilize ecotourism location as a development area in Makassar.	**WO**: Strategy to optimize local government regulation on ecotourism-based coastal area management.
Threats 1. The rapid growth of the population; 2. An increasing number of tourists or visitors; 3. Environmental degradation; 4. Pollution level; 5. Conflict.	**ST**: Strategy to increase collaboration among the parties of governments, universities, communities, NGOs, and the private sector.	**WT**: Strategy to increase institutions and communities' capacity on the management of coastal sustainability.

Determining strategic priority. Strategic program priority was determined by using the AHP approach. The hierarchy analysis of mangrove ecotourism management strategies in Makassar is depicted in Figure 4.

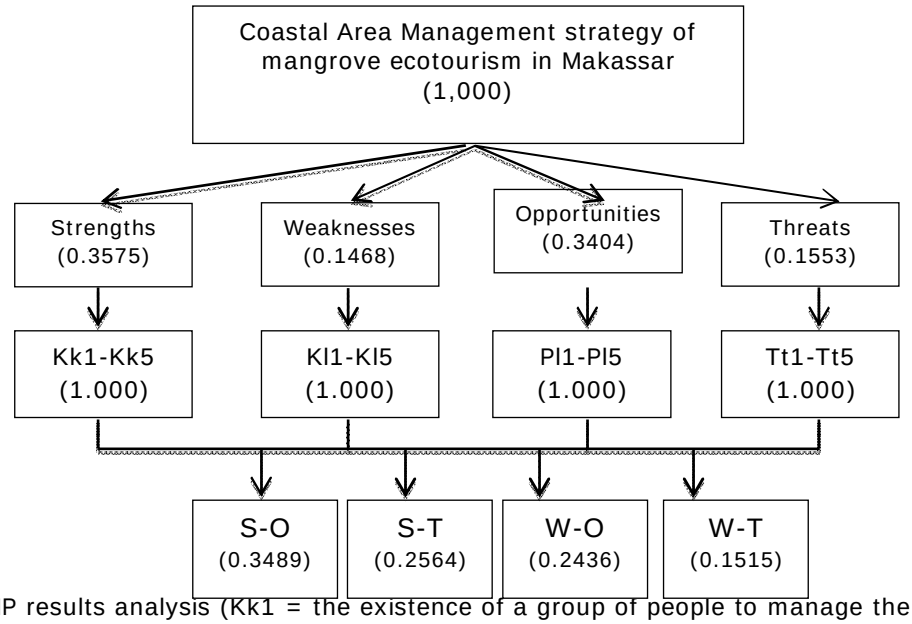

Figure 4. AHP results analysis (Kk1 = the existence of a group of people to manage the ecotourism area; Kk2 = the restructuring program of the ecotourism area; Kk3 = the program of clean area; Kk4 = the program of community education; Kk5 = the object of research and community dedication; Kl1 = no punishment; Kl2 = lack of waste disposal facilities; Kl3 = lack of information to dispose of a trash; Kl4 = no control from supervisors; Kl5 = the ecotourism area is close to a residential area; Pl1 = a part of the development area in Makassar; Pl2 = City Tourism concept; Pl3 = pilot area: Pl4 = research development area; Pl5 = assisted area; Tt1 = the rapid growth of the population; Tt2 = an increasing number of tourists or visitors; Tt3 = environmental degradation; Tt4 = pollution level; Tt5 = conflict).

Based on AHP analysis results, the SO strategy was a priority strategy with a coefficient value at 0.3489 (34.89%). SO strategy was a strategy to optimize the role of a group of people who manage the Lantebung mangrove ecotourism area through taking the opportunities to utilize ecotourism location as a development area in Makassar. Optimizing their role also becomes a part of community education. Chambers (1995) stated that community education is an economic development concept that summarizes society's values to build a new paradigm in developing people-centered, participatory, empowerment, and sustainability. Strengthening these community groups will indirectly encourage the development of the existing mangrove ecotourism area. It is in line with Insani et al (2019), who stated that there are some alternative strategies to develop tourist attraction, including optimizing all existing potential to create sustainable tourism management and involving all parties collaboration to improve, maintain, and optimize ecotourism.

The impact of the strategy on aquatic organisms. The results of interviews with the community obtained that the catch of fishermen to decline in line with the increasing waste around the mangrove area lantebung. Therefore, an effective and efficient management strategy is needed. SO strategy was a strategy to optimize the role of a group of people who manage the Lantebung mangrove ecotourism area through taking the opportunities to utilize ecotourism location as a development area in Makassar will have a great influence on the survival of mangrove ecosystems and also organisms contained in it. The strategy will give more space to ecosystems and organisms to grow and develop, where the communities that are the main benefits of mangroves can be controlled, so that the pressure that occurs during this time becomes reduced and even lost. Thus, mangrove ecosystems and organisms in it can grow well. On the other hand, this strategy also provides a wider management space to the community, especially related to the management of plastic waste which is also one of the sources of impact on mangrove ecosystems and organisms in it. Some types of organisms commonly found and captured by fishermen in the mangrove ecosystem include; mullet (*Valamugil seheli*), shrimp (*Litopenaeus vannamei*), crab (*Scylla serrata*), barramundi (*Lates*

calcarifer), rajungan (*Portunus pelagicus*) and clams anadara (*Anadara granosa*). All organisms are directly associated with mangrove ecosystems. According to Yulinda et al (2020) the species *A. granosa* is found in coastal areas textured mud, such as mangrove areas. According to Sumanti et al (2005), mangrove forests contribute greatly to organic detritus which is very important as an energy source for biota living in the surrounding waters. Furthermore, Bengen (2004) stated the mangrove ecosystem is a habitat for aquatic biota, where the ecological function of mangroves for biota is as a nursery ground, feeding ground and spawning ground. Indications of the abundance of organisms around the Lantebung mangrove area is the ingestion of several fishing tools such as sero (set net), gill net and bubu (fish trap). According to Surachmat et al (2020), sero is a common fishing tool generally found in coastal areas and particularly in mangrove areas.

Conclusions. The results of interviews with the community obtained that the catch of fishermen to decline in line with the increasing waste around the mangrove area lantebung. Therefore, an effective and efficient management strategy is needed. The coastal area priority strategy in managing mangrove ecotourism in Makassar is by optimizing the role of a group of people who manage the Lantebung mangrove ecotourism area through taking the opportunities to utilize ecotourism location as a development area in Makassar.

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