DEVELOPMENT OF ECTOURISM IN LIMBOTO LAKE THROUGH SUPPLY AND DEMAND APPROACH

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ABSTRACT

Limboto Lake is one of the lakes in Indonesia which is increasingly degraded due to uncontrolled sedimentation rates and aquatic plant populations, causing siltation. This study seeks to identify the ecotourism potential in Limboto Lake with a supply and demand approach. It applied questionnaires distribution, observation, and literature study method, while the analysis used is scoring and descriptive. Based on findings, Limboto Lake possesses supply aspects, including tourist attractions, facilities, accessibility, and community. For tourist attractions, there are a variety of lake activities that can be turned into ecotourism attractions, as well as the biodiversity of flora and fauna, art, and culture. In addition, the tourist facilities are still minim, which requires supporting facilities such as public toilets, homestays, information boards, and parking. Further, demand potential includes the characteristics, motivation, and tourists' desires/demands. The tourists are dominated by women, and domestic tourists, with frequent visits. The main activity for a visit is lake boating, and the most preferred object is the natural scenery. Information about the potential for ecotourism with conservation principles can be one way to support efforts to save Limboto Lake.

Keywords: Demand; Ecotourism; Limboto Lake; Supply

INTRODUCTION

On a worldwide scale, tourism has drawn particular attention since it is a significant source of foreign exchange in various countries. According to Travel & Tourism Development Index 2021 WEF of May 2022 edition, Indonesia's tourism industry ranks 32 out of 117 countries worldwide. Compared to Indonesia's accomplishments in 2019 or prior to the pandemic, this position has increased by 12 ranks (Uppink & Soskin, 2022). The growth of mass tourism causes large number of tourist, which harms the environment, such as waste accumulation in Kepulauan Seribu (Krisnamurti *et al.*, 2016), or mass tourism in Karimunjawa National Park which has an impact on the lack of clean water and landslides (Soetomo, 2013). The tourism development strategy from mass tourism to alternative tourism is a smart move towards sustainable tourism.

Ecotourism has a significant possibility to be developed since there is a tendency for world tourism interest to return to nature. However, ecotourism differs from natural tourism since the tourist activities in ecotourism focus more on observing and understanding nature and culture in the visited areas by supporting conservation activities and prioritizing the facilities and services provided by the local community. As for the nature tourism, tourists are limited to enjoying nature activities, adventure tourism emphasizes challenging physical activities and the ability to overcome the environmental conditions in the visited area (Kristyana, 2019). Ecotourism reflects the local community, culture, economy, and environment. It not only provides a solution for

sustainable development of social, economic, and environment but also promotes natural and cultural diversity (Osman *et al.*, 2018)

Limboto Lake is currently in an apprehensive condition because the process of shrinkage and siltation due to sedimentation puts its continued existence in jeopardy. Several research results show that the water quality of Limboto Lake has been polluted by heavy metals and the parameters of nitrate, phosphate and hydrogen sulfide are above the quality standard (Lihawa & Mahmud, 2017; Niode *et al.*, 2020). In addition, there are around 8.54 million tonnes/year of sediment entering Limboto Lake. The sub-watershed that has the potential to carry the largest sediment to Lake Limboto is the Alo sub-watershed (Dunggio & Chairil Ichsan, 2022; Alfianto & Cecilia, 2020). Further, despite being in critical condition, Limboto Lake can be managed as ecotourism due to the potential for biodiversity, history, culture, and other tourist attractions that surround it. Such condition demand conservation efforts. Hence, ecotourism is applied to conservation principles in order to help with efforts to save Limboto Lake. The potential of Limboto Lake has not been managed into ecotourism thus it is necessary to identify the potential with a supply and demand approach as the initial step in development.

METHOD

The research was conducted at Limboto Lake, located in Gorontalo Regency and Gorontalo City, Gorontalo Province, which include natural resources, locals, and tourists as the research object includes. The equipment employed was GPS, stationery, drones, cameras, and tape recorders. The material used is a questionnaire for locals and tourists. The type of data gathered is in the form of primary data and secondary data.

We distributed questionnaires to tourists and locals with a total of 30 respondents from each village using purposive sampling in three villages, namely Hutadaa Village and Timuato Village in Gorontalo District, as well as Dembe Village in Gorontalo City. The purpose of completing the questionnaire is to identify the community's general characteristics, perceptions of Lake Limboto, and perceptions of ecotourism. Meanwhile, a questionnaire for tourists aims to ascertain the general characteristics, motivations, and demands/desires of tourists. The interview involved 50 local tourists and 5 foreign tourists. Further, sampling using an accidental sampling method.

Data were analyzed using scoring and descriptive techniques. Scoring analysis was carried out on the questionnaires result of community respondents. Scoring is given to the answers given by respondents. The scoring scale used is a modified Likert Scale. The scale uses five categories of answers namely (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, (5) strongly agree. The answer value is adjusted to the category's serial number. Descriptive analysis aims to describe the quantitative and qualitative data.

RESULTS AND DISCUSSION

The supply and demand potential of an area is the main factor that must be considered in the development of ecotourism. By identifying supply, ecotourism potentials will be identified in various aspects. Meanwhile, demand needs to be identified, as part of efforts to improve the quality of ecotourism objects.

Supply
1. Tourist attraction

The tourist attractions in this study include flora, fauna, art and culture, and various activities on the lake. For flora, there are 50 types of plants in Limboto Lakesuch as water hyacinth (Eichornia crassipes), lotus (Nelumbium sp) and kale (Ipomea aquatica) (Rahim, 2022). The lake was dominated by water hyacinth

previously, yet most of the water were clean of these weeds after the study was conducted.

Limboto Lake posseses fauna and flora diversity, making it a potential ecotourism attraction. There are 15 different fish species recorded in Limboto Lake, which dominated by 11 native species, and the remainder are introduced species of tilapia (*Orechromis mozambicus*), tilapia (*O. mozambicus*), nilem (*Osteochilus hasselti*) and koan (*Ctenoparingodon idella*) fish (Nurfiarini, A. dan Hendrawan, 2016). Additionally, there are 117 bird species identified during 2014-2022. Migratory bird species include the Pied stilt (*Himantopus leucocephalus*), Pacific Golden-Plover (*Pluvalis fulva*), Pin-tailed snipe (*Gallinago stenura*), and glossy ibis (*Plegadis falcinellus*). Resident bird species in the area include the Common moorhen (*Galinula chloropus*), Javan Pond-Heron (*Ardeola speciosa*), Sunda Teal (*Anas gibberifrons*), Cattle egret (*Bubulcus ibis*) (Mano, 2022).

There are a variety of arts and culture that can still be carried out by the locals around Limboto Lake, such as *gambusi* art. *Gambusi* is a traditional musical instrument that resembles a guitar, with four strings each consisting of two tones (Pulukadang, 2016). *Gambusi* accompanies other performing arts such as the *dana-dana* dance, paiya hungo lo poli and *marwas*. *Gambusi* art can be presented as a tourist attraction, but the number of gambusi players is decreasing. Further, other traditions that can promote ecotourism are *dikili* and the *Apangi* Festival. Several activities on Limboto Lake that can become other tourist attractions are canoeing, fishing in the traditional way (fishing, spreading the net by the lake, and diving), photography, cycling, and bird watching.

2. Tourism facilities

Based on the observations result, tourist facilities at Limboto Lake are still minimal. Only three piers can be found on the lake's East and South sides, consisting of one homestay for foreign tourists, and two restaurants in the middle of the lake. There are no tourist information boards, parking spaces, and specific toilets for tourists.

3. Accessibility

Limboto Lake is strategically located to be accessed from the city center and the airport. It takes about 50 minutes with 26 kilometers of mileage from Djalaluddin Airport. Meanwhile, the distance from the provincial capital of Gorontalo to Limboto Lake is around 9.8 kilometers, with 24 minutes of mileage. The distance from the Gorontalo Port to the lake is about 13 kilometers and takes 31 minutes; from the Ferry Port it is about 14 kilometers and takes 26 minutes. Even though the road to the area has been paved, the lake area access is still a dirt road.

4. Communities around Limboto Lake

1) Community characteristics

The tourism development model that focuses more on profitability and growth often marginalizes local people in tourism management. Ecotourism was developed as a form of protest against the mass tourism development model with an emphasis on environmental conservation, cultural preservation, community participation, economic benefits, and empowering vulnerable groups (Cobbinah, 2015), thus the aspects of community involvement must be prioritized in ecotourism planning. In developing ecotourism, it is important to understand the community's characteristics as described in Table 1.

Table 1. Community's characteristics in Limboto Lake

No.	Parameter	Criteria	Community			Amount	%
			1	2	3		
1	Respondents	a. Man	13	9	14	36	40%
		b. Woman	17	21	16	54	60%
2	Age	a. 17-35 years	13	7	10	30	33%
		b. 36-55 years	15	17	15	47	52%
		c. 55 years and over	2	6	5	13	14%
3	Education	a. TTSD		1		1	1%
		b. Elementary School	16	13	11	40	44%
		c. Junior High School	4	8	6	18	20%
		d. Senior High School	9	5	8	22	24%
		e. Higher eduction	1	3	5	9	10%
4	Occupation	a. Fisherman	7		1	8	9%
		b. Employees / Honorary	7	6	5	18	20%
		c. Trader	4	3	7	14	16%
		d. Motorized Three-Wheeled Pedicab (Bentor)	1	3	3	7	8%
		e. Housewife	9	14	6	29	32%
		f. Other	1	4	8	13	14%

Source: Primary Data, 2022
Notes: 1 = Hutadaa Village (n=30); 2 = Timuato Village (n=30); 3 = Dembe Village (n=30)

2) Community perception of Limboto Lake

Based on the questionnaire result, most respondents agreed that Limboto Lake was in a critical condition, however, some were neutral and disagreed. Some of the respondents stated so because, as of yet, fishermen continue to catch lots of fish from the lake. Most respondents cited sedimentation and water pollution as contributing factors to Limboto Lake's critical condition, while few were neutral and disagreed. Some of the respondents stated disagreed and strongly disagreed because they considered that the cause of lake's condition was high rainfall which caused the lake water to overflow.

Most respondents agreed and strongly agreed that Limboto Lake required rescue measures and lake revitalization efforts that need community participation. The average respondent admitted that they had never been involved in activities related to Limboto Lake preservation. Only a small percentage of respondents admitted they had been involved, but it was merely about socialization regarding the government's arrangement of floating net cages. Furthermore, most respondents agreed related the transformation idea of Limboto Lake to become a tourist attraction, since in recent years, many people have visited the restaurant in the middle of the lake. Meanwhile, respondents, who disagreed claimed that Limboto would not draw tourists fro there were no tourist facilities in the vicinity.

Moreover, most respondents agreed regarding flora and fauna preservation in Limboto Lake because those are lake's natural components. Others argue that it is important to conserve since fish rely on aquatic plants such as water hyacinths to reproduce. While other plants around the lake are also utilized as animal feed. As for the fauna that needs to be preserved, the respondents mentioned fish and birds most.

All respondents agreed and strongly agreed that fishing was not environmentally friendly, and bird hunting and littering in Limboto Lake affect people's lives as well as the environment. Many responders expressed regret that fishermen still use electrocution and trawlers to catch fish and ask the government to handle it. According to respondents, the hunting of wild birds in the lake was not carried out by locals but rather by a large number of tourists who were there specifically to hunt birds, especially during weekends. In addition, regarding waste, several respondents claimed that there are still people who put trash on the lake bank and burn it at that location because they are unsure where to dispose of the waste.

Table 2. Community Perceptions of Lake Limboto

No.	Parameter	Criteria	Amount	%
1	Is Limboto Lake in critical condition?	a. Strongly agree	29	32%
		b. Agree	47	52%
		c. Neutral	11	12%
		d. Disagree	2	2%
		e. Strongly disagree	1	1%
2	Is the critical condition of Limboto Lake caused by sedimentation and water pollution?	a. Strongly agree	15	17%
		b. Agree	57	63%
		c. Neutral	15	17%
		d. Disagree	2	2%
		e. Strongly disagree	1	1%
3	Does Limboto Lake require rescue measures to overcome the critical condition?	a. Strongly agree	13	14%
		b. Agree	62	69%
		c. Neutral	15	17%
		d. Disagree	0	0%
		e. Strongly disagree	0	0%
4	Does the Limboto Lake revitalization effort need to involve the community around the lake?	a. Strongly agree	7	8%
		b. Agree	74	82%
		c. Neutral	6	7%
		d. Disagree	2	2%
		e. Strongly disagree	1	1%
5	Does Limboto Lake have a chance to become a tourist attraction?	a. Strongly agree	8	9%
		b. Agree	71	79%
		c. Neutral	8	9%
		d. Disagree	2	2%
		e. Strongly disagree	1	1%
6	Does flora and fauna in Limboto Lake need to be preserved?	a. Strongly agree	18	20%
		b. Agree	71	79%
		c. Neutral	1	1%
		d. Disagree	0	0%
		e. Strongly disagree	0	0%
7	Can environmentally unfriendly fishing, bird poaching, and littering into Limboto Lake harm the environment and impact the lives of the locals?	a. Strongly agree	20	22%
		b. Agree	70	78%
		c. Neutral	0	0%
		d. Disagree	0	0%
		e. Strongly disagree	0	0%

Source: Primary Data, 2022

3) Community perception of ecotourism development

Most respondents agreed that if Limboto Lake was developed into ecotourism, it would lead to work opportunities and a livelier atmosphere in the village. Additionally, the tourism's concept at Limboto Lake takes into account environmental sustainability, which was also favorably approved by all respondents because they believed that a polluted and damaged environment would affect tourists' interest. The majority of respondents likewise agree and strongly agree that the ecotourism management in Limboto Lake is carried out by the local community. Some respondents considered that community involvement would provide financial benefits for them. However, some respondents are still of the opinion that local governments should be in charge of managing tourism.

Table 3. Community Perceptions of ecotourism development

No.	Parameter	Criteria	Amount	%
1	Do you agree that Limboto Lake is developed into ecotourism?	a. Strongly agree	7	8%
		b. Agree	72	80%
		c. Neutral	5	6%
		d. Disagree	3	3%

No.	Parameter	Criteria	Amount	%
		e. Strongly disagree	3	3%
2	Do you agree that Limboto Lake ecotourism takes environmental sustainability seriously?	a. Strongly agree	41	46%
		b. Agree	49	54%
		c. Neutral	0	0%
		d. Disagree	0	0%
		e. Strongly disagree	0	0%
3	Do you agree that the locals carry out the ecotourism management on Limboto Lake?	a. Strongly agree	38	42%
		b. Agree	47	52%
		c. Neutral	4	4%
		d. Disagree	1	1%
		e. Strongly disagree	0	0%
4	Do you agree that the art, culture and history elements on Limboto Lake will support the area's tourism?	a. Strongly agree	27	30%
		b. Agree	60	67%
		c. Neutral	1	1%
		d. Disagree	1	1%
		e. Strongly disagree	1	1%
5	Do you agree that tourism on Limboto Lake can be an alternative to the community's economic income in addition to fishing?	a. Strongly agree	74	82%
		b. Agree	16	18%
		c. Neutral	0	0%
		d. Disagree	0	0%
		e. Strongly disagree	0	0%
6	Will the fauna that inhabits Limboto Lake support ecotourism development?	a. Strongly agree	74	82%
		b. Agree	16	18%
		c. Neutral	0	0%
		d. Disagree	0	0%
		e. Strongly disagree	0	0%
7	Do you want to actively participate if the ecotourism principle is applied to Limboto Lake?	a. Strongly agree	24	27%
		b. Agree	63	70%
		c. Neutral	3	3%
		d. Disagree	0	0%
		e. Strongly disagree	0	0%

Source: Primary Data, 2022

Most of the respondents also agreed and strongly agreed that the aspects of art, culture and history would promote tourism on Limboto Lake. Respondents who disagreed countered that tourists would only be interested in natural scenery, not culture. Nearly all of the respondents indicated their agreement that tourism on Limboto Lake could be an alternate source of the community's income other than fishing. They contend that tourism will create jobs and commercial opportunities, such as food sales and boat rentals. It is also considered that the animals that live in Limboto Lake will support the development of ecotourism, especially fish and birds. These respondents also agreed and strongly agreed to be directly involved if ecotourism was implemented in Limboto Lake, while the other was hesitant because they lacked understanding of experience managing tourism objects.

Demand

1. Tourist characteristics

The selected respodents in this study were those who had visited Limboto Lake and were visiting the area when the data were collected. Based on the questionnaire result, data regarding tourist characteristics were obtained, as shown in Table 4.

Based on the questionnaire result completed by 55 tourist respondents at Limboto Lake, there are more women than men. Differences in men's and women's interests in ecotourism activities also have an effect. Men are drawn to physically demanding activities, whereas women are more engaged in enjoyable activities such as nature, social, cultural, and culinary (Razak, 2017). The majority of tourists on Limboto Lake are between the ages of 36 and 55, which includes the adult and

productive age categories, thus, they are able to make their own decisions regarding the destinations to be visited.

Table 4. Tourist Characteristics at Limboto Lake

No.	Parameter	Criteria	Tourist	%
1	Respondents	a. Man	27	49%
		b. Woman	28	51%
2	Age	a. 17-35 years	22	40%
		b. 36-55 years	31	56%
		c. 55 years and over	2	4%
3	Education	a. Senior High School	8	15%
		b. Higher Education	47	85%
4	Occupation	a. Civil Servants / Honorary	30	55%
		b. Entrepreneur	17	31%
		c. Student	2	4%
		d. Other	6	11%
5	Origin (residence)	a. Within Gorontalo Province	40	73%
		b. Outside Gorontalo Province	10	18%
		c. Overseas	5	9%
6	Visit Frequency	a. once	7	13%
		c. More than 1 time	48	87%
7	Visit Duration	a. 1-3 Hours	47	85%
		b. 4-6 Hours	8	15%
		c. 7-9 Hours	0	0%

Source: Primary Data, 2022

2. Tourist motivation

Table 5 reveals that tourist motivation for Limboto Lake is to enjoy nature. This is also supported by research (Fitroh *et al.,* 2017) that several things motivate someone to visit tourist attractions, such as relaxing, refreshing, and overcoming boredom, enjoyiing fresh air and sunshine.

Table 5. Tourist motivation to Limboto Lake

No.	Parameter	Criteria	Number of Tourists	%
1	Purpose of Visit (multiple answers are allowed)	a. Fishing	18	33%
		b. Enjoying the sunset	21	38%
		c. Photography	22	40%
		d. Observing animals	20	36%
		e. Lake Boating	23	42%
		f. Other	6	11%
2	Information source (multiple answers are allowed)	a. Internet/social media	36	65%
		b. Brochure	2	4%
		c. Guide/tour guide	7	13%
		d. Travel agent	2	4%
		e. Other	14	25%
3	Favorite object (multiple answers are allowed)	a. Panorama	42	76%
		b. Community and fisherman activities	36	65%
		c. Wild animal	18	33%
		d. Culture and history	20	36%
		e. Other	1	2%
4	Expenses incurred (multiple answers are allowed)	a. none	2	4%
		b. IDR 10,000 - IDR 90,000	18	33%
		c. IDR 100,000 - IDR 190,000	19	35%
		d. > IDR 200,000	16	29%

Source: Primary Data, 2022

3. Tourist needs/wants

There are aspects of tourist needs/wants on Limboto Lake that are not fulfilled yet, i.e., inadequate ecotourism facilities. Tourism facilities have a significant effect on visiting intentions, that the better the tourist facilities increase interest in visiting tourist objects (Saputra & Meirina, 2022). Further, to address the demand for homestay services, locals can be encouraged to provide rooms in their homes to tourists.

Table 6. Tourist needs/wants to Limboto Lake

No.	Parameter	Criteria	Amount	%
1	Limboto Lake Attraction	a. Not attractive	2	4%
		b. Attractive	32	58%
		c. Very Attractive	21	38%
2	Comfort Level	a. Very Comfortable	18	33%
		b. Comfortable	29	53%
		c. Very Uncomfortable	8	15%
3	Security and Safety Level	a. Safe	27	49%
		b. Fairly Safe	21	38%
		c. Not Safe	7	13%
4	Tourism Facilities	a. Excellent	14	25%
		b. Good	8	15%
		c. Poor	31	56%
		d. Unknown	2	4%
5	Tourism Infrastructure	a. Good	12	22%
		b. Fair	25	45%
		c. Poor	18	33%
6	Entrance Access	a. Good	14	25%
		b. Fair	31	56%
		c. Poor	10	18%
7	The attitude of local residents toward tourists	a. Good	37	67%
		b. Fair	18	33%
		c. Poor	0	0%
8	The untapped potential of Limboto Lake	a. Fishery	4	7%
		b. History	6	11%
		c. Tradition/Culture	19	35%
		d. Local culture	17	31%
		e. Culinary	3	5%
		f. Other	6	11%

Source: Primary Data (2022)

CONCLUSION

Limboto Lake possesses a potential supply of tourist attractions, facilities, accessibility, and community. While in terms tourist attractions include the biodiversity of flora and fauna, art and culture, as well as various activities on the lake, which can become ecotourism attractions. Additionally, the tourist facilities are still minim, which requires supporting facilities such as public toilets, homestays, information boards, and parking. Further, in terms of accessibility, Limboto Lake is easily accessible from the city center, airport, and seaport with adequate road conditions. The community around the area also have good insight and perceptions of Limboto Lake and ecotourism development.

Aspects of tourist demand include characteristics, motivations, and desires/demands of tourists. The majority of tourists are women, domestic tourists, with a frequency of visiting more than once. The visits' aims are lake boating, and the most preferred object is the natural scenery. Limboto Lake is pleasant to tourists and provides them a sense of security.

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