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# Eco-Friendly Tourism to Improve Lake Toba Internasional Tourism

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**Abstract**

The Ministry of Tourism and Creative Economy is shifting its focus from simply increasing tourist numbers to promoting sustainable tourism in Indonesia. Sustainable tourism aims for long-term positive impacts on the environment, society, culture, and economy, benefiting both local communities and tourists. This concept is not new in Indonesia, with destinations like Baluran National Park and Ujung Kulon National Park showcasing sustainable tourism practices. In North Sumatra, Lake Toba exemplifies sustainable tourism. As the world's largest volcanic lake, it offers breathtaking views of green mountains and rich cultural experiences from local communities. However, environmental pollution from waste—both organic and non-organic—generated by residents and visitors has affected its water quality. This research aims to develop an eco-friendly economic model to support sustainable tourism at Lake Toba. A quantitative approach using questionnaire data is employed to analyze strategies that balance environmental conservation and economic growth. The study seeks to enhance the sustainability of Lake Toba by addressing pollution challenges and fostering practices that protect its natural and cultural heritage.

**Keywords**: Eco-Friendly; Sustainable Tourism; Lake Toba

## 1. Introduction

Lake Toba is a tecto-volcanic lake located in the province of North Sumatra, Indonesia. This lake is the largest lake in Indonesia and Southeast Asia [1]. Geographically, Lake Toba is surrounded by 7 (seven) regencies and 28 (twenty-eight) sub-districts. The seven districts surrounding Lake Toba consist of Karo Regency, Simalungun Regency, Toba Samosir Regency, North Tapanuli Regency, Humbang Haangularan Regency, Samosir Regency, and Dairi Regency [2]. In 2011, Lake Toba was determined to be one of the National Tourism Strategic Areas (KSPN) for 2010 – 2025 based on Government Decree Number 50 of 2011. That way, the important role of the Lake Toba area and its surroundings is to become a place of tourist development. The plan to make the Lake Toba area and its surroundings into a recreational destination in order to attract visitors not only from within the country but also from abroad. Of course, to receive the presence of visitors invited to Lake Toba tourism, their needs must be prepared such as hotels or inns in the Lake Toba area.

But based on the results of current observations in the Lake Toba area, some activities around the lake such as residential areas, hotels, restaurants that are not equipped with Wastewater Treatment Plants (WWTP) and produce domestic wastewater, fisheries cultivation, water transportation using oil or fuel, livestock, factories, even agricultural activities that use fertilizer solutions and other agricultural chemicals that will damage Lake Toba water. In addition to wastewater, domestic solid waste also enters Lake Toba so that it can pollute the waters of Lake Toba thereby reducing the quality of the lake water. However, environmental challenges, including domestic wastewater, agricultural runoff, and solid waste, have degraded water quality. As the lake becomes a key tourism hub, addressing these issues through sustainable practices becomes imperative [3].

## 2. Literature Review

### *2.1. Theoretical Foundation*

#### *2.1.1. Lake Toba*

When visiting the island of Sumatra, one of the destinations that become an attraction is Lake Toba. Lake Toba is the largest volcanic lake in Southeast Asia located in the caldera of a supervolcanic mountain with a length of 100 kilometers, a width of 30


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kilometers and a depth of 508 meters. Based on the supervolcanic eruption theory this is illustrated by the eruption of a super-large volcano that occurred about 74,000 years ago. The eruption is believed to be one of the largest in human geological history. At that time, the Toba volcano erupted violently, releasing large amounts of smoke, dust, and volcanic material into the atmosphere. The formation of a deep crater in Lake Toba occurs when the magma dome beneath the Toba volcano collapses after a major eruption, forming a very large caldera. The lake was then formed from the accumulation of rainwater that filled the crater, creating the giant crater lake we know today. Its size is far different from the size of the lake in general to attract outside tourists to visit this destination. The blue scenery of the lake water surrounded by the green Toba caldera makes Lake Toba has great potential to be able to compete with other local tourist destinations both local and international. This beautiful natural scenery certainly supports the surrounding economy that can be utilized by local people, especially in efforts to preserve local culture and introduce it to the outside world. Lake Toba's scenic beauty and cultural heritage make it an attractive destination for sustainable tourism [4]. Its economic potential lies in balancing environmental preservation with cultural tourism, promoting local traditions, and fostering community involvement [5].

*2.1.2. Sustainable Tourism*

Sustainable tourism is an approach in the tourism industry that aims to minimize negative impacts on the environment, culture, and local economy, while promoting long-term benefits to local communities, environmental preservation, and meaningful experiences for tourists. It involves a wide range of practices and policies aimed at creating a balance between economic growth, environmental preservation, and social welfare. Sustainable tourism emphasizes minimizing environmental impact while maximizing benefits to local communities [6]. Key principles include responsible resource use, environmental protection, and community participation [7].

The main goal of sustainable tourism is to ensure that tourism activities do not damage the natural environment, do not threaten cultural sustainability, and provide equitable economic benefits to local communities. According to Mclntyre as stated in the book *Sustainable Tourism Development Guide for Local Planner* explained that there are three important elements that are interconnected in building and developing sustainable tourism and if these elements are linked will grow the quality of life of the community. The three elements are:

1. Tourism Industry
   The tourism industry is something that can improve the economy in the form of jobs, increase income, support investment, and increase opportunities for business development.
2. Milieu
   The thing that encourages tourism to last a long time is that the model and level of tourism activities must be proportional between the available capacity, both natural and artificial resources.
3. Community
   Improving people's living standards is a basic aspect. If the community is involved in all activities, the community is motivated and feels responsible for the decisions chosen.

*2.1.3. Eco-Friendly Economy*

An eco-friendly economy integrates environmental conservation with economic growth. Key theories include environmental externalities, green innovation, and resource efficiency [8]. These principles ensure sustainable use of natural resources, promoting long-term ecological health [9]. Environmentally friendly economy is closely related to how people utilize economic activities without damaging and exploiting the environment around them. This environmentally friendly economic concept is formed based on analysis of environmental and economic principles. Some of them include:

1. Environmental Externalities
   Environmental externality theory states that economic activity often produces negative impacts on the environment that are not recognized or paid for by economic actors. This concept underlies the argument for internalizing environmental costs through instruments such as carbon taxes or environmental regulation.
2. Limited Natural Resource Economics:
   The economic theory of limited natural resources highlights the limitations of natural resources and the need for prudent management to prevent environmental damage and resource shortages in the future.
3. Green Economy and Sustainable Development
   Sustainable development theory emphasizes the importance of meeting current needs without compromising the ability of future generations to meet their needs. The green economy is part of this approach, which emphasizes innovation, efficiency, and responsible resource utilization.
4. Environmental Innovation Theory
   Environmental innovation theory states that environmental pressures and public policies can be key drivers of green technology innovation and more sustainable business practices.
5. Human Rights-Based Approach
   An economic approach that focuses on human rights places human well-being and the environment in an interrelated context. It recognizes that economic success must be measured not only by economic parameters, but also by standards

of social justice and environmental well-being. The application of these theories in practice requires integration between economic, social, and environmental aspects. It encourages holistic and sustainable policy development that can meet current economic needs without compromising the environment's ability to support future life.

## 3. Research Method

### *3.1. Research Methods*

The method used in this research is the quantitative research method. This method collects structured data through measurement instruments in the form of questionnaires given to a number of respondents with the aim of supporting this research.

### *3.2. Methodologists*

1. Data Sources
   The data source we used in this study is a quantitative data source obtained through surveys by distributing questionnaires as a tool for this study.
2. Data Collection Techniques
   Primary data collection by distributing questionnaires shared through electronic media, namely Google Form.
3. Data Analysis Techniques
   Researchers use quantitative descriptive analysis techniques. This technique was used to test, measure and hypothesize the results of the questionnaires used in this study.

## 4. Results and Discussion

Analysis conducted through questionnaires distributed with Google Form media to 40 respondents from Indonesian society whose questions have been made by researchers shows that:

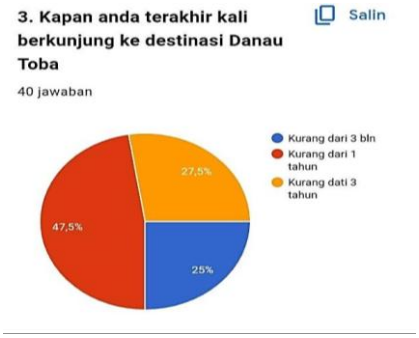


Figure 1. Percentage Diagram of Visit Data in Lake Toba

- 25% of respondents stated that they last visited Lake Toba destinations in less than 3 months.
- 47.5% of respondents stated that they last visited Lake Toba destinations in less than 1 year.
- 27.5% of respondents stated that they last visited Lake Toba destinations in less than 3 years.


Figure 2. percentage diagram of the feasibility of Lake Toba as eco-friendly tourism free of water pollution from garbage and waste

- 62.5% of respondents stated that it is feasible that Lake Toba destinations as Eco-Friendly tourism are free of water pollution from garbage and waste but still need improvisation to improve Lake Toba's water quality in order to compete with other tourist destinations.
- 37.5% of respondents stated that it is not feasible if the destination of Lake Toba as Eco-Friendly tourism is free of water pollution from garbage and waste and needs action from the community and government.

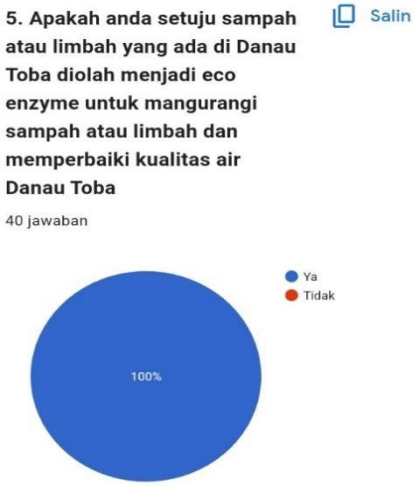


Figure 3. percentage diagram of respondents' percentage of approval for processing waste and waste into eco enzyme

- 100% of respondents agreed that garbage and waste in Lake Toba destinations are processed into eco enzyme to reduce waste and waste and improve Lake Toba water quality. Eco-enzyme initiatives can reduce pollution and enhance water quality [10].

## 5. Conclusion

Based on the results of research that has been described in the previous chapter, it can be concluded that the movement of pouring eco enzyme carried out to improve water quality and reduce pollution of Lake Toba has been carried out but has not been fully realized. From the results of research and data analysis that has been carried out, the author advises the community to maintain cleanliness in the area around Lake Toba and cooperation for the implementation of a sustainable program for making eco enzyme.

## References

[1] Saputra, H. (2022). Geological Formation and Tourism Potential of Lake Toba. *Indonesian Geological Review*, 15(3), 210-225. Discusses the geological significance of Lake Toba and its tourism appeal.
[2] Presidential Regulation No. 50 (2011). Designation of National Tourism Strategic Areas in Indonesia. Jakarta: Government Printing Office. Establishes Lake Toba as a National Tourism Strategic Area.
[3] Wolch, J. R., Byrne, J., & Newell, J. P. (2014). Urban Green Space, Public Health, and Environmental Justice: The Challenge of Making Cities 'Just Green Enough.' *Landscape and Urban Planning*, 125, 234-244. Explores the environmental challenges linked to urbanization, applicable to Lake Toba's issues.
[4] Andersson, E., Barthel, S., & Ahrné, K. (2007). Measuring Social-Ecological Dynamics Behind the Generation of Ecosystem Services. *Ecological Applications*, 17(5), 1267-1278.
[5] Chiesura, A. (2004). The Role of Urban Parks for the Sustainable City. *Landscape and Urban Planning*, 68(1), 129-138.
[6] McIntyre, G. (2007). *Sustainable Tourism Development Guide for Local Planners*. Madrid: World Tourism Organization.
[7] Beatley, T. (2000). Green Urbanism: Learning from European Cities. *Island Press*.
[8] Newman, P., & Jennings, I. (2008). Cities as Sustainable Ecosystems: Principles and Practices. *Island Press*.
[9] Jim, C. Y., & Chen, W. Y. (2006). Perception and Attitude of Residents Toward Urban Green Spaces in Guangzhou, China. *Environmental Management*, 38(3), 338-349.
[10] Toshima, M. C., Naadir, G., & Priya, R. (2021). Factors Contributing to Carbon Footprints Among Hotels: A Case Study in Mauritius. *European Journal of Sustainable Development*, 10(4), 9-21.