



World Tourism Organization
International Network
of Sustainable Tourism
Observatories

ANNUAL REPORT 2026

MONITORING CENTRE FOR SUSTAINABLE TOURISM
OBSERVATORIES INSTO AND WINSTO

UNIVERSITAS SUMATERA UTARA

LAKE TOBA – Indonesia

1. Executive Summary

In the current academic year, the MCSTO of USU has undertaken a comprehensive examination of eleven issue areas through socialization/FGD, monitoring, and observation: Economic Benefits to the Destination, Employment, Seasonal Tourism, Governance, Energy Management, Water Management, Liquid Waste Management, Solid Waste Management, Climate Action, and Accessibility. The main focus of the MCSTO in 2026 is monitoring the Local Satisfaction indicator that encompasses all 4 pillars of sustainable tourism: sustainable governance, environmental sustainability, socio-economic sustainability, and cultural sustainability. This focus is due to the research initiative that was conducted by the observatory to collect data in all 4 sub-districts through observation, questionnaires, and in-depth interviews with key stakeholders.

The objectives of the report have also shifted to risk-based reporting, to report the main findings that most affect sustainable tourism and satisfaction levels in each sub-district. This annual report presents data from two years: 2024 and 2025, compiling the data to showcase growth and/or decreases in monitored data. The report also identifies indicators that are insufficient in data and require further monitoring. The report aims to become a database which informs government, practitioners, academics, and business owners on the development of tourism in each destination, so that development can be enhanced to achieve sustainability.

The method of data collection is through primary and secondary data. Primary data is achieved through research initiatives by observing the destinations, conducting in-depth interviews with stakeholders and spreading structured questionnaires to both locals and tourists in each destination, as well as holding Focus Group Discussions to gain first-hand insights and reporting from the tourism stakeholders, especially the local government. Secondary data is gained through government-based websites, tourism-related organization websites, and news reports.

The 2024–2025 monitoring results indicate that tourism development in the Lake Toba destination continues to generate positive socio-economic outcomes. Across the monitored districts, Gross Regional Domestic Product (GRDP), tourism-sector economic contributions, and employment generally increased, while visitor satisfaction and intention to revisit remained high. Sustainable tourism governance was further strengthened through destination monitoring, climate education initiatives, tourism promotion events, infrastructure improvements, and the successful revalidation of the Toba Caldera UNESCO Global Geopark. These developments demonstrate the growing contribution of tourism to local economic development and destination competitiveness.

At the same time, the findings reveal increasing environmental and climate-related pressures associated with tourism growth and regional development. Waste generation, energy consumption, and pressure on water resources increased in several districts, while local satisfaction declined in Samosir due to concerns regarding waste management and pollution. Climate-related events, including floods, droughts, forest fires, and landslides, continued to affect communities and tourism activities. Although adaptation measures such as

renewable energy utilization, rainwater harvesting, recycling initiatives, environmental education programs, and disaster preparedness efforts have expanded, significant challenges remain in waste management, ecosystem protection, climate resilience, and data availability. These findings highlight the need to balance tourism growth with stronger environmental management and sustainable destination governance.

During the year 2024-2025, MCSTO USU has successfully conducted 3 research initiatives in 3 regencies to collect quantitative data on 4 satisfaction levels in 4 sub-districts. MCSTO USU also held an FGD with the local government. However, the main challenges faced by the observatory remain data unavailability and inefficiency, as well as further funding to conduct more rigorous research on several other indicators.

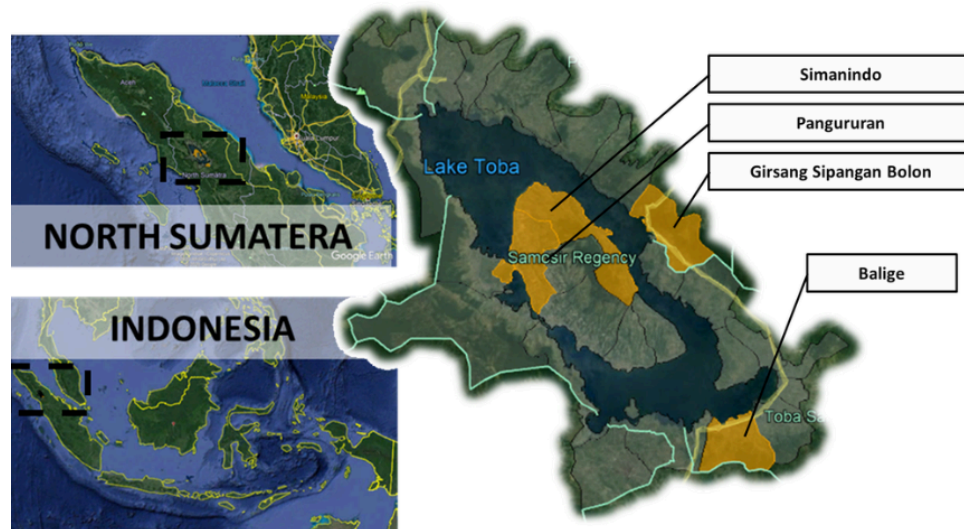
2. Introduction

The Universitas Sumatera Utara (USU) Monitoring Centre for Sustainable Tourism Observatories (MCSTO) has been actively contributing to the sustainable development of tourism in Lake Toba since becoming a member of the UNWTO International Network of Sustainable Tourism Observatories (INSTO) in 2017. Initially, MCSTO USU focused its monitoring efforts on four villages in Pangururan district, Samosir, before expanding in 2019 to cover thirty-one sub-districts, including both non-Key Tourism Areas (non-KTA) and Key Tourism Areas (KTA). This initiative aims to provide data-driven insights to support the achievement of Sustainable Development Goals (SDGs) and ensure that tourism development in the region remains sustainable and beneficial for local communities.

In 2024 and 2025, MCSTO USU remains committed to enhancing its monitoring capabilities and contributing to global sustainable tourism initiatives. The observatory continues to monitor 11 sustainability issue areas: (1) Local satisfaction with tourism; (2) Destination economic benefits; (3) Employment; (4) Tourism seasonality; (5) Energy management; (6) Water management; (7) Wastewater management; (8) Solid waste management; (9) Governance; (10) Climate change, and (11) Accessibility. These efforts align with UNWTO's sustainability framework and support government strategies in fostering a more resilient and responsible tourism sector in the Lake Toba Region.

3. Lake Toba Profile

Lake Toba is recognized as the world's largest volcanic lake and one of the most significant geological landscapes globally. Located in North Sumatra Province, Indonesia, it was formed by a massive volcanic eruption approximately 74,000–75,000 years ago. The lake covers approximately 1,130 km² and contains Samosir Island, a large island situated at its center. The destination spans seven regencies: Toba, Samosir, Simalungun, Karo, Dairi, North Tapanuli, and Humbang Hasundutan. These regencies collectively form the Lake Toba region, which is recognized as one of Indonesia's Super Priority Tourism Destinations and is home to the UNESCO Global Geopark Toba Caldera.



DESTINATION PROFILE			
		2024	2025
1	Tourism Satellite Account/s (TSA) in the destination country	☒ YES Last time a TSA was conducted: 2024	
2	Sector relevance: Contribution of (a) tourism and (b) other economic sectors to the local GDP (%) – latest figures	a) Tourism 7,22% b) Agriculture 24,73% c) Industry 21,12% Source: BPS of North Sumatera	d) Tourism 10,29% e) Agriculture 24,12% f) Industry 18,05% Source: BPS of North Sumatera
3	Arrivals of inbound (non-resident) visitors for last three years – Thousands	☒ YES North Sumatera 2025 : 292.481 2024 : 240.413 2023 : 93.312 Lake Toba Region 2025 : 16.738 2024 : 16.791 2023 : No Data Source: BPS of North Sumatera	

DESTINATION PROFILE			
		2024	2025
3. 1	Percentage of total annual arrivals of inbound (non-resident) visitors occurring in peak month and in peak quarter	☒ YES 2024 = 14.851 in January, 17.933 in June, and 21.400 in December. (Source: BPS of North Sumatera)	☒ YES 2025 = 23.354 in January, 25.545 in June, and 23.542 in December. (Source: BPS of North Sumatera)
4	Trips of domestic visitors for the last three years – Thousands	☒ YES Lake Toba Region 2025 : 11.578.028 2024 : 9.128.421 2023 : 2.197.015 Source: BPS of Toba Region	
5	Tourism industries: accommodation for visitors in hotel and similar establishments - Units	☒ YES Lake Toba Region Total rooms: 11.294 Total bed-space: 16.358 Source: BPS of North Sumatera	☒ YES Lake Toba Region Total rooms: 15.649 Total bed-space: 21.023 Source: BPS of North Sumatera
6	Current top 5 primary source markets for the destination	☒ YES Malaysia Singapore China Netherlands Germany Australia	☒ YES Malaysia Singapore China Spain Italy Germany
7	Research & Journal related to Sustainable Tourism	Students: 15 Lecturers: 21	Students: 23 Lecturers: 24
8	Please describe the destination's experience with other monitoring initiatives/systems	In 2024 & 2025, the monitoring continues on the whole lake's surroundings, which consists of 4 districts in 3 regencies.	
9	Are there strategies in place for sustainable development of the destination?	☒ YES Names of those of relevance: STDev program of the Indonesian Ministry of Tourism.	
10	DMO(s) in monitoring area: Yes/No and year of establishment	☒ YES Year of establishment: Badan Pelaksana Otorita Danau Toba / The Agency of Lake Toba Authority (2017); Badan Pengelola Geopark Kaldera Toba / The Management Board of Toba Caldera Geopark (2017)	

4. Issue Areas and Data Sources

MCSTO USU monitors 11 key issue areas by collecting both qualitative and quantitative data through primary and secondary sources. Primary sources include field observation, in-depth interviews, and questionnaire surveys conducted by the team at each district. Whereas, secondary data is provided by local government institutions and tourism operators in the area.

ISSUE AREA	INDICATORS	DATA SOURCE	NATURE OF DATA	SDGs
Local Satisfaction	Satisfaction of local people with tourism	Primary	Quantitative	  
Economic benefits to the destination	Number of tourism objects managed by non-government	Secondary	Quantitative	  
	Number of accommodations	Secondary	Quantitative	
	Number of food business places	Secondary	Quantitative	
	Local Gross Regional Domestic Product (GRDP)	Secondary	Quantitative	
	GRDP from the tourism sector	Secondary	Quantitative	
Employment	Number of workers	Secondary	Quantitative	  
	number of local workers	Secondary	Quantitative	
	number of female workers	Secondary	Quantitative	
	Tourist perception of worker services	Primary	Quantitative	
Seasonal Tourism	Domestic tourist visit	Secondary	Quantitative	 
	Foreign tourist visit	Secondary	Quantitative	
	Average number of rooms occupied by tourists /month	Secondary	Quantitative	
	Tourist perception of seasonal tourism	Primary	Quantitative	
Governance	Multi-year destination development plan or strategy	Secondary	Qualitative	  
	Organisations responsible for coordinating sustainable tourism management	Secondary	Quantitative Qualitative	
	Climate change education activities	Secondary	Quantitative Qualitative	

ISSUE AREA	INDICATORS	DATA SOURCE	NATURE OF DATA	SDGs
	Tourism promotion activities	Secondary	Quantitative Qualitative	
Energy management	Energy consumption	Secondary	Quantitative	 
	Business units in the tourism sector that use energy from renewable sources	Secondary	Quantitative	
Water management	Annual water consumption	Secondary	Quantitative	   
	Access to clean drinking water	Secondary	Quantitative	
	Business units that recycle water	Primary Secondary	Quantitative Qualitative	
	Tourist perceptions of water quality in the destination	Primary	Quantitative	
Liquid waste management	Water quality	Secondary	Qualitative	   
	Liquid waste treatment and water treatment system	Secondary	Quantitative Qualitative	
Solid Waste Management	Volume of waste generated	Secondary	Quantitative	  
	Business units that recycle waste	Secondary	Quantitative	
	Tourist perceptions of the destination's cleanliness	Primary	Quantitative	
Climate Action	Damage due to climate extremes	Secondary	Quantitative	 
	Number of natural disaster events	Secondary	Quantitative	
Accessibility	The existence of policies that are friendly to people with disabilities	Secondary	Qualitative	  
	Number of associated hospitals and public health centers	Secondary	Quantitative	
	Presence of medical personnel in tourist transportation	Secondary	Qualitative	

5. Monitoring Findings, Reviews, and Performance of Issues and Indicators

Data on the destination's economic benefits were collected through government sources that have conducted formal monitoring of the baseline indicators each year, which include:

5.1. Local Satisfaction

In 2025, monitoring was conducted in 2 sub-districts: Girsang Sipangan Bolon and Balige, as well as in 1 region, Samosir, which encompasses both Simanindo and Pangururan sub-districts. Through 5-likert scale questionnaires, the observatory measured locals' satisfaction with sustainable tourism in their area based on sustainable tourism indicators: sustainable governance, socio-economic sustainability, cultural sustainability, and environmental sustainability. The survey was conducted from 2 to 5 October 2025 and collected 100 responses each from Girsang Sipangan Bolon and Balige sub-district, while 355 responses were collected from Samosir Regency (Simanindo and Pangururan Sub-District). The results were then analyzed and produced a total mean of local satisfaction in each sub-district.

The overall satisfaction of locals in Samosir Regency had decreased from 3,94 in 2024 to 3.59 in 2025. Through the survey collected, it was identified that locals were not yet satisfied with the waste disposal system (2.97) and that the transportation and facilities supporting tourism produce high quantities of air, sound, and light pollution, which impact the locals' quality of life (3.07). However, the survey reported that the locals feel that development of tourism in the area is in harmony with the preservation of the natural environment (4.08).

In Girsang Sipangan Bolon, locals are satisfied with tourism development (3,74) and did not note any severe impacts on the destination. A total of 72,55% locals agreed that they are satisfied with kehadiran tourism in the area, however 39,22% disagreed that locals have full control in the activities and outcome of tourism. Despite this, most locals agree that tourism brings economic benefits (86,27%) and creates more job opportunities (74,51%).

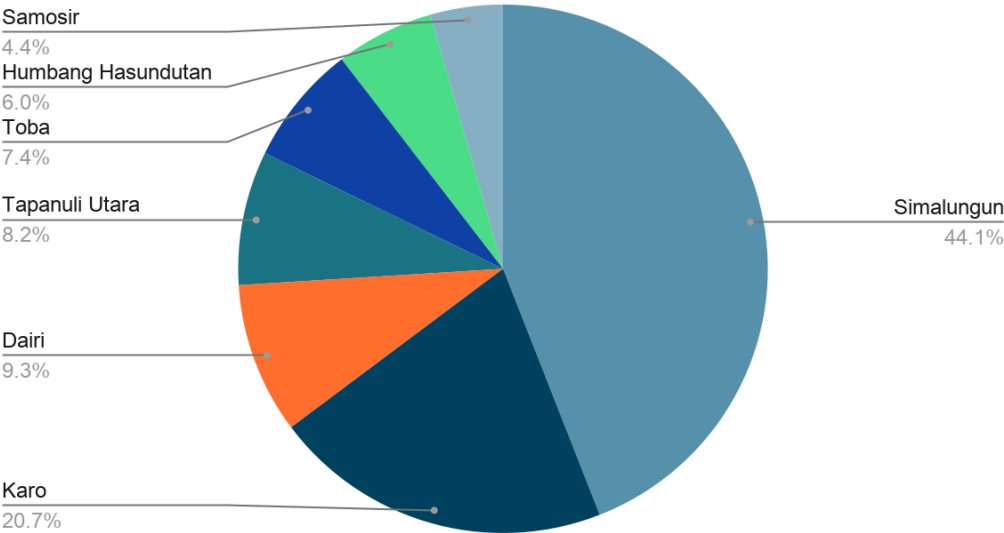
Baseline Indicator	Unit	Sub-District	Value		
			2023	2024	2025
Level of satisfaction of local people with tourism	Likert scale average	Simanindo	3,93	3,95	3,59
		Girsang Sipangan Bolon	3,3	No Data	3,74
		Pangururan	4	3,95	3,59
		Balige	3,4	No Data	4,16

Source: Observatory Report

5.2. Economic Benefits to the Destination

In the Lake Toba Region, which consists of 7 regencies, the share of Gross Regional Domestic Product (GRDP) is highly concentrated in Simalungun Regency (43,5%), followed by Karo Regency (20,45%), while Toba Regency only contributes 7,3% and Samosir 4.37% of the total GRDP.

Share of GRDP in Lake Toba Area (2025)



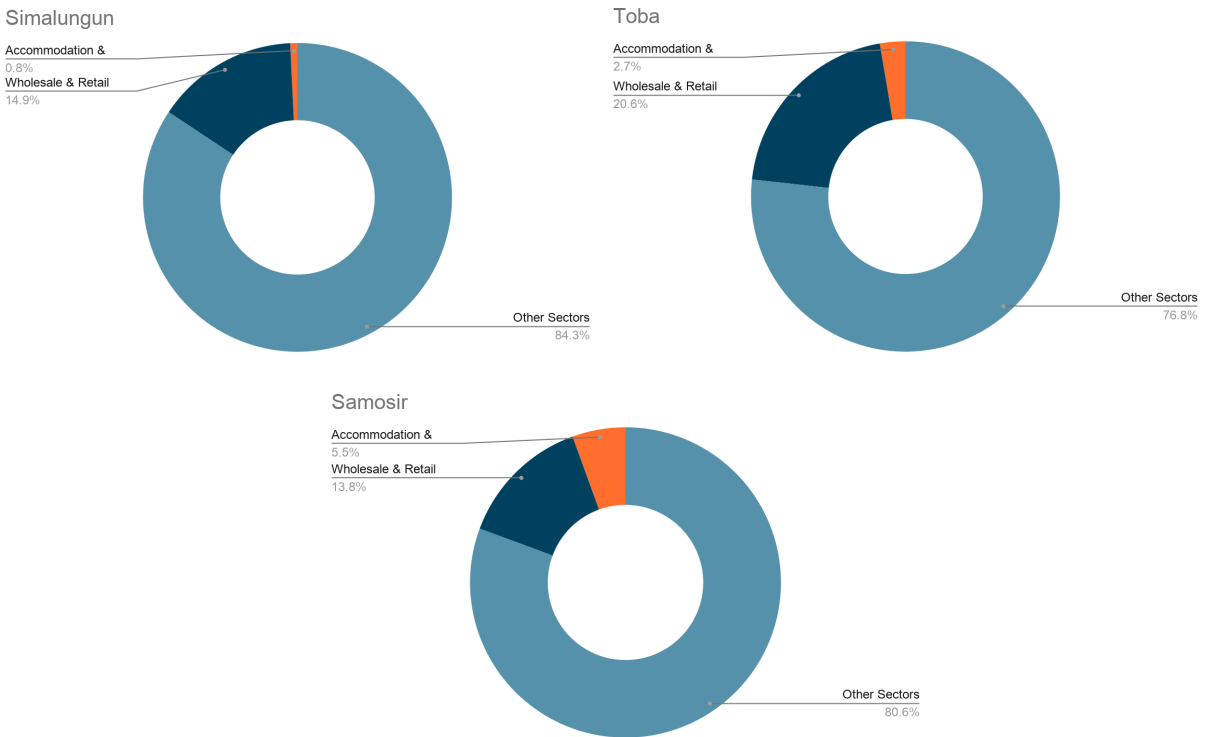
The districts of Simanindo and Pangururan, both located in Samosir Regency, contributed 6.100,41 million Rupiah in 2024, and increased 6.7% in 2025. Whereas Balige, which is located in Toba Regency, only experienced a 5.32% increase from 2024 to 2025. The highest GRDP growth was seen in Girsang Sipangan Bolon, Simalungun Regency (10.02%).

No	Baseline Indicator	Unit	District	Value		
				2023	2024	2025
1	Local Gross Regional Domestic Product (GRDP)	Rp (million)	Simanindo	5.166,25	6.100,41	6.509,11
			Girsang Sipangan Bolon	52.239,10	58.906,11	64.810,17
			Pangururan	5.166,25	6.100,41	6.509,11
			Balige	9.656,270*	10.284,43	10.831,86
2	Gross Regional Domestic Product (GRDP) from the Tourism sector	Rp (million)	Simanindo	No Data	1.098,66	1.250,164
			Girsang Sipangan Bolon	No Data	9.436,759	10.168,716
			Pangururan	No Data	1.098,66	1.250,164
			Balige	No Data	2.265,66	2.518,407

Source: Statistics Bureau of North Sumatra

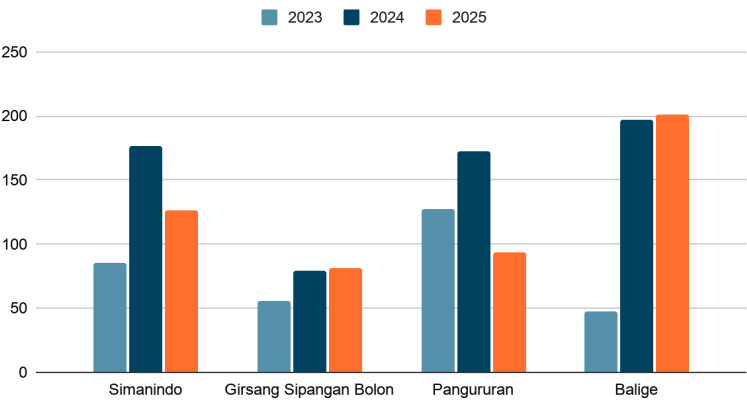
*The GRDP figure for 2023 in Balige has been corrected following a review of the previously reported data. This revision affects only the 2023 figure; other years remain unchanged.

Each Regency allocates a share of GRDP towards the tourism sector, which is divided into two business sectors: wholesale and retail, and Accommodation and Food Service Activities. Despite Simalungun Regency contributing the highest GRDP, the budget allocation towards the tourism sector is only 15.69%, followed by Samosir Regency (19.36%), and Toba Regency contributing 23.25%.

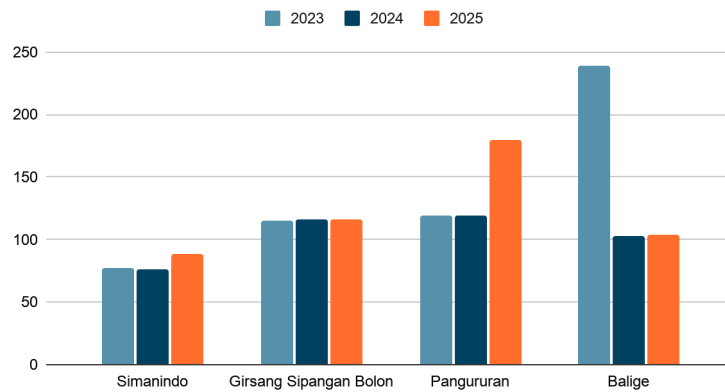


In 2024 and 2025, each district has maintained the number of tourism objects; however, the number of accommodations and food business places continues to fluctuate. Each District experienced increases in accommodation from 2023 to 2024; However, Balige saw the biggest rise in 2024, from 48 to 197 units and continued increasing to 201 units in 2025. Whereas both Simanindo and Pangururan saw decreases in 2025, Simanindo closed 51 accommodation units and Pangururan 78 units. For food business places, historical figures for Girsang Sipangan Bolon and Pangururan have been revised to reflect the actual district-level monitoring scope; therefore, figures are not directly comparable with previous reports. Based on the revised data, the number of food business establishments in Girsang Sipangan Bolon remained relatively stable, while Pangururan recorded a decrease in 2025.

Number of Accommodations



Number of Food Business Places

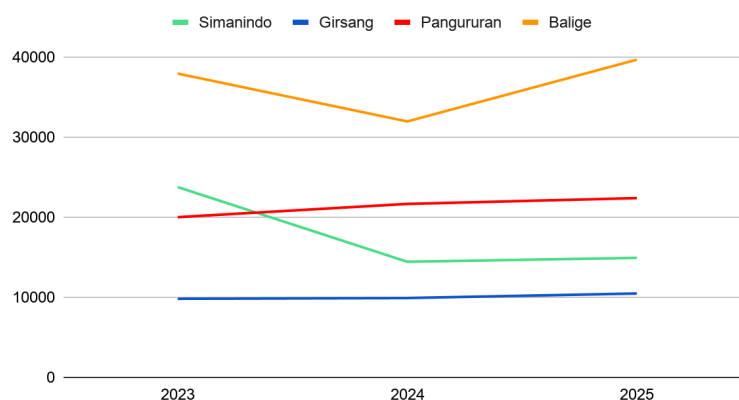


5.3. Employment

In 2025, 100 questionnaires were distributed to tourists visiting Balige District, specifically in 4 tourist destinations: Aek Nauli Conservation Area, Bul Bul Beach, Bebas Beach, and Pasir Putih Beach. The questionnaire used a 5 likert-scale to measure tourist perceptions of worker services in the tourism sector. Respondents (79,31%) agreed that the service provided was adequate, and 74,14% respondents reported that the staff were competent and helpful. Overall, 86,21% of respondents were very satisfied with the staff and service provided (4,2)

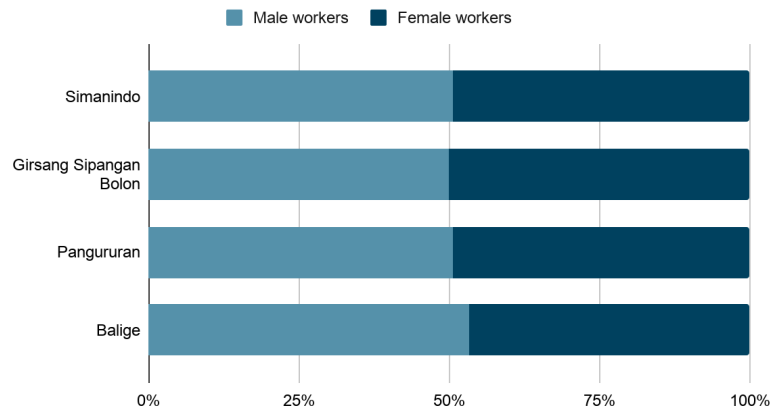
The number of workers throughout the three years has experienced a subtle rise in Pangururan. In contrast, both Simanindo and Balige saw a significant decrease in 2024; 9,322 workers left Simanindo and 5.973 in Balige. Despite this, all districts saw an increase of workers in 2025. For Girsang Sipangan Bolon, the historical employment series has been recalibrated to the district level to ensure consistency with the current monitoring scope.

Number of workers in the tourism sector



In 2025, the percentage of female and male workers in the tourism sector is equal in three districts: Simanindo, Girsang Sipangan Bolon, and Pangururan. On the other hand, the number of male workers in Balige outweighs the number of female workers by 13.95%.

Worker Gender Percentage (2025)

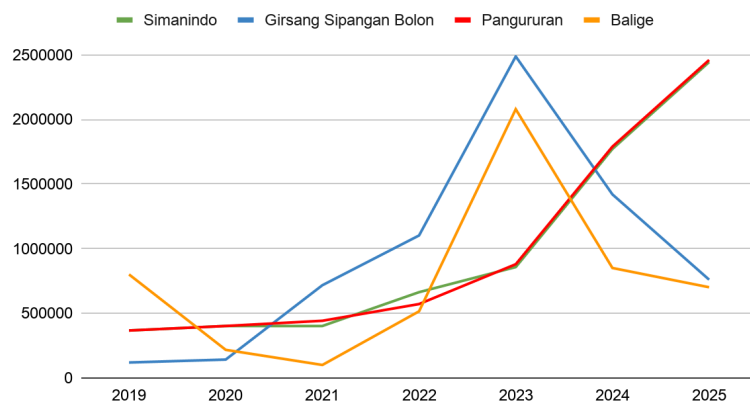


5.4. Seasonal Tourism

In 2025, a survey was conducted on 100 tourists in Balige District on tourists' perception of tourism activities and willingness to return to the destination (4,7). The findings were that 93,60% of tourists are most likely to return to Balige, and 90,21% will recommend the destination to their friends. This is reflected in the increase of international tourist visits from 379 to 1.088 visitors, despite the decrease of domestic tourists (-17,51%). Similarly, the number of tourist visits in Girsang Sipangan Bolon District significantly declined due to the floods that occurred in March 2025. The district lost nearly half of its domestic visitors and most of its foreign tourists.

Specific data on tourist visits in Simanindo and Pangururan District were unavailable; However, Samosir being a small island is estimated that tourists arriving by ferry at Ambarita Pier and Tomok Pier, which are located in Simanindo District, would travel into Pangururan District for the tourism attractions and facilities on the island. Therefore, the number of tourist visits for both districts is calculated based on the visitation data for Samosir Regency. The regency has experienced a rise in visits each year, reaching more than 2 million visitors in 2025.

Domestic Tourist Visits



5.5. Governance

The governance of sustainable tourism in the Lake Toba destination is supported through a multi-level framework involving government institutions, local communities, academia, and other stakeholders. At the destination level, BPODT serves as the primary destination management and coordination body for the Lake Toba Super Priority Tourism Destination, working closely with the respective Culture and Tourism Offices (Dinas Kebudayaan dan Pariwisata) of each regency. At the community level, Tourism Awareness Groups (Pokdarwis) contribute to destination stewardship, cultural preservation, environmental management, and visitor engagement, supporting the implementation of sustainable tourism principles across the region.

During 2024–2025, destinations around Lake Toba continued to strengthen environmental monitoring, disaster preparedness, and conservation efforts. In Samosir Regency, monitoring activities included geological assessments in disaster-prone areas, water quality monitoring in collaboration with Universitas Sumatera Utara, and the establishment of a Disaster Preparedness Task Force to improve emergency response. Conservation efforts were also supported through fish seed stocking programmes and the successful revalidation of the Toba Caldera UNESCO Global Geopark, which regained its Green Card status in 2025.

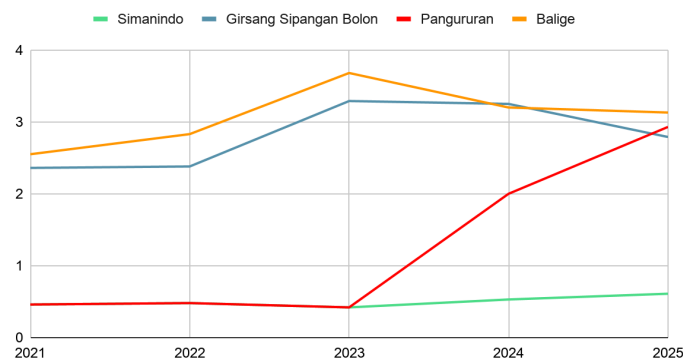
At the same time, climate change education and environmental awareness initiatives were expanded across the destination. In Samosir, a multi-stakeholder discussion promoted the integration of education, conservation, and community empowerment in protecting the Toba Caldera Geopark. Similar initiatives were implemented in Girsang Sipangan Bolon through community-based low-carbon tourism waste management education, while Balige conducted the Climate Generation Action Campaign, engaging youth in waste management and climate change mitigation activities. These programmes were complemented by tree-planting activities, community clean-up actions, and ecosystem conservation initiatives throughout the region.

Meanwhile, tourism promotion and destination enhancement remained key priorities. In 2024–2025, Lake Toba hosted a range of cultural, sporting, and tourism events, including the Aquabike Jetski World Championship, Samosir Music International, Festival Solu Bolon, Trail of the Kings, Festival Wisata Edukasi Leluhur Batak Rumahela, Samosir Run 5K, Festival Tao Toba Joujou, and the Four Colours Cultural Festival. Destination marketing was further strengthened through film-based promotions and the launch of the Visit Samosir Years 2025–2026 campaign. These efforts were complemented by investments in tourism infrastructure and cultural heritage preservation, including the revitalization of public spaces and markets, renovation of tourism attractions, construction of cultural facilities, and development of the Batak Heritage Museum, contributing to the sustainable growth and competitiveness of the Lake Toba destination.

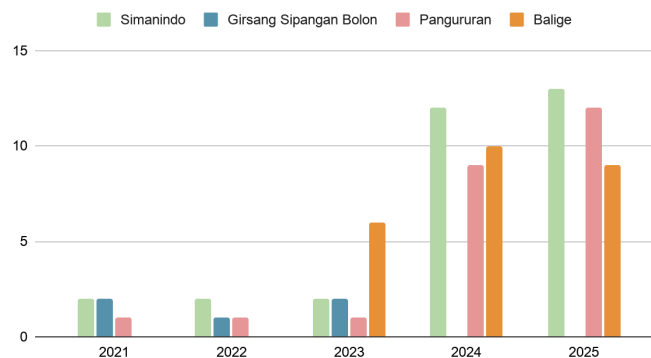
5.6. Energy Management

Energy consumption continues to increase in Pangururan (46,50%) and in Simanindo (15,09%). Whereas usage has declined in Girsang Sipangan Bolon (-14,15%) and Balige (-2,19%). Since 2023, efforts to achieve sustainable energy use are evident in the utilisation of solar energy for road lighting that was installed by the government. In 2025, the government continues to add solar lights in different locations, expanding their effectiveness. Additionally, in 2024 business places implementing the use of renewable energy saw a surge in Simanindo, Panguruan, and Balige. Whereas, no business places in Girsang Sipangan Bolon participated in utilizing renewable energy. In 2025, 9 business places in Balige, 12 in Pangururan and 13 in Simanindo have utilized new and renewable energy.

Energy Consumption



Business Units using Renewable Energy



5.7. Water Management

In 2025, annual water consumption reached 1,314,318 m³ in Pangururan, 1,083,186 m³ in Balige, and 119,147 m³ in Simanindo, while Girsang Sipangan Bolon distributed a total of 65,000 m³ of water. To strengthen water security and promote sustainable resource management, several adaptation and conservation initiatives were implemented across the Lake Toba area. Pangururan and Simanindo introduced rainwater harvesting systems, while one village in Girsang Sipangan Bolon also adopted rainwater harvesting as an alternative water source. In the tourism sector, water-saving measures were undertaken through the replacement of bathtubs with showers in hotels to reduce water consumption. In addition, safe drinking water programs were implemented, with drinking water supplied primarily through metered piped-water systems.

Field observations and in-depth interviews further revealed community-level adaptation measures, including the treatment of Lake Toba water for household drinking purposes. These initiatives have been driven by increasing pressure on traditional water sources, particularly the declining availability and reliability of mountain spring water. Collectively, these efforts demonstrate a growing commitment to diversifying water sources, improving water-use efficiency, and ensuring an adequate water supply for both local communities and tourism activities.

Based on a survey of 100 tourists visiting Balige, perceptions of water quality in the Lake Toba area were generally positive (4,3). Overall, 77% of respondents expressed satisfaction with the quality of Lake Toba's water, considering indicators such as water clarity, temperature, and odor. Meanwhile, only 7% of respondents perceived the water quality as unsatisfactory. Similar results were observed for drinking water quality, with 77% of visitors reporting satisfaction with the availability and quality of drinking water in the destination. These findings indicate that water quality remains a positive aspect of the visitor experience in the Lake Toba area.

5.8. Liquid Waste Management

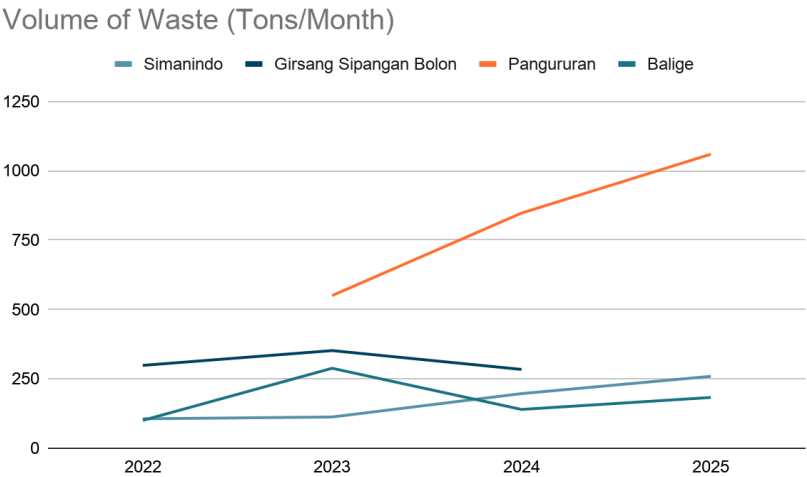
Maintaining Lake Toba’s water quality remains a key sustainability challenge, as environmental protection must be balanced with local economic activities. Floating net cage aquaculture (KJA), which has operated since 1998, continues to support local livelihoods, although government policies aim to gradually reduce KJA numbers to mitigate environmental impacts.

Water quality monitoring in Girsang Sipangan Bolon District in 2024 recorded elevated phosphorus and nitrogen levels, likely resulting from domestic wastewater, land use, livestock, tourism facilities, and aquaculture activities. While the maximum phosphorus pollution load capacity of Lake Toba is 1,138.54 g P/m² (Government Regulation No. 22/2021), Bangun et al. (2025) estimated phosphorus inputs at 1,279,719 g P per year. KJA activities have also contributed to localized water quality issues, including unpleasant odors and reduced water clarity, highlighting the need for continued efforts to reduce nutrient pollution and protect the lake ecosystem.

Environmental sanitation remains a priority in Simalungun Regency. Approximately 1.46% of the population still practices open defecation in rivers and lakes, which may contribute to water pollution. To improve environmental quality, eco-enzyme initiatives have been promoted to reduce organic waste, while wastewater treatment facilities (IPAL) and public toilets have been provided to strengthen sanitation management and reduce pollution entering Lake Toba.

5.9. Solid Waste Management

The volume of solid waste generated in Pangururan increased by 25% compared to 2024, exceeding 1,000 tons per month. Similar upward trends were observed in Simanindo and Balige, where waste generation rose by 32% and 31%, respectively. Waste generated from household, industrial, and agricultural activities continues to pose a significant threat to the water quality of Lake Toba. Survey findings further highlight persistent challenges in waste management across the destination. Among local residents, 57% perceived current waste management practices as inadequate, while only 48% of tourists considered waste management to be satisfactory. In response, several tourism businesses have initiated recycling activities, with Balige reporting the highest participation (20 business units), followed by Pangururan (2 units) and Simanindo (1 unit). Whereas Girsang Sipangan Bolon has started utilizing a solid waste bank. Despite these efforts, improper waste disposal practices remain prevalent, with five villages in Pangururan and three villages each in Balige and Simanindo still relying on open burning and illegal dumping sites. These findings indicate that while progress has been made in promoting waste recycling, substantial improvements in waste collection, treatment, and community awareness are still required to reduce environmental pressures on Lake Toba and support sustainable tourism development.



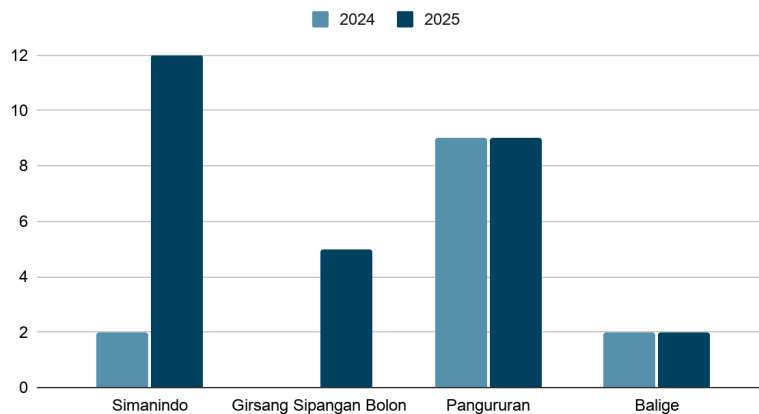
5.10. Climate Action

On 16 March 2025, the Batu Gaga River in Girsang Sipangan Bolon District overflowed and caused massive floods throughout the area, which resulted in the evacuation of 950 families and caused fatal damage to one house. The area also experienced massive forest fires in 32 districts. Fortunately, there have been no victims, despite 8 families being urgently evacuated. However, the area has yet to construct signs and evacuation routes for disasters.

Due to climate change, 24 villages in Pangururan have experienced water scarcity due to prolonged drought, which has resulted in difficulty in farming and fishing, whereas 4 villages in both Simanindo and Balige experienced water scarcity. Simanindo also experienced landslides in 7 districts, followed by Pangururan in 5 districts. Despite being in the same regency, Simanindo District has implemented a natural disaster early warning system, but Pangururan has not.

Several environmental and conservation activities have been carried out in each district. Mostly reforestation activities have been conducted to restore forests and prevent flooding. The utilisation of new and renewable energy is also implemented in road lighting and the processing and recycling of waste to reduce landfill waste sites.

Number of Natural Disasters



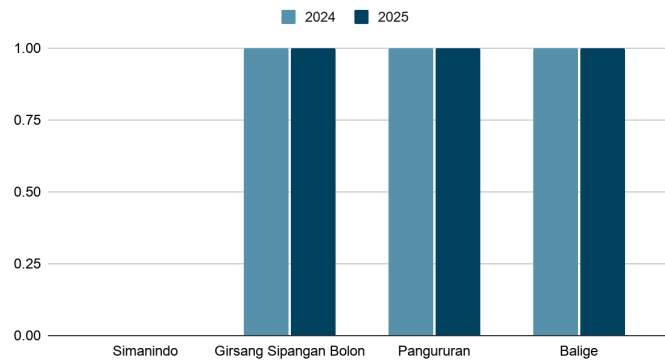
5.11. Accessibility

To enhance destination accessibility, the government conducted the inaugural trial flight of an amphibious aircraft connecting Silangit Airport and Mariana Resort Port in Tuktuk Siadong, Simanindo District. The introduction of seaplane transportation is expected to strengthen regional connectivity, support tourism development, and improve access to public services, particularly for communities located on Samosir Island and along the shores of Lake Toba. Commercial operations are scheduled to commence in 2026, representing a significant milestone in the development of sustainable transportation infrastructure within the destination.

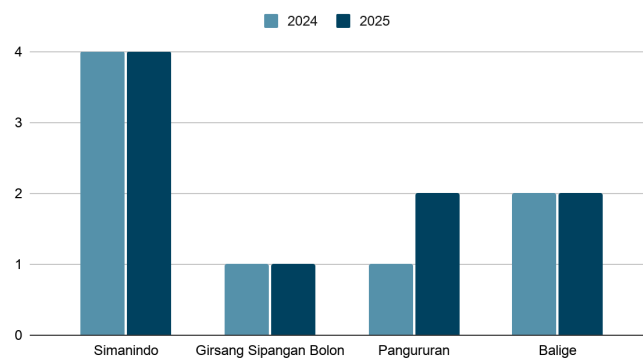
In addition to improvements in regional connectivity, Girsang Sipangan Bolon can be accessed by both land and water transportation, with public transport services operating fixed routes in three villages. The presence of Tigaraja Port plays a crucial role in facilitating tourist mobility between Parapat and Samosir Island. In 2025, the port recorded 127,669 passenger arrivals and departures, while 19,709 private vehicles—including motorcycles, cars, vans, and buses—were transported by ferry. Road infrastructure remains a challenge, however. Although 26.77 km of roads are paved, 2.68 km are classified as severely damaged, reducing accessibility in certain areas. This condition is reflected in survey results from 400 local residents and 400 tourists, which identified road quality as one of the main concerns regarding destination accessibility.

Each district is served by at least one hospital, with the exception of Simanindo, which has not yet established a hospital but is supported by four public health centers. Pangururan expanded its healthcare capacity with the addition of a second public health center in 2025. Note that the healthcare indicator used in the current report has been refined to include only hospitals and public health centres. Previous Annual Reports used the broader category of hospitals and medical facilities; therefore, historical figures from earlier reports are not directly comparable with the figures presented in this report.

Number of associated hospitals



Number of associated public health centers



APPENDIX

ECONOMIC BENEFITS TO THE DESTINATION

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Simanindo	Number of Tourism Objects managed by Non-Government	Business unit	24	23	23
	Number of Accommodations	Business unit	85	177	126
	The number of Food Business Places (restaurants, Café, etc.)	Business unit	77	76	89

Source: Statistics Bureau of Samosir Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Girsang Sipangan Bolon	Number of Tourism Objects managed by Non-Government	Business unit	12	12	12
	Number of Accommodations	Business unit	56	79	81
	The number of Food Business Places (restaurants, Café, etc.)*	Business unit	115*	116	116

Source: Statistics Bureau of Simalungun Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Pangururan	Number of Tourism Objects managed by Non-Government	Business unit	11	9	9
	Number of Accommodations	Business unit	127	172	94
	The number of Food Business Places (restaurants, Café, etc.)*	Business unit	119*	119	180

Source: Statistics Bureau of Samosir Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Balige	Number of Tourism Objects managed by Non-Government	Business unit	18	13	13
	Number of Accommodations	Business unit	48	197	201
	The number of Food Business Places (restaurants, Café, etc.)	Business unit	239	103	104

Source: Statistics Bureau of Toba Regency

*Historical figures for food business establishments in Girsang Sipangan Bolon and Pangururan have been revised to reflect the district-level monitoring scope. Figures reported in previous Annual Reports were based on a broader geographic area and are therefore not directly comparable with the revised series presented here.

EMPLOYMENT

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Simanindo	Total number of workers in the tourism sector	Person	23.752	14.430	14.918
	Number of local people working in the tourism sector	Person	21.904	No Data	No Data
	Number of female workers in the tourism sector	Person	9.236	6.929	7.374

Source: Statistics Bureau of Samosir Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Girsang Sipangan Bolon*	Total number of workers in the tourism sector	Person	9.814*	9.905	10.470
	Number of local people working in the tourism sector	Person	9.144*	9.601	9.908
	Number of female workers in the tourism sector	Person	4.921*	4.976	5.245

Source: Statistics Bureau of Simalungun Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Pangururan	Total number of workers in the tourism sector	Person	No Data	21.651	22.375
	Number of local people working in the tourism sector	Person	No Data	No Data	No Data
	Number of female workers in the tourism sector	Person	No Data	10.397	11.060

Source: Statistics Bureau of Samosir Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Balige	Total number of workers in the tourism sector	Person	37.917	31.944	39.654
	Number of local people working in the tourism sector	Person	34.110	No Data	No Data
	Number of female workers in the tourism sector	Person	21.849	16.161	18.534

Source: Statistics Bureau of Toba Regency

*Historical employment figures for Girsang Sipangan Bolon have been revised to reflect district-level data. Figures reported in previous Annual Reports were based on a broader geographic scope and are therefore not directly comparable with the revised series presented here.

SEASONAL TOURISM

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Simanindo	Domestic tourists visit	Person	857.939	1.771.801	2.443.915
	Number of foreign tourist visits	Person	2.953	5.331	7.354
	The average number of rooms occupied by tourists per month	Room/month	15,17	24,56	No Data

Source: Statistics Bureau of Samosir Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Girsang Sipangan Bolon	Domestic tourists visit	Person	2.487.529	1.420.165	760.596
	Number of foreign tourist visits	Person	No Data	8.424	942
	The average number of rooms occupied by tourists per month	Room/month	23,01	24,23	20%

Source: Statistics Bureau of Simalungun Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Pangururan	Domestic tourists visit	Person	857.939	1.771.801	2.443.915
	Number of foreign tourist visits	Person	2.953	5.331	7.354
	The average number of rooms occupied by tourists per month	Room/month	15,17	24,56	No Data

Source: Statistics Bureau of Samosir Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Balige	Domestic tourists visit	Person	2.079.369	850.928	701.953
	Number of foreign tourist visits	Person	0	379	1.088
	The average number of rooms occupied by tourists per month	Room/month	24,94	19,49	18,44

Source: Statistics Bureau of Toba Regency

GOVERNANCE

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Simanindo	Multi-year destination development plan or strategy	Yes/No	Yes	Yes	Yes
	Number of organisations responsible for coordinating the management of sustainable tourism	Organisation	4	4	4
	Number of tourism monitoring in one year	Activity	5	7	9
	Number of climate change education activities in one year	Activity	5	5	4
	Number of tourism promotion activities in one year	Activity	26	5	4

Source: Statistics Bureau of Samosir Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Girsang Sipangan Bolon	Multi-year destination development plan or strategy	Yes/No	Yes		
	Number of organisations responsible for coordinating the management of sustainable tourism	Organisation	No Data	2	2
	Number of tourism monitoring in one year	Activity	1	7	7
	Number of climate change education activities in one year	Activity	5	8	5
	Number of tourism promotion activities in one year	Activity	No Data	5	8

Source: Statistics Bureau of Simalungun Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Pangururan	Multi-year destination development plan or strategy	Yes/No	Yes	Yes	Yes
	Number of organisations responsible for coordinating the management of sustainable tourism	Organisation	4	4	4
	Number of tourism monitoring in one year	Activity	6	9	10
	Number of climate change education activities in one year	Activity	3	5	7
	Number of tourism promotion activities in one year	Activity	29	7	16

Source: Statistics Bureau of Samosir Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Balige	Multi-year destination development plan or strategy	Yes/No	Yes	Yes	Yes
	Number of organisations responsible for coordinating the management of sustainable tourism	Organisation	7	4	4
	Number of tourism monitoring in one year	Activity	No Data	5	5
	Number of climate change education activities in one year	Activity	No Data	4	4
	Number of tourism promotion activities in one year	Activity	No Data	4	5

Source: Statistics Bureau of Toba Regency

ENERGY MANAGEMENT

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Simanindo	Energy Consumption in a day	kWh/person/day*	0,42	0,53	0,61
	Number of business units in the tourism sector that use energy from renewable resources	Business Unit	2	12	13

Source: Statistics Bureau of Samosir Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Girsang Sipangan Bolon	Energy Consumption in a day	kWh/person/day*	3,29	3,25	2,79
	Number of business units in the tourism sector that use energy from renewable resources	Business Unit	2	0	0

Source: Statistics Bureau of Simalungun Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Pangururan	Energy Consumption in a day	kWh/person/day*	0,42	2,00	2,93
	Number of business units in the tourism sector that use energy from renewable resources	Business Unit	1	9	12

Source: Statistics Bureau of Samosir Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Balige	Energy Consumption in a day	kWh/person/day*	3,68	3,20	3,13
	Number of business units in the tourism sector that use energy from renewable resources	Business Unit	6	10	9

Source: Statistics Bureau of Toba Regency

SOLID WASTE MANAGEMENT

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Simanindo	The volume of waste generated by the destination	Tons/ Month	112,61	196,9	259,2
	Number of tourism sector business units that recycle waste	Business unit	0	No Data	1

Source: Statistics Bureau of Samosir Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Girsang Sipangan Bolon	The volume of waste generated by the destination	Tons/ Month	351,92	284,1	No Data
	Number of tourism sector business units that recycle waste	Business unit	0	No Data	0

Source: Statistics Bureau of Simalungun Regency

*The unit has been corrected from kWh/Org/Hr to kWh/person/day to reflect the actual calculation basis of average daily energy consumption per person.

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Pangururan	The volume of waste generated by the destination	Tons/ Month	550,19	847,5	1.059,7
	Number of tourism sector business units that recycle waste	Business unit	No Data	No Data	2

Source: Statistics Bureau of Samosir Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Balige	The volume of waste generated by the destination	Tons/ Month	288,23	139,8	183
	Number of tourism sector business units that recycle waste	Business unit	10	No Data	20

Source: Statistics Bureau of Toba Regency

CLIMATE CHANGE

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Simanindo	Damage due to climate extremes	Business Unit	7	2	2
	Number of natural disaster events	Activity	5	2	12

Source: Statistics Bureau of Samosir Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Girsang Sipangan Bolon	Damage due to climate extremes	Business Unit	9	0	1
	Number of natural disaster events	Activity	2	0	5

Source: Statistics Bureau of Simalungun Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Pangururan	Damage due to climate extremes	Business Unit	19	4	4
	Number of natural disaster events	Activity	3	9	9

Source: Statistics Bureau of Samosir Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Balige	Damage due to climate extremes	Business Unit	4	0	0
	Number of natural disaster events	Activity	4	2	2

Source: Statistics Bureau of Toba Regency

ACCESSIBILITY

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Simanindo	The existence of policies that are friendly to people with disabilities	Yes/No	Yes	Yes	Yes
	Number of associated hospitals*	Business unit	0	0	0
	Number of associated public health centers*	Business unit	No Data	4	4
	Presence of medical personnel in tourist transportation	Yes/No	Yes	Yes	Yes

Source: Statistics Bureau of Samosir Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Girsang Sipangan Bolon	The existence of policies that are friendly to people with disabilities	Yes/No	Yes	Yes	Yes
	Number of associated hospitals*	Business unit	1	1	1
	Number of associated public health centers*	Business unit	1	1	1
	Presence of medical personnel in tourist transportation	Yes/No	Yes	Yes	Yes

Source: Statistics Bureau of Simalungun Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Pangururan	The existence of policies that are friendly to people with disabilities	Yes/No	Yes	Yes	Yes
	Number of associated hospitals*	Business unit	1	1	1
	Number of associated public health centers*	Business unit	No Data	1	2
	Presence of medical personnel in tourist transportation	Yes/No	Yes	Yes	Yes

Source: Statistics Bureau of Samosir Regency

District	Baseline Indicator	Unit	Value		
			2023	2024	2025
Balige	The existence of policies that are friendly to people with disabilities	Yes/No	Yes	Yes	Yes
	Number of associated hospitals*	Business unit	No Data	1	1
	Number of associated public health centers*	Business unit	No Data	2	2
	Presence of medical personnel in tourist transportation	Yes/No	Yes	Yes	Yes

Source: Statistics Bureau of Toba Regency

*Previous reports used a broader combined category of hospitals and medical facilities. The current report separately presents hospitals and public health centres; therefore, historical figures are not directly comparable.

RESEARCH AND JOURNALS ON SUSTAINABLE TOURISM

District	2024		2025	
	Student	Lecturer	Student	Lecturer
Simanindo	8	7	9	5
Girsang Sipangan Bolon	3	7	2	3
Pangururan	4	7	10	5
Balige	0	0	2	10