



World Tourism Organization
International Network
of Sustainable Tourism
Observatories

ANNUAL REPORT 2023
MONITORING CENTRE FOR SUSTAINABLE TOURISM
OBSERVATORIES INSTO AND WINSTO
UNIVERSITAS SUMATERA UTARA
LAKE TOBA – Indonesia

1. 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 Subdistrict, 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.

The COVID-19 pandemic significantly impacted tourism in Indonesia, necessitating adjustments to MCSTO USU's monitoring activities. Government-imposed restrictions on mobility in 2020 led to a temporary limitation of monitoring efforts to four Key Tourism Areas (Girsang Sipangan Bolon, Simanindo, Pangururan, and Balige). Despite these challenges, MCSTO USU continued to assess the sustainability of tourism in the region, adapting its methodologies to ensure reliable and consistent data collection during the pandemic period.

In 2022, MCSTO USU remains committed to enhancing its monitoring capabilities and contributing to global sustainable tourism initiatives. This year, the observatory continues its focus on the ten sustainability indicators: (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) Community participation in tourism. These efforts align with UNWTO's sustainability framework and support government strategies in fostering a more resilient and responsible tourism sector in Lake Toba.

2. Destination Profile

DESTINATION PROFILE			
		2021	2022
1	Tourism Satellite Account/s (TSA) in the destination country	☒ YES Last time a TSA was conducted:	☒ YES Last time a TSA was conducted:
2	Sector relevance: Contribution of (a) tourism and (b) other economic sectors to the local GDP (%) – latest figures	a) Tourism 2,37% b) Agriculture 21,38% c) Industry 20,28% Source: BPS of North Sumatera	a) Tourism 2,04% b) Agriculture 22,98% c) Industry 19,13% Source: BPS of North Sumatera
3	Arrivals of inbound (non-resident) visitors for last three years	☒ YES North Sumatera 2021: 230 2020: 44.400 2019: 258.822 Lake Toba Region 2021: No Data 2020: 297 2019: 258.822 Source: BPS of North Sumatera	☒ YES North Sumatera 2022 : 74.498 2021: 230 2020: 44.400 Lake Toba Region 2022 : No Data 2021: No Data 2020: 297 Source: BPS of North Sumatera
3.1	Percentage of total annual arrivals of inbound (non-resident) visitors occurring in peak month and in peak quarter (please indicate which month and quarter)	☒ YES 2021 = 4,78% (11) in January, 16,5% (38) in June, and 0% (0) in December. (Source: BPS of North Sumatera)	☒ YES 2022 = 3.214 in January, 6.317 in June, and 19.198 in December. (Source: BPS of North Sumatera)
4	Trips of domestic visitors for the last three years	☒ YES Lake Toba Region 2021: 201.335 2020: 217.462 2019: 1.209.008 Source: BPS of Toba Region	☒ YES Lake Toba Region 2022 : 1.031.594 2021: 201.335 2020: 217.462 Source: BPS of Toba Region

DESTINATION PROFILE			
		2021	2022
5	Tourism industries: accommodation for visitors in hotel and similar establishments - Units	☒ YES North Sumatera Total rooms: 34.638 Total bed-space: 48.672 Lake Toba Region Total rooms: 899 Total bed-places: 1.167 Source: BPS of North Sumatera	☒ YES North Sumatera Total rooms: 33.580 Total bed-space: 48.164 Lake Toba Region Total rooms: 818 Total bed-places: 1.350 Source: BPS of North Sumatera
6	Current top 5 primary source markets for the destination	☒ YES Malaysia Singapore China Germany France Netherlands	☒ YES Malaysia Singapore Germany Australia Netherlands United States of America
7	Research & Journal related to Sustainable Tourism	Lecture Research & Journal 2021: 0 Student Research & Thesis 2021: 3	Student Research & Thesis: 26
8	Please describe the destination's experience with other monitoring initiatives/systems	In 2021, the monitoring continues on the whole lake's surroundings, which consists of 4 sub-districts.	In 2022, the monitoring continues on the whole lake's surroundings, which consists of 4 sub-districts.
9	Are there strategies in place for sustainable development of the destination?	☒ YES Name of those of relevance: STDev program of the Indonesian Ministry of Tourism.	☒ YES Name 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)	☒ 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)

3. Findings, Reviews, and Performances of Issues and Indicators

In the current academic year, the MCSTO of USU has undertaken a comprehensive examination of ten distinct domains through socialization/FGD, monitoring, observation, and evaluation: Economic Benefits to the Destination, Employment, Seasonal Tourism, Governance, Local Satisfaction, Community Participation, Energy Management, Water Management, Liquid Waste Management, and Solid Waste Management. The completed activities and the upcoming action plan for the ten sustainable tourism concerns are listed below.

3.1 Local Satisfaction

The data on local satisfaction with tourism between 2020 and 2022 shows a positive trend in Simanindo and Pangururan, where satisfaction increased 0,43 and 0,33 points, respectively. Girsang Sipangan Bolon, however, recorded no change, with satisfaction remaining steady at 3,8, while Balige experienced a decline from a notably high 4,85 in 2020 to 4,27 in 2022 (-0,58 points). All districts lack 2021 data, limiting the ability to assess year-on-year trends.

Simanindo

No.	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
1	Local Satisfaction	Level of satisfaction of local people with tourism	Likert scale average	3,50	No Data	3,93

Girsang Sipangan Bolon

No.	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
1	Local Satisfaction	Level of satisfaction of local people with tourism	Likert scale average	3,8	No Data	3,8

Pangururan

No.	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
1	Local Satisfaction	Level of satisfaction of local people with tourism	Likert scale average	3,64	No Data	3,97

Balige

No.	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
1	Local Satisfaction	Level of satisfaction of local people with tourism	Likert scale average	4,85	No Data	4,27

Source: Observatory Report

3.2 Economic Benefits to the Destination

Across all four destinations, economic indicators generally indicate gradual yet uneven growth in tourism-related sectors. In Simanindo, while the number of lodging and certified businesses decreased from 2021 to 2022, there was a modest increase in lodging capacity, with total rentable rooms rising from 1.647 to 1.776 (a 7,83% increase). Similarly, local and tourism-related GDP rose by 8,64% and 8,96%, respectively, indicating positive but restrained growth. The local GDP increases each year, regardless of the district. Notably, Pangururan saw a dramatic increase in lodging units, from 42 in 2021 to 127 in 2022. However, several indicators present missing data, particularly for Girsang Sipangan Bolon and Balige. These inconsistencies hinder a comprehensive evaluation of long-term trends and economic impact.

Simanindo

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
2	Economic Benefits for Destinations	Number of Tourism Services (Bureau/Travel Agent)	Business unit	17	17	17
		Number of Tourism Objects managed by Non-Government	Business unit	21	21	21
		Number of Lodging (Hotel, Cottage, Guesthouse, Villa Motel)	Business unit	89	90	88
		Total number of rooms for rent (room)	Room	No Data	1.647	1.776
		The number of Food Business Places (restaurants, Café, etc.)	Business unit	83	77	77
		Number of certified/ licensed Lodging, Dining, and Tourist Attractions	Business unit	No Data	191	189
		Local Gross Regional Domestic Product (GDP)	Rp	4.542.850.000	4.755.230.000	5.166.230.000
		Gross Regional Domestic Product (GDP) from the Tourism sector	Rp	231.430.000	232.900.000	253.770.000
		Total local development budget	Rp	No Data	8.796.456.862	8.556.972.913
		Development budget in support of the tourism sector	Rp	6.111.794.513	3.412.470.944	4.403.926.537

Girsang Sipangan Bolon

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
2	Economic Benefits for Destinations	Number of Tourism Services (Bureau/Travel Agent)	Business unit	5	5	5
		Number of Tourism Objects managed by Non-Government	Business unit	18	18	18
		Number of Lodging (Hotel, Cottage, Guesthouse, Villa Motel)	Business unit	54	74	83
		Total number of rooms for rent (room)	Room	1.876	No Data	1.772
		The number of Food Business Places (restaurants, Café, etc.)	Business unit	286	No Data	No Data
		Number of certified/ licensed Lodging, Dining, and Tourist Attractions	Business unit	71	71	71
		Local Gross Regional Domestic Product (GDP)	Rp	39.441.350.000	42.576.880.000	47.285.890.000
		Gross Regional Domestic Product (GDP) from the Tourism sector	Rp	231,43	335.350.000	359.920.000

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
		Total local development budget	Rp	1.383.829.793	No Data	No Data
		Development budget in support of the tourism sector	Rp	3.400.959.272	No Data	No Data

Pangururan

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
2	Economic Benefits for Destinations	Number of Tourism Services (Bureau/Travel Agent)	Business unit	9	9	11
		Number of Tourism Objects managed by Non-Government	Business unit	11	11	11
		Number of Lodging (Hotel, Cottage, Guesthouse, Villa Motel)	Business unit	22	42	127
		Total number of rooms for rent (room)	Room	362	505	571
		The number of Food Business Places (restaurants, Café, etc.)	Business unit	111	375	429
		Number of certified/ licensed Lodging, Dining, and Tourist Attractions	Business unit	144	428	567
		Local Gross Regional Domestic Product (GDP)	Rp	4.542.850.000	4,542.850.000	4.755.230.000
		Gross Regional Domestic Product (GDP) from the Tourism sector	Rp	231.430.000	No Data	No Data
		Total local development budget	Rp	9.993.428.804	8.796.456.862	8.556.972.913
		Development budget in support of the tourism sector	Rp	8.480.252.874	3.412.470.944	4.403.926.537

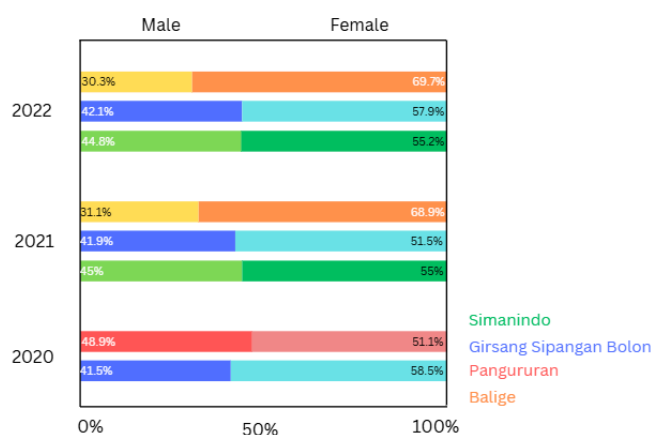
Balige

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
2	Economic Benefits for Destinations	Number of Tourism Services (Bureau/Travel Agent)	Business unit	10	15	15
		Number of Tourism Objects managed by Non-Government	Business unit	18	18	18
		Number of Lodging (Hotel, Cottage, Guesthouse, Villa Motel)	Business unit	32	30	40
		Total number of rooms for rent (room)	Room	385	417	542

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
		The number of Food Business Places (restaurants, Café, etc.)	Business unit	175	94	102
		Number of certified/ licensed Lodging, Dining, and Tourist Attractions	Business unit	120	No Data	No Data
		Local Gross Regional Domestic Product (GDP)	Rp	4.532.850.000	5.649.100.000	5.888.370.000
		Gross Regional Domestic Product (GDP) from the Tourism sector	Rp	231.430.000	No Data	No Data
		Total local development budget	Rp	9.993.428.804	No Data	No Data
		Development budget in support of the tourism sector	Rp	8.480.252.874	14.549.286.980	No Data

Source: BPS of North Sumatra

3.3 Employment



Percentage of Male and Female Workers (2020-2022)

The employment data highlights a mixed trajectory across the destinations. Data in Simanindo and Pangururan on the tourist's perception of worker services in the tourism sector experienced a rise in 2022, after decreasing from 2020 to 2021. The data on the demographics of workers in the tourism sector show that the majority in each district is female, ranging from 51% to 69%. In Simanindo, employment in the tourism sector rose from 2020 to 2021; however, it plummeted by 7.75% in 2022. This also affected the number of female workers, which dropped by 6.97%. On the other hand, workers in Girsang Sipangan Bolon increased by 1.42%, which also led to an increase in female workers (1.78%). However, Pangururan is missing annual data on key variables, such as local and female workers, which limits the robustness of the findings.

Simanindo

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
3	Employment	Total number of workers in the tourism sector	Person	5.162	21.574	19.901
		Number of local people working in the tourism sector	Person	8.662	19.896	18.353

		Number of female workers in the tourism sector	Person	No Data	11.844	11.018
		Tourist perceptions of worker services in the tourism sector	Likert scale average	3,93	3,34	3,9

Girsang Sipangan Bolon

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
3	Employment	Total number of workers in the tourism sector	Person	439.251	449.676	456.080
		Number of local people working in the tourism sector	Person	53.257	414.691	420.597
		Number of female workers in the tourism sector	Person	182.159	188.351	191.704
		Tourist perceptions of worker services in the tourism sector	Likert scale average	3,59	No Data	No Data

Pangururan

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
3	Employment	Total number of workers in the tourism sector	Person	94	No Data	No Data
		Number of local people working in the tourism sector	Person	74	No Data	No Data
		Number of female workers in the tourism sector	Person	46	No Data	No Data
		Tourist perceptions of worker services in the tourism sector	Likert scale average	4,6	3,34	3,79

Balige

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
3	Employment	Total number of workers in the tourism sector	Person	32.930	No Data	34.367
		Number of local people working in the tourism sector	Person	29.624	No Data	30.916
		Number of female workers in the tourism sector	Person	22.682	No Data	23.940
		Tourist perceptions of worker services in the tourism sector	Likert scale average	4,8	No Data	No Data

Source: BPS of North Sumatra

3.4 Seasonal Tourism

The number of tourists visiting each sub-district varies each year, and there has been a notable difference in tourist volume during COVID in 2020 and the amount in 2022. Girsang Sipangan Bolon reported a dramatic increase from 717.714 domestic tourists in 2021 to 1.102.567 in 2022, a staggering 53,62% rise. Balige and Simanindo also recorded strong growth in 2022 after dips or stagnation, likely reflecting post-pandemic recovery patterns. However, foreign tourism remains nonexistent in Balige, which recorded zero foreign tourists throughout the period. While tourist perceptions remain satisfactory in Simanindo and Pangururan, missing years weaken any analysis of

sentiment trends. These data limitations underline the necessity for more in-depth, continuous monitoring of seasonal demand and satisfaction.

Simanindo

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
4	Seasonal Tourism	Domestic tourists visit	Person	402.295	402.295	663.848
		Number of foreign tourist visits	Person	2.908	2.908	0
		The average number of rooms occupied by tourists per month	%	16,46	15,17	15,17
		Tourist perception of seasonal tourism	Likert scale average	3,95	No Data	3,82

Girsang Sipangan Bolon

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
4	Seasonal Tourism	Domestic tourists visit	Person	142.361	717.714	1.102.567
		Number of foreign tourist visits	Person	117	44.746	No Data
		The average number of rooms occupied by tourists per month	%	18,76	11,02	24,77
		Tourist perception of seasonal tourism	Likert scale average	3,83	No Data	No Data

Pangururan

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
4	Seasonal Tourism	Domestic tourists visit	Person	402.295	442.565	571.959
		Number of foreign tourist visits	Person	2.908	0	1.968
		The average number of rooms occupied by tourists per month	%	16,46	15,17	15,17
		Tourist perception of seasonal tourism	Likert scale average	4,5	No Data	3,91

Balige

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
4	Seasonal Tourism	Domestic tourists visit	Person	217.683	100.667	515.797
		Number of foreign tourist visits	Person	0	0	0
		The average number of rooms occupied by tourists per month	%	8,31	20,45	29,33
		Tourist perception of seasonal tourism	Likert scale average	4,2	No Data	No Data

Source: BPS of North Sumatra

3.5 Governance

Governance structures appear consistently in place, with all destinations maintaining multi-year strategic plans. Simanindo showed increased activity, with tourism monitoring growing from 1 in 2020 to 7 in 2022 and promotional efforts more than doubling. Meanwhile, Balige's data is unattainable after 2020, inhibiting any meaningful trend analysis. The number of climate change education activities is generally low, with most destinations introducing such initiatives only recently. Despite the increase in activities, one setback was recorded in Pangururan, where the number of

tourism promotion activities in one year decreased from 10 in 2020 and 2021 to only 8 in 2022. Although governance frameworks exist, the partial data and variability in implementation efforts suggest that institutional effectiveness and transparency require further strengthening.

Simanindo

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
5	Governance	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	1	4	7
		Number of climate change education activities in one year	Activity	0	3	3
		Number of assets and tourist attractions inventoried	Object	23	23	23
		Number of tourism promotion activities in one year	Activity	10	12	21

Girsang Sipangan Bolon

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
5	Governance	Multi-year destination development plan or strategy	Yes/No	Yes	Yes	Yes
		Number of organisations responsible for coordinating the management of sustainable tourism	Organisation	9	4	4
		Number of tourism monitoring in one year	Activity	2	4	4
		Number of climate change education activities in one year	Activity	0	0	1
		Number of assets and tourist attractions inventoried	Object	16	23	23
		Number of tourism promotion activities in one year	Activity	8	6	6

Pangururan

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
5	Governance	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	4	5	5
		Number of climate change education activities in one year	Activity	0	2	4
		Number of assets and tourist attractions inventoried	Object	5	5	5

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
		Number of tourism promotion activities in one year	Activity	10	10	8

Balige

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
5	Governance	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	7	7
		Number of tourism monitoring in one year	Activity	2	No Data	No Data
		Number of climate change education activities in one year	Activity	0	No Data	No Data
		Number of assets and tourist attractions inventoried	Object	7	No Data	No Data
		Number of tourism promotion activities in one year	Activity	16	No Data	No Data

Source: BPS of North Sumatra

3.6 Community Participation in Tourism

The data on community participation reflects limitations in local engagement with sustainable tourism development. Both Pangururan and Balige recorded 41 institutions that consistently integrate sustainability into their curricula, yet other areas documented zero. Despite all four locations affirming the availability of accessible sustainability information, persistent data gaps and limited educational activities hinder a complete understanding of the effectiveness and inclusivity of these initiatives. Overall, while some structures are in place, sustained monitoring and community capacity-building efforts remain insufficiently documented.

Simanindo

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
6	Community participation in tourism	Number of educational activities on the benefits of tourism and community assistance in one year	Activity	4	No Data	No Data
		Percentage of people who understand the concept of sustainable tourism development	%	2,8	No Data	No Data
		Availability of information on sustainable tourism development that is easily accessible to the public	Yes/No	Yes	Yes	Yes
		Number of educational programs /institutions that incorporate sustainable tourism learning into the curriculum;	Institutional unit	0	0	0
		Perceptions of the issue of community participation in tourism	Likert scale average	3,79	No Data	3,73

Girsang Sipangan Bolon

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
6	Community participation in tourism	Number of educational activities on the benefits of tourism and community assistance in one year	Activity	7	No Data	No Data
		Percentage of people who understand the concept of sustainable tourism development	%	3,56	No Data	No Data
		Availability of information on sustainable tourism development that is easily accessible to the public	Yes/No	Yes	Yes	Yes
		Number of educational programs /institutions that incorporate sustainable tourism learning into the curriculum;	Institutional unit	0	0	0
		Perceptions of the issue of community participation in tourism	Likert scale average	3,87	No Data	No Data

Pangururan

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
6	Community participation in tourism	Number of educational activities on the benefits of tourism and community assistance in one year	Activity	No Data	No Data	No Data
		Percentage of people who understand the concept of sustainable tourism development	%	No Data	No Data	No Data
		Availability of information on sustainable tourism development that is easily accessible to the public	Yes/No	Yes	Yes	Yes
		Number of educational programs/ institutions that incorporate sustainable tourism learning into the curriculum;	Institutional unit	41	41	41
		Perceptions of the issue of community participation in tourism	Likert scale average	4,44	No Data	No Data

Balige

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
6	Community participation in tourism	Number of educational activities on the benefits of tourism and community assistance in one year	Activity	5	No Data	No Data
		Percentage of people who understand the concept of sustainable tourism development	%	65	No Data	No Data
		Availability of information on sustainable tourism development that is easily accessible to the public	Yes/No	Yes	Yes	Yes
		Number of educational programs/ institutions that incorporate sustainable tourism learning into the curriculum;	Institutional unit	41	41	41
		Perceptions of the issue of community participation in tourism	Likert scale average	4,44	No Data	4,89

Source: BPS of North Sumatra

3.7 Energy Management

Energy management practices across the destinations remain underdeveloped, with no improvements recorded. Daily per capita energy consumption in Simanindo and Pangururan remained low and relatively stable from 2020 to 2022 (between 0,46 and 0,65 kWh/person/hour). In contrast, Girsang Sipangan Bolon and Balige showed a significant spike in energy use from 2020 to 2021, followed by a slight increase in 2022. This suggests either measurement anomalies or substantial increases in energy intensity, potentially from expanded tourism infrastructure. Participation in energy conservation programs is negligible, with only Pangururan showing any engagement (one business unit in both 2021 and 2022). Renewable energy use is also limited, with no district surpassing two business units using such resources. The data suggests that while energy consumption is rising in certain regions, commitment to sustainable energy practices within the tourism sector is lagging and poorly institutionalized.

Simanindo

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
7	Energy Management	Energy Consumption in a day	kWh/Org/Hr	0,63	0,46	0,48
		Number of business units participating in energy conservation programs	Business Unit	0	0	0
		Number of business units in the tourism sector that use energy from renewable resources	Business Unit	2	2	2

Girsang Sipangan Bolon

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
7	Energy Management	Energy Consumption in a day	kWh/Org/Hr	0,63	2,36	2,38
		Number of business units participating in energy conservation programs	Business Unit	0	0	0
		Number of business units in the tourism sector that use energy from renewable resources	Business Unit	0	2	1

Pangururan

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
7	Energy Management	Energy Consumption in a day	kWh/Org/Hr	0,65	0,46	0,48
		Number of business units participating in energy conservation programs	Business Unit	No Data	1	1
		Number of business units in the tourism sector that use energy from renewable resources	Business Unit	1	1	1

Balige

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
7	Energy Management	Energy Consumption in a day	kWh/Org/Hr	0,46	2,55	2,83

		Number of business units participating in energy conservation programs	Business Unit	451	No Data	No Data
		Number of business units in the tourism sector that use energy from renewable resources	Business Unit	0	0	0

Source: BPS of North Sumatra

3.8 Water Management

Despite fluctuating water use across districts, no recycling efforts have been recorded in certain districts. Recycled water utilization remains nonexistent in Simanindo and Girsang Sipangan Bolon (0%) and is largely unreported in other locations. Balige is the only region reporting substantial infrastructure, with 112 tourism facilities having recycled water systems. Meanwhile, public perceptions of water quality were only partially available, with early scores ranging from moderate (2,42 in Pangururan) to high (4,2 in Balige) in 2020, and no further data has been recorded. These inconsistencies and sparse updates, particularly regarding recycling and access to clean drinking water, point to an urgent need for more in-depth monitoring and reporting.

Simanindo

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
8	Water Management	Daily use of clean water	Litres/Person /Day	86,85	139	131
		Percentage of recycled water use	%	0	0	0
		Number of tourism facilities that have recycled water	Business unit	0	0	0
		Number of tourism facilities that already have access to clean drinking water	Business unit	0	0	0
		Travellers' Perceptions of Water Quality	Likert scale average	3,70	No Data	No Data

Girsang Sipangan Bolon

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
8	Water Management	Daily use of clean water	Litres/Person /Day	108	191	122
		Percentage of recycled water use	%	0	0	0
		Number of tourism facilities that have recycled water	Business unit	0	0	0
		Number of tourism facilities that already have access to clean drinking water	Business unit	53	53	53
		Travellers' Perceptions of Water Quality	Likert scale average	3,44	No Data	No Data

Pangururan

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
8	Water Management	Daily use of clean water	Litres/Person /Day	108	123	132

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
		Percentage of recycled water use	%	86,85	No Data	No Data
		Number of tourism facilities that have recycled water	Business unit	No Data	No Data	No Data
		Number of tourism facilities that already have access to clean drinking water	Business unit	No Data	No Data	No Data
		Travellers' Perceptions of Water Quality	Likert scale average	2,42	No Data	No Data

Balige

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
8	Water Management	Daily use of clean water	Litres/Person /Day	0,12	133	130
		Percentage of recycled water use	%	28	No Data	No Data
		Number of tourism facilities that have recycled water	Business unit	112	112	112
		Number of tourism facilities that already have access to clean drinking water	Business unit	195	No Data	No Data
		Travellers' Perceptions of Water Quality	Likert scale average	4,2	No Data	No Data

Source: BPS of North Sumatra

3.9 Liquid Waste Management

Liquid waste treatment in the tourism sector remains largely underdeveloped, even though some destinations report consistent treatment volumes. For example, Simanindo and Pangururan treated approximately 639 and 656 litres/day, respectively, continuously from 2020 to 2022. The number of businesses with water treatment systems remained unchanged across all regions, indicating stagnation in infrastructure improvements.

Simanindo

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
9	Liquid Waste Management	The amount of liquid waste from the tourism sector	Litres/Day	108.091	No Data	177.522, 83
		The amount of liquid waste from the tourism sector receiving treatment (liquid waste treatment)	Litres/Day	639,36	639,36	639,36
		Number of business units in the tourism sector that implement a water treatment system	Business unit	37	37	37

Girsang Sipangan Bolon

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
9	Liquid Waste Management	The amount of liquid waste from the tourism sector	Litres/Day	159.788	No Data	No Data

		The amount of liquid waste from the tourism sector receiving treatment (liquid waste treatment)	Litres/Day	0	0	0
		Number of business units in the tourism sector that implement a water treatment system	Business unit	4	4	4

Pangururan

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
9	Liquid Waste Management	The amount of liquid waste from the tourism sector	Litres/Day	155.706	No Data	491.475
		The amount of liquid waste from the tourism sector receiving treatment (liquid waste treatment)	Litres/Day	656,64	656,64	656,64
		Number of business units in the tourism sector that implement a water treatment system	Business unit	38	38	38

Balige

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
9	Liquid Waste Management	The amount of liquid waste from the tourism sector	Litres/Day	78.960,5	No Data	165.174,32
		The amount of liquid waste from the tourism sector receiving treatment (liquid waste treatment)	Litres/Day	0.084	0.084	0.084
		Number of business units in the tourism sector that implement a water treatment system	Business unit	1	1	1

Source: BPS of North Sumatra

3.10 Solid Waste Management

Solid waste management demonstrates minimal progress, with substantial data gaps impeding meaningful assessment. For example, 2021 data is unavailable for waste volume across all destinations. Waste segregation is practiced by only a small fraction of business units: 6 in Girsang Sipangan Bolon, 2 in Simanindo and Pangururan, and 1 in Balige, indicating limited industry-wide implementation. Balige stands out slightly, with 10 business units engaging in recycling.

Simanindo

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
10	Solid Waste Management	The volume of waste generated by the destination	Tons/Month	82,5	No Data	106,07
		Number of business units in the tourism sector that implement waste type segregation	Business unit	2	2	2
		Number of tourism sector business units that recycle waste	Business unit	0	0	0
		Tourist perceptions of the image of the cleanliness of the destination	Likert scale average	3,47	No Data	3,7

Girsang Sipangan Bolon

No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
10	Solid Waste Management	The volume of waste generated by the destination	Tons/ Month	294,3	No Data	298,61
		Number of business units in the tourism sector that implement waste type segregation	Business unit	6	6	6
		Number of tourism sector business units that recycle waste	Business unit	0	0	0
		Tourist perceptions of the image of the cleanliness of the destination	Likert scale average	3,16	No Data	No Data

Pangururan

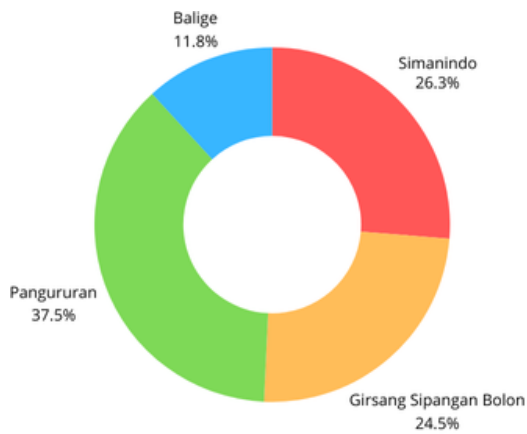
No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
10	Solid Waste Management	The volume of waste generated by the destination	Tons/ Month	96,32	No Data	No Data
		Number of business units in the tourism sector that implement waste type segregation	Business unit	2	2	2
		Number of tourism sector business units that recycle waste	Business unit	No Data	No Data	No Data
		Tourist perceptions of the image of the cleanliness of the destination	Likert scale average	3,47	No Data	2,74

Balige

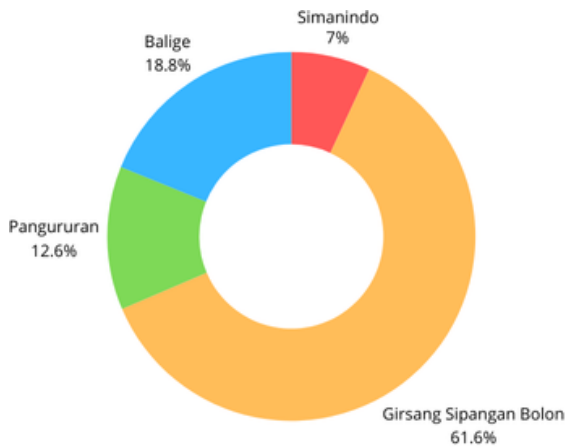
No	Monitoring Issue	Baseline Indicator	Unit	Value		
				2020	2021	2022
10	Solid Waste Management	The volume of waste generated by the destination	Tons/ Month	122,8	No Data	100,48
		Number of business units in the tourism sector that implement waste type segregation	Business unit	1	1	1
		Number of tourism sector business units that recycle waste	Business unit	10	10	10
		Tourist perceptions of the image of the cleanliness of the destination	Likert scale average	4,58	No Data	No Data

Source: BPS of North Sumatra

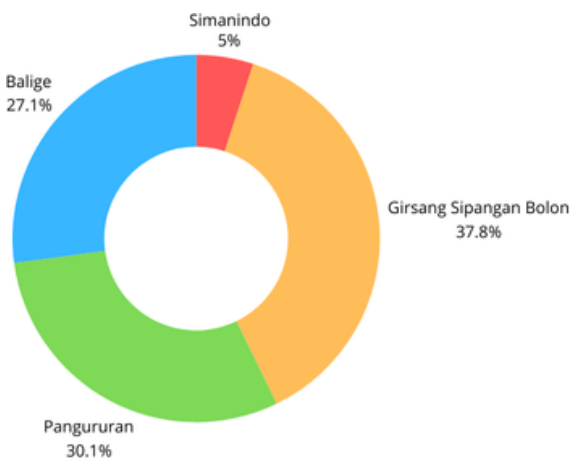
INFOGRAPHIC



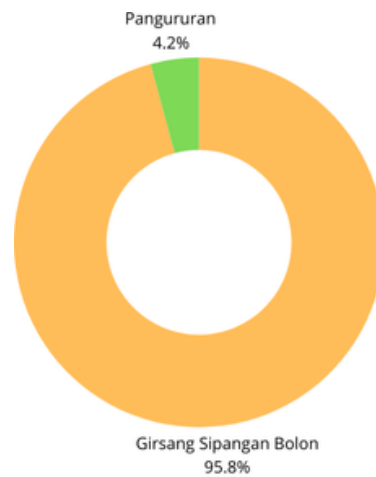
**NUMBER OF LODGING
(HOTEL, COTTAGE, GUESTHOUSE, VILLA MOTEL)**



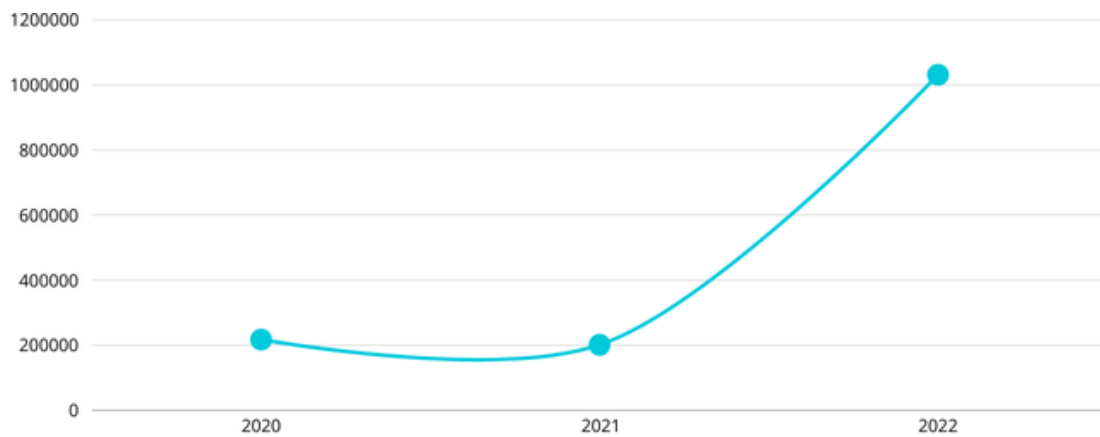
TOTAL NUMBER OF ROOMS FOR RENT (ROOM)



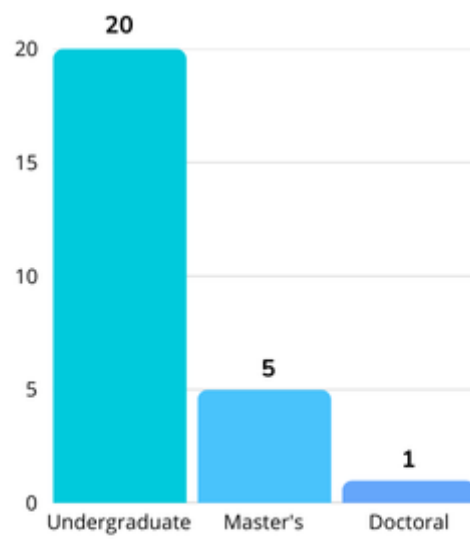
DOMESTIC TOURISTS VISIT



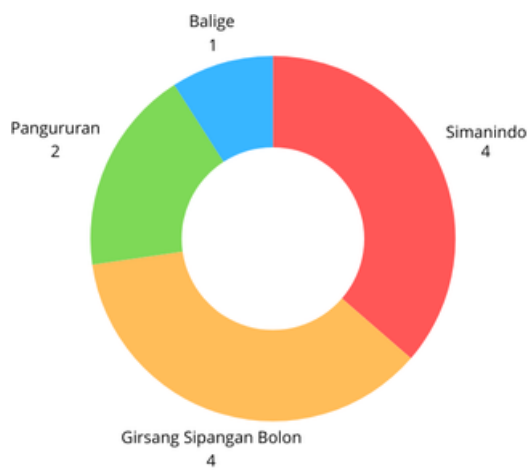
FOREIGN TOURISTS VISIT



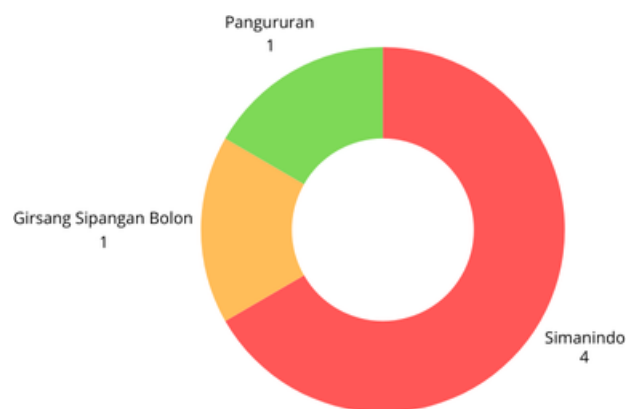
TRIPS OF DOMESTIC VISITORS FOR THE LAST THREE YEARS



STUDENT THESIS & DISSERTATION 2022



STUDENT RESEARCH 2022



LECTURER RESEARCH & JOURNAL 2022