Journal of Sylva Indonesiana (JSI) Vol. 06, *No.* 02, 2023 | *114 – 127*

Spatial Analysis of Tourism Objects and Facilities in Simarjarunjung Natural Tourism Area, North Sumatra Province, Indonesia

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Abstract. North Sumatra is one of the provinces in Indonesia that has a wealth of natural resources in the form of natural beauty. One place whose potential natural beauty stands out is the Simarjarunjung area, which is on the north side of Lake Toba. The purpose of this study was to analyze the spatial distribution of tourist objects, natural tourism amenities, and infrastructure in the Simarjarunjung nature tourism area. This research method uses spatial analysis. There are 11 tourist attractions located in the Simarjarunjung natural tourism area that have the potential to be utilized by the manager for natural tourism activities. My Maps technology from Google is used to facilitate access to information so that it is expected to have a positive impact. One of them is the promotion of tourist attractions so that they can be easily accessed by anyone through online networks. The availability of data on the distribution of tourist attractions, attractions and facilities / infrastructure resulting from this research is expected to be a means to be able to increase visitor access to find out information about tourism contained in Simarjarunjung tourist attractions. Each tourist attraction in the Simarjarunjung area has various attractions and tourist facilities, each of which is the attraction and uniqueness of each tourist attraction.

Keyword: Nature Tourism, Simarjarunjung Tourism Area, Spatial Analysis, Tourism Amenities, Tourism Attractions, Tourism Potential

Received 27 July 2022 | Revised 26 January 2023 | Accepted 01 February 2023

1 Introduction

Indonesia is one of the few countries in the world that is in the form of an archipelago and has a wealth of natural resources and natural potential [1]-[2]. Potential is a strength, ability, or power that has the possibility of being developed back into a larger form. In this case, the potential in question is the natural potential that exists in Indonesia, which is a natural resource managed by human resources [3]. The many natural potentials that exist can present an object or vehicle that can be enjoyed by humans as a form of embodiment of that potential. One form of the

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Published by Talenta Publisher, ISSN: 2622-5093 e-ISSN: 2622-5158 DOI : 10.32734/jsi.v6i02.9270
Journal Homepage: http://jsi.usu.ac.id

embodiment of natural potential is seen in the tourism sector [4]. Tourism is an industry that utilizes the potential of nature and the environment, historic buildings, local culture, and so on. Apart from being an industry, tourism is also considered a form of business [5]. The development of information technology today is very rapid in entering various fields, so that many emerging technologies are increasingly facilitating. One of them is geographic information system technology. Visual studies of tourism in the Simarjarunjung tourist area are carried out by utilizing GIS as a tool to explain various kinds of distribution of tourist attractions in the Simarjarunjung tourist area [6].

Simarjarunjung Hill has attractive natural scenery and relatively cool climatic conditions. It makes tourists interested in stopping at this place. The number of visits to these places gives the landowner an idea of how tourism in the Simarjarunjung area has developed, which can be seen in several tourist objects such as Bukit Indah Simarjarunjung, Hound Sky, Penatapan Simarjarunjung Indah, Annex, and other tourist objects. It has a positive impact on the surrounding community because the tourism sector is a driver of the local economy, which is expected to run sustainably through community tourism development. To realize sustainable people-based tourism development, efforts are needed to diversify tourist attractions oriented towards improving citizens' welfare, preserving cultural arts, and developing regionally friendly tourism to make the place a tourist spot [7]. Geographic Information System technology in the digital era like today is very useful in presenting information related to tourist attractions, including tourism potential and existing facilities at tourist attractions [8].

A visual study of tourism in the Simarjarunjung tourist area by utilizing Geographic information systems (GIS) has been used as a tool to explain various kinds of distribution of tourist objects in the Simarjarunjung tourist area [9]. The development of information technology is currently very rapidly entering various fields, so many new technologies have emerged, especially in the world of technology. One of them is geographic information system technology, which is a geographic information system that functions to enter, store, recall, process, analyze, and generate geo-referenced or geospatial data [10]. GIS in the digital era, as it is today, is very useful in presenting information related to tourist objects, including tourism potential and existing amenities at tourist objects [11]-[12]. This study is aimed to analyze the spatial distribution of attractions and natural tourism amenities and infrastructure in the Simarjarunjung nature tourism area.

2 Research Method

The research was conducted in Simalungun Regency at 2°36'–3°18' North Latitude and 98°32′–99°35′ East Longitude. Simalungun Regency has an area of 438,660 Ha. The Simarjarunjung tourist area is a tourist destination located in the Dolok Pardamean District, Simalungun Regency, North Sumatra Province, Indonesia.

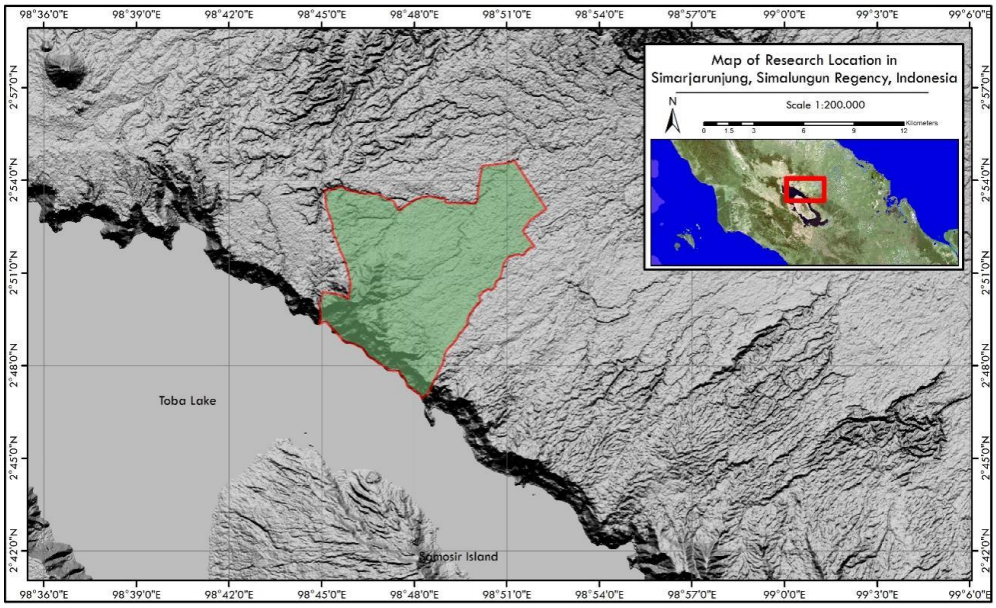

Figure 1 Research Location Map

2.1 Tools and Materials

The tools used for data collection are stationary, cameras, GPS, Microsoft Word, Microsoft Excel, ArcGIS 10.8 software, and computer equipment. The materials used for data collection include satellite imagery data and literature study data.

2.2 Data Analysis

Spatial analysis was used to map the distribution of attractions and amenities/infrastructure through GIS tools at this stage. An analysis was carried out to map the data obtained in the form of the coordinates of a place and then describe the mapping using GIS tools. Spatial analysis to map the distribution of attractions and facilities in the Simarjarunjung natural tourism area was carried out with GIS devices [13].

Data management techniques can be used by inputting the coordinates of the location of attractions, amenities, or infrastructure into Arc GIS 10.8 software. In this study, researchers will obtain data in the form of tourist attraction names, locations, coordinates, and other information. The map of the distribution of attractions and amenities/infrastructure of the Simarjarunjung natural tourism area was obtained by overlaying the results of field points (ground checks) with slope maps, road maps, forest area boundary maps, and land cover maps.

2.3 Data Visualization

Data visualization techniques are carried out after obtaining coordinate points in each location and database, then carrying out the map layout process by displaying each location point on the map. This technique serves to determine the position of a tourist location on the map. Thus,

tourists, the public, and tourism managers can easily identify tourist objects in the Simarjarunjung tourist area.

2.4 Survey of Tourist Attractions and Amenities

Spatial analysis of the distribution of attractions, amenities, and infrastructure in natural tourism is used to map the distribution of attractions, amenities, and infrastructure through GIS tools [14]. The distribution of attractions and amenities/infrastructure is overlapped with slope maps, road maps, forest area boundary maps, and land cover maps. The only data collected from the survey activities are the coordinates of the GPS and documentary photos of attractions, amenities, or infrastructure [15]. The analysis obtained the distribution of attractions and amenities / infrastructure in nature tourism in the Simarjarunjung area. Tourist attractions in the Simarjarunjung Nature Tourism Area are camping grounds, campgrounds, flower gardens, and tree houses.

2.5 Online Map Application

The use of online maps (my maps application) in a system for presenting information on tourist objects in the Simarjarunjung area uses a website-based map to manage tourist attraction information so that it is easily accessible to tourists, the public, and tourism managers.

3 Result and Discussion

3.1 General Conditions of Location

The Simarjarunjung nature tourism area is located in Parik Soapangan Village, Dolok Pardamean District, Simalungun Regency. Its altitude is 1,479 meters above sea level. Based on the Decree of the Minister of Environment and Forestry Number 6609/MENLHK/2021, the Simarjarunjung area is almost entirely within the state forest area. There are five tourist objects outside the forest area and six tourist objects within the forest area. Tourist objects outside the forest area are Dolok Sipintuangin Lake Toba View, Simarjarunjung Beautiful Hills, BIS Annex, Tekosima Hills, and Beautifull Charm of Simarjarunjung. The inside are Pinus Hills, Salsabila Hills, Hound Sky, Beautiful Sunset of Simarjarunjung Hilltop, Simarjarunjung Hilltop, and Beautiful View of Simarjarunjung.

Access to Simarjarunjung natural attractions is still relatively limited. From the results of field observations, it is known that there is no public transportation route that leads to the location of tourist attractions. However, the condition of the road to Simarjarunjung natural tourism can be said to be quite good, and there is no damaged asphalt road, but the road inside the Simarjarunjung natural tourism area is still bad and rocky.

3.2 Analysis of Attractions and amenities/Infrastructure

In order to map the distribution of attractions and amenities through GIS tools, the distribution is superimposed on sub-district boundary maps and land cover maps. The spatial distribution of names and locations of tourism objects with their attractiveness of the Simarjarunjung natural tourism area is presented in Table 1 and Figure 2.

Table 1 Spatial distribution of names and locations of tourism objects

No	Tourist Objects	Spatial Coordinates		Attractions Overview
		X	Y	
1.	Dolok Sipintuangin Lake Toba View	98°47'12.11"E	2°48'50.30"N	
2.	Simarjarun-jung Beautifull Hills	98°46'56.32"E	2°48'53.19"N	
3.	Pine Hills	98°46'58.00"E	2°49'1.34" N	

No	Tourist Objects	Spatial Coordinates		Attractions Overview
		X	Y	
4.	Tekosima Hills	98°46'43.44"E	2°48'56.93"N	
5.	BIS Annex	98°46'46.05"E	2°48'55.83"N	
6.	Hound Sky	98°46'35.72"E	2°49'9.70" N	
7.	Salsabila Hills	98°46'50.48"E	2°49'1.30" N	

No	Tourist Objects	Spatial Coordinates		Attractions Overview
		X	Y	
8.	Simarjarun-jung Hilltop	98°46'12.56"E	2°49'40.76"N	
9.	Beautiful Sunset of Simarjarun-jung Hilltop	98°46'9.87"E	2°49'34.19"N	
10.	Beautifull Simarjarun-jungView	98°45'52.93"E	2°49'52.76"N	
11.	Beautifull Charm of Simarjarun-jung	98°45'24.18"E	2°50'3.20"N	

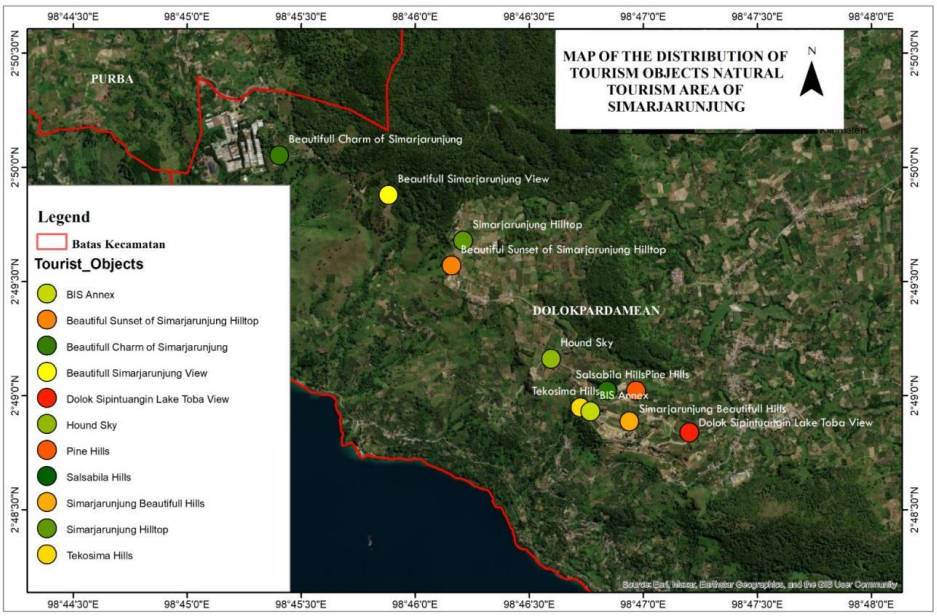

Figure 2 Map of tourist attraction spatial distribution

Based on Table 1, it is known that as a result of the distribution of natural tourism objects in the Simarjarunjung area, 10 tourist objects are managed by individuals or communities around natural tourism, namely: Dolok Sipintuangin View, Beautiful Hills of Simarjarunjung, Tekosima Hills, BIS Annex, Hound Sky, Salsabila Hills, Simarjarunjung Hilltop, Beautiful Sunset of Simarjarunjung Hilltop, Beautiful Vew of Simarjarunjung, and Beautiful Charm of Simarjarunjung. There is one object managed by the forest farmer group KPH region II Pematang Siantar, namely Pinus Hills.

Based on the results, there are eleven tourist objects and various types of attractions and amenities. Panatapan Dolok Sipintuangin provides attractions, namely camping grounds and flower gardens; amenities and infrastructure, namely swings, viewing towers, photo spots, extreme bridges, seats, lodging, prayer rooms, restaurants, and toilets. Bukit Indah Simarjarunjung offers attractions such as camping grounds and tree houses, as well as amenities and infrastructure such as a flying fox, prayer room/mosque, toilets, lodging, photo spots, bicycle swings, restaurants, parking area, king kong rides, seating, cultural performances, souvenir shops, and balloon rides in the air. Pinus Hills offers flower garden attractions and amenities such as photo opportunities, parking, restrooms, cross-legged chairs, seats, and a restaurant. Tekosima Hills provides amenities such as photo spots, parking area, seating, souvenir shop, cross-legged bikes, and sky bikes.

Hound Sky provides attractions, namely camping grounds and flower gardens, as well as amenities and infrastructure, namely photo spots, swings, restaurants, prayer rooms, toilets, lodging, cross-legged seats, and viewing towers. Salsabila Hills provides tourist attractions and amenities, namely photo spots, cloud bikes, viewing towers, cross-legged areas, lodging, prayer

rooms, restaurants, and toilets. Simarjarunjung Peak provides camping grounds and treehouse tourist attractions, as well as amenities and infrastructure, namely souvenir shops, photo spots, restaurants, and toilets.

Beautiful Sunset Peak of Simarjarunjung offers infrastructure and amenities such as photo spots, prayer rooms, parking, cross-legged, restaurants, and toilets. Panatapan Simarjarunjung Indah provides tourist attractions and amenities such as photo spots, swings, cross-leggings, toilets, suspension bridges, and restaurants. Beautiful Charm of Simarjarunjung provides tourist attractions, namely a camping ground amenities such as toilets, photo spots, a seating area, a prayer room, a restaurant, lodging, parking area, and seating.

Based on the explanation above, Beautiful Hills of Simarjarunjung has many attractions and amenities. It makes this site unique among other tourist attractions. Attractions and amenities that are unique and interesting can certainly satisfy visitors and increase their interest in visiting. If tourist attractions are improved, this can affect visitors; visitors will feel satisfied, and naturally, visitors will want to come back to these attractions [16]. Tourist attractions have a positive influence on visiting intentions; in other words, the better the tourist attractions, the higher the interest in visiting by tourist visitors [17].

Many innovative attractions and amenities can encourage tourists to stay longer and use the available attractions. Infrastructure innovation is the most important way for an organization to create value for visitors and achieve a competitive advantage. The innovation process will have a direct impact on the success of an activity that aims to increase revenue and profits [18]. Interesting tourist attractions can motivate tourists to visit these attractions. Thus, the tourist motivation will directly influence the visiting decision [19].

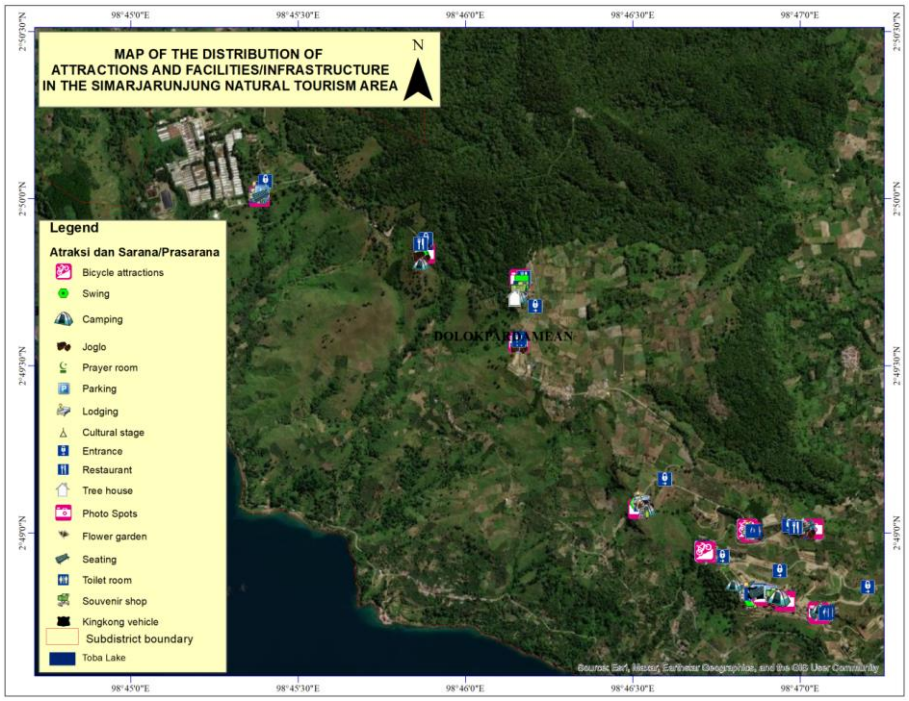

Figure 3 Map of the distribution of attractions and amenities

Based on the distribution map of natural attractions in Figure 3 above, there are eleven natural attractions marked with a red round symbol. Figure 3 shows the distribution of attractions and amenities/infrastructure. All tourist objects and amenities infrastructure is located in the Dolok Pardamean sub-district. The tourist objects in the Simarjarunjung natural tourism area have the potential to be developed for natural tourism activities. The spatial distribution of attractions and amenities in each natural tourism object in the Simarjarunjung area is presented in Table 2.

Table 2 Spatial distribution of attractions and amenities in each natural tourism object in the Simarjarunjung area

No.	Tourism objects	Attractions	Amenities	Coordinates	
				X	Y
1.	Dolok Sipintuangin View Point	Camping Ground		98°47'3.43"E	2°48'46.58"N
		Flower Garden		98°47'3.48"E	2°48’45.97”N
		View Pint	Swing	98°47'4.38"E	2°48'45.24"N
			View Tower	98°47'4.00"E	2°48'45.45"N
			Photo Spot	98°47'3.43"E	2°48’45.51”N
			Extreme Bridges	98°47'3.20"E	2°48’45.80”N
			Seating	98°47'3.50"E	2°48'45.71"N
			Lodging	98°47'4.39"E	2°48’45.94”N
			Mosque	98°47'3.98"E	2°48’46.36”N
			Restaurant	98°47'4.56"E	2°48'45.54"N
			Toilet	98°47'5.02"E	2°48'45.80"N
2.	Simarjarun-jung Beautiful Hill	Tree House		98°46'54.47"E	2°48'48.96"N
		Camping Ground		98°46'56.09"E	2°48'48.92"N
			Flying fox	98°46'54.61"E	2°48'47.49"N
			Mosque	98°46'54.96"E	2°48'49.56"N
			Toilet	98°46'54.37"E	2°48'49.31"N
			Lodging	98°46'53.82"E	2°48'49.16"N
			Photo Spot	98°46'53.72"E	2°48'48.75"N
			Sky Bike	98°46'53.17"E	2°48'49.01"N
			Restaurant	98°46'52.92"E	2°48'49.76"N
			Car Park	98°46'52.33"E	2°48'49.72"N
			Kingkong Rides	98°46'52.09"E	2°48'49.20"N
			Seating	98°46'52.65"E	2°48'49.43"N
			Cultural Performances	98°46'54.08"E	2°48'49.45"N
			Motorcycle Park	98°46'54.64"E	2°48'49.64"N
			Souvenir Shop	98°46'55.03"E	2°48'48.78"N
			Air Balloon Rides	98°46'57.29"E	2°48'47.73"N
			Extreme Swing	98°46'56.42"E	2°48'47.76"N
			Lesehan Seating	98°46'55.47"E	2°48'47.95"N
3.	Pine Hills	Flower Garden		98°47'0.27"E	2°49'1.30"N
		Camping Ground	Photo Spot	98°47'2.31"E	2°49'0.71"N
			Parking Area	98°47'1.31"E	2°49'0.91"N
			Toilet	98°47'1.32"E	2°49'0.21"N
			Lesehan Seating	98°47'1.01"E	2°49'0.24"N
			Seating	98°47'1.28"E	2°49'1.29"N
			Restaurant	98°46'59.16"E	2°49'0.99"N
4.	Tekosima Hills	Lake Toba View Point	Sky Bike	98°46'42.91"E	2°48'56.68"N
			Spot Foto	98°46'43.20"E	2°48'56.43"N
			Parking Area	98°46'42.94"E	2°48'56.84"N
			Seating	98°46'43.76"E	2°48'55.83"N
			Souvenir Shop	98°46'43.95"E	2°48'56.20"N
			Lesehan Seating	98°46'42.65"E	2°48'57.93"N
5.	BIS Annex	Camping Ground		98°46'48.10"E	2°48'50.98"N
		View Point	Lake Toba View	98°46'51.32"E	2°48'47.79"N
			Extreme Swing	98°46'51.10"E	2°48'47.93"N

No.	Tourism objects	Attractions	Amenities	Coordinates	
				X	Y
			Parking Area	98°46'50.24"E	2°48'49.95"N
			Toilet	98°46'51.08"E	2°48'49.74"N
			Seating	98°46'51.01"E	2°48'50.43"N
			Lodging	98°46'51.28"E	2°48'49.35"N
			Restaurant	98°46'51.18"E	2°48'49.10"N
			Mosque	98°46'46.66"E	2°48'54.32"N
6.	Hound Sky	Camping Ground		98°46'32.54"E	2°49'4.47"N
		View Point	Flower Garden	98°46'31.00"E	2°49'4.72"N
			Swing	98°46'30.68"E	2°49'5.34"N
			Restaurant	98°46'31.45"E	2°49'5.11"N
			Mosque	98°46'31.21"E	2°49'5.75"N
			Toilet	98°46'31.62"E	2°49'5.52"N
			Lodging	98°46'31.67"E	2°49'6.09"N
			Lesehan Seating	98°46'32.19"E	2°49'5.08"N
			View Tower	98°46'32.02"E	2°49'4.03"N
			Photo Spot	98°46'31.00"E	2°49'4.30"N
7.	Salsabila Hills	Camping Ground		98°46'52.26"E	2°48'59.97"N
		View Point	Photo Spot	98°46'51.11"E	2°49'0.13"N
		Flower Garden	Cloud Bike	98°46'50.52"E	2°49'0.70"N
			View Tower	98°46'51.40"E	2°49'0.16"N
			Lesehan Seating	98°46'51.90"E	2°48'59.80"N
			Lodging	98°46'51.53"E	2°48'59.88"N
			Mosque	98°46'51.54"E	2°49'0.74"N
			Restaurant	98°46'51.47"E	2°49'0.38"N
			Toilet	98°46'52.01"E	2°49'0.37"N
8.	Simarjarun-jung Hilltop	View Point		98°46'9.58"E	2°49'42.77"N
		Camping Gound	Tree House	98°46'9.06"E	2°49'42.28"N
			Photo Spot	98°46'9.76"E	2°49'45.51"N
			Restaurant	98°46'10.48"E	2°49'45.85"N
			Toilet	98°46'9.84"E	2°49'44.03"N
			Souvenir Shop	98°46'9.68"E	2°49'43.45"N
9.	Beautiful Sunset Simarjarun-jung Hilltop	View Point	Photo Spot	98°46'9.50"E	2°49'34.20"N
		Camping Ground	Mosque	98°46'9.76"E	2°49'34.91"N
		Sunset View Point	Parking Area	98°46'9.61"E	2°49'33.84"N
			Lesehan Seating	98°46'9.53"E	2°49'33.43"N
			Restaurant	98°46'9.58"E	2°49'34.60"N
			Toilet	98°46'9.68"E	2°49'35.04"N
10.	Beautifull Simarjarun-jungView	Camping Ground		98°45'51.97"E	2°49'48.60"N
		View Point	Photo Spot	98°45'52.69"E	2°49'50.15"N
			Swing	98°45'52.28"E	2°49'50.10"N
			Lesehan Seating	98°45'52.12"E	2°49'49.70"N
			Toilet	98°45'52.96"E	2°49'52.04"N
			Sky Bridge	98°45'52.96"E	2°49'51.57"N
			Restaurant	98°45'51.99"E	2°49'51.87"N
11.	Beautiful charm of Simarjarun-jung	Camping Ground		98°45'23.12"E	2°50'0.54"N
		View Point	Toilet	98°45'22.59"E	2°50'0.47"N
			Photo Spot	98°45'23.08"E	2°50'0.34"N
			Lesehan Seating	98°45'23.97"E	2°50'1.46"N
			Mosque	98°45'24.94"E	2°50'2.34"N
			Restaurant	98°45'23.67"E	2°50'1.88"N
			Lodging	98°45'23.22"E	2°50'1.23"N
			Parking area	98°45'23.48"E	2°50'1.42"N
			Seating	98°45'23.62"E	2°50'0.65"N
			Souvenir Shop	98°45'23.67"E	2°50'1.88"N

After obtaining the distribution map of natural attractions, it will be improved and converted to a distribution map based on a website through Google My Maps (Figure 4). It aims to make it

easier for tourists to find out the locations of tourist objects in the Simarjarunjung area by displaying locations, pictures, and some related information about tourist objects in the Simarjarunjung natural tourist area. Furthermore, maps can be displayed and present the distribution of tourist objects through the internet, using the concept of website-based cloud sourcing, and will be easily accessed by visitors. It is also easier for tourism managers to add descriptions.

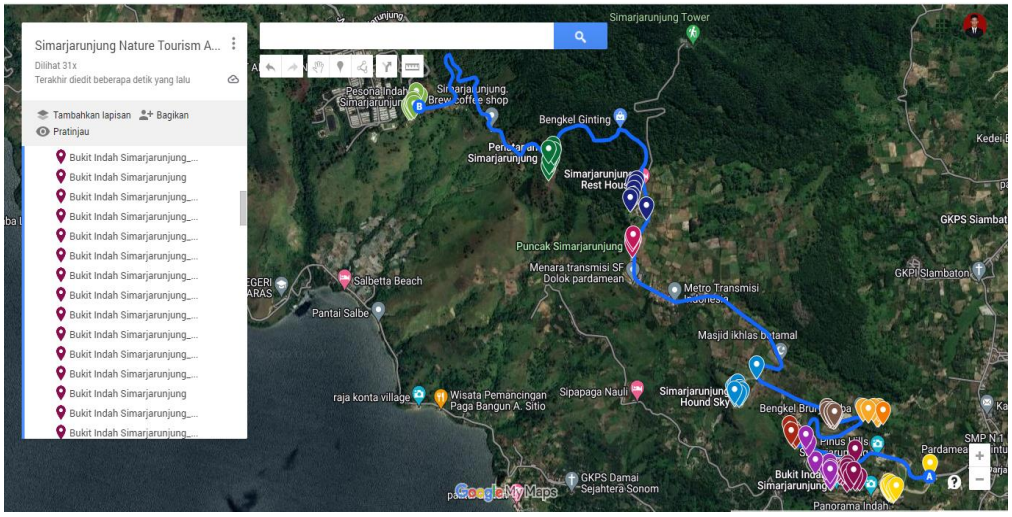

Figure 4 The appearance of the features of the dashboard that has been presented based on Google My Maps

Based on Figure 4 above, the distribution map accessed through the website (https://www.google.com/mymaps/viewer?mid=1wknYNAGqZl0ciBDYA3GhsdyVUGci84&hl=in). The purpose of using Google My Maps is to make it easier for visitors to explore the Simarjarunjung natural tourism area. Based on the visit of researchers to tourist attractions in the Simarjarunjung area, tourism development has not been so optimal which can be seen from the number of visits every day which is still low. Tourist visits are high during the holiday season. It can be seen from the low number of daily visits and the high number of tourist visits during the holiday season. One of the obstacles is that transportation to tourist sites is not yet available properly, and the promotion of tourist objects is still minimal.

Existing tourist attractions have not been developed properly to attract people to visit. This deficiency is not only from management issues but also from a lack of information and promotions. It should be easily accessible by the community as a nature tourism market. The development of technology and information has many positive impacts. One of them is the promotion of tourist attractions that can be easily accessed by anyone through the Google My Maps website [21]. The availability of data on the distribution of tourist objects, attractions, and amenities/infrastructure described in this study is expected to be a means of increasing visitor access to obtaining tourism information at the Simarjarunjung tourist attraction.

4 Conclusions

Spatial analysis of tourist attractions and amenities in the Simarjarunjung Natural Tourism Area shows that there are eleven tourist attractions. Each attraction has a variety of different attractions and amenities that are unique and become an attraction, such as tree houses, camping ground, flying fox, sky bikes, photo spots, lodging, kingkong rides, air balloon rides, cultural performances, souvenir shop, extreme swing, seating, lesehan seating, prayer rooms, restaurants, toilets, parking area, and others. There are five attractions outside the forest area and six attractions within the forest area. The limited number of public vehicles to this area makes access to Simarjarunjung natural attractions still relatively limited. Then the road access to Simarjarunjung natural tourism is quite good, but the road condition inside the Simarjarunjung natural tourism area is still bad and rocky.

Acknowledgment

The author would like to thank the University of Sumatera Utara has funded this research. The author would like to thank the managers of tourism objects in the Simarjarunjung natural tourism area, local governments, and visitors who have provided support for data collection in this study.

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