

# Tourism Development Based on Geopark in Bakkara Caldera Toba, Indonesia

N Ginting<sup>1\*</sup>, N Vinky Rahman<sup>1</sup>, and G Sembiring<sup>2</sup>

<sup>1</sup>Departement of Architecture, Faculty of Engineering, Universitas Sumatera Utara, Jl. dr. Mansur Kampus USU Medan, 20155

<sup>2</sup>Ikatan Ahli Geologi Indonesia Provinsi Sumatera Utara, Jl. 1Jamin Ginting 118, 11,1 km Medan, 20135

\*nurlisa@usu.ac.id

**Abstract.** Bakkara Caldera Toba is an outstanding product of natural phenomena of Toba Supervolcano which has fascinating nature and culture. Bakkara has a great potential to develop world tourism further. It requires a model of sustainable planning Geopark to develop Bakkara. This sustainable concept helps to improve the local community and tourist's quality of life and also still maintain the quality of the environment. through field observation and depth interview. The Collected data with a triangulation method. Development tourism destination such as attractions and environment; facilities and services; accessibility; image; and price to consume. It associated based on Geopark aspects there are; geological heritage; geo-conservation activities; sustainable tourism activities; educational; activities; community involvement products; strong management structure; and secure basis, infrastructure, and activities. The results of this study indicate that the Bakkara has the potential to become a tourist destination by applying the concept of Geotourism which accentuate its natural side, by optimizing the management of its destination attractions, its facilities and services, and its accessibilities.

## 1. Introduction

Toba is the biggest Volcano-Tectonic Quarter Caldera in the world, formed by the supervolcano on 74.000 years ago [1]. The supereruptions have caused the significant impact on the world, the outburst of Toba volcanic ash effect the volcanic winter and mass extinction [2]. That natural phenomenon built the extraordinary geographical and biological. The eruption was also born a community which has harmony living with nature and their local wisdom. On the beginning 2000, UNESCO introduced to the world a new concept namely Geopark. Geopark is a region which has the outside geological elements, i.e., archeology, ecology, and culture then the resident participates to conserve the natural heritage [3]. Caldera Toba with all of the uniqueness is very potential to be developed into Geopark. Geopark has three focus namely tourism, conservation, and socio-economic development [4].

Bakkara is a part of the Caldera Toba which it rich with geodiversity, biodiversity, and culture diversity. Despite it potential, Bakkara remains untouched and lack of development. Tourist development will optimize this potential and improve the economy of local community [5]. However, it can also spoil the authenticity of the environment. Geopark concept is one of the ways to developed it yet protect the quality of the environment. In some cases, Geopark concept proved to bring the sustainable economic benefits and increase the conservation of nature, culture, aesthetics, heritage, and quality of life [6-7]. This concept is relatively new, and its definition can change over time[8]. Therefore, further research on geopark concept is very needed. The aim of this research is to analyze and plan the tourism development concept based on geopark in Bakkara, Caldera Toba, Indonesia.



## 2. Tourism Based on Geopark

Tourism is one of the primary elements to develop an area. An area that is a tourist destination will be able to bring positive impact on the availability of employment for the local community such as selling the local products and supply needs of tourist's needs [9]. Tourism is a sector that always has dynamic movement; in optimal condition, it will be huge profits to local communities and others parties involved [10]. The economic benefits make tourism be the main sector of some countries as a source of foreign exchange [7]. Tourism development aims to increase communities standard of life. According to Middleton et al. in their book *Marketing in Travel and Tourism* [11], to develop tourism there are some criteria to fulfilled, (1) Destination attractions and environment; (2) Destination facilities and services; (3) Accessibility of the; (4) Image of destination; and (5) Price to the consumer.

Geotourism is a system that involves the geological elements and the components of tourism like attractions, accommodations, tours, activities, interpretation also planning and management [6]. Geotourism can be considered part of natural-based tourism and ecotourism, but actually, geotourism is a specialized form of tourism that focuses on geosite. [13]. Geology destination attraction; nature and water; ecological benefits; cultural monument; and handicraft and agriculture product of local communities are the parts of Geopark [14]. The synergy between geodiversity, cultural, and biodiversity are the major components in the concept of Geopark [15]. There are some criteria an area to be geopark [13]; significant geology heritage; geoconservation activities; sustainable tourism activities; educational activities; community involvement products; strong management structure; and secure basis (financial), infrastructure, activities. The greatest challenge of this concept is still providing education to tourists without bringing down the 'fun' of tourism [7].

## 3. Methodology

### 3.1. Research Area

Lake Toba has a beautiful panorama, cultural and biological diversity, and the type of rock that is extraordinary, but this potency has not managed properly. There are ten tourism destinations which highly capable of representing Tourism Caldera that has been set by acceleration team filing Geopark Caldera Toba. One of those is Bakkara Geopark Sibandang. The research location is in Bakkara district Humbang Hasundutan, which has the charm of unspoiled nature. The attractions contained in this caldera remain unexplored. Panorama Bakkara still has a good condition and natural with the activity of the local community. Most of the citizen working as a farmer, and the area was chosen because of geo area the only untapped and has a high potential. Bakkara has a diversity of potency attractions, i.e. (1) Janji Waterfall; (2) Aek Sipangolu; (3) Tombak Sulu-sulu; (4) Bakkara Village; (5) Sipinsur; (6) Sisingamangaraja Palace; (7) Hariara Tunghot Tree (Figure 1).

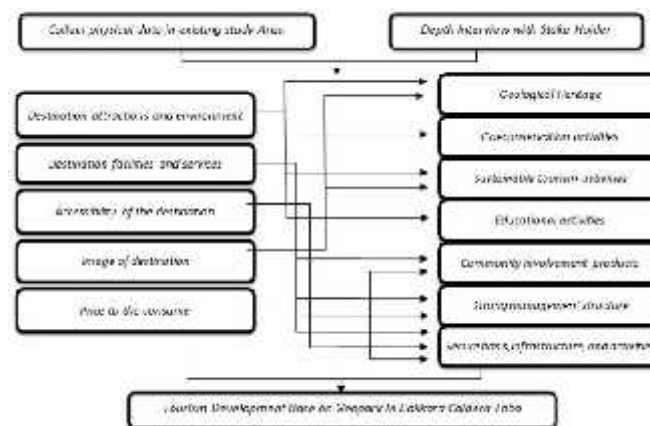


**Figure 1.** Research Area

### 3.2. Method

This research was conducted to find the concept of tourism development based on Geopark. It should be based on the current observation to get the result that corresponds with the local wisdom. That is why this research used the qualitative method. Qualitative research methods not only focus on the data finding, but also consider the sociocultural that exist to produce the results [16]. Data collected with field observations and depth interviews method.

Data obtained through different methods processed using the triangulation method. Data analysis method of triangulation is a process of analysis using various data that is processed to produce research findings [17]. Photographs physical condition assessment, exposure area from the source processed and depth interview with eight people of stakeholder, such as geologist, the tourism expert, government official, association of travel tours and local figure. All the data will interpreted according to literature review has been conducted and direct observation by the Author (Figure 2). The results of the analysis of the data obtained will become research findings which underlie the concept of Bakkara Caldera Toba tourism development based on geopark.



**Figure 2.** Analysis Chart

## 4. Results and Discussions

The results will be discussed in five subsections, there are (1) Destination Attraction and Environment, (2) Destination Facilities and Service, (3) Accessibility of The Destination, (4) Image of Destination, and (5) Price to Consume.

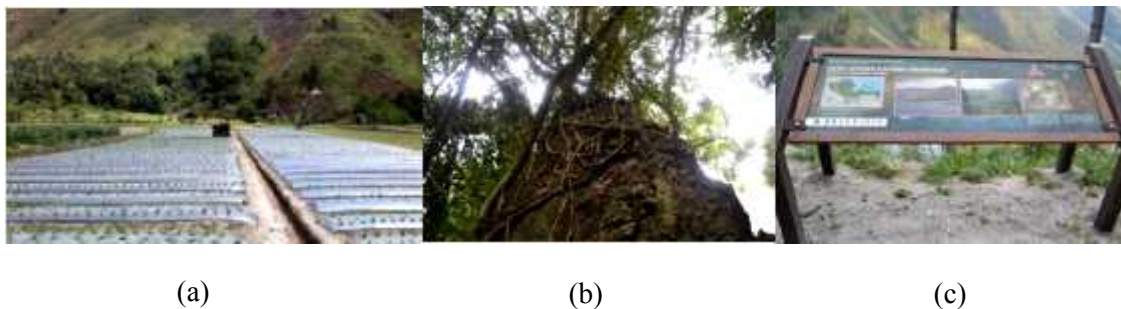
### 4.1. Destination Attraction and environment

In general, geotourism destination attraction consists of geological environments; built structure; and events based around such sites [6]. Furthermore, geopark also contains geological heritage, geoconservation activities, tourism activities and educational activities [1].

The long history of Bakkara has produced many values to the site (Table 1). It is known as the hometown of Sisingamangaraja, one of the Batakese renowned King. Bakkara becomes sacred sites to the community and was made into destination attraction. It is consist of Sisingamangaraja Palace; Tombak Sulusulu which is the birthplace of the King; an endemic plant namely 'Sakka Madeha' that protected the rocks from falling; Haiara Tunghot, the tree that was once the place to anchor the Sisingamangaraja ship; Aek Sipangolu which is a sacred water spring; Janji Waterfall; and Sipinsur (Figure 1). This is also supported by depth interviews with the principal respondents:

“In Bakkara some geosites is very sacred, and this becomes a potential of tourism, such as Tombak-sulusulu. Before the local community knows about the geoconservation, they have conserved because of the historical value.” (Key Respondent: Local Figure)

Not only the historical richness that becomes the attraction, but also the exceptional natural environment in Bakkara (Table 1). There is diversity of geological structure in Bakkara, such as Young Toba Tuff (YTT) formed 74,000 years ago, Old Toba tuff formed 800,000 years ago at Janji Waterfall, Meta-sediment rock formed about 300 million years ago and Mesozoic limestone in Tombak Sulu-sulu which formed about 250 million years ago (Figure 3). Nowadays, most of this land is used by the local people to grow local plants such as banana, onion, coffee and others.



**Figure 3.** (a) Field in Bakkara; (b) Sakka Madeha; and (c) Information Panel About the Geological History

**Table 1.** Observation Result of Component Destination Attraction and Environment that associated with Geopark Aspect in Bakkara

<i>Indicator</i>	<i>Component</i>	<i>Observation Result</i>
<i>Geological Heritage</i>	Historical Place	(+ ) There are Sisangamangaraja Palace; Tombak Sulu sulu; Hariara Tunghot Tree; Aek Sipangolu
	Agriculture Destination	(+) Bakkara has a potential to be agriculture destination
	Cultural Activities	(+) Bakkara has a potential to cultural activities
	Rocks from Supervolcano	(+) Young Toba Tuff; Mesozoic Limestone ; Old Toba Tuff; Metasediment Rock
	Nature Tourism Destination	(+) Janji Waterfall; Sipinsur
<i>Geoconservation Activities</i>	Flora & Fauna Conservation	(+) There is attempt to conserve local flora at Sipinsur
	Tourist Intensity	(-) Only a few tourists
<i>Sustainable Tourism Activities</i>	Tourist Activities	(-) Only a few tourists activities
<i>Educational Activities</i>	Story Telling	(+) There are a lot of stories about Sisingamangaraja
	Geology Education	(-) Only information panel

Unfortunately, the great potency comes from heritage, and natural environment is not followed by tourism activities (Table 1). It can be seen that tourism in the area has not developed optimally in spite of the rich potency. There is only a little number of visitors as they can barely find interesting agenda to do there. It turns out that the rich potency is still merely raw products. It is also expressed by one of the principal respondents:

“Bakkara has an exceptional potential, but only a few people knew about it potential” (Key Respondent: Chairman of Association of Travel Tours).

The main challenge in this situation is how to manage the great potency of the site. Otherwise, they will stay only as heritage and natural objects, known by only a little of people. This is a real task for

local government and involving parties. All destinations as listed above should be managed properly, each by its character, to produce tourism activities. The tourists need to know what agenda they can do in each destination so they can decide to make visits.

Every destination must be planned to carry out their amusement and attraction to visitors. The Sisingamangaraja Palace, for example, shall be supported by cultural activity like performance shows to increase the enthusiasm of visitors. The geological sites will be enriched by interesting performance such as sound interpretive panel [17]. It will also increase their interest on geological knowledge. Indeed, each destination and attraction must be planned authentically. In the end, conservative effort must follow to make sure these attraction and destinations last for the future.

#### 4.2. Destination Facilities and Services

Bakkara has had attractions facility, but still less comprehensive. Facilities Tourism Destinations is a significant predictor of satisfaction rating [18]. Components of facilities and services destinations such as accommodation units; restaurant; bar and cafe; transportation in tourist destinations; sports activities; adventure; other facilities; retail outlets and other services such as an information center, rental, and the tourism police [11]. As shown in Table 2, attractions in Bakkara such as Singamangaraja Palace and Tombak Sulu-sulu still lacks facilities like parking space, toilets, restaurant, and retail. Janji Waterfall has fairly complete facilities, but the conditions are slightly damaged. The design of Aek Sipangolu also incompatible with the location, and there is no parking space for visitors. The facilities in Sipinsur are adequate but still need some treatment (Figure 3). And at Hariara Tunghot Tree, there's no stopping point for tourist to see it.

**Table 2.** Observation Result of Component Destination Facilities and Services that associated with geopark aspect in Bakkara

<i>Indicator</i>	<i>Component</i>	<i>Observation Result</i>
<i>Community Involvement Product</i>	Products of local people	(-) There is no local product
	Tourism facility that involves the community	(+) There is tourism facility that involves the community
		(-) Government and public awareness for tourism is still lacking
<i>Strong Management Structure</i>	Community and Services facilities Management	(-) There are no community and services facilities management in Bakkara
	Police Office	(+) There are Security facility and Police Offices
	Tourist Information	(-) Only a few tourists activities
	Worship Facility	(-) There is no worship facility
	Toilet	(-) There is toilet but in bad condition
<i>Secure Basis, Infrastructur, And Activities</i>	Acomodation	(-) There is no acomodation facility
	Restaurant	(-) There is restaurant facility
	Transportation	(+) There is transportation facility
	Pedestrian path	(-) Only a few pedestrian path, and damaged
	Health Facility	(+) There is health facility
	Retail	(-) There is no retail
	Bank/Money Changer	(-) No bank/money changer

Overall Bakkara does not have the adequate facilities and services, such as tourist information, worship facility, accommodation, pedestrian path, and bank (Table 2). This is also supported by depth interviews with the principal respondents:

“Bakkara is very beautiful and potential, but the facility not support enough for tourist, and Government have responsibility to develop Bakkara, such as sidewalks, the roads, trash and then Environment in Lake Toba.” (Key Respondent : Tourism Expert)



**Figure 3.**Public Facilities in Sipinsur (a) Pedestrian Path, (b) waste container, (c) toilet

The main challenge in this situation is how to provide the facilities to make tourist comfortable. It is the real task of the government and the parties involving. Each facility attractions should be design in the context of the environment and local culture. Tombak Sulu-sulu for example, the design is not context with environment and culture of Batak Toba. Good Facility will make tourist Comfortable and they will back again to destination [5].

#### 4.3. Accessibility of the destination

Bakkara as the destination is very easy to access. It can be accessed whether by land, water and air transportation (Table 3). Usually, most visitors are accessing Bakkara from the land by private or public transportation. They also come from the nearest airport. There is airport nearby, which is Silangit ( $\pm$  1h 30m). Meanwhile, there're not many visitors come from the dock. Even though Bakkara is possible to access from anywhere; it is still not managed properly (Table 3).

**Table 3.** Observation Result of Component Accessibility of The Destination that Associated with Geopark Aspect in Bakkara

<i>Indicator</i>	<i>Component</i>	<i>Observation Result</i>
<i>Strong Management Structure</i>	Management Community of Accesibility	(-) There is no structure of management community
	Pedestrian Path	(-) Pedestrian path is not available
	Land Transportation	(+)Bakkara can be acces by the car or motorcycle
	Road Facilities	(-) The road facilities is not optimal; and there's no signage
<i>Secure Basis, Infrastructure, and Activities</i>	Dock	(-) Dock is not optimize
	Airport	(+) Nearest airport to Bakkara is Silangit
	Water Transportation	(+)Water transportation available but not adequate
	Public Transportation	(-)Public transportation is available but not adequate

For example, the road to sipinsur still dangerous, there's no road railing and signage, and there is some hole on the way. It is also stated by one of the primary respondents:

*“The path towards Sipinsur is very dangerous, there's still no road railing, and there are some holes on the road”* (Key Respondent: Government Official)

The challenge is how to manage and utilize the existing access in Bakkara. Otherwise, the development of destination attraction in Bakkara will be futile. Good accessibility to the destination is one of the keys



for successful tourism. In tourism, safety is must be provided [19]. Thus the government needs to improve it, for example, build road railing and signage. They also need to create an organization with the community to manages the accessibility. Because the organization was formed to provide the necessary infrastructure and can also benefit the local community. [20]

#### 4.4. Image of Destination

The destination image is commonly described as "impressions of a place" or "perceptions of an area." However, destination image should not be defined as only the perceptions of individual destination attributes but also the holistic impression made by the destination [21]. Although Bakkara has extraordinary geological & culture heritage it still unknown to people outside Bakkara. This ignorance is caused by a lack of promotion of the Bakkara. It is also expressed in the interview with the principal respondent, as follow:

*“There’s no promotion for tourism in Bakkara. Not many people know where is it Bakkara and what kind of place is that”* (Key Respondent: Tourist Expert)

The experience of satisfied tourist will give the positive image of the tourism destination while increasing the destination marketability through the promotion of the destination with other potential clients in mind [21]. The challenge is how to give an image to Bakkara and make it known to many people through some promotions in any commercial form such as website, brochure, pamphlet, and tv commercial. Promotion is one of an attempt to bring in tourist [21]. This promotion will give the tourist a ‘first image’ of Bakkara and would be interested in visiting and getting the ‘real image’ of Bakkara.

#### 4.5. Price to The Consumer

There was almost no charge for tourist when they had visited destination attraction in Bakkara. The entry to destination attraction and facilities in Bakkara are free of charge. The local product and restaurant are almost nonexistent. It is necessary for tourist to pay all of that related to tourism to improve the economy of local communities [22]. While the local product also attract tourist, unfortunately there is no product available, eventhough there is potential on that. Moreover, Local communities are ready to participate in managing the destination attractions in Bakkara. This is also supported by depth interviews with the principal respondents:

*“Bakkara is the future of Toba tourism and local people are also very proud of it and want to participate like selling local product, and also managing destination attractions.”* (KeyRespondent: Local Figure).

The challenge is how to provide local products variation and the entry fee to destination attraction. The government needs to set the entry fee to destination attractions in Bakkara and provide a place to sell local products. Because price can affect the tourist perception for decide what kind of experience that they want visiting destination attractions [11]. Tourist who are satisfied with the tourist destination will have the desire to come back [5].

### 5. Conclusions

Bakkara already has five component of tourism; there are destination attraction and environment, , accessibility of destination, the image of destination unless destination facilities and services price to consume. However there still many things that need to be addressed before it becomes a destination that based on geopark. Destination attractions and the facilities in Bakkara were still unmanaged. There's still need improvements to infrastructure such as roads, parking area, and signage. Promotional

commercial, economic activities and community involvement in Bakkara are not yet available. Once these issues are solved, then the tourism development based on Geopark in Bakkara will run sustainably.

Researchers suggest geotrail to complete the concept of Geopark. There are three alternatives Geotrail in Bakkara, the first trail, from Doloksanggul-Sisingamangaraja Palace-Hariahara Tunghot Tree-Tombak sulu sulu-Bakkara Village-Waterfall Janji-Aek Sipangolu-Sipinsur. Second alternative is from Silangit Airport-Sipinsur-Aek Sipangolu-Haria Tunghot-Sisingamangaraja Palace-Tombak sulu-sulu-Bakkara Village-Waterfall Janji. The Third alternative is from Bakkara Dock-Waterfall Janji-Bakkara Village-Tombak sulu sulu-Sisingamangaraja Palace-Haria Tunghot-Aek Sipangolu-Sipinsur.

Researchers encourage further research of geopark design of Bakkara. Then, researchers also recommended investigating others geo area in Caldera Toba to complete the geotourism concept in Caldera Toba.

### Acknowledgments

The authors gratefully acknowledge that the present research is supported by Ministry of Research and Technology and the Higher Education Republic of Indonesia. The support is from the research grant BP-PTN USU of Year 2016 Contract Number: 47/UN5.2.3.1/PPM/SP/2016.

### References

- [1] Chesner, C. A. (2012). The Toba caldera complex. *Quaternary International*, 258, 5-18. Jones, S C 2012 *Quaternary International* **258** 100–118.
- [2] Jones, S. C. (2012). Local-and regional-scale impacts of the ~ 74 ka Toba supervolcanic eruption on hominin populations and habitats in India. *Quaternary International*, 258, 100-118.
- [3] UNESCO. 2006. Global Geopark Network.
- [4] AZMAN, Norzaini, et al. Public education in heritage conservation for geopark community. *Procedia-Social and Behavioral Sciences*, 2010, 7: 504-511.
- [5] Ginting, N., & Wahid, J. (2015). Exploring Identity's Aspect of Continuity of Urban Heritage Tourism. *Procedia-Social and Behavioral Sciences*, 202, 234-241.
- [6] Dowling, R. K. (2011). Geotourism's Global Growth. *Geoheritage*, 3(1), 1-13.
- [7] Bujdosó, Z., Dávid, L., Wéber, Z., & Tenk, A. (2015). Utilization of geoheritage in tourism development. *Procedia-Social and Behavioral Sciences*, 188, 316-324.
- [8] Dan k, T., & Skupien, P. (2016). Geotourism aspects of the Lufeng Dinosaur National Geopark in Yunnan Province, China. *GeoScience Engineering*, 62(1), 51-57.
- [9] Cengiz, T., Ozkok, F., & Ayhan, C. K. (2011). Participation of the local community in the tourism development of Imbros (Gokceada). *African Journal of Agricultural Research*, 6(16), 3832-3840.
- [10] Yeoman, I. (2010). Tomorrow's tourist: Fluid and simple identities. *Journal of Globalization Studies*, 1(2).
- [11] Middleton, V. T., Fyall, A., Morgan, M., & Ranchhod, A. (2009). *Marketing in travel and tourism*. Routledge.
- [12] Newsome, D., & Dowling, R. (2006). The scope and nature of geotourism. *Geotourism. Elsevier Butterworth Heinemann, Oxford*, 3-25.
- [13] Zouros, N, Fassoulas, K, & Valiakos, H. (2010). European Geopark Network and Geotourism. *Journal of Geotourism*, 39(1/2), 423-424.
- [14] Patzak, Margarete. (2011). UNESCO Geopark Action: How To Manage Geopark.
- [15] Groat, L. N., & Wang, D. (2013). *Architectural research methods*. John Wiley & Sons.
- [16] Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (1993). *How to design and evaluate research in education* (Vol. 7). New York: McGraw-Hill.
- [17] Ren, F., Simonson, L., & Pan, Z. (2013). Interpretation of Geoheritage for Geotourism—a Comparison of Chinese geoparks and National Parks in the United States. *Czech Journal of Tourism*, 2(2), 105-125.



- [18] Crawford K, Black R (2012) Visitor understanding of the geodiversity and geoconservation value of the Giant's causeway World Heritage Site, Northern Ireland. *Geoheritage* 4:115–126
- [19] Butnaru, G.I., Miller, A. (2012). Conceptual approach on quality and theory of tourism services. *Procedia Economics and Finance*, 3, 375-380
- [20] Tomi , N. (2011). The potential of Lazar Canyon (Serbia) as a geotourism destination: inventory and evaluation. *Geographica Pannonica*, 15(3), 103-112.
- [21] Echtner, C. M., & Ritchie, J. B. (1991). The meaning and measurement of destination image. *Journal of tourism studies*, 2(2), 2-12.
- [22] Swarna, K., Biswas, S. K., & Harinarayana, T. (2013). Development of Geotourism in Kutch Region, Gujarat, India: An Innovative Approach. *Journal of Environmental Protection*, 2013.