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Land-use Planning for Geotourism Development in Bakara Caldera Toba, Indonesia

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Abstract. Bakara is a tourism destination located in Humbang Hasundutan Regency, which geologically belongs to Sibandang Geo area of the Toba Caldera Geopark. The effort to preserve its values is by restructuring the tourism area in Bakara. Land-use is one of the regional planning elements. Land-use planning is a delicate process because the success of physical, social, and economic functions in an area is highly dependent on it. This research aims to examine land-use planning along with geodiversity, biodiversity, and cultural diversity by geotourism development elements in Bakara, which are economy, education, promotion, and conservation. A qualitative method was conducted through observations, interviews, and focus group discussions. The result indicates that the lands in Bakara are generally occupied for agricultural activities, residential, and tourist attractions while the development of geotourism still needs to be improved. Therefore, the research suggests recommendations to develop the tourism sector in Bakara.

1. Introduction

Tourism is an essential sector which can improve the economy and the quality of life of a country [1]. It must be able to provide benefits for the community and the environment, as well as meet the desires of tourists. Geotourism is such one form which can trigger the development of the local economy [2]. It is one way to get sustainable tourism and also increase awareness of the exciting aspects of nature that can bring many tourists.

Bakara is a leading tourist destination in Humbang Hasundutan Regency. It has extraordinary natural phenomena as the result of a supervolcano eruption which the last occurred at 74,000 years ago that formed Toba Caldera [3]. In the development of geotourism, land-use, which is one of the regional arrangement aspects, needs to be applied as an effort to preserve its values as well as to develop the tourism sector in Bakara. Land-use creates functional correlation among some different areas with different functions. Land-use planning is the initial step in planning a region where the success of physical, social, and economic depends on it [4].

Along with the development of planning methods, many experts take many approaches in planning or structuring an area. Thus far, one theory that developed rapidly and extensively is Urban Design theory. There are eight elements in Urban Design which use in planning an area, they are: (1) Land-use, (2) Building Form and Massing, (3) Circulation, (4) Open Space, (5) Pedestrian Ways, (6) Activity Support, (7) Signage, and (8) Preservation. These elements need arrangement thoroughly to create a pleasant and attractive area [5].



According to Shirvani (1985), land-use is two-dimensional planning for the functions of a region by considering the capacity of the environment [5]. Land-use is all kinds of human intervention to the area as to fulfill their necessities [6]. Moreover, land-use generally depends on the capability of the location and the site itself [7].

Geotourism is a type of tourism that emphasizes natural wealth, where the geodiversity from an area is explored into a tourist attraction [8]. Its characteristic is a geographic area that has outstanding geological elements including the archaeological, ecological and cultural values in it. However, local people are invited to play a role as well as to protect and improve the function of natural heritage [9]. The development of geotourism must concern in providing local products to increase the local economy. Moreover, educational activities in geo-site as to initiate the geotourism, promoting to improve the tourist visits and effectuate the geo-site conservation [10] [11].

The development of geotourism through the economy products by the locals aims to increase tourist visits. In terms of geotourism, marketing strategy and improvement of local products can fulfill the tourist's needs [12]. Introducing the geotourism is one step to present tourism as a marketing strategy as well as to develop the geo-site [10] [11] [13]. Concerning in research location, factors affecting of economy aspect as land-use planning to promote the geotourism in Bakara are (1) improvisation of local products, (2) marketing, and (3) economy products of the community.

Geotourism is a tourism sector which focuses explicitly on landscape and geology as well as to promote tourism by conservation of the geodiversity. Geotourism concerns to world heritage through education and interpretation [14]. Geotourism aims to initiate the public about the Geopark, along with all elements of society, infrastructure, and economic development [14]. According to the research location, the indicators which concern in land-use planning as the development of geotourism in Bakara are (1) Appreciation of culture value and world heritage through education and interpretation, (2) The development of Geosite, (3) Educational activities.

Promotion activities of tourism will facilitate people to find out about the latest tourist attractions and help them in planning their visits [15]. Concerning in research location, factor affecting which is most appropriate towards the land-use planning in Bakara is the image of the destination.

According to Newsome and Dowling (2010), geotourism focus on landscape and geology of tourism as promoting tourism by conservation of the geodiversity through education and interpretation [14]. In the research location, factors affecting as land-use planning to develop the geotourism in Bakara are (1) Sustainability; preservation of geosite, and (2) Conservation of geosite.

2. Method

2.1. Research Area

The research area is Bakara Village, Baktiraja Sub-district, Humbang Hasundutan Regency, North Sumatera Province. The location is 211 km from Medan city and 20 km from Doloksanggul, the capital of Humbang Hasundutan Regency. Bakara is one part of the Toba Caldera geosite point areas which has geotourism elements such as Geodiversity, Biodiversity, and Cultural Diversity. Its extraordinary natural beauty makes Bakara has tourism potential as well as the tourist destination areas in North Sumatera Province, which is worthy of being developed (figure 1).



Figure 1 Geotrail Bakara

As research location points, there are eight tourist attraction in Bakara which are also the samples of research, they are: (1) Bakara Scenery, (2) Sisingamangaraja Palace, (3) Tombak Sulu-sulu, (4) Bakara Village, (5) Janji Waterfall, (6) Hariara Tunghot, (7) Aek Sipangolu, and (8) Aek Sitio-tio (figure 2).



Figure 2 Research Location

2.2. Methodology

This research was conducted to examine land-use planning through observations, interviews, and focus group discussion by the qualitative method. Qualitative research method focuses on the data found, as well as consider the sociocultural that exist to produce the results [16]. Reference of the indicators to conduct this research are the theory of geotourism development, which are presented by land-use planning as an aspect of the Urban Design theory (table 1) [5].

Table 1 Variables and Indicators

Variables	Indicators	Reference
Land-use in economy aspect	Improvisation of local products	Newsome and Dowling (2006)
	Marketing Economy products of the community	Pralong (2006) Ginting (2016), Zouros (2010)
Land-use in the education aspect	Appreciation of culture value and world heritage through education and interpretation	Newsome and Dowling (2006)
	The development of geosite Educational activities	Gerner et al. (2009) Ginting (2016), Zouros (2010)
Land-use in the promotion aspect	Image of the destination	Ginting (2016), Zouros (2010)
Land-use in the conservation aspect	Sustainability; preservation of geosite	Newsome and Dowling (2006)
	Conservation of geosite	Ginting (2016), Zouros (2010)

3. Results and Discussions

3.1. Land-use in Economy Aspect

Bakara has geodiversity, biodiversity, and cultural diversity of Toba Caldera Geopark, which makes it has enormous tourism potential. This potency helps in enhancing sustainable economic growth of the local community. Some tourist attractions in Bakara which have the geodiversity are Tombak Sulu-sulu, Janji Waterfall, Aek Sipangolu, and Aek Sitio-tio. Meanwhile, the tourist attractions of cultural diversity are Sisingamangaraja Palace, Hariara Tunghot, and Tombak Sulu-sulu. These tourist attractions help in increasing the economy of the community from the tourism sector (figure 3).



Figure 3 Land-use in Bakara

Bakara also has biodiversity such as Sakka Madeha plant in Tombak Sulu-sulu and Hariara Tunghot tree. Besides, in Bakara village also can be found some typical agricultural products such as good quality rice, coffee bean, onion, lemongrass, and nuts. These products have many benefits in increasing the economic value of the community itself by proper management. Furthermore, the lodging area is rare in research location, while there are many houses in Bakara which have the potential of a homestay for tourists in Bakara village. The potency comes in its land-use as local residential and agriculture as it has beautiful natural attraction and activity for tourists such as natural tourism or Toba water recreation. The proper arrangement of tourist facilities has an impact on improving the local economy as well as enhance the tourist visits. Essential for tourists to pay for everything related to creativity to improve the economy of the local community [17]. Therefore, the recommendation to develop the local economy in Bakara is by providing some souvenir shop which has some handmade products by locals and also developing potential local houses as a homestay for tourists.

3.2. *Land-use in Education Aspect*

Geotourism does not only concern with infrastructure and tourism supporting facilities which aim at providing tourist satisfaction; however, it must offer knowledge related to the geodiversity for tourists [18]. The management of geopark education intends to initiate and promote the public about the Geopark, along with all elements of society, economic, and infrastructure development [19]. Meanwhile, land-use, in general, depends on the ability and the location of the area [7].

Bakara has the geodiversity, biodiversity, and cultural diversity of geotourism, which are potential as an educational area of the Geopark. Some tourist attractions of cultural diversity such as Sisingamangaraja Palace, Hariara Tunghot, Tombak Sulu-sulu, and Aek Sipangolu are lots of knowledge in history, culture, and folklore. Meanwhile, the other attractions which have geodiversity and biodiversity such as Bakara Scenery, Bakara Village, Janji Waterfall, Aek Sipangolu, and Aek Sitio are lots of education related to Caldera Toba Geopark. Bakara has some diversities which educate directly about the Geopark along with the development of geotourism (figure 4).



Figure 4 Educational Aspect in Bakara

However, land-use planning is not the only way which provides knowledge about the Geopark. Various types of facilities must support and facilitate tourists regarding the education of Geopark as well as the development of geotourism [15]. Some tourist attractions in Bakara have provided signboard as tourist facility which supports the area as helps to educate tourists or local people about the Geopark. Therefore, the recommendation is by persuading tourists to participate in preserving each tourist attractions while improving tourists' awareness of the geotourism in Bakara.

3.3. *Land-use in Promotion Aspect*

The promotional activities in a broader sense related to land-use planning in Bakara, include the development of tourist attraction areas. Proper management for every tourist attraction can help in the implied promotion of the area itself. As an example, people who come to a tourist attraction area which is equipped by tourist facilities (tourist information center, public toilet, restaurant) as properly managed are more likely to promote the area rather than a tourist attraction area with poor management (figure 5).



Figure 5 Promotion Aspect in Bakara

The land-use in the research location is more likely not well organized as it has much diversity, which became tourist attractions. Many tourist attractions that scattered in some points will necessitate people to go around Bakara. This case also helps to promote the tourist attractions in Bakara indirectly as well as developing the geotourism.

3.4. Land-use in Conservation Aspect

Bakara has a lot of natural and cultural tourist attraction area which has a diversity of Geopark. Natural tourist attractions in Bakara are Janji Waterfall, Bakara Scenery, Aek Sipangolu, Aek Sitio-tio, and Tombak Sulu-sulu. These areas have geodiversity and biodiversity, which are the integral parts of Toba Caldera Geopark. Meanwhile, the cultural tourist attractions in Bakara are Sisingamangaraja Palace, Hariara Tunghot, and Tombak Sulu-sulu, which form the character of the region itself as well as to attract tourists (figure 6). Therefore, the conservation of cultural tourist attraction must be maintained and cultivated.



Figure 6 Conservation Aspect in Bakara

Land-use, which contains diversity (geodiversity, biodiversity, and cultural diversity), needs conservation to develop geotourism. Bakara has a lot of tourist attraction that scattered in some points in the whole region. Therefore, to conserve the area in terms of land-use planning is by focusing each area by its function. Tourist attraction areas must be functioned dominantly as tourism area which is entirely equipped by tourism facilities. However, the residential area is placed explicitly in Bakara village in conjunction with the agricultural area. Moreover, it is also recommended to provide commercial areas such as the market of agricultural products or souvenir shop adjacent to the residential area in Bakara village.

4. Conclusions

Land-use in Bakara dominantly as agricultural, tourism, and partly as residential. A scatter of tourist attractions are in some points in the whole region, which has biodiversity, geodiversity, and cultural diversity. Residential dominantly located in Bakara village in conjunction with the agricultural area. Meanwhile, in terms of geotourism development in the research location; such as economy, education, promotion, and conservation have been carried out but not significantly. In the economic aspect, land-use in Bakara has potentially participated in increasing the local economy. However, still, need the improvement of local products and potency.

Regarding the educational aspect of land-use is very potential but still less exposed and needs exploration on how to package this to be engaging content for tourist. In the promotion, tourist attractions in Bakara need to be more improve as well as to promote the attractions. Meanwhile, in the conservation, the diversity of tourist attraction has preserved but not significantly. The tourist attractions should be well maintained and facilitated as well to improve the conservation, such as the cleanliness of the area. Therefore, these aspects still need improvements to enhance the development of geotourism in Bakara significantly. Researchers recommend further research regarding the land-use planning along with the development of geotourism in Bakara.

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