

# The Identification of Infrastructure, Accessibility, Environment, and Physical Tourism Attraction Resources: Cibereum Lake Case

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## ABSTRACT

Natural lakes have the potential to be developed as a tourism area, but it is very important to identify and measure the potential level of their tourism resources. This paper aims to identify and assess the potential resources of physical tourism assets based on four criteria, namely tourism infrastructure and facilities, accessibility, level of environmental degradation, and tourist attraction levels. This study applied a descriptive method with data collection through observation and interviews with managers and operators of the Cibereum lake area. The tourism resource potential data were measured based on indicators on each criterion, then scoring was done using a rating scale so that the potential level for each indicator and criteria could be identified. The findings of the research show that infrastructure and facilities, environmental degradation, and tourist attraction are at a medium potential level while accessibility is at a low potential level. It means that the infrastructure and facilities are already available but inadequate based on quality and quantity. Low accessibility means that the Cibereum lake area has limited access due to damaged roads that cannot be passed by all types of vehicles. The medium of environmental degradation expresses that the area has been touched by human activities, but the impact is not too high. Meanwhile, the physical tourist attraction services are quite varied. The novelty of this research is that lake tourism destinations that have low accessibility are less attractive to tourists even though the attractions are appealing so it is important to provide adequate accessibility.

**Keywords:** Resource assessment, Potential assets, Tourism resources, Cibereum Lake.

## 1. INTRODUCTION

Besides functioning as a habitat for flora and fauna, a forest can also be developed as a tourist destination [1]. Forest tourism is one type of nature-based tourism that can provide opportunities to study and explore the natural environment and its elements [2]. Nature-based tourism is a place that is relatively far from settlements and still has a natural environment. It requires a clear nature-based tourism plan to maximize benefits and minimize the negative impacts of this tourist attraction [3].

However, like other tourist attractions, nature-based tourism needs to be supported by other tourism resources which are categorized into three parts, namely basic tourism resources consisting of all real potential and attractions, other direct tourism resources including accommodation, supporting facilities, information systems, and finally indirect tourism resources consisting of the environment, security, transportation [4]. A tourism destination is developed based on

potential tourist attractions built synergistically with the development of tourist facilities, public facilities, accessibility and/or infrastructure, and community empowerment in a comprehensive and sustainable system. If there is insufficient information about tourism resources, the first thing to do is to identify and assess the resources to develop the potential of tourist attractions [3].

Assessing the potential of tourism resources is the basis for tourism development so that every tourism asset needs to assess it [3,5]. Cibereum Lake has potential tourism asset resources, but the level of this potential is not yet known. Therefore, it is important to identify and assess the potential resources of physical tourism assets of Cibereum Lake based on four criteria, namely tourism infrastructure and facilities, accessibility, environmental degradation, and tourist attractions.

## 2. LITERATURE REVIEW

Infrastructure is an important component in tourism products [6]. Although tourism is highly dependent on natural attractiveness or beauty, the existence of infrastructure and facilities can increase visitor convenience [3]. Apart from infrastructure, tourism facilities are also supporting services that can be offered to visitors. A facility is an asset that is built, installed, or established to serve social and economic activities that include various types of infrastructure and buildings [7]. Visitor satisfaction comes from the attractions they see and depends on the tourism facilities they enjoy [8]. Supporting infrastructure and facilities are needed for long-term and sustainable tourism development [5].

Accessibility can be interpreted as the ease of reaching tourism places, supported by the availability and quality of travel modes, roads, facilities such as toilets and drinking water, and attraction functions such as opening hours and entrance fees [9]. [3] argues that accessibility is measured using two indicators, first, types of vehicles that can pass the access, and second, vehicle classes. In general, accessibility to a tourism place can be influenced by the availability of transportation modes such as cars, buses, bicycles, walking, trains, taxis, and motorbikes [9]. Therefore, the accessibility of the transportation system can be measured through three indicators, namely the quality of roads, the type of travel modes used, and the distance to tourism places [9]. Meanwhile, there are other four indicators to measure accessibility, namely: (1) the distance to the city center, (2) the distance to other natural or historical resources, (3) the level of road convenience, and (4) all types of transportation [5]. They are measured using 1-5 indicators, ranging from 1 (very poor) to 5 (very good).

Environmental quality refers to the well-being of an ecosystem and its assessment. It requires detailed scientific audits and in-depth analysis. Environmental degradation is caused by the depletion of natural resources such as air, water, and soil, ecosystem destruction, and extinction of wildlife [10]. One of the causes of environmental degradation is human activities. There are ten indicators to evaluate the level of environmental degradation [5], namely: (1) waste, (2) weeds, (3) disease/illness, (4) fire, (5) erosion, (6) stepping on plants, (7) dunes destruction, (8) land erosion, (9) tracks or paths, and (10) buildings.

The attractiveness of a destination will affect the type of tourism developed and it needs to be equipped with services that support the creation of attractions [4]. One of the attraction's services is the diversity offered such as various forms of activities, shops, catering, entertainment, and activities for children [11]. [5] suggest that attraction levels can be measured based on 10 indicators, namely: (1) floral diversities, (2) view diversities, (3) recreational facilities, (4) adventure

facilities, (5) lakes or wetlands and protected beaches, (6) rocky shore or cliffs, (7) sandy beaches or coastlines (sandy/pebble beach or coastline), (8) quality of the view, (9) uniqueness of the area, and (10) geologic features.

## 3. RESEARCH METHODOLOGY

This research applied a descriptive method with a quantitative approach according to [5]'s study. The research subjects were the managers and owners of Cibereum Lake, Garut; Perum Perhutani KPH Garut. The data were collected using observation and interviews with the head of tourist operations and tourism service operators of Lake Cibereum. The data analysis technique used descriptive statistics including mean and frequency.

The quantitative data in this study, in the form of the assessment value of each indicator, referred to the research which provides a minimum and maximum value for each measurement [3,5,12]. Meanwhile, the scoring was processed using a rating scale. The research procedures and instrument analysis for the data focused on four criteria: tourism infrastructure and facilities, accessibility, environmental degradation, and tourist attractions.

The infrastructure and facilities variables were measured using 19 indicators of elaboration results [5, 8,13]. As a result, Cibereum Lake has met 12 infrastructure and facilities criteria, namely toilets, parking lots, accommodation, trash cans, gazebos, places of worship, food and beverage facilities, signs, camping areas, clean water, electricity, and telecommunications.

The accessibility was measured using 4 (four) indicators adopted from [5], namely the distance to the city center, the distance to other natural or historical resources, the level of road convenience, and all types of transportation. They were measured according to replicating measurements using 1-5 points, ranging from 1 (very poor) to 5 (very good).

In the context of this study, the attraction service asset refers to the availability of assets that can support or create an attraction for Cibereum Lake tourism. It was measured by four indicators, namely floral diversities, view diversities, recreational facilities, and adventure facilities.

The analysis of environmental degradation in this study adopted four indicators from [5] and [3], namely waste, weeds, tracks/paths, and buildings. The level of environmental degradation in this study was also measured using a scale of 1-5, from 1 (very small) to 5 (very large). The greater the value is given, the bigger the environmental degradation is.

Cibeureum Lake's potential is worth identifying and assessing since it is one example of nature-based tourism that has the criteria of attraction services, infrastructure and facilities, environmental degradation, and accessibility.

#### 4. RESULT AND DISCUSSION

**Infrastructure and facilities.** This variable was measured using 19 indicators elaborated from [5,8,13]. Based on the results of observations, Cibeureum Lake has met 12 infrastructure and facilities criteria, namely toilets, parking lots, accommodation, trash cans, gazebos, places of worship, food and beverage facilities, signs, camping areas, clean water, electricity, and telecommunications. As for picnic tables, cooking facilities, facilities for the disables, security posts, souvenir shops, information centers, and first aid kits are not yet available at the Cibeureum Lake area.

The interviews with the Cibeureum lake site manager went as:

*"All tourism infrastructure and facilities are provided by PT Perhutani with a very limited investment so that the quantity and quality are still minimal, and some supporting facilities are still incomplete."*

PT Perhutani has the main function as the forest management company while the provision of tourism services is an additional function. This function can be a source of additional income for the company. However, regarding this additional function, the provision of tourism facilities and infrastructure has not been fully fulfilled.

**Table 1.** Assessment of Infrastructure and Facilities

Indicator	Available	Not Available
Toilet facilities	Yes	
Parking area	Yes	
Accommodation	Yes	
Rubbish bins	Yes	
Gazebo	Yes	
Prayer room	Yes	
Picnic table		NA
Barbeque facilities		NA
Food and beverages	Yes	
Arrangement for disable		NA
Security post		NA
Souvenir shop		NA
Information counter		NA

Indicator	Available	Not Available
First aid		NA
Signboard	Yes	
Camping site	Yes	
Water supply	Yes	
Electricity	Yes	
Telecommunication and network	Yes	
Total	12	7

Further, the level of infrastructure was measured by replicating [5]. This measurement was carried out by giving 1 if the infrastructure and facilities are available and 0 if they are not.

Based on Table 1, there are 12 available infrastructures and facilities in Cibeureum Lake so the total value of infrastructure and facilities is 12. It means that the infrastructure is at the medium level. In the research conducted by [5], 57% of nature-based tourism has inadequate infrastructure and facilities, 26% is adequate, and 17% is at a high level. The result of this study, therefore, differs from the previous study as it concludes that nature-based tourism has relatively high infrastructure and facilities.

**Accessibility.** This study used four indicators adopted from [5] to assess the accessibility, namely the distance to the city center, the distance to other natural or historical resources, the level of road convenience, and all types of transportation. It was also measured using 1-5 points for each indicator, ranging from 1 (very poor) to 5 (very good).

The Cibeureum lake operator stated that:

*"The accessibility problem of Cibeureum lake is inadequate road because the width and the quality of materials used do not follow the required road quality standards."*

The condition of the roads still does not meet the standards, some are still dirt. This is the cause of the low quality of accessibility.

**Table 2.** Assessment of Accessibility, Environmental Degradation, and Attraction Service Assets

Indicator	Score	Result	Interpretation
<b>Accessibility</b>			
Distance to the city center	1-5 1 = very poor	1	Very poor
Distance to other historical sources	5 = very good	3	Sufficient
Convenience of roads	good	1	Very poor

Indicator	Score	Result	Interpretation
Transport types		2	Poor
Total		7	
Mean		1,75	
<b>Environmental Degradation</b>			
Waste	1-5	4	Big
Weeds	1 = very	4	Big
Erosion	little 5 = too much	2	Little
Track or paths		1	Very little
Buildings		2	Little
Total		13	
Mean		2,6	
<b>Attraction Service Asset</b>			
Floral Diversities	1-5	5	Very good
View Diversities	1 = very	4	Good
Recreational Facilities	bad 5 = very	1	Very bad
Adventure Facilities	good	1	Very bad
Total		11	
Mean		2,75	

Based on the table above, the indicator of the distance to the city center is 1. It is because Cibereum Lake is quite far from the city center. The distance to natural resources or other historical sources has a value of 3 because there are several natural resources or historical sources close to Cibereum Lake. The road convenience level is 1 because some of the roads are still dirt, the roads are narrow, and some weeds can damage the vehicle. In terms of vehicle types, it gets a score of 3 because the types of transportation that can access Cibereum Lake are only small two-wheeled and four-wheeled vehicles.

The total value of accessibility is 7, which means that the level of accessibility of Cibereum Lake is low. Previous research has shown that natural areas can have low and high accessibility, depending on each indicator. A study of [5] concludes that 39% of natural areas have low accessibility, 22% medium, and 39% high. On the other hand, research by [3] shows that most natural areas are not easily accessible so that they have low accessibility. In this study, Cibereum Lake is included in a natural area with low accessibility because it has a damaged road, is far from the city center, and cannot be passed by all types of transportation.

**Environmental Degradation.** This study adopted four indicators from [5] and [3] to assess environmental degradation, namely waste, weeds, tracks/paths, and buildings.

According to environmental maintenance operators at Cibereum Lake:

*"The more tourists visit, the more waste or garbage they leave as they don't throw their garbage into the right place."*

The observation also gives a similar result, that a lot of garbage is scattered in tourist attractions and the number of trash bins provided is still insufficient.

The level of environmental degradation was then measured by modifying measurements of [5]. It was measured using a scale of 1-5 which means 1 (very small) and 5 (very large). The greater the value is given, the bigger the environmental degradation is. Based on Table 2, the indicator of waste or garbage has a value of 4, which means that there is quite a lot of waste in Cibereum Lake. Likewise, the level of weeds indicator has a value of 4, indicating that there are lots of weeds that can disturb visitors' comfort. The erosion indicator has a value of 2 because there is a small potential for erosion when raining. Furthermore, the tracks/paths indicator has a value of 1 because there are no illegal trails. The buildings indicator has a value of 2 because there is a building that belongs to the manager near the lake.

The total value of environmental degradation is 13, indicating that the level of environmental degradation in Cibereum Lake is medium. It is different from the results of research conducted by [5], that most nature-based tourism has low environmental degradation. This difference is due to the high level of weeds in Cibereum Lake, whereas, in the previous study, the level is not too high.

**Attraction Service Assets.** The attraction service asset in this study is the availability of assets that can support or create an attraction for Cibereum Lake tourism. It was measured using four indicators, namely floral diversities, view diversities, recreational facilities, and adventure facilities.

Based on observations, the species of plants found in Cibereum Lake are various, including pine, *pohpohan*, clover, and *rane* leaves. This is consistent with the statement of [3] that the diversity of plant assets must indicate the level of species diversity of vegetation.

The interview with the Cibereum lake site manager stated that:

*"Actually, the Cibereum lake attraction is quite interesting, especially around the lake, it is overgrown by dense forest plants and it is very beautiful, but due to poor access, tourists are less interested to visit."*

Cibereum Lake already has view diversity. [5] states that view diversity is the level of diversity associated with landscape features. However, the

condition of dirty water in Cibereum Lake has not been able to provide beauty to tourists.

Recreational facilities attractions can be measured through the availability of facilities that can support recreational activities [5]. Based on the variations, the recreational facilities at Cibereum Lake are still less varied because it has only one facility. Its condition is also not safe to use, and the equipment is not yet adequate to support recreational activities.

Based on the result, the attraction service asset was then measured by modifying the measurements of [5]. It used a scale of 1-5 which means 1 (very bad) and 5 (very good). The assessment was carried out using a graphic rating scale as then the rating scale results were processed by scoring as presented in Table 2. The total value of the attraction service assets is 11, which means that the level of attraction service assets at Cibereum Lake is medium. It means that the attraction service assets of Cibereum Lake are quite adequate. The result of this study is in line with [5]'s study which shows that nature-based tourism has a relatively moderate level of attraction.

## 5. CONCLUSION

Based on the four criteria identified and measured to assess the potential resources of physical tourism assets, it shows that the infrastructure and facilities at Lake Cibereum are at the medium level, meaning that the facilities and infrastructure are quite adequate. Telaga Cibereum has been equipped with toilets, parking lots, accommodation, trash cans, gazebos, places for worship, food and beverage facilities, signs, camping areas, clean water, electricity, and telecommunication facilities. However, some are poorly maintained, the number is still not enough, and some are not safe to use.

Environmental degradation is also at a medium level. There are similarities with the research of [5], that in general, lakes that are developed as tourist destinations can reduce the quality of their physical environment.

The level of accessibility is low. This is experienced by other lakes that function as tourist spots [5,3]. It implies that most lakes functioned as natural tourist areas are not easily accessed, the condition of the roads is not good, they are far from the city center, and cannot be passed by all types of transportation.

Finally, the level of tourist attraction in Lake Cibereum is quite interesting. The types of plants that exist include pine, *pohpohan*, clover, *rane* leaves, and other vegetation types.

## REFERENCES

- [1] R.W. Douglass, Forest recreation, Third Edition, Pergamon Press, Elsevier, United States of America, 2016.
- [2] D.B. Weaver, Ecotourism as mass tourism: contradiction or reality? *Cornell Hospitality Quarterly*, vol. 42, 2001, pp. 104-12. DOI: <https://doi.org/10.1177/0010880401422010>
- [3] J. Priskin, Assessment of natural resources for nature-based tourism: the case of the Central Coast Region of Western Australia, *Journal of Tourism Management*, vol. 22, Elsevier, 2001, pp. 637-648. DOI: [https://doi.org/10.1016/S02615177\(01\)00039-5](https://doi.org/10.1016/S02615177(01)00039-5)
- [4] E. Kušen, A system of tourism attractions, *Tourism: An International Interdisciplinary Journal*, vol. 58, 2010, pp. 409-424.
- [5] F. Alaeddinoglu, A.S. Can, Identification and classification of nature-based tourism resources: Western Lake Van basin, Turkey, *Procedia-Social and Behavioral Science*, vol. 19, Elsevier, 2011, pp. 198- 207. DOI: <https://doi.org/10.1016/j.sbspro.2011.05.124>
- [6] A. Panasiuk, Tourism infrastructure as a determinant of regional development, *Ekonomika ir vadyba: aktualijos ir perspektyvos*, vol. 1, 2007, pp. 212-215.
- [7] J. Xu, W. Lu, F. Xue, K. Chen, Cognitive facility management: definition, system architecture, and example scenario. *Automation in Construction*, vol. 107, Elsevier, 2019, pp. 102922. DOI: <https://doi.org/10.1016/j.autcon.2019.102922>
- [8] N. Ginting, A. Sasmita, Developing tourism facilities based on geotourism in Silalahi village, Geopark Toba Caldera, *IOP Conf. Series: Earth and Environmental Science*, vol. 126, IOP Publishing, 2018, p. 012163. DOI: <https://doi.org/10.1088/1755-1315/126/1/012163>
- [9] S.J.H. AlKahtani, J.C. Xia, B. Veenendaaland, C. Caufield, M. Hughes, Building a conceptual framework for determining individual differences of accessibility to tourist attraction, *Tourism Management Perspectives*, vol. 16, Elsevier, 2015, pp. 28-42. DOI: <https://doi.org/10.1016/j.tmp.2015.05.002>
- [10] S. Tyagi, N. Garg, R. Paudel, Environmental degradation: causes and consequences, *European Researcher*, vol. 81, Research Gate, 2014, pp. 1491-1498.
- [11] M. Nowacki, The determinants of satisfaction of tourist attraction's visitors, *Active*, 2013.

- [12] M. Clius, M. Patroescu, An evaluation matrix for ecotourism potential in certain categories of protected areas in Romania. case studies: national parc, nature parc, geopark, International Multidisciplinary Scientific GeoConference Surveying Geology, and Mining Ecology Management, vol. 2, SGEM, 2014, pp. 9-16.
- [13] A. Marzuki, M. Khoshkam, D. Mohamad, I. Abdul Kadir, Linking nature-based tourism attributes to tourists' satisfaction, *Anatolia*, vol. 28, Taylor and Francis, 2017, pp. 96-99. DOI: <https://doi.org/10.1080/13032917.2016.1277432>