



Analyzing Spatial Distribution Patterns of Tourism and Accessibility Level of Tourism Objects in Karanganyar Regency

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Abstract. Karanganyar Regency is one of the regencies in Central Java. Since it is located in a highland area and directly adjacent to East Java Province, it supports expanding tourism-related activities. The tourism industry is the leading sector in Karanganyar Regency, providing the highest regional income. In the Karanganyar Regency, where there is much tourism with various characteristics, the industry's distribution pattern is spread out, beginning at the west end and moving eastward. In addition, the accessibility level of tourist objects in Karanganyar Regency, starting from the existing facilities and infrastructure, is relatively good for each location. The condition of the road or access to tourist sites in Karanganyar Regency is likewise fairly good and evenly spread. The drawback, however, lies in the narrow and uphill roads, which are difficult and impossible to pass by large buses in highland areas or those with a small road network. In July 2022, the total number of tourists visiting Karanganyar Regency was 140,931. Nevertheless, it is unknown whether this accessibility affects the level of tourist visits. For this reason, this research used a quantitative approach with descriptive analysis and surveys or direct observation. From the research conducted, it can be seen the spatial distribution pattern analysis of the tourist attractions and the accessibility level to tourist objects in Karanganyar Regency.

Keywords: Karanganyar Regency · Tourism · Accessibility level · Tourists · Roads

1 Introduction

The Karanganyar Regency is situated on Mount Lawu's western slope. Since Karanganyar Regency has natural beauty, the potential for the tourism sector is high, such as nature tourism and others. This tourist destination is a key sector in Karanganyar Regency, which generates the most income. In Karanganyar Regency, there are also many tourist attractions, from Tawangmangu in the easternmost part to Colomadu in the westernmost part. Besides, most tourism sites in Karanganyar are located in the highlands, i.e., the Ngargoyoso Sub-district and Tawangmangu Sub-district. Tourism is varied, not only for the scenery but also for historical, religious, and others.

On the other side, tourism interaction is a temporary traveling process by a person or group going to a different location from where they are. Tourism is one of the important and dynamic sectors to support the manufacturing economy industry. The existence of high growth and development rates, large volumes of foreign currency flows, infrastructure development, and the introduction of new management has positively impacted different sectors of the economy, making a positive contribution to the development of society and the country's economy as a whole. Moreover, basically, an activity will certainly need space to grow. Changing space for the development of tourism activities will certainly impact changes in the environmental components as a buffer. According to its development, the tourism sector will generate two types of impacts, positive and negative. From a geographical point of view, tourism demand is the total number of people traveling or wishing to use tourism facilities and services (Wicaksono Arief, 2021).

Additionally, accessibility can be defined as the level of ease in reaching or obtaining the required goods and services. High or low levels of accessibility are influenced by the availability of infrastructure (road network) that is good and supported by the existence of facilities for movement. To develop an area into a tourist attraction or become a tourist village, other supporting elements are needed, not only relying on natural beauty and accommodation. As (Suwanto, 1997) explained, good accessibility will determine whether a location is easy to reach. In addition, the road network is also one that influences the smooth running of public services, which is crucial.

In the Karanganyar Regency area, the availability of accessibility to go to existing tourist objects is not known with certainty whether it affects the level of tourist visits; thus, further studies should be carried out. Besides accessibility, supporting infrastructure is vital to supporting tourism activities in the Karanganyar Regency area. According to Soekadijo (2000), infrastructure is a facility for the needs of society in general, and its construction is a big undertaking; therefore, it is usually handled by the government using state finances. Not only the availability of accessibility and infrastructure needed to support tourism activities, but facilities are also a factor in determining the progress of a tourist attraction. As Suwanto (1997) stated, tourist facilities can be classified into three groups: main tourism facilities (main tourism superstructure), restaurants (catering trades), and tourist attractions. Thus, the limited support of supporting facilities and infrastructure is one of the problems that need attention in terms of accommodation, transportation, and other supporting infrastructure.

Moreover, the network analysis method is a technique that uses an object in the form of a line, with the requirement that the line, which serves as the object of analysis, be an uninterrupted network system. In Geographic Information Systems (GIS), this is a network analysis technique based on spatial data in lines. Since there is no need to travel directly to the field or location, this method makes it simpler for researchers to do their research. Hence, a regional (spatial) or GIS-based information system must accommodate and support these needs (Jumadi, 2016). This GIS also supports the activity of determining the best route in terms of processing, data analysis, data presentation, and reporting so that it is easier, faster, complete, timely, and in accordance with the conditions of each region (Mutalazimah et al., 2009). Further, GIS technology has made it easy for many people to manage and use spatial data (geographically referenced data) (Jumadi, 2009). Departing from the explanation above, this study aims to determine the

influence of the distribution of tourist attractions and their level of accessibility to tourist attractions in Karanganyar Regency using the network analysis method.

2 Method

2.1 Research Sites

The study's setting was Karanganyar Regency. Karanganyar Regency is a regency in Central Java Province. Karanganyar City, which is 14 km east of Surakarta City, is where its administrative center is situated. This regency is bordered by Sragen Regency in the north, Ngawi Regency and Magetan Regency (East Java) in the east, Wonogiri Regency in the south, and Boyolali Regency, Surakarta City and Sukoharjo Regency in the west. The western part of Karanganyar Regency is a lowland, i.e., the Bengawan Solo valley, which flows to the north. Meanwhile, the eastern part is in the form of mountains, which is part of the system of Mount Lawu.

Karanganyar is also located at 110040"-110070" East Longitude and 7028"-7046" South Latitude, with an area of 77,378.64 Ha or around 2.38% of the total area of Central Java Province. This area has an altitude between 80 to 2,000 m above sea level. The highest area is Tawangmangu Sub-district, while the lowest is Colomadu Sub-district. Morphologically, it consists of flat, undulating, steep, and very steep areas. This situation is quite influential on the types of tourism in Karanganyar Regency. Apart from its fertile

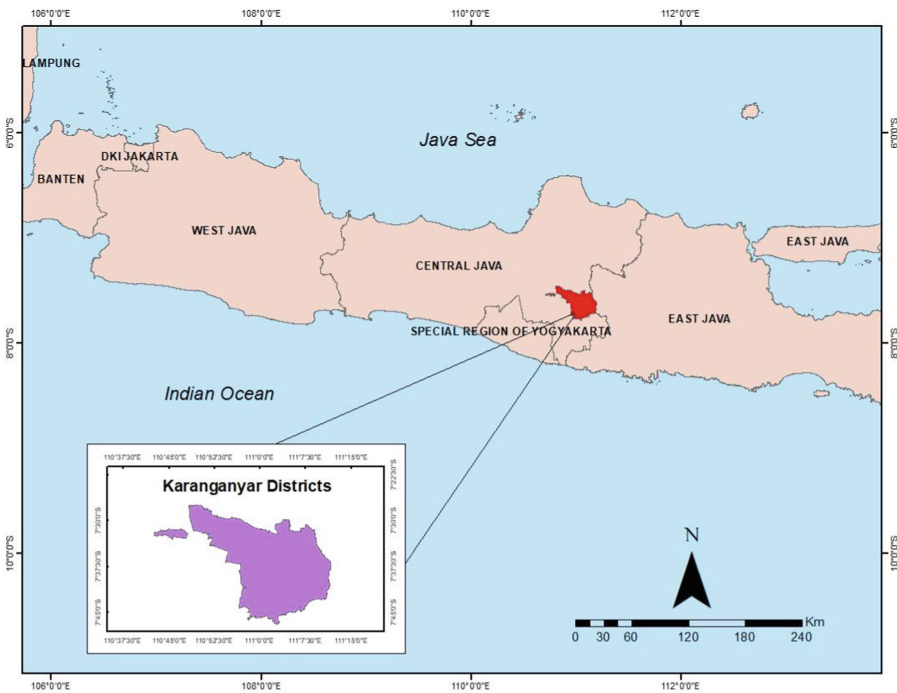


Fig. 1. Map of research locations (Karanganyar Regency)

Table 1. Research data

Data	Source	Function
Central Java Province administrative shapefile data (roads, rivers, and others)	Geospatial Information Agency (BIG) 2019	Making administrative maps of research locations
Point coordinates and addresses of tourist sites	Google Earth Pro	Determining tourist location points along with the best routes
Visitors or tourists	Karanganyar Central Bureau of Statistics (BPS)	Knowing the number of tourists visiting Karanganyar Regency

soil, Karanganyar Regency is also rich in tourism. Historical, religious, natural landscape tourism and others can be found. The exact location of Karanganyar Regency can be seen in Fig. 1. Based on the map, it can be seen that Karanganyar Regency is located on the eastern side of Central Java Province and is directly adjacent to the Magetan area, East Java.

2.2 Data Collection and Processing

The quantitative approach used in this study involved performing a descriptive analysis of the required data. Searching official agency pages such as related journals and direct observation were used to acquire secondary data (surveys). The network analysis method was then used to ascertain the spatial distribution pattern of the tourist destinations and the level of accessibility of tourist attractions in Karanganyar Regency. It was aided by creating administrative maps, tourist destination distribution maps, and route maps to tourist destinations. Geographic Also, the network analysis method was used in Geographic Information Systems. The Table 1 presents the information required for and used in this study.

The data processing stage was carried out by a) plotting all administrative shapefile data into ArcGIS to create administrative maps of the research locations used and b) plotting coordinates of tourist location data in ArcGIS (previously made) to create a map of location points and maps route distribution of tourist sites in Karanganyar Regency. The determination of the distribution route employed network analysis techniques.

3 Results and Discussion

3.1 Results

Karanganyar Regency is at the foot of Mount Lawu, with an average elevation of 511 m above sea level. Because it is in a mountainous area, the temperature is around 18–31 °C in normal weather. The Karanganyar Regency area is also very fertile since the soil varies, ranging from reddish brown litosol, dark brown Mediterranean, gray alluvial,

and others. Thus, many people use it for farming and gardening, while the highland areas are moor. In addition, Karanganyar Regency is superior in tourism, ranging from tourism to natural beauty, religion, and history.

Moreover, Karanganyar Regency has a total area of around 773.8 km², consisting of various types of land, namely wet and dry land. Wetland is the land most commonly used by the community for rice fields. From year to year, the area of forestry or green land is also decreasing due to the influence of land conversion.

Karanganyar Regency is also located on the western slopes of Mount Lawu. Since Karanganyar Regency has natural beauty, the potential for the tourism sector is high, for example, natural tourism and others. This tourist attraction is a leading sector in Karanganyar Regency, which provides the highest regional income. In Karanganyar Regency, there are many tourist attractions, starting from Tawangmangu in the east to Colomadu in the west. Most tourism sites in Karanganyar are located in the highlands, namely the Ngargoyoso Sub-district and Tawangmangu Sub-district. Tourism is diverse, both in the scenery and historical, religious, and others. Table 2 shows some tourist attractions scattered in Karanganyar Regency.

After getting each tourist location's coordinates, it was plotted into ArcGIS to make a map. From the map, it can be seen what the distribution pattern of tourist sites in Karanganyar Regency looks like. Figure 2 is a map depicting the distribution pattern of tourist location points in Karanganyar.

Based on the map image (Fig. 2), the distribution pattern of tourism in Karanganyar Regency is spread, starting from the westernmost side to the easternmost side. Each location has different tourist characteristics. Because it is located in the easternmost part, in the highlands of the Tawangmangu Sub-district and Ngargoyoso Sub-district, the tourism that stands out is the beautiful natural beauty.

3.2 Discussion

Network analysis can answer various questions related to linear networks, such as roads, railroads, rivers, facilities, and utilities. In this study, researchers are looking for an analysis of the spatial distribution pattern of the tourist attractions and the accessibility level to tourist objects in Karanganyar Regency.

The study uncovered that mountainous or highland areas make up most of Karanganyar Regency's locations or tourist attractions. In reality, Tawangmangu Sub-district in Karanganyar Regency is one of the most popular tourist destinations in Central Java. As a result, the tourism area is where most visitors go. Additionally, the number of tourism-supporting facilities in the Tawangmangu tourist area is growing yearly. The addition of companion equipment at tourist attractions aims to increase comfort for tourists visiting the Tawangmangu area.

Moreover, the tourist attractions in Karanganyar Regency are scattered, starting from the highlands, cities, and lowland areas. Tourism also does not only present natural beauty but also religious, historical, and much more. Tourist areas in the highlands are identical to their natural beauty, such as the Tawangmangu, Ngargoyoso, Jenawi, and Jatiyoso Sub-districts. In the city itself, the most famous is the Great Mosque, located in the middle of the city, and in front of it is the Karanganyar square. Not only during the day, but this area is also very crowded at night.

Table 2. Coordinate points and addresses for tourist attraction locations

Tourist Attraction Name	x	y	Address
Kemuning Paragliding	51586283	915948206	Segorogunung, Ngargoyoso, Karanganyar Regency, Central Java 57793
Kemuning Tea Garden	51471130	916041161	Jl. Kemuning, Kemuning, Ngargoyoso, Karanganyar Regency, Central Java 57793
Sukuh Temple	51449688	915689901	Tambak, Berjo, Ngargoyoso, Karanganyar Regeency, Central Java 57793
Cetho Temple	51743768	916038666	Cetho, Gumeng, Jenawi, Karanganyar Regency, Central Java 57794
Jumog Waterfall	51342962	915655901	Gandu, Berjo, Ngargoyoso, Karanganyar Regency, Central Java 57793
Telaga Madirda	51442708	915549436	Berjo, Ngargoyoso, Karanganyar Regency, Central Java 57793
Pancasila Garden	49454415	916017965	Jl. Lawu, Dompon, Karanganyar, Karanganyar Regency, Central Java 57711
Alun-alun Karanganyar	49337510	916049778	Jl. Lawu, Badran Asri, Cangkan, Karanganyar, Karanganyar Regency, Central Java 57791
Giyanti Agreement Site	49702427	915780868	Kerten, Jantiharjo, Karanganyar, Karanganyar Regency, Central Java 57716
The Dayu Cluster Ancient Human Museum	48300497	917383113	Dayu, Gondangrejo, Karanganyar Regency, Central Java 57188
Sondokoro Tasikmadu Agrotourism	49245167	916254057	Jl. Mangkunegara, Bojonegara, Ngijo, Tasikmadu, Karanganyar Regency, Central Java 42454
De Tjolomadoe	47240492	916715666	Jl. Adi Sucipto No.1, Paulan Wetan, Malangjiwan, Colomadu, Karanganyar Regency, Central Java 57177
Pasekan Karangpandan Temple	50917960	915798628	Pasekan, RT.6/RW.5, Gedangan, keprabon, Karangpandan, Karanganyar Regency, Central Java 57791

(continued)

Table 2. (continued)

Tourist Attraction Name	x	y	Address
Cemoro Kandang	52060966	915289069	Jl. Raya Gondosuli No.16, Gondosuli Kidul, Gondosuli, Tawangmangu, Karanganyar Regency, Central Java 57792
Amanah Agrotourism	51171506	915640233	Jl. Raya Solo – Tawangmangu KM. 34, 3, Karang, Karangpandan, Karanganyar Regency, Central Java 57791
Grojogan Sewu	51443073	915318584	Jl. Raya Tawangmangu, Beji, Tawangmangu, Karanganyar Regency, Central Java 57792
The Lawu Park	51945328	915277181	Bulakrejo, Gondosuli Kidul, Gondosuli, Tawangmangu, Karanganyar Regency, Central Java 57792
Sapta Tirta Pablengan Matesih	50633791	915635057	Jl. TP. Joko Songo, Bt.Argotiloso, Pablengan, Matesih, Karanganyar Regency, Central Java 57781
Astana Mangadeg	50820586	915413123	Babadan, Girilayu, Matesih, Karanganyar Regency, Central Java 57781
Mongkrang Hill Tour	52000583	915240760	Lapangan Tlogo Dringo Karanganyar, Gondosuli Kidul, Gondosuli, Tawangmangu, Karanganyar Regency, Central Java 57792

However, an area's land usage must increase yearly and undergo various changes. There are a few potential causes for these alterations. One of the elements accelerating the quick pace of land usage in Karanganyar Regency is the development of tourism-related enterprises. If observed from year to year, the area of agricultural land begins to decrease, especially those close to tourist sites. These areas were transformed into shops, restaurants, or even brand-new tourist destinations.

The existence of this tourism does have positive and negative impacts on society and the environment. An example of a positive impact is improving the regional economy and residents. Conversely, the negative impact is damage to the surrounding environment due to excessive exploitation, such as significant land conversion.

If seen from the results of the route map for the distribution of tourist sites in Karanganyar Regency (Fig. 3), tourist sites dominate the highlands. Meanwhile, in urban areas, there are only a few. In addition, the level of accessibility to tourist objects in the highlands can be difficult at several points. It is because the road is narrow and uphill.

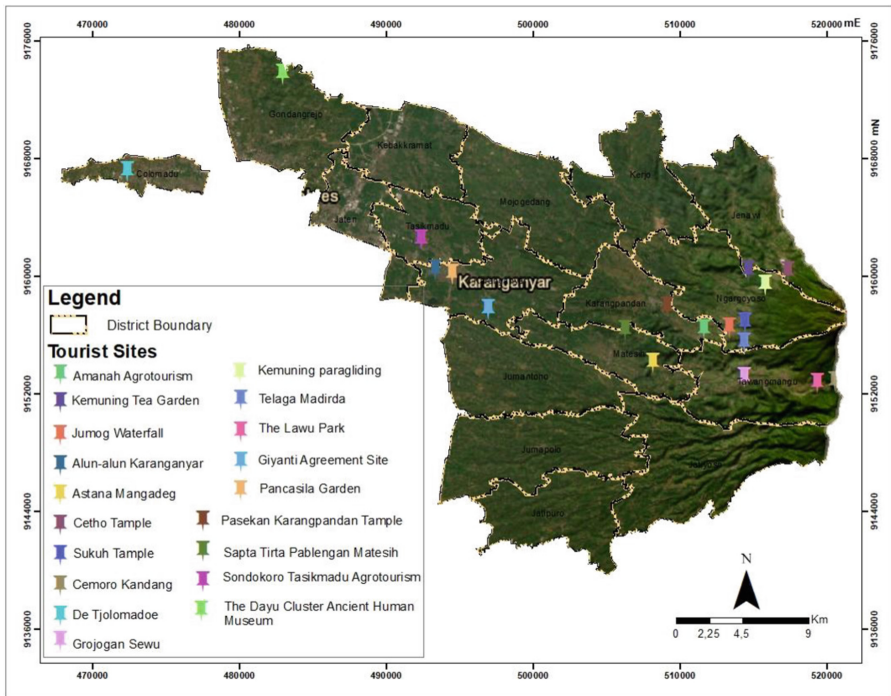


Fig. 2. Distribution map of tourist locations in Karanganyar Regency

For example, access to one of the historical and religious tourist sites, Cetho Temple, is difficult because the roads are narrow and uphill. The road to the location can only be passed by private vehicles in minibusses and motorbikes. If the vehicle’s condition is not good, visitors will not be able to reach the location.

On the other hand, locations in urban areas are not empty of visitors; it is just not as many as those who visit the highlands. It could have happened because of better facilities and infrastructure and the destinations of visitors who want to be away from the bustle of cities.

The accessibility level of tourist objects starting from existing facilities and infrastructure, is good enough for each location. The condition of the road or access to tourist sites in Karanganyar Regency is also relatively good and evenly distributed. The roads have been paved or concreted. However, the only drawback is that the roads are narrow and uphill, which is difficult and impossible for large buses to pass through, and even crossing with cars or other vehicles is quite difficult.

Moreover, the distribution pattern of tourist sites in Karanganyar is spread from the lowlands to the highlands. According to data released by the Karanganyar Regency Communication and Information Service in July 2022, the most visitors who traveled were in the highlands, to be precise at The Lawu Park Tawangmangu, i.e., around 56,280 people out of a total of 140,931 visitors. It can happen because the route used or passed to reach the place is quite easy, on the main road of Solo-Tawangmangu.

drawback is that the narrow and uphill roads are difficult and impossible to pass by large buses, and even crossing with cars or other vehicles is quite difficult.

Moreover, the distribution pattern of locations in Karanganyar is dispersive. From the lowlands to the highlands, all have tourist sites. This accessibility greatly affects the level of tourist visits. Tourist attractions close to the main road or along the main road (highway) are the main attraction for visitors. In other words, the better the access (road network), the more tourists visit. For example, out of 140,931 tourists, 56,280 people chose to visit the tourist spot, The Lawu Park, whose location is easy to reach by private vehicles or other public transportation.

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