Abstract

The development of geotourism destinations often does not involve spatial planning according to the characteristics of an area. This study describes the design results for Bandung Basin geotourism destinations, Indonesia, through a destination spatial planning approach. In addition, it also discusses appropriate spatial models to support a sustainable Bandung Basin area. This qualitative study used primary data obtained through a series of semi-structured interview questions to the government and attraction managers in the Bandung Basin area and observations were conducted to 112 out of 191 tourism attractions on the site. Meanwhile, secondary data are obtained using a desk study method to acquire more information and data regarding spatial information and geotourism development from a variety of policy documents. Data analysed in this study consisted of content analysis, map analysis, and descriptive analysis. The spatial design process of this destination has produced an appropriate spatial model for the development of the Bandung Basin area as a geotourism destination. The spatial elements that make up the Bandung Basin geotourism destination can be applied to tourism destinations that are tailored to the uniqueness of the region and local government policies. The spatial model of geotourism destinations contributes to geopark development to support the realization of sustainable regional development.

Keywords: Bandung basin, Destination management, Geotourism, spatial planning.
1. Introduction

Geotourism destination planning in general aims to trigger sustainable development through education, conservation, and local community income [1]. The development of geotourism destinations without including spatial model planning will find it difficult to identify tourist markets, design sustainable destination management, spread the economic benefits of tourism, determine superior tourist attractions, and manage tourist activities [2]. The spatial model for geotourism destinations can help minimize negative impacts due to tourist activities and provide direction, strategy, and evaluation for management in realizing sustainable regional development and increasing the competitiveness of geotourism destinations [3, 4]. It is necessary to think about various spatial models of geotourism destinations in supporting the achievement of sustainable development goals. Until now, there has been no planning of a spatial model for geotourism destinations [5], which triggers upgrading and application according to the characteristics of a geotourism destination.

Previous research has explained that the destination spatial model is useful in determining the direction of tourism development policies in a region and is able to help predict the tourist target market [2, 6]. The destination spatial model also assists in realizing sustainable tourism development [7, 8]. Meanwhile, previous studies related to geotourism tended to focus on the geotourism potential of an area of 46.1 percent, only around 9.8 percent of which focused on the geotourism development model [5]. Although discussing the geotourism development model, it is very limited which specifically discusses the spatial model of geotourism destinations. The spatial destination model can be applied to various thematic tourism destinations, such as urban areas, rural areas, national parks, and coastal areas [9, 10]; however, the study of the spatial model of geotourism destinations is still very limited, especially in the planning and development of geotourism. This study aims to design a spatial model for geotourism destinations and discuss appropriate models to support sustainable regional development.

2. Literature Review

2.1. Tourism destination spatial model

Understanding in developing an area does not only include previous identification and current conditions but is also necessary in identifying the motives and interests of each stakeholder involved as well as empirical conditions in predicting future plans and actions, especially regarding the direction of regional development policies [11]. Planning through a spatial model has a special important role in developing an area, including economic areas, settlements, facilities, transportation, tourism, and environmental impacts [12]. Through a spatial model, regional development involves several different disciplines in helping to design a spatial model of tourism destinations, including economics, geography, sociology, transportation, and multidisciplinary [13]. Multidisciplinary is an integration of two or more of the four previous models that are commonly used in planning land use for tourism [14].

The spatial model of tourism destinations explains the relationship between tourism and geography through elements of space and time which refers to the tourism system according to empirical conditions through the relationship between
travel behaviour patterns and tourism structures [15]. Previous studies related to
the destination spatial model have explained the spatial patterns of tourist
movement [16], the development of a tourism destination system [17], and planning
tourist routes [18]. Meanwhile, the development model and regional planning for
tourism have been previously reviewed, including the development of the Product's
Analysis Sequence for Outdoor Leisure Planning [19] concept, the tourism
destination development model [20], and the development of tourism destination
policies [21]. There are four basic things that need to be considered in designing a
destination spatial model, namely the physical characteristics of tourism
destinations, functional and normative, explanatory, and predictive, and integration
between spatial elements and tourism components [20]. Important ideas that
underlie the spatial model in this study are the spatial model of tourism destinations
based on the diversity of spatial elements [20, 22, 23], these spatial elements
include areas of origin of tourists, tourism destinations, circulation routes, tourism
areas, tourist service centres, entrance, and tourist attraction.

2.2. Geotourism concept in supporting the spatial destination model

Geotourism is a tourism product based on geological processes and forms as its
main attraction which includes landscapes, landform, fossils, rock outcrops, and
minerals [24]. Geological processes and forms become an attraction for tourists to
visit and learn, so that elements of tourism destination management are needed
which include accessibility, amenities, activities, as well as planning and
management [25]. Geotourism is supported by bio-based and cultural tourist
attractions that are closely related to geological phenomena, such as cultural
tourism that utilizes geological materials (rocks and landscapes) for the arts and
culture of local communities [26]. Geotourism elements exist in various natural and
man-made environments and can encourage conservation activities and provide a
good understanding of geology through interpretation [27]. Environmental
interpretations that focus on geological aspects can create tourist satisfaction so as
to contribute to the conservation of geotourism attractiveness [28].

The concept of geotourism refers to the nature and scope of process, form, and
tourism elements [29]. The concept is expanded by the presence of three additional
elements which include geobasic, geohistory, and geo+ so that it is referred to as
the Geotourism Box concept [26]. The Geotourism box becomes a reference in
assessing geotourism attraction. Geotourism attraction is something that has unique
processes and forms from geology and geomorphology, supported by elements of
tourism which are the destination of tourist visits. The linkage of geotourism with
elements of nature, culture, and local communities can influence the planning of
the spatial model of tourism destinations, especially in its implementation on the
implications of social, economic, and environmental elements [28]. Planning a
tourism destination spatial model can be used as an instrument to integrate the
development of the natural, social, and economic environment while protecting it,
because tourism planning has long-term characteristics [8].

3. Methods

3.1. Object of the study

The research site of this study was Bandung Basin which covered five different
areas such as Bandung City, Cimahi City, Bandung Regency, West Bandung
Regency, and areas of Sumedang Regency (Fig. 1). The site was selected as it had been appointed to be West Java Tourism Destination on West Java Tourism Development Master Plan 2015 - 2025 as well as Development Area and Special Destination stated on West Java Spatial Planning 2009 - 2029.

Fig. 1. Map of the research site.

3.2. Data collection

This qualitative study employed a series of semi-structured interview questions regarding the existing conditions of master plan development within Bandung Basin area. The interview, which aims to obtain general description of the site prior to observation, took place in the first two weeks of August 2017. Interviewees were staff members of West Java Department of Tourism and West Java Regional Development Planning Agency who were considered to have knowledge and information regarding development and tourism planning in Bandung Basin. There were also some interviewees from West Java Geological Agency to talk about the condition and potentials of geological aspects within the area. Starting from the third week of August to October 2017, observations were conducted to 112 out of 191 tourism attractions on the site. The duration of the observations was due to the limited time of the research. During the observations, satellite-based spatial element positioning using global positioning system (GPS) was conducted aiming to determine the coordinates of each tourism attractions located in the Bandung Basin.

In addition to primary data, this study also collected secondary data using desk study method to acquire more information and data regarding spatial information and geotourism development from a variety of policy documents regarding destination spatial model planning and geotourism development in the Bandung Basin stated in West Java Spatial Planning 2009-2029, West Java Tourism Development Master Plan 2015-2025, as well Spatial Planning and Tourism Development Master Plan in each cities located in Bandung Basin.
3.3. Data analysis

Data analyses in this study consisted of content analysis, map analysis, and descriptive analysis. These analyses were carried out prior to the observation to collect secondary data reducing unnecessary and temporary data and information so that data collection in the field would have more focus.

Either data or spatial information acquired from the observations were then analysed through a series of processes including data input, data processing (coordinate transformation, digitalization, and editing), data plotting, and data conversion using such geographic information system software as Esri ArcGIS and a graphic design software as Adobe Illustrator. A descriptive analysis then took place through data presentation and conclusion drawing processes. The data were presented in maps, figures, and tables, while the conclusions were described narratively to avoid multi-interpretations.

3.4. Unit of analysis

To design a geotourism spatial model, four basic aspects including characteristics of the destination physiques; its functions and norms; explanations and predictions; and integration among natural and spatial elements as well as interrelations among tourism components were identified. The last aspect was later broken down into 14 spatial elements including tourism destination; tourists generating regions; geotourism destination, geotourism cluster; geotourism area; external and internal route circulation; main and alternative gateway; primary service center; secondary service center; tertiary service center; primary and secondary geotourism attractions; and supporting tourism attractions.

4. Results and Discussion

The Bandung Basin geotourism destination modeling process refers to the previously designed spatial structure. Tourist generating regions and external route circulation are included in the external spatial structure group, while other spatial elements are included in the internal spatial structure category. Tourist generating regions and external route circulation are categorized as external spatial structures because of their position outside the destination and bridging tourists to destinations [22]. Several spatial elements that can form a destination spatial model include gateways, tourism clusters, tourism service centres, tourist attractions, and internal route circulation [20, 22, 30]. The specific structure of Bandung Basin geotourism destination is the result of a synthesis of the various literatures, so that it is grouped into two main categories, namely external and internal spatial structures (Fig. 2). Gradually, the spatial structure of the Bandung Basin geotourism destinations from the largest to the smallest includes tourist generating regions, external route circulation, gateways, geotourism destinations, internal route circulation, geotourism clusters, geotourism areas, service centres, and geotourism attractions.

In the internal spatial structure, there is a geotourism destination which consists of five geotourism clusters (Fig. 2). The first geotourism cluster, namely East Bandung Ancient Lake Surrounding, has the only primary service center and main gateway supported by two secondary service centres and three alternative gateways. West Bandung Ancient Lake Surrounding has the most geotourism attractions, namely 58 geotourism attractions spread over four geotourism areas.
The third geotourism cluster, namely Lembang Fault Surrounding, has two geotourism areas with 30 geotourism attractions and is supported by one secondary service center and an alternative gateway each. The Ancient Sunda Mountain Surrounding consists of three geotourism areas, one secondary service center, one tertiary service center, two alternative gateways, and 29 geotourism attractions. The last geotourism cluster, namely the South Bandung Mountains Surrounding, consists of two geotourism areas, 51 geotourism attractions, four alternative gateways, and two secondary and tertiary service centres each.

![Fig. 2. The spatial structure of Bandung basin geotourism destinations.](image)

The spatial structure in Bandung Basin geotourism destination divides the area into several clusters that have been adjusted to the physical characteristics of the area, spatial planning policies, and integration between spatial elements with tourism components. This spatial structure contributes to the preparation of sustainable tourism planning in the Bandung Basin area through the spread of tourist movements to several tourist attractions, so that it has the potential to increase length of stay and tourist expenditure as well as income for the local community. The spatial structure helps formulate visitor management strategies in spreading its movements which are concentrated in a destination [20], so as to create tourism income for the local community [14, 23]. The spatial structure of tourism destinations provides opportunities for tourists to choose and travel...
according to the time and distance from their home [31, 32]. The results of this study explain that tourist travel is triggered by the proximity of the house to the tourist attraction that is still in one destination, while in this study it is explained that tourists come from outside the tourism destination or external spatial structure. In addition, there are other studies which state that tourist movements are influenced by the planning and management of tourist attractions, accommodation, and transportation networks, without considering the boundaries of a tourism destination [9, 11]. Although the boundaries of tourism destinations have been identified based on tourist travel patterns in determining the spatial structure of the destination [33], this study focuses on the physical characteristics of the region and spatial policies. However, this study is able to provide an overview of the resulting tourism travel patterns between spatial elements in planning and managing tourism destinations. So far, there is very limited study regarding the spatial structure of destinations that focus on thematic tourism, especially geotourism.

After the spatial structure of the destination has been completed, the process of planning the spatial model of the geotourism destination can be carried out in three stages. First, input the destination spatial element data based on the classification of the five geotourism clusters and determine the boundaries that refer to the delineation of the Bandung Basin area in the West Java Province Tourism Development Master Plan. Second, plotting spatial element data in the form of GPS using the Google Maps application to design a digital map. The last stage is digitizing the digital map using Adobe Illustrator software. After carrying out these stages, the spatial model of geotourism destinations designed in the study is complete (Fig. 3).

The main use of the destination spatial model is to facilitate the preparation of regional plans as geotourism destinations in a comprehensive manner in supporting sustainable development in the Bandung Basin Area. The destination spatial model also contributes to decision makers in considering the development of their area as a tourism destination based on policy references related to planning and regional characteristics. Land use planning as a tourism destination requires a spatial interpretation, which often lacks specific guidance in the form of a spatial strategy at the government and local government levels [20, 34]. In Indonesia, tourism development planning that uses a spatial strategy has been started since 2011 through the enactment of Government Regulation Number 50 of 2011 concerning the National Tourism Development Master Plan for 2010-2025, one of the directions of this policy is to describe the zoning strategy of tourism destinations on a national scale. Meanwhile in the Bandung Basin, regional planning for tourism destinations has been regulated in the West Java Provincial Regulation Number 15 of 2015 concerning the West Java Province Tourism Development Master Plan for 2015-2025. However, currently there are limited spatial strategies for destinations that focus on developing them as geotourism destinations, both on a national and international scale. This is indicated by the phenomenon of tourism destinations that are used as geoparks [4, 35], which triggers a new term, namely geopark as a geotourism destination [24, 36].

The design of a spatial model for geotourism destinations not only requires spatial elements of tourism destinations which include tourist generating regions, tourism destinations, service centres, gateways, internal route circulation, and tourist attractions [20, 22, 23], but it is also important to pay attention to regional potential based on geomorphological characteristics that shape geological diversity,
biodiversity, and culture [4, 26]. This triggers a tourism attraction classification based on geological uniqueness which is called geotourism attraction as a spatial element. Geotourism attraction is something that has unique processes and forms from geology and geomorphology, supported by elements of tourism which are the destination of tourist visits. In this study, the spatial elements of geotourism attraction (GA) are classified into GA primary and GA secondary which are assessed based on the geotourism grid concept. GA primary has all the elements of the geotourism box, namely process, shape, tourism, geodasar, geohistory, and geo+, while GA secondary only has elements of geological processes and forms without the support of tourism elements.

Fig. 3. Design of Bandung basin geotourism destination spatial model.
The design of the spatial model of Bandung Basin geotourism destinations refers to four fundamental factors, including 1) the physical character of the Bandung Basin area, including the availability of accessibility and modes of land and air transportation, the condition of arterial and collector roads, as well as the distance and travel time between geotourism attractions; 2) functional and normative through the integration of national policies and local government policies in the Bandung Basin area related to spatial planning and tourism development plans; 3) useful explanatory and predictive in predicting the development of the tourist market in the future; and 4) integration between spatial elements and tourism components which include attraction, accessibility, amenities and activity. The physical character and direction of development policies in the Bandung Basin area as well as the tourist market become a reference in designing spatial structures in the Bandung Basin area, so that they can be integrated between spatial elements based on their nature and relationship with tourism components (Fig. 4).

Bandung Basin geotourism destination modeling is the result of integration of fourteen spatial elements supported by physical characters and policy directions related to tourism planning in the Bandung Basin area as well as existing conditions and potential tourist markets. Spatial elements have a role and are interrelated with each other in realizing a sustainable geotourism destination. These spatial elements are manifestations of the tourism system indicating the supply and demand side of the tourism sector [22, 37]. In the spatial structure the demand side refers to the external spatial structure, while the internal spatial structure refers to the supply side.

The first spatial element, namely tourist generating regions, is a tourist market that has the potential to travel to geotourism destinations in the Bandung Basin based on geographical conditions, namely tourists from DKI Jakarta Province, Regencies and Cities adjacent to the Bandung Basin, Central Java Province, East Java, and DI Yogyakarta, as well as from Malaysia and Singapore which have direct accessibility to the city of Bandung. In addition, it is possible for local people who live in the Bandung Basin to travel within the destination. Tourist generating regions become the starting and ending places for tourists to travel or can be called permanent residences for tourists [37]. In addition to paying attention to the
elements of space and time travelled by tourists to destinations, this spatial element is also important to study about tourism marketing [25, 38]. Tourism marketing carried out by destination managers in tourist generating regions has the potential to trigger the interest of tourists to visit. Marketing activities in tourist generating regions can be carried out in the form of socialization to travel agents, participating in tourism fairs, advertising, and other tourism agencies that provide guidance and information for tourists. In addition, tourism marketing activities can also be carried out through digital media such as promotional activities on websites, social media, to influencers (YouTubers, travel bloggers, celebgrams, etc.).

An external circulation route to the Bandung Basin geotourism destination can be reached by land and air. The land route can be reached via 1) arterial and collector roads located throughout the Bandung Basin area, with the origin of tourists generally from regencies / cities in West Java Province and from Central Java, East Java, and DI Yogyakarta from the east of the region. West Java; 2) Cipularang Toll Road, with tourists originating from DKI Jakarta and Banten Provinces, as well as parts of West Java Province; and 3) Kerta Api Route, originating from tourists from DKI Jakarta, Central Java, East Java, DI Yogyakarta, and parts of West Java Province.

Meanwhile for the air route, it can be reached through domestic flights for tourists from all over Indonesia and international flights for tourists from Singapore and Malaysia. Tourists from other countries, first transit in Jakarta, Bali, Malaysia, and Singapore to go to Bandung Basin geotourism destinations. External circulation routes have an important role as a link between tourist generating regions and destinations, usually there are transit points on the route to the destination [20, 37]. The external circulation route is related to the mode of transportation used by tourists from the tourist departure point or gateway to the destination [34]. The gateways in the tourist generating region can be airports, seaports, train stations and bus terminals, this also applies to destinations. However, the term gateway in this study refers to the entry point or entry point for tourists located at the destination. Gateway refers to the entrance to a tourism destination through the transportation routes that tourists must pass, such as airports, seaports, roads and so on [23].

In Bandung Basin geotourism destinations, there are four primary gateways located in Bandung City, including toll gates, Bandung Train Station, Leuwipanjang Terminal, and Husein Sastranegara International Airport. In addition, there are also alternative gateways that can only be accessed by land route to the Bandung Basin geo-geographical destinations, which are located in the west (Gununghalu and Citatah), north (Cipeundeuy and Lembang), east (Jatinangor, Nagrek, and Paseh), and south (Rancabali, Pangalengan, Kertasari, and Ibun). Alternative gateways in this study are one of the spatial elements of a destination [20, 38], different from previous studies that only focused on primary gateways [22, 23, 34].

Tourists who have passed through the gateway can use an internal circulation route while in the Bandung Basin tourism destination. Internal route circulation has a function as connecting accessibility between geotourism clusters, geotourism and geotourism attractions in the Bandung Basin geotourism destinations. The Bandung Basin area as a geotourism destination has nine spatial elements that are integrated with one another. Within the Bandung Basin geotourism destinations, there are
Geotourism cluster is a collection of geotourism area, while geotourism area is a collection of geotourism attraction which has geographic proximity. There are fourteen geotourism areas in the Bandung Basin geotourism destinations spread over five geotourism clusters (Fig. 4). The purpose of dividing the Bandung Basin geotourism destinations into several clusters and areas is to make it easier to determine the development of themes according to their potential and improve the experience for tourists. A destination has different characteristics, it is necessary to develop tourism potential in each cluster that is tailored to its characteristics in order to create tourist lengths of stay and spread income [20, 22, 23].

In addition, internal circulation is also used as accessibility between main and alternative entrances to tourism service centres. There are three classifications of service centres in the Bandung Basin geotourism destinations, namely primary, secondary, and tertiary service centres (Fig. 4). The city of Bandung as the primary service center for the Bandung Basin geotourism destination is supported by various facilities and services to support the needs of tourists and is supported by the main entrance. Another function of Bandung City as a primary service center is as a spreader for the movement of tourists to geotourism areas through internal route circulation and connecting primary service centres with secondary and tertiary service centres. Meanwhile, secondary, and tertiary service centres have a function in increasing the growth of geotourism, the quality of transportation and telecommunications infrastructure, providing public transportation that connects service centres and geotourism areas. Destinations have an area of facilities and services for tourists called a node or staging area [20, 23], in this study it is called a service center. Service centres cover all tourism facilities to meet the needs of tourists such as hotels, restaurants, shopping centres and others, usually located close to the gateway [23].

The last spatial element that becomes the smallest unit in a destination is geotourism attraction. Geotourism attraction is divided into three, including primary geotourism attraction, secondary geotourism attraction, and supporting tourism attraction. The classification of geotourism attractions is based on an assessment of the geotourism box on nature-based tourist attractions in the Bandung Basin area. Most of the geological sites in the Bandung Basin area are classified as natural tourist attractions, therefore a reinterpretation of natural tourist attractions as geotourism attractions is needed [26]. These efforts aim to promote and preserve geological and geomorphological features in tourism destinations [4, 5, 24].

After determining the spatial elements to design a destination spatial model, then the Bandung Basin geotourism destination design process is carried out through a geographic information system (GIS) mapping using the Arcgis online application and digitizing using Adobe Illustrator software. Destination design is carried out using GIS which aims to provide insight into cognitive distance based on geographic elements [39]. Planning a spatial model for a tourism destination is closely related to GIS assisting in planning a destination through analysing land use, identifying tourist travel patterns, analysing tourism impacts, and community
involvement and participation [40, 41]. The spatial information of Bandung Basin geotourism destinations is a digital data base regarding the geographical position of the spatial elements of the geotourism attraction, gateway, and service center, while other spatial elements are imaginary. The results of the geotourism destination design stage process can be seen in Fig. 5.

![GIS application on Bandung basin geotourism destination.](image)

**Fig. 5.** GIS application on Bandung basin geotourism destination.

The use of spatial modeling of the Bandung Basin geotourism destinations is to facilitate the West Java provincial government and local governments in the Bandung Basin area in determining the direction of tourism policies, especially the development of geotourism. In addition to making it easier for local governments to prepare destination planning, the spatial model also triggers the realization of tourism income because it encourages the spread of tourists to all destinations so that it can support sustainable development [2, 12, 20, 21, 42]. Previous research has applied GIS to models of tourism destinations in urban areas without paying attention to themes that are in accordance with the characteristics of the area [8, 10, 13, 20, 32, 42]. In contrast to this research, which focuses on spotting the potential characteristics of the region based on geodiversity, biodiversity, and cultural diversity as basic assets in developing geotourism destinations. However, the weakness of this study is that it tends to focus on destination modeling without paying attention to tourist travel patterns and tourist routes that can add value to a destination spatial model [11, 14, 23, 33]. Nevertheless, the design of the spatial model of the Bandung Basin geotourism destination can be a guide for designing tourist routes that can support the creation of tourist routes.

**5. Conclusions**

The process of designing a spatial model to make the Bandung Basin a geotourism destination has resulted in new spatial elements based on the unique characteristics of the Bandung Basin combined with the potential tourist market and local
government planning policies. The spatial elements that make up geotourism destinations can be applied in all regions in Indonesia and internationally which of course must be adjusted to the uniqueness of the region and local government policies. The spatial structure can be used as a reference for researchers in designing geotourism destinations, both developed and potential tourism destinations. The spatial model of geotourism destinations contributes to geopark development to support the realization of sustainable regional development.

References


