

The Spatial Formation of The Berastagi Sub-District, Kabupaten Karo

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ABSTRACT

Berastagi Sub-District, located in Karo Regency, North Sumatra, is a highland area with significant potential for tourism and settlement development due to its mountainous landscape, cool climate, agricultural activities, and strong Karo cultural identity. This study aims to identify the spatial formation of Berastagi Sub-District and examine how spatial planning aspects influence the development of tourism destinations in the area. A descriptive research approach was applied through questionnaires, interviews, observation, and documentation. The study focused on tourism centers such as Bukit Kubu, Bukit Gundaling, and Berastagi Market to understand the relationship between settlement patterns, tourism activities, accessibility, environmental conditions, institutional support, and local socio-cultural characteristics. The findings indicate that spatial planning plays an important role in reducing socio-economic externalities, coordinating spatial interests, determining the saturation threshold of tourism areas, and identifying physically vulnerable zones. These shaping aspects demonstrate that tourism development in Berastagi should not be viewed merely as an economic activity, but as an integrated spatial process that requires environmental control, cultural preservation, community participation, and infrastructure planning. The study contributes to the understanding of how spatial planning can support sustainable tourism destination development while improving comfort, harmony, safety, and the quality of life of local communities.

Keywords: Berastagi sub-district, spatial formation, spatial planning, sustainable destination, tourism development

1. Introduction

Spatial arrangement is an important component of regional development because it regulates the structure and pattern of land use by considering physical, environmental, social, cultural, economic, administrative, and functional aspects. The concept of regional development was strengthened by the development of regional science, which emphasizes the relationship between geographic conditions, social structures, economic activities, and environmental characteristics in shaping regional growth [1]. In Indonesia, spatial planning has continued to develop as a policy instrument for supporting infrastructure development, reducing regional disparities, and directing the sustainable use of space [2][3]. Therefore, regional spatial planning is not only concerned with the physical organization of land but also with the management of natural and artificial resources to support sustainable development for present and future generations [4].

Spatial planning aims to create an efficient, equitable, and sustainable spatial structure. It supports the optimization of resource utilization, the distribution of development benefits, and the protection of environmental quality [5]. In practice, the control of spatial utilization is implemented through zoning

regulations, licensing, incentives and disincentives, and administrative sanctions [6]. These instruments are particularly important in areas that face environmental vulnerability and disaster risk, because inappropriate land use may increase exposure to hazards and cause social, economic, and physical losses [7]. Thus, spatial planning should be understood as a preventive and strategic mechanism for guiding development while minimizing negative impacts on communities and the environment.

Berastagi Sub-District, located in Karo Regency, North Sumatra, has strong potential as a tourism and settlement area because of its mountainous landscape, cool climate, agricultural production, and cultural identity. The area is closely associated with the Karo community, whose cultural characteristics contribute to the traditional identity of the settlement pattern. Berastagi is also supported by several tourism destinations, including Bukit Kubu, Bukit Gundaling, and Berastagi Market, which strengthen its role as a regional tourism center. However, the development of tourism and settlement areas must be supported by appropriate spatial planning so that growth can be aligned with public needs, environmental protection, cultural preservation, and regional development objectives.

The concept of layout in spatial planning refers to the organization of spatial structures in a planned, orderly, and functional manner. Spatial planning functions as a basis for allocating space for socio-economic activities, environmental conservation, infrastructure provision, and settlement development [8]. It also helps create a safe, comfortable, productive, and sustainable spatial system by controlling land-use changes and preventing negative environmental impacts. In this study, the spatial aspects used to understand the formation of Berastagi are grouped into technical, economic, socio-cultural, legal and institutional, and environmental aspects, as presented in Table 1. These aspects provide the analytical foundation for identifying how spatial formation influences the organization of settlements and tourism areas in Berastagi.

Table 1. Spatial Aspect

No.	Reference	Spatial Aspect	Conclusions
1	Technical (Ginting, 2010)	• City hierarchy system • Region location	• Technical Aspect
2	Economic (Kodoatie and Sjarief, 2010)	• Designation of industrial and trade areas • Determination of agricultural area • Determination of tourism area • Determination of residential area • Establishment of markets and other centers of economic activity	• Economic Aspect • Socio-Cultural Aspects
3	Social and Culture (Kodoatie and Sjarief, 2010)	• Social characteristics of the population • Cultural (customary) characteristics of the community • Community social life • Total population • Population density and distribution	• Legal and Institutional Aspects
4	Law and Institutions (Marpaung, 2017)	• Build settlements that are adapted to the planned settlements of the government	• Environmental Aspects
5	Environment (Corneles Salomo Sikora, 2014)	• Climatology • Topography • Geology • Hydrology • Mineral resources/ minerals • Natural disasters • Land use	

Tourism development is closely related to spatial planning because tourism activities require appropriate land use, infrastructure, accessibility, environmental management, and institutional support. Tourism has an important role in improving regional economic growth and community welfare [9][10][11]. The development of tourism destinations generally includes economic and socio-cultural dimensions, where economic development is directed toward increasing competitiveness and regional income, while socio-cultural development is directed toward strengthening local identity, community participation, and cultural sustainability. In this context, tourism development should be guided by sustainable tourism principles, including the responsible use of natural resources, waste reduction, diversity preservation, integration of tourism into planning, support for the local economy, stakeholder consultation, community involvement, staff training, responsible marketing, and continuous tourism research.

The relationship between spatial planning and tourism destination development can be understood through several key components. Spatial planning helps reduce the externalities of socio-economic activities, coordinate various interests in land use, determine the carrying capacity of an area, and identify physically vulnerable zones. Meanwhile, tourism destination development requires attractions, amenities or infrastructure, accessibility, and institutional support. These aspects are summarized in Table 2, which shows that tourism development in Berastagi should consider natural and artificial attractions, supporting facilities, transportation and access systems, and the role of government, private actors, tourism industries, and local communities. Therefore, Table 1 and Table 2 serve as the conceptual basis for examining the influence of spatial aspects on the development of tourism destinations in Berastagi.

Table 2. Aspects of Tourism Destination Development

No.	Reference	Aspects of Tourism Destination Development	Conclusion
1	Attraction (Pitana and Diarta in Astuti and Noor 2016)	1. Landscapes 2. Beach 3. Mountains 4. Climate 5. Valley 6. Historic city 7. Park and resort 8. Cultural attractions	1. Natural attractions 2. Artificial attractions
2	Amenities/Infrastructure (Yoeti in Astuti and Noor 2016)	1. Public infrastructure 2. Security infrastructure 3. Basic facilities 4. Complementary facilities 5. Supporting facilities	1. Toilet 2. Mosque 3. Canteen
3	Accessibility (According Sunaryo in Wilopo and Hakim 2017)	1. Terminal 2. Airport 3. Directions 4. Time required 5. Transport frequency 6. Travel costs to tourist sites and other devices	1. Transportation 2. Directions 3. Airport 4. Road and terminal conditions
4	Institutional (Sunaryo in Wilopo and Hakim 2017)	1. Central or regional government 2. Private or tourism industry 3. Tourism community	1. Central or regional government 2. Private or tourism industry 3. Tourism community

Based on this background, this study aims to identify the spatial formation of Berastagi Sub-District and examine how spatial planning aspects influence the development of tourism destinations in Karo Regency. The study focuses on the relationship between spatial aspects and tourism destination development, particularly in relation to settlement formation, local cultural characteristics, environmental conditions, infrastructure, accessibility, and institutional support. Through this approach, the research is expected to

contribute to a better understanding of how spatial planning can support sustainable tourism development while improving comfort, harmony, safety, and the quality of life of the local community.

2. Method

The research method refers to a systematic and scientific procedure used to obtain data for specific research purposes. A scientific study must be conducted rationally, empirically, and systematically so that the data collected can be interpreted objectively and used to answer the research problem [12]. In this study, the method was designed to examine the relationship between spatial planning aspects and the development of tourism destinations in Berastagi Sub-District, Karo Regency. Research methodology is generally understood as a scientific process that involves four main elements: method, data, purpose, and usefulness [13]. Based on this understanding, the present study applied a descriptive approach to collect, organize, analyze, and present data related to the spatial formation of Berastagi and its influence on tourism destination development. The descriptive approach was considered appropriate because the study aimed to explain existing spatial conditions, community characteristics, tourism potential, and development-related aspects in the research area.

The data collection techniques used in this study consisted of questionnaires, interviews, observation, and documentation. These techniques were selected to obtain both primary and supporting data from the field. Questionnaires were used to collect structured responses from respondents, while interviews provided more detailed information regarding community perceptions and tourism development conditions. Observation was conducted to identify the physical and spatial characteristics of the study area, and documentation was used to support the analysis through written, visual, and administrative sources. These techniques are relevant to studies that require detailed data collection over a certain period of field investigation [14]. The research variables were determined based on the relationship between spatial planning and tourism destination development. A research variable refers to an attribute, characteristic, or value of individuals, objects, or activities that has certain variations and is selected by the researcher to be studied and analyzed [15]. In this study, spatial planning was positioned as the independent variable, while tourism destination development was positioned as the dependent variable. This classification follows the concept that variables can be categorized according to their relationship with one another, particularly as independent and dependent variables [16].

The population of this study consisted of communities living in Berastagi Sub-District, Karo Regency, particularly those associated with tourism areas. The research focused on several tourism centers in Berastagi, including Bukit Kubu, Bukit Gundaling, and Berastagi Market. These locations were selected because they represent important tourism spaces in the sub-district and reflect the relationship between spatial arrangement, community activities, accessibility, facilities, and destination development. The sampling technique was used to determine respondents who could represent the population of the study. Sampling is an important stage in research because it influences the quality and representativeness of the collected data. In general, sampling techniques may be divided into probability sampling and non-probability sampling. Probability sampling provides equal opportunity for each member of the population to be selected as a sample [16]. Therefore, the selected sampling technique should be clearly stated in the final manuscript, including the number of respondents, selection criteria, and the reason for using the technique, so that the research procedure becomes more transparent and replicable.

The data analysis process was conducted after all data from respondents and field observations had been collected. Data analysis included grouping the data based on research variables and respondent categories, organizing the data into a readable form, presenting the data according to each variable, and conducting calculations to answer the research problem [15]. The analysis focused on identifying the relationship between spatial planning aspects and tourism destination development in Berastagi Sub-District. The analytical method used in this study was simple linear regression analysis. This method was applied to examine the linear relationship between one independent variable, namely spatial planning, and one dependent variable, namely tourism destination development. Through this analysis, the study sought to determine whether spatial planning has an influence on the development of tourism destinations in Berastagi. The results of the analysis

were then interpreted to explain how spatial aspects contribute to tourism development, particularly in relation to attractions, amenities, accessibility, institutional support, and environmental conditions.

The conclusions of this study were drawn based on the results of data analysis and field findings. In research involving field data, conclusions may develop along with the evidence obtained during the data collection and analysis process. Therefore, the final interpretation must be supported by sufficient data and should remain consistent with the research objectives, variables, and analytical results. This approach ensures that the conclusions are not merely theoretical but are grounded in the actual spatial and tourism development conditions of Berastagi Sub-District.

3. Result and Discussion

The results of this study indicate that spatial planning plays an important role in supporting the development of tourism destinations in Berastagi Sub-District, Karo Regency. The spatial formation of Berastagi is shaped by the interaction between settlement patterns, tourism activities, accessibility, local economic functions, environmental conditions, and the cultural identity of the Karo community. As a mountainous tourism area with strong agricultural and cultural characteristics, Berastagi requires spatial planning that is not only directed toward physical development but also toward the integration of environmental sustainability, community needs, and tourism destination management.

The relationship between spatial planning and tourism destination development can be understood through the shaping aspects presented in Table 3. The table shows that spatial planning contributes to tourism development by reducing the externalities of socio-economic activities, coordinating various interests in spatial utilization, identifying the saturation threshold of an area, and determining physically vulnerable zones. These aspects are relevant to Berastagi because tourism activities in Bukit Kubu, Bukit Gundaling, and Berastagi Market generate movement, trade, service activities, infrastructure demand, and environmental pressure. Therefore, spatial planning is needed to ensure that tourism growth does not create uncontrolled land-use change, traffic congestion, environmental degradation, or conflict between settlement, commercial, agricultural, and tourism functions. The first important finding is that spatial planning helps reduce the negative externalities caused by tourism and socio-economic activities. In Berastagi, tourism development may increase economic opportunities through trade, accommodation, transportation, and local services. However, without proper spatial control, such activities may also produce spatial problems, including informal land conversion, overcrowding in tourism centers, inadequate public facilities, and declining environmental quality. Spatial planning therefore functions as a regulatory mechanism that directs tourism-related activities into appropriate zones and supports a more balanced relationship between economic growth and environmental protection.

Table 3. Shaping Aspects

Spatial Planning towards the Development of Tourist Destinations	Shaping Aspects
	• Can reduce the effects of externalities (spillover) of socioeconomic activities, especially in the dimension of space, for example market failure • Can coordinate all interests in the arrangement of space • Can determine the saturation threshold of a region • Can determine physically vulnerable areas

The second finding shows that spatial planning supports coordination among different stakeholders involved in tourism destination development. Tourism areas are not shaped by one actor alone, but by the interaction of local communities, government institutions, private investors, tourism businesses, and visitors. In this context, spatial planning provides a common framework for regulating land use, infrastructure provision, accessibility, public facilities, and environmental management. This is particularly important for Berastagi because its tourism potential is strongly connected to local culture, agricultural landscapes, and natural scenery. A

coordinated spatial approach can help prevent fragmented development and strengthen the identity of Berastagi as a sustainable tourism destination. The third finding relates to the importance of determining the carrying capacity or saturation threshold of the tourism area. Tourism destination development should consider the ability of an area to accommodate visitors, vehicles, commercial activities, and infrastructure needs without reducing the quality of the environment and the comfort of local residents. In Berastagi, areas such as Bukit Gundaling, Bukit Kubu, and Berastagi Market may experience increasing pressure during peak tourism periods. Therefore, spatial planning should be used to manage visitor concentration, improve circulation systems, provide adequate facilities, and protect open spaces and environmentally sensitive areas.

The fourth finding emphasizes the role of spatial planning in identifying physically vulnerable areas. Berastagi is located in a highland region with specific topographical, climatic, and environmental characteristics. These conditions require careful planning to avoid development in areas that may be vulnerable to disaster risk, land instability, environmental degradation, or infrastructure limitations. By identifying vulnerable zones, spatial planning can guide tourism and settlement development toward safer and more suitable locations. This finding supports the argument that tourism development should not only pursue economic benefits but also consider long-term safety, resilience, and environmental sustainability. Overall, the discussion confirms that spatial planning has a strategic influence on tourism destination development in Berastagi. The shaping aspects identified in Table 3 demonstrate that spatial planning is closely related to the management of externalities, stakeholder coordination, carrying capacity, and environmental vulnerability. These findings are consistent with the broader understanding that sustainable tourism development requires the integration of spatial, economic, socio-cultural, institutional, and environmental considerations. Therefore, the development of Berastagi as a tourism destination should be guided by spatial policies that protect local identity, improve accessibility and facilities, support community participation, and maintain the ecological quality of the area.

4. Conclusion

This study concludes that the spatial formation of Berastagi Sub-District is closely related to the development of tourism destinations in Karo Regency. Spatial planning provides an essential framework for managing land use, settlement growth, tourism activities, accessibility, environmental protection, and socio-cultural identity. In the context of Berastagi, spatial planning is particularly important because the area combines natural attractions, agricultural landscapes, cultural characteristics, and growing tourism activities. The findings show that spatial planning contributes to tourism destination development through several shaping aspects, namely the reduction of socio-economic externalities, coordination of spatial interests, determination of the area's saturation threshold, and identification of physically vulnerable zones. These aspects indicate that tourism development should not be conducted only as an economic activity, but also as a spatial and environmental process that requires careful regulation and long-term planning. The reference to Table 3 strengthens this conclusion by showing that the influence of spatial planning on tourism development is multidimensional and directly related to the sustainability of the destination. The development of tourism destinations in Berastagi should therefore be directed toward a sustainable model that balances economic growth, community welfare, cultural preservation, and environmental protection. Tourism facilities, accessibility, settlement expansion, and commercial activities need to be planned in accordance with the spatial capacity of the area. This approach is necessary to maintain the comfort, harmony, safety, and quality of life of local communities while also improving the attractiveness and competitiveness of Berastagi as a tourism destination. For future research, it is recommended that the analysis be strengthened with quantitative spatial data, visitor distribution patterns, land-use mapping, carrying-capacity assessment, and measurable indicators of tourism development. Such additional data would provide stronger empirical evidence and improve the scientific contribution of the study. Nevertheless, the present study provides a useful conceptual basis for understanding the role of spatial planning in supporting sustainable tourism destination development in Berastagi Sub-District.

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6. Conflict of Interest

The authors declare that there is no conflict of interest related to the publication of this manuscript. The research was conducted independently, and no financial, institutional, or personal relationships influenced the study design, data collection, analysis, interpretation, or preparation of the manuscript.

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