

# MOUNTAIN ECOTOURISM SPATIAL PLANNING TOWARDS GREEN MANAGEMENT: THE CASE OF MOUNT LAWU REGION OF INDONESIA

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**Abstract:** *Mount Lawu region has abundant resources consisting of diverse flora and fauna which have the potentials to be developed as ecotourism attractions. It has also cultural sites containing local wisdom. As the area is a fragile ecosystem, it needs appropriate planning for green management and development. This research aims at: (1) exploring the planning concept for managing and developing ecotourism in the region; (2) analyzing the spatial distribution of ecotourism facilities to support sustainable management, and (3) creating a foundation for designing a new spatial planning model for ecotourism development in Mount Lawu region. Mapping method using geographic information system (GIS), spatial analysis, and interactive analysis were employed as analytical lenses. Research findings reveal that ecotourism management planning in Mount Lawu region has not optimized the function of spaces. Even though ecotourism has developed in the region for several years, the appropriate usage of spaces has not been taken into account by stakeholders. Essential facilities of ecotourism including space for interpretation have not been provided. This study highlights the significance of spatial planning to manage and develop sustainable mountain ecotourism in Mount Lawu region by mapping out the resources and facilities to support planning and decision making. It is in line with several models proposed by some researchers which suggest the importance of analyzing the available spaces for sustainable ecotourism management and development.*

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## 1. INTRODUCTION

Mount Lawu is located in the border area between Central Java and East Java Indonesia. The area lies between 07° 42' S latitude and 111° 08' E longitude. Since the mountain has abundant natural and cultural resources, it has been developing rapidly as one of ecotourism destinations in the region (Sugiarti, 2005). A lot of tourists visit the mountain every year, especially in Sura (one of the names of months in Javanese calendar). Together with the changing mindset of tourists, many of them travel to conduct ecotourism and go back to nature. This is in line with the development of ecotourism in the global context. Several studies mention that ecotourism is one of special interest tourism that has been booming along with the global trend of travel to relatively undisturbed natural areas (Wang et al., 2014; Wood, 2002). United Nations and World Trade Organization predicted that ecotourism will become one of the largest industries in the world in the future (Wang et al., 2014). Besides, Drumm & Moore (2005) mention that ecotourism is projected to support conservation, improve the well-being of the local communities, and create new business opportunities.

Several studies on ecotourism perform different results. Jaafar & Maideen (2012) mentioned that ecotourism development in Malaysia, especially concerning small and medium island chalets, has reached its optimum level: demand clearly outstrips supply. However, apart from its fast development tourism has put several impacts, both positive and negative, as tourism itself is an agent of change (Gupta & Rout, 2016). To maintain and sustain the attractions, ecotourism development which entails less environmental impacts needs to be prioritized. Heedless development will threaten the sustainability of ecotourism resources.

To maximize positive impacts and minimize negative impacts tourism stakeholders, including government and private sectors, has to ensure that tourism development is well planned, operated, and managed. One of the alternatives to help reduce negative impacts and enhance positive impacts of tourism on the environment is by developing ecotourism (Dowling & Fennell, 2003). Wang et al. (2014) underlines some measures to practice the concept of ecotourism and protect the environment. Some of them are developing comprehensive and scientific planning and applying strict implementation of environmental impact assessment.

According to Dede & Ayten (2012) and Boyd & Butler(1996) ecotourism depends largely on the environmental resources, both natural and cultural The environment on which ecotourism depends should be sustainably managed by conducting green planning. Planning is basically a process-based continuous approach that needs to address several issues including protection of environment and biodiversity, appreciation of socio-cultural values and traditions, and provision of tourism infrastructure. Planning concerns with some elements including providing facilities, preparing human resources, formulating regulation, and undertaking spatial arrangement (Maksin & Milijic, 2010).

Wight (2016) mentioned that despite the fact that ecotourism has been developed for decades there are a lot problems in the development of ecotourism. To implement ecotourism stakeholders needs to address several issues and challenges as well as problems generally faced when developing ecotourism. They include conflicting national planning and policy objectives, inconsistent or nonexistent policy for ecotourism, absence of transboundary management, lack of fiscal commitment, lack of information, lack of human resource capacity, lack of local community empowerment, and lack of stakeholders participation (Blamey, 1997; Boyd & Butler, 1996).

Studies on ecotourism by Wight (2016) and Drumm & Moore (2005) give several recommendations, both general and specific, to develop ecotourism. They include recommendation for the environment, economic development, social and cultural benefits, and multi stakeholder participation. General recommendation includes using national and international transboundary management approaches, planning and fostering policy development, developing appropriate tools for planning and management, planning systematically for protected areas, committing adequate financial resources and developing appropriate funding mechanism, building local capacity, conserving material resources at all levels, and building multi-stakeholders participation into planning and policy development processes. Recommendation for the environment involves educating communities about biodiversity and conservation, managing impacts, and managing visitors. Recommendation for economic development includes building small business capacities and competencies, and providing government and other support for community level ecotourism. Recommendation for social and cultural benefits includes involving communities and giving ownership, and providing training and education. Recommendation for multi-stakeholder participation involves joint ventures and planning and performing planning and policy development activities based on the attractions.

The principal attraction for tourists is the opportunity to experience a particular natural environment, or specific components such as individual plant or animal species (Buckley, 2009). If positive experiences are not available, tourists will cease to come (Aiping et al., 2015). Besides providing positive experience for tourists, ecotourism should be environmentally sustainable, socio-culturally acceptable, and economically viable. If the environment on which ecotourism depends is not managed sustainably, tourists will not obtain traveling benefits, including having a high level of experience. As a result, they will not pay any repeat visit to the site (Nahuelhual et al., 2013; Wall, 1996)

Another research on ecotourism (Asmamaw & Verma, 2013) found that ecotourism development which does not perform economic viability will result in the lack of provision of quality ecotourism facilities and services. If ecotourism is not economically viable, the ecotourism industry providers and the local people will obtain no benefits from the ecotourism development in their area (Qin et al., 2014). Ecotourism in Gold Coast Australia has contributed \$3 billion and 16 percent of gross regional products. In other words, as it equates to just over 20 percent of all business on the coast, ecotourism in Gold Coast provides significant economic contribution to the local economy. On the other hand, as ecotourism depends largely on the environment, lack of maintenance of the environment will destroy the resource base for ecotourism development, including ecotourism as one of the economic sources for the region. Degraded environment

will not attract tourists to come. Therefore, if ecotourism is to succeed stakeholders including tourists should have commitment and take actions to restore the damaged environment. Environment includes nature and culture. Besides performing suitable management of the natural environment, ecotourism should consider appropriate management of cultural resources. Ecotourism should provide economic, ecological, and cultural benefits to the local people in order that they will not neglect its existence (Nepal, 2002).

Some studies on ecotourism (Dede & Aytan, 2012; Gupta & Rout, 2016) mention that ecotourism is an alternative form of tourism which is intended to help protect the environment, local culture and assets. As ecotourism makes use of spaces, the step to start the development by making spatial planning is necessary. Besides, conserving natural and cultural resources which become the main assets of ecotourism is crucial; therefore, ecotourism spatial planning is needed. Spatial planning for ecotourism development requires comprehensive understanding about the natural and cultural resources of the area being developed. Several important aspects need to be addressed when planning ecotourism. Some of the aspects are attractions, accessibility, amenities, and activities. Besides, when planning ecotourism community participation and collaboration among stakeholders remain prerequisite. Ecotourism planning can be carried out at a range of level (Dowling & Fennell, 2003). In ecotourism planning some aspects such as socio-cultural values and traditions, protection of environment and biodiversity, and regulation also requires prompt attention (Dinc & Kocan, 2012). Ecotourism requires special space or site, area, regional or spatial planning, and site design (Gunn & Var, 2002). Ecotourism planning can be utilized to support sustainable development. It offers a way to enhance conservation in environmentally fragile areas, generate the economies of the local communities, and provide the public with nature-based education experience (Mirsanjari, 2012).

Ecotourism planning needs to be equipped with the attempts to execute sustainable or green management. Managing ecotourism, especially in the mountainous area, should consider several aspects including the available spaces, natural and cultural attractions, accessibility, amenities, and activities which can be done by the tourists in the destination. Green management requires commitment of stakeholders to apply the concepts of ecotourism development. The local people should be involved, and therefore, empowerment of the locals is crucial (Chan & Bhatta, 2013).

In the context of ecotourism development, spaces need to be utilized environmentally friendly. Natural resources need to be protected by applying the concept of "Take nothing except photographs, and leave nothing except footprints". Cultural assets have to be revitalized by educating tourists about how to behave appropriately when visiting or taking part in cultural events. Accessibility should consider how to save and minimize the use of energy for facilitating tourists to reach the destination. Activities refer to everything which tourists do during their stay at the destination. Green management should take into consideration the types of tourist activities which do not harm the environment.

This research offers a new insight on mountain ecotourism spatial planning in Mount Lawu region. This is due to the fact that there has not been any previous research on Mount Lawu ecotourism spatial planning. Based on all potentials and problems concerning ecotourism in Mount Lawu region this study specifically aims to examine the planning concept for managing and developing ecotourism in Mount Lawu region, to analyze the spatial distribution of ecotourism facilities to support sustainable management, and to create a foundation for designing a new spatial planning model for ecotourism development in Mount Lawu region. Furthermore, this research attempts to give knowledge contribution concerning spatial planning of ecotourism in mountainous area to perform sustainable ecotourism development and management.

## 2. DATA AND METHODS

### 2.1. Data

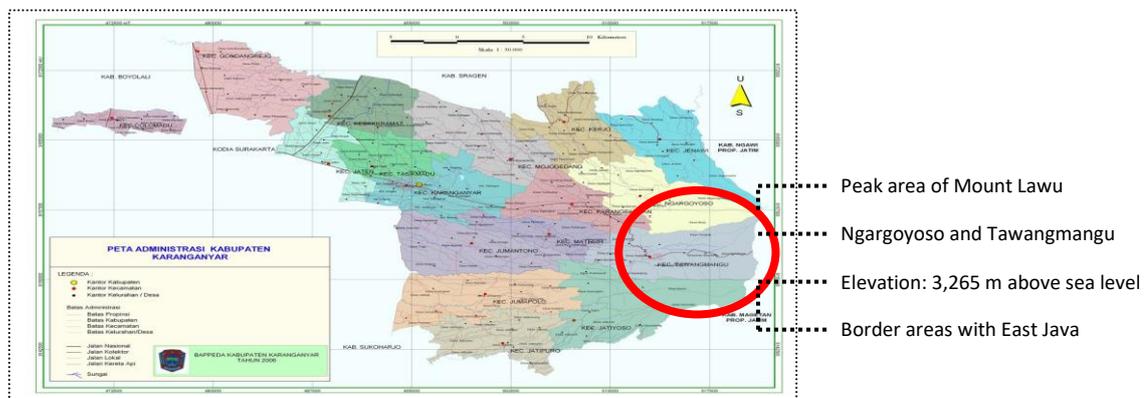
Mount Lawu region has been visited by a great number of visitors. More than a thousand of visitors visit the site each year. They have various motives of travel. One of them is doing ecotourism, involving both nature-based and cultural activities. Mountainous environment with a variety of available resources has attracted a lot of tourists. Flora, fauna, fresh air, beautiful scenery, green atmosphere, as well as cultural sites have become a magnet for visitors to come to the location (Figure 1). Tourists undertake

diverse activities when visiting Mount Lawu region, including trekking, hiking, camping, bird watching, exploring nature, learning various flora and fauna found in the area, and doing cultural and spiritual exercise.

All stakeholders have significant role in the development of ecotourism in Mount Lawu region. The local community has supported the development of ecotourism by providing relevant services such as food and drinks services, lodging services, and guiding services. They also prepare attractions related to their culture such as traditional ceremonies, cultural sites, as well as local arts and crafts. The government has been in the corridor to formulate policies and regulations related to tourism planning and development. The private sector has supported the travel arrangement, tourism information and promotion, and marketing tourism products.

Stakeholders' participation is one of success keys to ecotourism development. Strengthening their role has been done through various processes, such as dialogues, discussions, training, education, and actions. It is important to synchronize the vision in building commitment to develop ecotourism in Mount Lawu region. In addition, it is necessary to consider the division of roles to ensure that all stakeholders engage to a maximum extend, such as thinking about what needs to be prepared by the local community, what needs to be worked out by the government and what needs to be done by the private sector.

The role of stakeholders also can be strengthened through the development of science in supporting ecotourism. For example, universities can take part in supporting ecotourism. This is based on the premise that nature contributes to the scientific development, such as the development of biological sciences, biodiversity, and the cycle associated with nature. Nature tourism potential in Mount Lawu region can be developed as an ecotourism package performing knowledge about biodiversity. In the region diverse flora and fauna can be found, including Lawu starling and orchids that become distinctive identifier of the pine forest ecosystem in the region.



**Figure 1:** The Map of Research Location in Mount Lawu Central Java Indonesia.

Concerning natural resources, biodiversity is one of the potentials to attract tourists. In order to sustain the resources, local community and tourists should be encouraged to keep and preserve biodiversity which becomes one of the main assets of ecotourism in Mount Lawu region. Similarly, universities should also take part in maintaining the sustainability of the region as they can use the nature as a natural laboratory. This also will become a point of interest for foreign tourists, students, and international research experts. There are some advantages to develop ecotourism, such as enhancing knowledge and increasing values of research. The society will be invited in scientific development. Tourists visiting Mount Lawu area have done various activities, including ecotourism activities, even though they do not realize that they are doing ecotourism activities. The activities range from nature based to those which are dominated by cultural elements. Both natures based and culture-based activities require local participation and therefore the host communities need to be empowered to take part in ecotourism development.

There has been local participation so far, even though it is still limited. For example, the local community provides accommodation services (home stay) for the tourists who climb the mountain. Before climbing the mountain, they usually undertake some preparation in the nearest local houses. They stay with

the local community and listen to their recommendation, especially dealing with safety and security. This kind of accommodation services can be found in Gondosuli Tawangmangu and Berjo Ngargoyoso Karanganyar. In addition, the local people can participate to supply food and drinks (catering services) for the tourists. Besides providing food and drinks for the tourists, some catering service providers also give services to the public. This is due to seasonality of ecotourism activities. On the one hand, providing catering services for both tourists and the public will help the food and drinks sellers maintain continuity of their business. On the other hand, tourists can take advantage of the existence of catering services. Besides serving food and drinks, the local people can provide guiding and interpretation services for the tourists who climb the mountain. Concerning local participation, the community also can provide local transportation services to the tourists to accommodate them in reaching the tourist destination.

Obviously Mount Lawu area has abundant natural resources which have the potentials to be developed as ecotourism attractions. A lot of plants grow in the area and some unique plants are of interests to the tourists (Sutarno, 2005). Some plants which can be found in Mount Lawu region can be seen in Table 1.

**Table 1:** Some Plants in Mount Lawu Region.

	Types of Plants	Species	Location
1.	Epiphytic plants	<i>Bulbophyllum</i>	Station (1), Station (2)
		<i>Flavidiflorum</i>	Station (1), Station (2)
		<i>Bulbophyllum ovalifolium</i>	Station (1), Station (2)
		<i>Bulbophyllum sp</i>	Station (1), Station (2)
		<i>Coelogyne miniata</i>	Station (1), Station (2)
		<i>Coelogyne sp</i>	Station (1), Station (2)
		<i>Eria multiflora</i>	Station (1), Station (2)
		<i>Eria sp</i>	Station (1), Station (2)
		<i>Pholidota globosa</i>	Station (1), Station (2)
		2.	Cryptogamae
Bryophyta	Jobolarangan		
Pteridophyta	Jobolarangan		
3.	Spermathophyta	<i>Strobilanthes paniculata</i>	-
		<i>Acer laurium</i>	-
		<i>Achyranthes bidentata</i>	-
		<i>Altemanthera sessilis</i>	-
		<i>Amaranthus gracilis</i>	-
		<i>Amaranthus sp</i>	-

Source: Adaped from Yulia (2011); Setyawan (2000)

As can be seen from Table 1 there are various plants which can entice visitors and stimulate them to know more about the plants. This becomes an entry point to provide interpretation services to the tourists. Interpretation is a process of explaining to the tourists the meaning and significance of a place they visit so that they understand, learn more, enjoy more, appreciate, and develop positive attitude towards conservation of the place.

The duty of the managers is to maintain the sustainability of all the resources found in the region, including local plants and animals. To protect the resources there has been regulation for both the managers and visitors concerning conservation of resources. Tourists are not allowed to take anything including plants and animal from the sites they visit.

Widiyanto (2015) conducted a study on fauna found in Mount Lawu region, especially aves and mammals, and carried out some inventories. Some of them are birds such as nisaetus bartelsi, halcyon cyanopentris, spilornis cheela, pycnonotus aurigaster, streptopelia chinensis, dicrurus leucophaeus, collocalia linchi, eumyias indigo. some mammals include sus scrofa, muntiacus muntjak, callosciurus notatus, paradoxurus hermaphroditus, tupaia javanica, hystrix brachyuran, macaca falcularis, panthera pardus, cervustimorensis, dan panthera tigris.

Space is absolutely needed to accommodate visitors to undertake ecotourism activities in the region, and therefore, spatial planning is crucial to foster the success of ecotourism management and

development. Spatial planning should be made in such a way that the tourists can observe, enjoy, learn, appreciate, and even take part in the conservation of the natural resources they visit.

Besides various natural attractions, there are abundant cultural resources which have attracted tourists to visit the region. Manager of the region has provided space for visitors who want to conduct some cultural activities. However, interpretation facilities provided in the site is still limited. These are very important to inform and 'educate' visitors about how to act environmentally friendly in the visited natural sites and how to behave appropriately when dealing with the local community. They are also important to consider when taking part in the events conducted by the locals in order to minimize cultural misunderstanding between tourists and the hosts. Overall, interpretation facilities are substantial for maintaining sustainability of the attractions, increasing cultural tourist product diversification, and enhancing tourist experience.

Amenities are all facilities that conduce to comfort, convenience, or enjoyment. They play an important role in all tourism activities. Some facilities have been provided to support ecotourism development in Mount Lawu region ranging from information center to safety equipment. They consist of visitor information center, lodges, maps and signage, guiding and interpretation services, safety devices, and catering services.

Despite the fact that visitor information center is crucial in ecotourism development, the number of visitor information center in Mount Lawu region is limited. Lack of visitor information center will reduce tourists' knowledge and understanding about the visited ecotourism sites. Sufficient information about the place should be given to all visitors prior to their travel to ecotourism sites. In this case visitor information center has a substantial role to transfer knowledge and information to the tourists.

There have been accidents where some visitors get lost while climbing Mount Lawu. Consequently, maps and signage have to be provided sufficiently throughout the ecotourism sites to avoid such accidents. Although there are already maps and signage in the site right now, their quality and quantity need to be improved.

Manager of ecotourism destination in Mount Lawu region has implemented environmental and educational initiatives. However, it is still limited. Therefore, this issue needs to be given attention as providing sufficient information and knowledge to tourists via guiding and interpretation services is very important to help sustain the environment. The interpretation facilities provided by the managers of the area are now still limited, both in terms quantity and quality.

Ecotourism often deals with visit to undisturbed environment which tends to seek adventure and explore something new and unknown. Therefore, the eco-tourists should equip themselves with adequate devices for their safety. The destination manager of Mount Lawu ecotourism provides tourists with some devices to protect them from emergency conditions such as getting lost, being trapped in heavy rain, strong winds, storm, coldness, and extreme weather.

The catering or food and beverage industry is one of the most important elements in the tourism industry. It plays a significant role in the promotion of local food and drinks as well as the culture of a particular place. Besides, it provides employment opportunity for the locals and it will in turn build local economy. In front of the entrance area of Lawu ecotourism destination there is some food center. These food stalls offer traditional menu. Various local food and drinks are provided for both tourists and those who pass through the area. As tourists' journey to the peak of Mount Lawu takes several hours, managers need to arrange the spaces for catering services in such a way that they help visitors to get food and drinks easily.

Abundant resources of Mount Lawu region produces diverse attractions of ecotourism. These attractions in turn create various activities which can be undertaken by the tourists. Some of the activities are hiking, adventuring, exploring nature, observing plants, bird watching, bushwalking, enjoying mountain panorama, taking photographs, and planting trees. Lately, concerning the activities, the manager of the ecotourism region has encouraged visitors to take part in planting trees to empower water catchment area and avoid water run-off. One of the strategies to manage ecotourism in Mount Lawu region is by encouraging visitors to play an active role in contributing to sustainability and viability of the environment. With an increasing number of visitors involved in planting trees to support forestation program, the task of reforestation and conservation is lightened.

## 2.2. Methods

This research was conducted in Mount Lawu region of Central Java Indonesia considering the existing potentials and problems of ecotourism development, particularly related to the lack of ecotourism interpretation center in the area. This research applied spatial analysis which emphasizes the process of turning raw data into useful information with the objective of solving scientific or decision making problems (Goodchild, 2016). It was carried out by collecting spatial data concerning elements of ecotourism facilities which are spatially distributed in Mount Lawu region by employing Geographic Information System (GIS) method. The result of the GIS-based mapping was utilized to show the whole picture of ecotourism spatial constellation in Mount Lawu region. The spatial data was analyzed to identify all aspects of tourism facilities which support conservation and sustainability of natural resources found in the site.

This study belongs to descriptive type of research. In this case descriptive refers to an objective representation of natural phenomena in Mount Lawu region investigated by the researcher. This research also used qualitative data which were obtained from two different sources. The first was the primary data sources including focus group discussion involving stakeholders, interviews with key persons and tourists, as well as ecotourism site inspection and observation to acquire a firsthand view of Mount Lawu region. Primary data collection was aimed at obtaining a deeper understanding about the place, the people, the culture, and the natural resources of Mount Lawu region. The second was secondary data sources which involves previous studies, government documents on tourism development in Mount Lawu region, statistical reports, demographic data, and ecotourism promotional brochures.

A semi-structured interview was utilized to acquire the key informants' and the tourists' perceptions, attitudes, and experiences on ecotourism in Mount Lawu region. The study involved government officials of Karanganyar regency, tourists, managers, and the local people. A non-probability purposive sampling was applied. This method is relevant since this research is not concerned with generalizing from samples to the population; Thus, representativeness of the samples is less important (de Vaus, 1995). Key persons, who can provide useful information regarding ecotourism development in Mount Lawu region, are much more significant.

Interactive analysis applied to look at the development of ecotourism in the region. Interactive analysis consists of three important steps including data reduction, data display, and conclusion drawing (Miles & Hubermann, 1984). In the first step of the analysis all data concerning the potentials and problems of ecotourism development in Mount Lawu region were collected and reduced by selecting the appropriate data. Second, the data were displayed in various forms such as maps, graphs, tables, or charts to facilitate the analysis process. Third, based on all data which were collected, a conclusion was drawn concerning the results of the analysis about ecotourism development in Mount Lawu region.

## 3. RESULTS AND DISCUSSION

Ecotourism has developed for several years in Mount Lawu region. Studies on ecotourism planning conducted by several researchers (Gunn & Var, 2002; Maksin & Milijic, 2010) show that spaces have a significant role in performing sound ecotourism development. Similarly, in ecotourism spaces need to be utilized appropriately based on some elements including attractions, accessibility, amenities, and activities. However, what happened to ecotourism in Mount Lawu region is vice versa. The development of ecotourism in Mount Lawu region has not applied spatial planning. The importance of spaces has not been taken into account by the managers of Mount Lawu. To perform sound ecotourism development in the region some crucial factors need to be discussed. This study focuses on the discussion of those essential factors.

The discussion highlights three important aspects which become the focus of this study. Firstly, it looks at the planning concept for managing and developing ecotourism in Mount Lawu region. Secondly, it scrutinizes the spatial distribution of ecotourism facilities in Mount Lawu region. Finally, it examines and formulates a new spatial planning model for ecotourism development in Mount Lawu region which highlights the availability of all related facilities, especially interpretation centers, which are needed in every space of ecotourism activity to perform green management of the region.

### **3.1. The planning concept for managing and developing ecotourism in Mount Lawu region**

Developing ecotourism in Mount Lawu region requires sound planning if it is to be sustainable. This is in line with many studies concerning ecotourism development planning which highlights the importance of planning by preparing a comprehensive site design to reach the goal of ecotourism development (Chan & Bhatta, 2013; Dowling & Fennell, 2003; Gunn & Var, 2002; Maksin & Milijic, 2010; Mirsanjari, 2012; Nepal, 2002). Tourism spatial planning, among other things, can be done by creating site design (Gunn & Var, 2002). Site design is one of the elements of ecotourism planning concepts which is significant to develop ecologically-friendly and economically-viable tourism. It includes various elements including how to create ways to prevent any environmental problems with the ecosystem and how to keep visitors traveling to a certain ecotourism spot safe (Gunn & Var, 2002). Site design requires holistic, ecologically based strategies to help repair and restore existing ecotourism assets, such as plants and animals, local communities, soils, and water (Mirsanjari, 2012).

Unlike what was found in those previous studies (Chan & Bhatta, 2013; Dowling & Fennell, 2003; Gunn & Var, 2002; Maksin & Milijic, 2010; Mirsanjari, 2012; Nepal, 2002), ecotourism in Mount Lawu region was not based on spatial planning concept. The manager of ecotourism in Mount Lawu region has not maximized the function of the available spaces to build sustainable ecotourism destination. This was concluded from the results of focus group discussions which involved related stakeholders of Mount Lawu ecotourism development including the representatives of Perhutani (Department of Forestry), the representatives of the local government (Karanganyar Office of Environment, Karanganyar Office of Tourism, Karanganyar Office of Agriculture), the local organization of the environment ("Children of Mount Lawu"), the local tourist guides as well as the representatives of the local communities. Results of the discussion show that they do not have spatial planning for ecotourism development in the region. This shows that ecotourism in Mount Lawu region has not been developed and managed professionally. Good planning concept of the site will help increase quality service to tourists. Besides, it can prevent any environmental damages caused by the presence of the tourists. Therefore, managers and operators, need to consider the operation of ecotourism in Mount Lawu region by making appropriate spatial planning. According to Gunn & Var (2002) spatial planning supports visitor management in order to keep the environment sustainable.

Based on the findings, this research offers a new spatial planning concept for ecotourism to support green management in Mount Lawu. What is new about this planning concept is that this planning considers the existence of interpretation centers to be present in the ecotourism space. The center should be located in every post or station on the way to the top of the mountain. The center functions as a place to provide knowledge to the tourists about the significance of the place they visit in order that they understand, enjoy, appreciate, and develop positive attitudes towards the conservation of Mount Lawu's resources. Many studies Aiping et al. (2015) have been undertaken concerning ecotourism planning concepts. However, those studies do not take interpretation centers into account. For instance, although the research conducted by Aiping et al. (2015) specifically discusses the suitability of ecotourism, it does not mention interpretation center at all as an aspect to perform suitability. Similarly, although Nepal (2002) mentioned that mountain ecotourism development requires planning concept, it only highlighted participatory planning and environmental friendliness. In conclusion, all of the studies on ecotourism planning do not consider interpretation centers as the very important aspect in building sustainable ecotourism. Therefore, planning concept which highlights the importance of ecotourism interpretation center is the novelty of this study.

### **3.2. The Spatial distribution of ecotourism facilities in Mount Lawu region to maintain sustainability of resources**

The mapping of Mount Lawu ecotourism is started by identifying all ecotourism facilities in the region. This is because ecotourism facilities play an important role in performing quality ecotourism activities. The existence of ecotourism facilities is crucial for the safety and comfort for tourists visiting Mount Lawu region. There are some services and several facilities scattered in two different climbing routes (Cemoro Kandang and Cemoro Sewu) to the top of the mountain including catering facilities, lodging facilities, administration facilities in the base camp, campsites, guiding services, and safety equipment. The ecotourism facilities and services should be maintained by all stakeholders including the local society

(Aseres, 2015). One of the essential ecotourism facilities is interpretation center. Several studies (Buesgens, 2013; Leanza et al., 2016; Pearce, 2004) mention that interpretation center has a significant role in making visitors aware of the environment, which is the very asset of ecotourism. The lack of interpretation center will cause tourists' ignorance about the resources of the site. However, interpretation center has not yet been provided in Mount Lawu region, even though interpretation center gives tourists opportunities to learn more about the site and take benefits from their visit. In short, the spatial distribution of ecotourism facilities in Mount Lawu region has not accommodated the role of interpretation facilities in maintaining the sustainability of the resources. Figure 2 shows the spatial distribution of facilities in Mount Lawu region. As can be seen in the Figure, there are limited ecotourism facilities in the area, including interpretation centers.

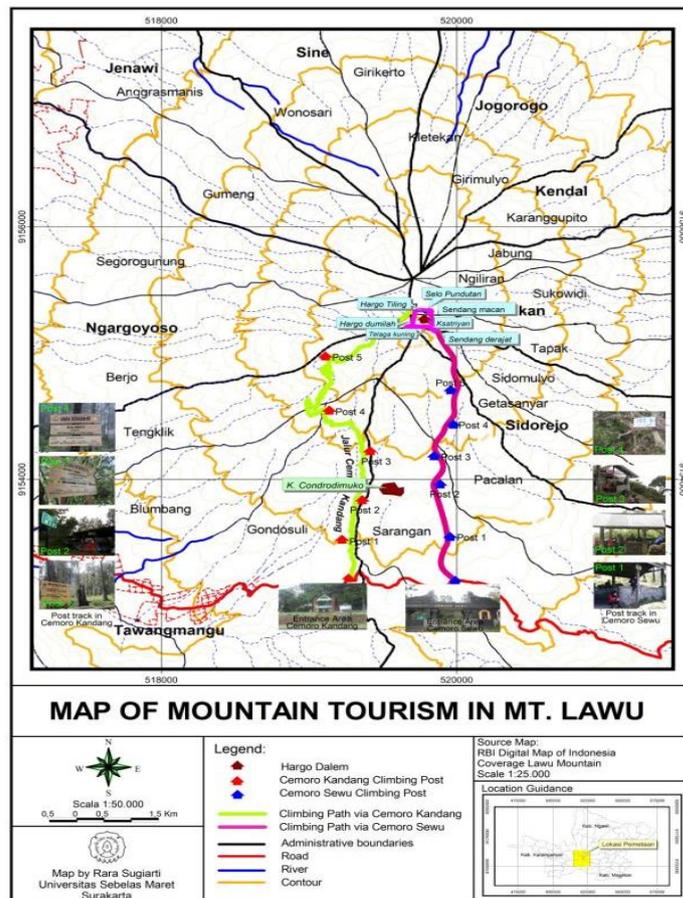


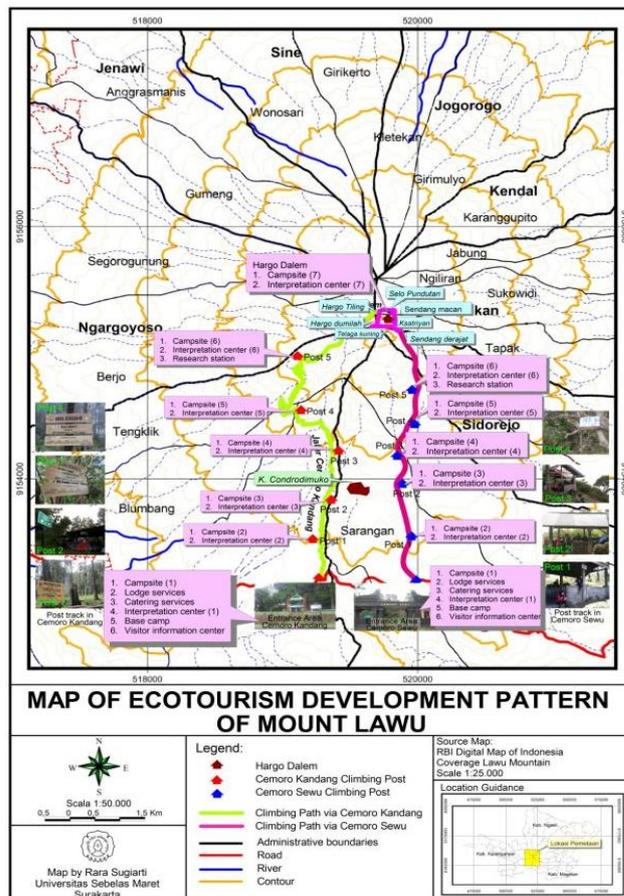
Figure 2. Existing spatial distribution of facilities in Mount Lawu region.

For this reason a spatial planning needs to be made by optimizing the use of the available spaces to develop ecotourism facilities. The facilities can be utilized to support the development of attractions, accessibility, amenities, and activities. In the planning process it is also important to consider the number of visitors, the time of visit, as well as some crucial factors which need to be taken into account such as meteorological, climatological, and geophysical aspects. Since Mount Lawu area is a fragile environment, visitors need to be provided with enough information and knowledge about the area. Because of the fragility of the mountainous region, spatial planning has a significant role to support appropriate management of the area. Some climbers to Mount Lawu often come across some land slides, strong winds, storms, heavy rain, coldness, and extreme weather. This is one of the results of the lack of planning. Therefore, it is crucial to give tourists adequate knowledge and skills concerning how to anticipate and deal with emergency situations. In this context spaces for ecotourism facilities, including interpretation center in Mount Lawu should be provided and well managed. This is in line with some findings of research conducted by Nepal (2002), Qin et al. (2014), Nahuelhual et al. (2013) and Mirsanjari (2012) which mention the need and function of related facilities in ecotourism development and management.

### 3.3. The Spatial distribution of ecotourism facilities in Mount Lawu region to maintain sustainability of resources

Results of research conducted by [Gheorghe & Iftime \(2013\)](#) show that ecotourism development in Europe mountain areas should be based on strategic planning. Moreover, ecotourism must be developed at the social and economic level, and therefore, the multiple benefits of ecotourism are only seen from the social and economic sides. Although the study centers attention on planning, it does not discuss the importance of ecotourism facilities to support best practice of ecotourism in mountainous area. Furthermore, the existence of ecotourism interpretation center as one of ecotourism facilities is not considered as a substantial element of ecotourism space. Similarly, research on ecotourism mapping conducted by [Aiping et al. \(2015\)](#) did not include ecotourism facilities as an essential aspect. Results of the previous research are different from the study on mountain ecotourism spatial planning in Mount Lawu region of Indonesia.

Research concerning ecotourism development in Mount Lawu is done by looking at the whole environment and resources of the area. Mount Lawu region has diverse resources including nature and culture which have the potentials to be ecotourism attractions. However, there are also many problems to develop sound ecotourism in the region. By boosting the potentials and overcoming the problems found in Mount Lawu region managers have the opportunity to develop sustainable ecotourism in the region. To develop ecotourism and apply quality management of ecotourism resources in Mount Lawu sound planning is required. Based on the result of the study a new spatial planning model for ecotourism development in Mount Lawu region to support green management is formulized and recommended to stakeholders. The model underlines the provision of all related facilities which are needed in every space of ecotourism activity to perform green management of the region. [Figure 3](#) shows the new spatial planning model for ecotourism development in Mount Lawu region to support green management. The space is utilized in such a way that best practice of mountain ecotourism can be performed by the managers.



**Figure 3.** Spatial distribution of facilities for ecotourism development in Mount Lawu region.

As can be seen in [Figure 3](#) several ecotourism facilities are provided in the site. The provision of various facilities is intended to help achieve the goal of ecotourism, i.e. maintaining the sustainability of the environment and creating a high level of tourist experience. The most important facility introduced to the ecotourism spatial planning in Mount Lawu region is interpretation center. In every climbing post (station) travelers are given interpretation service in various forms, including interpretation boards and guiding services provided by local tourist guides. Interpretation center has a significant role in ecotourism as it is intended to 'educate' visitors and make them learn about the resources in order that they can understand, enjoy, appreciate, and take part in the conservation of the resources they visit. This can, in fact, become one of the strategies to manage visitors and their impacts on the environment. Finally, the result shows that the new spatial planning model for ecotourism development in Mount Lawu region highlights the availability of all suitable facilities, particularly interpretation centers, which are needed in every space of ecotourism activity to perform green management of the region. Interpretation center as one of interpretation facilities need to be provided in the entrance area and at all stations in the whole route / track to the top of Mount Lawu.

#### 4. CONCLUSION

Results show that the planning concept for managing and developing ecotourism in the region has not maximized the function of the available space to build sustainable ecotourism destination. The spatial distribution of ecotourism facilities in Mount Lawu region has not accommodated the role of interpretation facilities in maintaining the sustainability of the resources. A new spatial planning model for ecotourism development in Mount Lawu region should highlight the availability of all related facilities, particularly interpretation centers, which are needed in every space of ecotourism activity to perform green management of the region.

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