



Study of Geographic Characteristics of Dynamics Ecology at Nglanggeran Volcano

Aldinta Lindri Tripujiantari¹, Fahmi Fahrudin Fadirubun^{1*}, Dewi Ratih Hapsari¹, Rama Listiawan Saputra¹, Ilham Nurul Qomari¹, Alya Athifahnisah¹

¹Geography Education, Faculty of Social and Political Sciences,
State University of Surabaya, East Java, Indonesia
fahmifadirubun@unesa.ac.id

Abstract. An area has different ecological dynamics and characteristics and this can be used to prioritize that area. Like the ancient Nglanggeran volcano area in Kab. Gunungkidul, Yogyakarta Special Region Province, where this area has an interesting ecological research because it has significant historical, geological and ecological value because this can be used as a reference in carrying out environmental conservation, examining and maintaining the environment of the Nglanggeran volcano. This article aims to determine and analyze the ecological role of the Nglanggeran volcano, identify research locations and the impact of environmental conservation. By collecting data using observation, interviews and literature study techniques. With this, it can be seen that the Nglanggeran volcanic area has many kinds of flora and fauna that are still well preserved, and thus the flora and fauna have their own role in the activities in this area. Then, environmental conservation has had a significant impact on the Nglanggeran ancient volcano area, which was previously known as an arid area, where plants were difficult to grow and lacked water. It has become an ecotourism area with various beautiful views presented in the Nglanggeran ancient volcano area so that it can be developed more widely and can help the economic sector of the surrounding community.

Keywords: Nglanggeran Ancient Volcano, Ecology, Characteristics.

1 Introduction

Nglanggeran Ancient Volcano is a mountain located in Nglanggeran Village, Patuk District, Gunungkidul Regency, Yogyakarta Special Region Province. With a height of 700 meters above sea level and steep slopes, this mountain has great tourism potential. The ecology of the ancient volcano Nglanggeran is an interesting and important research topic, especially because the site has significant historical, geological, and ecological value. The ancient volcano Nglanggeran is one of the oldest geological sites in Indonesia is estimated to be more than 70 million years old, this area holds a lot of information about geological history and natural phenomena that have occurred over millions of years.

Nglanggeran is interesting not only from a geological but also ecological perspective. The ecosystem around this ancient volcano has its own uniqueness which is reflected in its high biodiversity, this area is home to various endemic plant and animal species, making Nglanggeran a natural laboratory for environmental research

and conservation, the presence of various types of vegetation adapted to certain environmental conditions reflects complex ecosystem dynamics and is interesting for further research, apart from that, the Nglanggeran area also has important value for the local community.

People in this region have a close relationship with the surrounding nature, they rely on regional natural resources for various needs, including agriculture, tourism and daily life. Therefore, a deeper understanding of the ecology of the ancient Nglanggeran volcano is beneficial not only for science but also for sustainable management of natural resources and improving the welfare of local communities. Research into the ecology of these ancient volcanoes is also important from the perspective of global climate change. Understanding how ecosystems in these regions respond to environmental change provides valuable insight into how ecosystems adapt to climate change. This can contribute to conservation efforts and mitigating the impacts of climate change, not only at the local level, but also at the regional and global levels.

Geographic characteristics refer to the physical, environmental, and cultural features that distinguish a region, such as topography, climate, vegetation, hydrology, and human interaction with the environment. The geographical characteristics of Nglanggeran Ancient Volcano, which include unique topography with volcanic rock formations, tropical climate with two main seasons, diverse vegetation, play an important role in the ecological dynamics of this region. The rugged topography and volcanic rock create a habitat that supports a diversity of flora and fauna, including endemic and rare species. The tropical climate allows the growth of dense vegetation that provides shelter and food sources for many organisms. Understanding these geographical characteristics is essential in conservation management, ecological research, and the development of sustainable ecotourism, as well as in efforts to protect and maintain biodiversity on the Nglanggeran Ancient Volcano.

Yogyakarta's Nglanggeran Ancient Volcano is more than 70 million years old and is an ancient geological site with significant historical, geological and ecological value. Its biodiversity-rich ecosystem is home to many endemic species and is important for environmental research and nature conservation. Society relies on natural resources to meet various needs. Therefore, understanding the ecology of Nglanggeran is useful for sustainable management of natural resources and increasing their welfare. This research on mountain ecology also contributes to understanding how ecosystems adapt to climate change, so that it can contribute to conservation efforts and mitigating the impacts of climate change at various scales.

Climate change has a significant impact on biodiversity on the Nglanggeran Ancient Volcano. Increasing temperatures can disrupt the physiological processes and behavior of species, while changes in rainfall patterns can affect air and habitat availability. Shifts in vegetation composition may also occur, where species that are more resistant to new conditions become dominant, while others are pushed out. Additionally, an increase in extreme weather events such as floods and landslides can destroy habitats and threaten species. Some species may attempt to migrate, but geographic limitations may hinder this adaptation. Ultimately, these changes can disrupt interactions between species, such as predation and competition, which in turn affects ecosystem stability.

Based on the background above, the formulation of the problem in this research is what are the How is the relationship between geographical characteristics and

ecological dynamics in the Nglanggeran Ancient Volcano area, what are the characteristics and diversity of flora and fauna in the Nglanggeran Ancient Volcano area, then what are the characteristics and diversity of flora and fauna in influencing the ecological role in the Nglanggeran Ancient Volcano area, and what is the impact of the role of conservation environmental impact on ecotourism in the Nglanggeran Ancient Volcano area?

2 Research Methods

This research was conducted at the Nglanggeran Ancient Volcano which is located in Gunung Kidul Regency, Yogyakarta Special Region. This study used qualitative research methods. According (Moleong, 2013) defines qualitative research as a type of research that aims to understand phenomena experienced by researchers such as perpetrators, perceptions, motivations, actions, etc. in the form of words and language in a natural context. using various scientific methods[3]. The qualitative approach according (Creswell W., 2003) is a method used to create knowledge statements based on a participatory perspective, a constructive perspective, or both[3]. This confirms that in qualitative research, knowledge is built through interpretation and referring to various perspectives and existing knowledge about the research subject.

The data collection techniques used were observation, interviews, literature study. Observation is a data collection technique, where material and information are collected by systematically observing and recording various phenomena that are the object of observation, such as human behavior, work processes, natural phenomena, etc. In this technique, a small number of respondents are observed (Djaali, 2020)[4]. The observation method used is non-participation, namely observations made at a distance or not participating in the activity being observed. An interview is an interactive communication process between two people or parties which is carried out directly between the researcher as the interviewer and the respondent as the person being interviewed on a predetermined topic. Literature study is a data collection technique using literary sources such as books, scientific journals, reports and other documents that support research or studies.

Based on the research method used, the aim of this research is to identify the relationship between geographical characteristics and ecological dynamics in the Nglanggeran Ancient Volcano area, identify the characteristics and biodiversity of the Nglanggeran Ancient Volcano area, analyze the important role of ecology in the Nglanggeran Ancient Volcano area, and identify the impact of the role of environmental conservation on ecotourism in the Nglanggeran Ancient Volcano area.

3 Result And Discussion

3.1 Relationship between Geographical Characteristics and Ecological Dynamics in the Nglanggeran Ancient Volcano Area

The Nglanggeran Ancient Volcano was formed from volcanic activity that occurred around 70 million years ago. Nglanggeran Ancient Volcano consists of dominant

andesite rock, creating a steep and varied topography. The topography of this region varies greatly, from highlands to steep valleys. With this difference in altitude, the microclimate formed can have an impact on the distribution of vegetation and fauna.

The Nglanggeran Ancient Volcano is located in Gunungkidul Regency, Yogyakarta Special Region. Nglanggeran Ancient Volcano has varied topography, ancient volcanic rock formations, and diverse ecological habitats, making this area unique. Its unique characteristics can significantly influence the ecological dynamics of this area. In the Nglanggeran Ancient Volcano area, the relationship between geographical characteristics and ecological dynamics is very close and complex. This area is a tourist attraction that has high ecological and geological value, which causes various unique ecological dynamics.

The type of topography in the Nglanggeran Ancient Volcano area can influence the existing ecological dynamics. Biodiversity such as flora and fauna, soil and water, ecosystem interactions, and human activities are part of the ecological dynamics that exist in this area. There are various species of plants, birds, insects and mammals that have adapted to the climate of the ancient Nglanggeran volcano. The existing rock structure affects soil porosity and permeability. This can impact groundwater availability and surface drainage, which impacts the types of plants that can grow and the overall health of the ecosystem. The interactions in this area will form a complex and dynamic ecosystem. In this area, human and natural interactions such as climbing and nature tourism can influence the ecosystem structure and natural balance.

The geographical characteristics of Nglanggeran Ancient Volcano and ecological dynamics influence each other. Biodiversity is supported by diverse microhabitats produced by diverse geography. The structure of rocks and certain types of soil can influence drainage patterns and water availability, both of which are essential for the survival of the flora and fauna in this area. Human activities in this area need to be managed well to maintain ecological balance. Sustainable conservation and tourism programs must be implemented to ensure that the unique geology and ecology of the Nglanggeran Ancient Volcano is maintained for future generations.

3.2 Characteristics and Diversity of Flora and Fauna in the Nglanggeran Ancient Volcano Area

Biodiversity in the ancient Nglanggeran volcanic area shows that the area has a variety of unique and endemic plant and animal species. It was found that the existence of this ancient volcano played an important role in maintaining the surrounding ecosystem. The ecology of the ancient Nglanggeran volcano provides important ecosystem services, such as providing clean water, maintaining soil, and habitat for various species. Local communities interact with the ancient Nglanggeran volcanic ecosystem through ecotourism, agriculture and other economic activities. They utilize natural resources sustainably by maintaining ecosystem balance and implementing conservation practices. However, there are also challenges faced in maintaining the sustainability of this ecosystem, such as climate change, increased human activity, and land use conflicts. Therefore, there is a need for cooperation between local communities, government and other related parties to maintain the biodiversity and ecology of the ancient Nglanggeran volcano for the sake of mutual prosperity.

The ancient volcano Nglanggeran, located in Gunungkidul district, a special region of Yogyakarta, has a high richness of flora and fauna. With around 250 plant species that grow in the area and have been identified. The type of tree dominates the Nglanggeran area such as acacia, mahogany, teak, sengon, cempaka, and banyan. Small plants such as grass, ferns, shrubs and flowers. types of flowers such as orchid are also often found in the Nglanggeran area. There are around 20 species of orchids that grow in this area, ground orchids and epiphytic orchids are the most common in this area. The diversity of flora in the Nglanggeran area can be influenced by several factors such as altitude and climate, and the type soil that tends to be fertile.

Apart from the diversity of flora, the Nglanggeran area is also rich in fauna diversity. Both from mammal species, birds to reptiles. The most common types of mammals found in this area are long- tailed macaques, Javanese langurs, mouse deer and porcupines. Of the bird species, we can generally see Javanese eagles, cockatoos, storks and many types of songbirds. Like mountains and forests in general, the Nglanggeran area is also inhabited by several reptiles such as snakes and monitor lizards.

Ecology in the Nglanggeran area has an important role in the sustainability of the ecosystem in the area. The Nglanggeran volcanic area is a habitat for the diverse flora and fauna there. This diversity plays an important role in maintaining ecosystem balance and has the benefit of providing natural resources, especially for humans. Lush forest areas in Nglanggeran play an important role, especially in preventing soil erosion due to water. Tree roots play a role in absorbing water and binding the soil. Apart from that, the tree roots here also act as a binder for water so that it does not flow directly into the river, where if there is heavy rain it will cause the water to overflow in the river, and this is where the role of forests is really needed. Healthy air quality is also caused by several factors, including air filtering by trees from the Nglanggeran forest area. Apart from having benefits for the ecosystem there, healthy air certainly brings benefits to the standard of living of people living in the Nglanggeran area.

3.3 The Influence of Characteristics and Diversity of Flora and Fauna on the Role of Ecology in the Nglanggeran Ancient Volcano Area

Nglanggeran volcano has diverse characteristics both in terms of flora and fauna. With around 300 types of plants that grow abundantly in this area. With the most dominant type of flora being moss. Moss plants themselves are a group of small plants and belong to the bryophyta family. Unlike other plants that have true vessels, mosses do not have true vessels. With humid area habitat. The Nglanggeran volcanic area is a tropical rainforest, with high rainfall and warm temperatures. Making the Nglanggeran volcanic area a suitable habitat for moss.

The growth of moss in the Nglanggeran volcanic area plays a very important role in the ecology of the area. Even though moss is a small plant, it has the same role as other plants, namely as a producer of oxygen. Apart from that, moss is also able to accommodate and retain large amounts of water so that there is less potential for erosion to occur in the Nglanggeran volcano area. Moss also plays a role in the food chain, with its role as food for small plants and helping maintain the balance of the fauna population in the Nglanggeran volcanic area. The growth of moss in the Nglanggeran volcano area

also indicates that this area is free of air pollution, because moss is known as an indicator of air pollution.

Apart from moss or bryophyte plants, the Nglanggeran volcanic area also grows fern plants. Fern plants have an important role in maintaining the ecosystem of the Nglanggeran volcano area. This is influenced by abiotic environmental conditions with an air temperature of around 26.44 degrees Celsius and a soil temperature of around 26.18 degrees Celsius. Nutrient balance in the Nglanggeran volcanic area. The large growth index of ferns in the Nglanggeran volcano area makes ferns a characteristic of the area. Even though they are often considered weeds, ferns have quite an important influence on ecology. One of the benefits for humans is that it is a medicinal plant that is cheap and easy to find.

3.4 The Impact of Environmental Conservation on Ecotourism in the Nglanggeran Ancient Volcano Area

The Nglanggeran volcano area used to be an area that was not known as an ecotourism area like it is now. Many local people used to earn a living by going out and looking for work in the city, especially the youth of the local community. Many of them migrate to cities and even abroad. But now the habits of the youth there have begun to be abandoned. They began to develop the potential of their area by turning the Nglanggeran volcano area into ecotourism. The Nglanggeran volcano area is part of the Mount Sewu geosite site. Where the development of ecotourism in the area focuses on natural volcanic tourism ancient. The Nglanggeran ancient volcanic area has several good characteristics in terms of flora and fauna which make this area a plus in the development of the ecotourism industry. The development of ecotourism by carrying out environmental conservation in the Nglanggeran volcano area, maintenance and guarding of the flora and fauna there needs to be done so that they do not suffer damage. Additional facilities such as additional climbing routes and standby posts for climbers to rest. Making information boards regarding types of flora or information about ancient volcanic areas can be added to clarify the information conveyed to tourists.

Ecotourism in the Nglanggeran area is still being developed and has new innovations to attract tourists from both local and foreign tourists. such as tourism development in the field of village culture. However, this is still not widely developed by the local community. One of the influencing factors is inadequate workforce in managing the culture of the surrounding community. Planning to establish a village as a tourist village needs to be done carefully and requires participation and cooperation from local residents. By carrying out careful planning in managing Nglanggeran village as a tourist village, it can help develop the economy of the surrounding community and not only depend on the Nglanggeran volcano ecotourism alone. Opportunities for the community to develop supporting businesses such as accommodation and accessories shops and souvenirs can be an innovation to develop the economy of the surrounding community.

4 Conclusion

The Nglanggeran volcano area was previously not known as an ecotourism area, because this area is known to be barren and difficult to grow crops because this area is a karst area. However, currently the Nglanggeran volcano area is an ecotourism area which is managed by the community and government by carrying out environmental conservation, guarding and maintaining the flora and fauna which makes the Nglanggeran volcano area have a variety of flora and fauna that are able to attract tourists to visit. The volcano is langgering. The ecology of the Nglanggeran volcano has an important role in ecotourism in this area, so it requires several treatments so that the ecology in the Nglanggeran volcano area is maintained and can be further developed. Efforts have been made the community in developing the Nglanggeran volcanic area is able to help the community in the economic sector.

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