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### Development Zoning of Bindu River Ecotourism based on Eco Culture

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**Abstract.** Bindu River Ecotourism is a tourist attraction that has natural potential as a place of recreation in the Denpasar City area. Apart from its potential there are still problems that exist in Bindu River Ecotourism. If zoning is not carried out in its development, the natural potential of the area that has been arranged can be reduced, for this reason, zoning is needed in its development to determine areas in the Bindu River Ecotourism area that are in accordance with the land use and development potential. Based on the delineation and the existing potential, the Bindu River Ecotourism area is divided into a conservation zone and a recreation zone. For the conservation zone, it can be developed into several more zones in the upstream part, it can be developed into a zone for the development of the function of protecting water resources, a zone for the development of the function of protecting flora and fauna as well as limited recreational functions. While the recreation zone can also be developed into several more zones. The upstream recreation zone can be developed into a recreation function development zone and the downstream recreation zone can be developed into an educational function development zone.

Keywords: eco culture, river ecotourism, sustainable development, zoning

**1. Introduction**  
Rivers as one of the water resources have important benefits and roles in human life. The river that crosses the residential area is quite dense, nowadays its condition shows a tendency to get worse every year. Increasing economic development activities, changes in land use, and increasing population growth have resulted in high pressure on the river basin on the environment [1]. High population growth and rapid development activities in riverside areas such as settlements and so on cause ecological pressure on ecosystems and river resources to increase as well. This pressure can

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*by I Gusti Agung Putu Eryani*

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### 1. Introduction

Rivers as one of the water resources have important benefits and roles in human life. The river that crosses the residential area is quite dense, nowadays its condition shows a tendency to get worse every year. Increasing economic development activities, changes in land use, and increasing population growth have resulted in high pressure on the river basin on the environment [1].

High population growth and rapid development activities in riverside areas such as settlements and so on cause ecological pressure on ecosystems and river resources to increase as well. This pressure can

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certainly threaten the existence and sustainability of river ecosystems and resources, either directly or indirectly.

Ecotourism-based tourism area management can create sustainable tourism [2]. Sustainable ecotourism planning is to help conservation to survive without changing the basic mission of ecotourism and its unique status in the global environmental scheme [3]. One of the important steps needed in anticipating this problem is to develop a comprehensive master plan for the development and revitalization of river ecosystems and resources [4].

Currently, the Denpasar City Government organizes several rivers in Denpasar into a public space. One of them is Bindu River Ecotourism which has been developed as a recreational object in Denpasar City as part of the Denpasar City clean river program since 2010 [3]. Before being laid out, Bindu River Ecotourism often functioned as a household waste disposal site. The current condition in Bindu River Ecotourism is dominated by soft cape so that it can give a natural impression. Bindu River Ecotourism is located in Banjar Ujung, Kesiman Village, East Denpasar District, Denpasar City. Bindu River Ecotourism is an ecotourism-based tourism object which was just inaugurated on March 24, 2017 [4].

Bindu River ecotourism is a tourist attraction that has the potential as a place of recreation for children, adolescents, parents, and families. Bindu River Ecotourism provides buoys, tires, and canoes for playing facilities in the waters of the Bindu River tourist attraction. Bindu River also provides several outdoor fitness facilities, several children's play facilities, and a neatly arranged garden. Apart from the potential offered by Bindu River Ecotourism, there are still problems that exist in the Bindu River including river water which has a lot of sediment, the lack of public awareness to care about the surrounding environment, and the lack of exposure by the public makes only the surrounding community know. If zoning is not carried out in its development, the natural potential of the Bindu River Ecotourism area that has been arranged can be reduced, for this reason, zoning is needed in its development to determine areas in the Bindu River Ecotourism area that are in accordance with the land use and development potential.

## 2. Material and Methods

### 2.1. Research Location

This research was conducted at the Bindu River Ecotourism located in Banjar Ujung, Kesiman Village, East Denpasar District, Denpasar City (Figure 1). Bindu River is an ecotourism-based tourism object which was just inaugurated on March 24, 2017.



Figure 1. Research Location

## 2.2. Research Tools and Materials

In this study, the tools used were drones, GPS, cameras, Google earth pro. Drones, meters, cameras are used to see potential locations adapted to possible development zones. Google Earth Pro is used to match the mapping results from the survey with imagery at the location, then used for zoning mapping based on the coordinates mapped during the survey. While the materials used in the form of primary data and secondary data. Primary data was obtained from the results of a direct survey at the location around the Bindu River Ecotourism. While the secondary data used in the form of a literature review is used as the theoretical basis for determining zoning.

## 2.3. Data Analysis Methods

This research is descriptive quantitative research, where this research begins with problem analysis, then data collection is carried out, both primary and secondary data. Primary data is taken by conducting a field survey to see the existing condition and then mapping the potential for regional development. Based on this data, the delineation of the area is carried out to determine the development zones that can be carried out, then match the potential of the area with the appropriate development zone based on its potential. The results of the division of these zones can be used as a reference for the government and also Bindu River Ecotourism managers to develop the Bindu River Ecotourism area in the future so that the existing potential can be used sustainably to increase the economic level of the surrounding area without damaging the existing ecology.

## 3. Result and Discussion

### 3.1. The Existing Condition of Bindu River Ecotourism

The length of the Bindu River watershed is  $\pm 1300$  m, with an area of  $\pm 22,100$  m<sup>2</sup>. Bindu River is located in East Denpasar District, Kesiman Village. It consists of several banjars, namely: Banjar Dukuh, Banjar Ujung, Banjar Abianangka Kaja and Banjar Abianangka Kelod (Figure 2). Currently, the Bindu River has been managed and developed as an ecotourism area. The Ecotourism Society defines it as responsible travel to natural areas that conserves the environment and improves the well-being of local people. A walk in the rainforest is not ecotourism unless the trip benefits the environment and the people who live there. A rafting trip is only ecotourism if it raises awareness and funds to help protect watersheds. A loose interpretation of this definition allows many companies to promote themselves as something they are not [5].

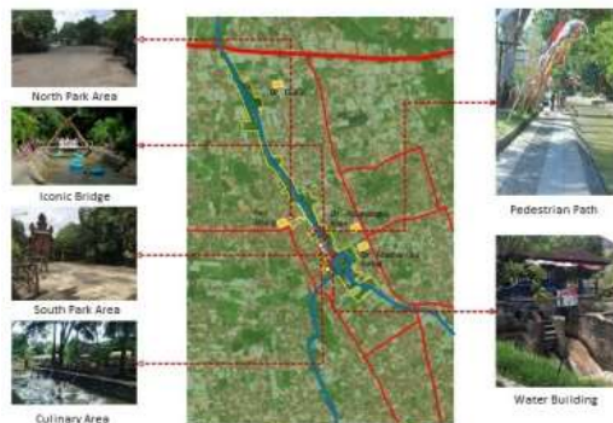


Figure 2. The Existing Condition of the Bindu River Ecotourism Area



In the northern part of the Bindu River ecotourism area, there is a parking area that can be used by the community when visiting the Bindu River area which is usually used for car parking due to its large location, while the southern parking area is usually used for motorbike parking areas. Then in the river area of the Bindu River ecotourism, a bridge has been built with the inscription Bindu River ecotourism which is usually used by visitors to take photos, and there is a culinary area that is usually used for visitors to enjoy food during recreation. However, during the Covid-19 Pandemic, this culinary area is not too crowded so only a few stalls are operating. The Bindu River has considerable potential as river ecotourism in the middle of the city. It is still rare that a river in the middle of a city with identical problems can be arranged in such a way that it can be used as river ecotourism.

### 3.2. Bindu River Ecotourism Problems

Although it has great tourism potential, currently the Bindu River still has several problems, such as the existence of riverbank areas that have not been properly managed so that when the water rises during heavy rains, the risk of flooding will be even greater coupled with sediment shipments from upstream parts of the river, which causes siltation of the Bindu River thereby reducing the river's storage capacity (Figure 3). If the development of Bindu River ecotourism is not managed properly, the development of the Bindu River as ecotourism can threaten the sustainability of the Bindu River ecosystem.



**Figure 3.** Bindu River Ecotourism Problems

### 3.3. Bindu River Ecotourism Area Delineation

The determination of the delineation of the area is based on the length of the existing development segment that has been previously determined, the physical condition of the environment, and the administrative boundaries of the Banjar or environmental scale. Based on these considerations, delineation of the area is determined, as shown in Figure 4.



**Figure 4.** Bindu River Ecotourism Area Delineation

Based on the results of the delineation above, it can be seen that the Bindu River development area is included in 4 (four) Banjar/environmental administrative areas, namely; Banjar Dukuh, Banjar Ujung, Banjar Abianangka Kaja, and Banjar Abianangka Kelod, with the length of the watershed used as long as 1300 meters or 1.3 km and an area of 22,100 m<sup>2</sup> or 2.2 ha.

#### 3.4. The Basic Concept of Bindu River Ecotourism Development Based on Eco Culture

Ecotourism aims to minimize environmental impacts, contribute to the economic development of local communities, and finance conservation and sustainable development programs [5]. Therefore, the development of ecotourism as an industry or economic sector must be planned following the environment (human and natural). Environmental vulnerabilities should be carefully considered and properly integrated into the area planning under the protection requirements. Otherwise, the mental consequences of the environment will outweigh the short-term benefits of socio-economic development [6].

Based on the consideration of the physical environment, socio-cultural conditions of the community, and the potential for activities that can be developed, the development of Bindu River Ecotourism can be carried out on an Eco-Culture basis. Eco Culture is a combination of the word ecological which is abbreviated as eco or in Indonesian it is ecology and the word culture which in Indonesian is culture. Ecology can be defined as the study of the interrelationships between living things and their environment. Eco or ecology is a combination of physical conditions that include the state of natural resources such as land, water, solar energy, minerals, and flora and fauna that grow on land and in the ocean, with institutions that include human creations such as decisions on how to use the physical that environment. All decisions made by all parties involved are always oriented to the balance of nature. Meanwhile, culture is a means of the work, taste, and creation of the community. Eco Culture is a development and design concept that is oriented towards culture and the balance of nature.

The consideration of establishing eco culture as the basic concept of developing the Bindu River also aims to ensure the sustainability of the Bindu River area as a city tourist destination. Thus all forms of activities and arrangements in the context of development carried out must always be oriented to local culture and environmental sustainability. Development must be carried out by utilizing the local potential and paying attention to the surrounding environment, both the physical and non-physical environment.

#### 3.5. Development Zoning of Bindu River Ecotourism based on Eco Culture

Suparno [7] explained that the purpose of preparing a zoning plan is to divide the area into zones that are compatible with mutually supportive (compatible) designations and activities and separate them from incompatible activities. The determination of the zone is focused on the main activities and priorities for the use of coastal resources to facilitate control and utilization.

Sustainable development is a development process that optimizes the use of natural resources and human resources, by harmonizing natural resources with humans in development. [8].

The basis of ecotourism zoning must be based on regional ideology [9]. Since the main task of Bindu River ecotourism is the preservation and recreation of natural landscapes, the development of environmental management methods that are adequate for local environmental conditions and cultural traditions. According to the Seville Strategy, biosphere reserves must fulfill three functions:

- 1) Conservation  
Contribution to the preservation of landscapes, ecosystems, species, and genetic varieties;
- 2) Development  
Promote sustainable economic, social, cultural, and environmental development;
- 3) Scientific and technical functions  
Support for pilot projects, environmental education, training in the field of environment, research, monitoring related to local, regional, national, also global issues of environmental conservation, and sustainable development.



**Figure 5.** Development Zoning of Bindu River Ecotourism based on Eco Culture

Several studies confirm the importance of ecotourism for biodiversity conservation [10][11][12]. So in the development of the Bindu River Ecotourism area, it is necessary to pay attention to the concept of sustainability. Therefore, based on its potential, the Bindu River ecotourism area is divided into two zones, namely the conservation zone and the recreation zone (Figure 5). A conservation zone is an area designated for the preservation and protection of water, flora, and fauna. While the recreation zone is an area designated for utilization through the development of recreational and educational activities.

### 3.6. Conservation Zone Development Concept

For the conservation zone, it can be developed into several more zones, upstream can be developed into a zone for the development of the function of protecting water sources, where this zone can be used for water protection both in terms of quality and quantity. To support water protection in this zone, water cleaning facilities and water treatment facilities can be added. This zone will later become a guard for water catchment that falls so that it does not immediately become runoff so that the potential for flooding that occurs downstream of the Bindu River can be reduced. In the middle part of the conservation, the zone can be developed as a zone for the development of flora and fauna protection functions, where for the function of flora and fauna protection it can be in the form of animal-friendly vegetation, animal breeding, and rare plant nurseries such as the *Gumi Banten* park (a place to plant plants that can be used for religious ceremonies), animal parks, fishing recreation, yoga facilities (elderly). Conservation zone in Bindu River Ecotourism can be seen at Figure 6.





**Figure 6.** Conservation Zone Development

### 3.7. Recreation Zone Development Concept

The recreation zone can also be developed into several more zones. The upstream part of the recreation zone can be developed into a recreation function development zone where at this location several development activities such as water recreation facilities and culinary facilities can be carried out. Meanwhile, downstream of the recreation zone can be developed into a zone for the development of educational functions by carrying out several fish hatchery activities, agriculture, outbound, creative business training, art training, co-working space, and water galleries. Recreation zone in Bindu River Ecotourism can be seen at Figure 7.



**Figure 7.** Recreation Zone Development

By developing a conservation zone in the upstream area of the Bindu River Ecotourism area, it is hoped that it can become a water catchment area and water protection. During the rainy season, the area can catch rainwater and store it for the dry season. If this conservation area is damaged, then when it rains with a large intensity, the water will flow directly downstream, this coupled with the relatively flat

slope conditions of the area will cause a large potential for flooding so that it can damage the existing ecotourism facilities downstream. And the recreation zone is intended for environmental-based tourism that can be done to increase the economic potential of Bindu River Ecotourism and as a tourist location for city people who are tired of daily routines but there is no recreation area in the middle of the city.

#### 11 4. Conclusions

Based on the results of the study, it can be concluded several things as follows.

- 1) Bindu River is a tourist attraction that has the potential as a place of recreation for children, teenagers, parents, and families. The Bindu River provides buoys, tires, and canoes for playing facilities in the waters of the Bindu River tourist attraction. Bindu River also provides several outdoor fitness facilities, several children's play facilities, and a neatly arranged garden. Apart from the potential offered by the Bindu River, there are still problems that exist in the Bindu River including river water which has a lot of sediment, the lack of public awareness to care about the surrounding environment, and the lack of exposure by the public makes only the surrounding community know.
- 2) Based on the delineation and the existing potential, the Bindu River Ecotourism area is divided into a conservation zone and a recreation zone. For the conservation zone, it can be developed into several more zones in the upstream part, it can be developed into a zone for the development of the function of protecting water resources, a zone for the development of the function of protecting flora and fauna as well as limited recreational functions. While the recreation zone can also be developed into several more zones. The upstream recreation zone can be developed into a recreational function development zone and the downstream recreation zone can be developed into an educational function development zone.

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