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The Ecotourism Planning of Jatiluhur Reservoir Based on Conservation

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ABSTRACT

Jatiluhur reservoir is the first multifunctional reservoir in Indonesia that must be conserved because of its vital function for its surrounding area. Currently the quality of this reservoir has decreased because of water pollution by the remnants of KJA fish-feed and sedimentation due to the silting of the reservoir, which can cause the water instability and the derivate function of reservoir. Because of those conditions, the management of Jatiluhur reservoir must consider the balance between the conservation and the economic value as well as the need to facilitate the existing social activities. One of the protection efforts that proposed in this study area is ecotourism development. The aim of this study is to evaluate and propose some recommendations for the best conservation management of the Jatiluhur reservoir such as an educational tourism approach. The formulation of the vision, concept, and the strategy for tourism development planning in this reservoir should be considered. The tourism development concept of this reservoir has formulated to protect the balance between the ecological, economic, cultural, educational, and to improve the image of the reservoir. Refer to that basic consideration, the concept of tourism planning in Jatiluhur reservoir is an ecotourism concept that can emphasize the principles of sustainable development. The outcome of this study are an activity zones, also spatial strategy and development of Jatiluhur Reservoir.

Keywords: Tourism, Conservation, Educational Tourism, Ecotourism, sustainable development.

FOREWORD

Background

Jatiluhur reservoir is the first multifunctional dam in Indonesia and should be maintained because of its vital functions. This reservoir was constructed in 1957, and began operation in 1968. The main function of this dam is a hydroelectric power which has capacity of 187,5 MW. Jatiluhur reservoir is able to accommodate around 2,5-3 billion m³ of water. This volume of water serves several catchment area include Bandung, Cianjur, Cimahi, and Purwakarta. Another important function of this reservoir is to irrigate 242,000 ha of paddy's barn. In addition, this reservoir also covered some functions, there are as flood and erosion controller in Karawang, Subang's paddy field, and water suppliers for household, industry, and aquaculture in Northern Coast of West Java which consist of 20,000 ha.

Jatiluhur reservoir is one of the three dam series that utilized the Citarum River. These three dams forms a giant cascade. Citarum river was utilized by three dams, there are: Jatiluhur, Saguling, and Cirata reservoir. The highest dam is Saguling reservoir at elevation 643 m above sea level, the next one is Cirata reservoir at elevation 220 m above sea level, and the last is Jatiluhur reservoir at elevation 107 m above sea level. Those three dams consist of 5.607 ha, 6200 ha, and 8300 ha of waterbody total area.

As the last reservoir, Jatiluhur's water quality is influenced by its geographical position. Not only by its geographical position the reduction of water quality is also caused by the exchange of Saguling and Cirata reservoir into a multipurpose reservoir and the pollution from the activities along Citarum river

The operation of Jatiluhur reservoir is responsible by Perum Jasa Tirta (PJT) II. This Institution is responsible to manage the reservoir's performance independently. So that, Jatiluhur reservoir must generate not only environmental purpose but also economical purpose to operate all the main reservoir's function. PJT II Jatiluhur as a government organization provides its commodity such as electricity and clean water to whole society. The purpose and function diversification are needed to run the business in term of creating a powerful and self-sufficient economy for Jatiluhur reservoir's management.

This reservoir had turned into a national vital area which needed an extra management. Water resource conservation is the essential aspect for every activities that held in this area. The conservation is not only for water body but also for the land that surrounding this water body which is related to the control of quality and quantity inside. The surrounding land can be utilized as the important buffer zone. In this case, the integrity among the built area must be maintained. Land without ownership caused unrestrained development and it is threatened the land function as the buffer. To restore the land function, some activities should be developed for this buffer area. It is important to increase the economical conservational value rapidly.

In order to business activity diversification, PJT II Jatiluhur developed tourism activities by using the water body of the reservoir and all surrounding land area (Figure 1). The potential attraction that offered by the reservoir are the water body, the dam structure, and the surrounding greeneries. Those had proven by the increasing number of public visitors every year. The easiest way to get this reservoir is easily accessed by using Cipularang highway and it is located between two main source tourism markets in West Java, Bandung, and Jakarta which gives the benefit value to this reservoir as a potential tourism attraction.



Figure 1. Jatiluhur reservoir

The main attraction of Jatiluhur reservoir is the reservoir water body and the natural environment. A uniqueness is also offered the biggest overflow/spillway morning glory in the world, and the only one reservoir that has a pair of power generation and irrigation valves suplesi inside the reservoir (Figure 2).

The discussion for this study is:

Nowadays, the management of Jatiluhur reservoir should be able to balance the protection (conserving) between its main function, as the electricity and clean water supplier, and the environmental purpose and activities.

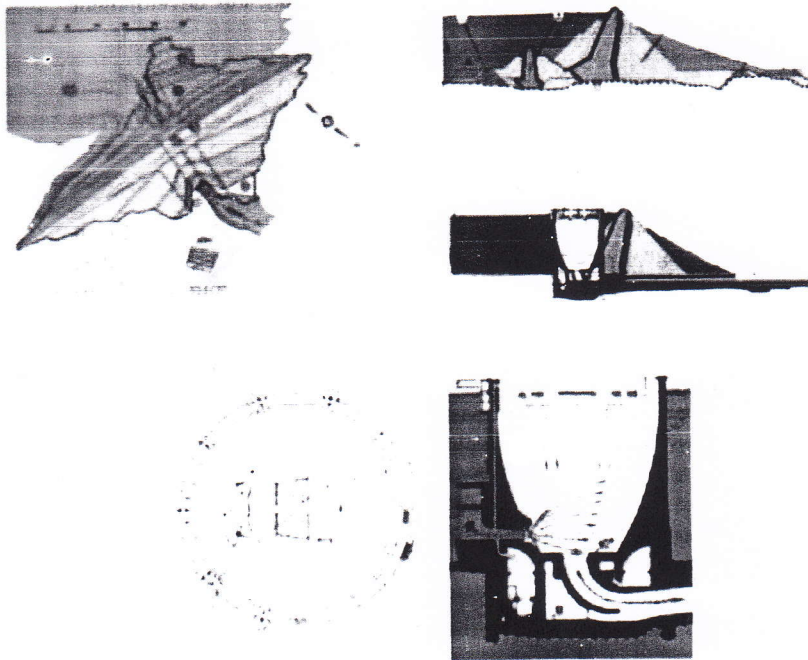


Figure 2. The design of Jatiluhur reservoir

The current condition of the environment quality and carrying capacity of Jatiluhur reservoir had been degrading slightly, it is because of:

- Water pollution by the remnants of KJA fish-feed,
- Degraded reservoir's capacity due to the silting of the reservoir that affected the stability of the water and dam, the reservoir/dam sustainability, and the condition of the local people and environment.

Goals and Objectives

The purpose of this study is to create an ecotourism concept, principle, and strategy based on conservation

The objectives of this study are:

- To determine the spatial and environmental planning, such as zoning strategy, of Jatiluhur reservoir.
- To formulate a spatial strategy and development based on conservation and tourism, in Jatiluhur reservoir as a solution to control the tourism area and the activities, the greenbelts surrounding the reservoir, and the floating net cages (KJA).

Table 1 Trofik Status of Lake and Reservoir

Trofik Status	Total Nitrogen (mg/L)	Total P (mg/L)	Chlorophyll-a (mg/L)	Brightness(m)
Oligotrof	<0,661	< 10	<0,0017	<9,9
Mesotrof	<0,753	< 30	<0,0047	<4,2
Eutrof	<1,875	< 100	<0,0143	<2,4
Hypereutrof		≥100		

Source: Ministry of Energy and Mineral Resources Regulation No. 28, 2009

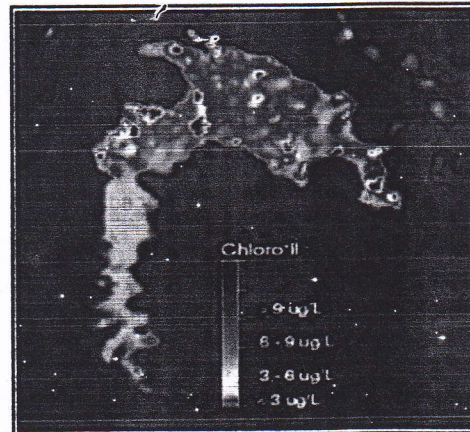


Figure 3. Pollution level of Jatiluhur reservoir from chlorophyll indicator
Source: Research Center of water resource, 2007, Ecoterra Multiplan. 2010

The water condition which has a high level of pollution turns the main function area such as reservoir and water intake need to be considered, thus the KJA zones should be allocated, not to close to the main function.

Development Concept

Tourism development concept of Jatiluhur reservoir is formulated to keep the balance between the needs of environmental water body conservation and the surrounding of catchment area. The need of economic diversification, and the needs of social, cultural, and educational aspect could promote the image of Jatiluhur reservoir and Perum Jasa Tirta II as the institution.

Refer to those basic considerations, ecotourism concept is applied for the concept which is using the principles of sustainable development, such as environment utilization to keep the needs of tourism's of the present, to enhance the opportunities in the future, to create a balance usage for economy, social, and beauty benefits. The escalation of human's life by protect the culture, ecological process, biodiversity, and other supporting elements become necessary as well.

Ecotourism is a concept that responsible and respect to the natural environment; conserve the environment; and continuing the local community welfare (Epler, 2002). The ecotourism activity form include a) actively contributes to conserve the nature and culture, b) involves the local communities in planning, development, and management as well as to contribute positively to their welfare, c) carried out in the form of independent or organization in a small group tourism (Heher, 2003)

Ecotourism Principles

The tourism development will refer to the ecotourism principle which is developed by the United Nations Environmental Programme (Epler, 2002). There are several principles of ecotourism include:

1. Prevent and mitigate the impact of tourism activity in natural and cultural local aspect
2. Education for environmental conservation. Educate tourists and local people for the importance of conservation.
3. Community participatory planning, development, and supervision.
4. Avoiding the use of oil, conserve flora and fauna as well as maintaining the local culture.
5. Adjust the carrying capacity of tourism activities and the environment, because the natural environment generally has lower carrying capacity rather than the regional man-made capacity.

Ecotourism Spectrum

The principles of sustainable tourism development that explained before will be elaborated in four categories of ecotourism spectrum. This concept is developed by Alan Mills, 2002 (Figure 4), those are:

1. "Light ecotourism". It is an ecotourism category which has all essential elements of ecotourism. In fact, the travelling activities is not a responsible travel to natural area or not contribute to conservational activity, local community welfares, and environmental education programs for tourist and local society as well. The color code for this spectrum is light blue.
2. "Green tourism". This spectrum is a travelling activity that responsible to the natural area, with a primary focus on natural resources and conservation. The aim of this concept is not to increase the local society welfare. The color code for this spectrum is green.
3. "Adventure travel". This spectrum highly depends on natural resources usage, it requires a specific physical capacity and the activities have a specific risk, such as rock-climbing, kayaking, and scuba diving. The color code for this spectrum is yellow.
4. "Nature tourism". This spectrum depends on the natural resources usage, includes lighter physical activities compare to the adventure's travelers. The color code for this spectrum is red.

The other spectrum that was not applied in Jatiluhur reservoir area is "pure ecotourism". This spectrum concept is a condition which all the elements of ecotourism have been established already, includes: responsible travelling activities to natural area, natural conservational efforts, actively contributing for local community welfares, and developing environment educational programs. In the future, this spectrum is possibly engage to give an extra protection for Jatiluhur reservoir and its surrounding area, as it is seen on Figure 4.



Figure 4. Ecotourism spectrum

The other concepts that support the ecotourism development are controlled mass-tourism and restricted tourism in several zones that still developing in mass tourism (Figure 5). The mass tourism was already established since long time ago, and now it became a backbone of tourism activities. It is undeniable that the public need an access for tourism and recreation to this national reservoir.

Basically, the *controlled* mass-tourism concept is applied in several special points which is relatively limited as a place with a high level density of tourism activities.

Meanwhile, the restricted-tourism concept is applied to several zones in this area, where the vital function is essential and also tourist interest because it gave knowledges and experiences to them. The terms of interest here requires an extra high-security and safety services for them.

Man-made attraction was built to support the main attraction from reservoir's environmental itself.



Figure 5. The implementation of ecotourism spectrum concept in Jatiluhur reservoir tourism area

Spatial Development Strategy of Jatiluhur Reservoir Area

Spatial development strategy of Jatiluhur reservoir as a tourism area is formulated as follow:

1. The determination and distribution of tourism activities and its supporting functions should consider according to the regional characteristic and sustainability of the area.
 - Jatiluhur reservoir tourism area must be functioned as a conservational area, to protect the sustainability of its main function. The functions should be developed with several limitation and should not interfere the primary function of the reservoir.
 - Tourism activities, which have been developed, are using an existing resource with a little change of the land form.
 - The tourism activities, which are being developed, are divided into: soft educational tourism (such as agro-tourism, geo-tourism, and museum); hard educative tourism (such as educational tourism related to the reservoir or related to the hydrological aspect), which are allocated in appropriate areas; and adventure tourism (such as water sports, hiking, and trekking).
 - Mass recreational tourism that has been running in Jatiluhur reservoir, should be limited, directed, and controlled into educational recreation development.
 - The land use planning of Jatiluhur reservoir tourism both aquatic and terrestrial area is divided into several following zones, those are:
 1. Water and reservoir zone is directed to water sports tourism activities, agrotourism, aquaculture, and tourism activities that related to the scientific research and development for reservoir and dam conservation.
 2. Riparian zone is a zone that is intended to research and development activities. It is also used to develop the science and knowledge about biodiversity and conservational program in Jatiluhur reservoir area.
 3. Green belt zone is also intended to limited natural and sport tourism activities.

4. The upstream zone is directed for tourism activities that support to the reservoir's conservation.
5. Uphill zones refer to natural adventure tourism activities.
6. Morning glory zone is used for hard educative tourism activities.
7. West coast zone is for soft educative tourism activities and low-density resort.
8. East coast zone is for service center, information center, and educational tourism.

2. The detail plan of Jatiluhur reservoir's tourism development were done by its function and zoning, especially for KJA's management regulation, buffer zone (green belts), riparian zone, and morning glory zone. Each program will be described as follow:

- a. KJA zone is limited by only 3257 plots with an area of 49 m² per plot, as an effort to control water pollution. (KJA study Phase II, 2007, PJT II).
- b. Riparian zone, is preserved area with its natural conditions, it is regulated that this area, which is managed by Perum Jasa Tirta II, should not be modified.
- c. Buffer Zone has width of 50 m according to presidential decree 32/1990. This zone has function as a pedestrian ways, passive tourism activities, and rain water runoff and vegetation's zone.
- d. Coastal Lake/mainland protection zone area has function as a residential area with a strict regulation for intensity of land use. This zone has a width of 450 m.
- e. Water catchment zone is in the basin watersheds that related directly to the reservoir.
- f. Morning glory zone is an area around the morning glory that should be protected 200 m around the morning glory/dam.

Land Use Planning of Jatiluhur Reservoir Area

In accordance to the spatial strategy and development of Jatiluhur reservoir area, the land use planning is directed in several zones there are reservoir zone, riparian zone, green-belt zone, upstream zone, uphill zone, morning glory zone, west coast zone, and east coast zone. For more detail, it could be seen in table 2, and figure 7.

Table 2. Activity zones of Jatiluhur Reservoir the spatial strategy and development

ZONE	ACTIVITIES
Reservoir Zone	Water sports tourism (rowing, surfing) Fishing Fisheries-agrotourism Conservation
Riparian Zone	Limited educational tourism (soft educative tourism) Research Conservation
Green-belt Zone	Natural recreation Sport tourism Agrotourism Geo-tourism Adventure tourism (soft adventure tourism) Rest area
Upstream Zone	Limited educational tourism (hard educative tourism) research conservation
Uphill Zone	Limited educational tourism (hard educative tourism) Research Adventure tourism (hard adventure tourism) Conservation
Morning Glory Zone	Limited educational tourism (hard educative tourism)
West coast zone	Forest cultivation-Agrotourism Geotourism Resort (low density)
East coast zone	Tourism information center Accommodation services Commercial center and services Educational recreation Agrotourism Museum

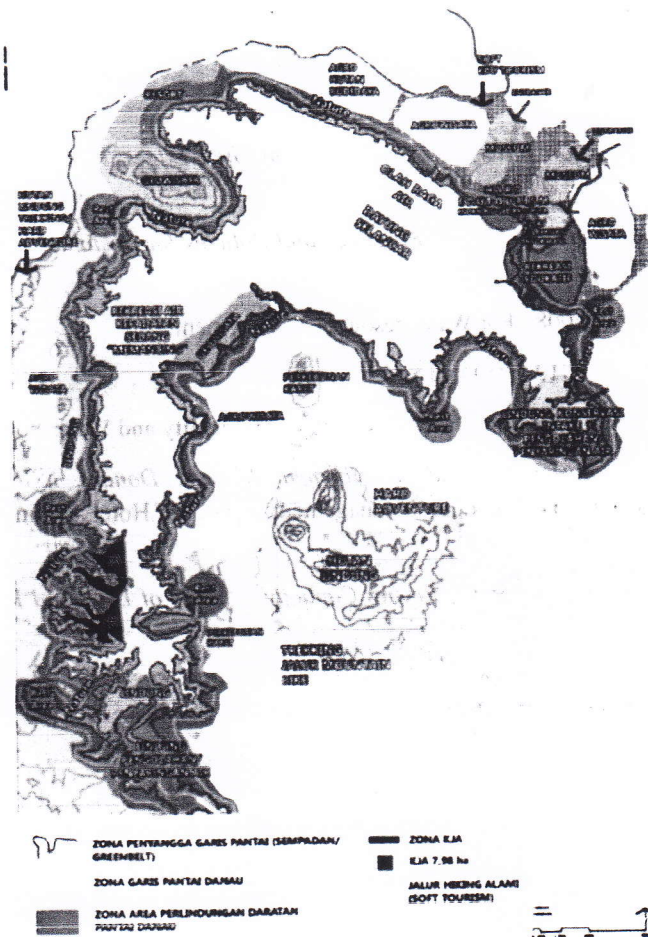


Figure 7. Land use planning of Jatiluhur reservoir (aquatic and terrestrial) area

CONCLUSION

Jatiluhur reservoir has many potential functions and benefits such as energy, economy, food, and natural environment. The current quality of reservoir has decreased because of water pollution and sedimentation. Therefore, this study needed an approach which could maintain the role and function of reservoir as a tourism object/ attraction. Ecotourism approach is an environmental approach that are considering the existing resources and optimizing the potential aspect, without intervention and drastically changes of nature. This study wants to optimize the most potential value of Jatiluhur reservoir, by keep the main function as a reservoir without destructive intervention. The output of this study are zoning and spatial strategy and development of Jatiluhur Reservoir. The land use planning is directed in several zones such as reservoir zone, riparian zone, green-belt zone, upstream zone, uphill zone, morning glory zone, west coast zone, and east coast zone.

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