

# Landscape Character of Pongkor Mining Ecotourism Area

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**Abstract.** Pongkor Mining Ecotourism Area has a diverse landscape character as a potential landscape resources for the development of ecotourism destination. This area is part of the Mount of Botol Resort, Halimun Salak National Park (HSNP). This area also has a fairly high biodiversity. This study aims to identify and analysis the category of landscape character in the Pongkor Mining Ecotourism Area for the development of ecotourism destination. This study used a descriptive approach through field surveys and interviews, was carried out through two steps : 1) identify the landscape character, and 2) analysis of the landscape character. The results showed that in areas set aside for ecotourism destination in Pongkor Mining, landscape character category scattered forests, tailing ponds, river, plain, and the built environment. The Category of landscape character most dominant scattered in the area is forest, here is the river, plain, tailing ponds, the built environment, and plain. The landscape character in a natural environment most preferred for ecotourism activities. The landscape character that spread in the natural environment and the built environment is a potential that must be protected and modified such as elimination of incongruous element, accentuation of natural form, alteration of the natural form, intensification and enhanced visual quality intensively to be developed as a ecotourism destination area.

## 1. Introduction

The landscape character that formed from units of the landscape is a real pattern of elements that occur consistently in a particular type of landscape, which is created from a landscape formations formed from human activities that interact with land in a considerable period of time. In this period of continuous change, but the important thing is the damage or destruction of ecosystems through improper development [1]. The natural landscape character can be categorized as follows: mountain, dune, prairie, swamp, lake, sea, streams, hill, canyon, forest, river, valley, pond, desert, and plain [2].

Human involvement in development who utilizing the natural resources, many lead changes in landscape character, causing damage and destruction of ecosystems [3] [4]. One alternative effort to protect the resources of the natural landscape character damage and maintain the aesthetic quality is through ecotourism. Ecotourism is one of the limited tourism activities that can be done in an



environment that has a natural landscape character, where its resources can also be utilized for economic purposes, as well as underground mining areas.

Pongkor Mining Ecotourism Area has a diverse landscape character as a potential landscape resource for development of ecotourism. Ecotourism activities based on landscape character in mining will provide an advantage in controlling the degradation of the environment, protect natural resources, education, conservation of biodiversity and protecting the cultural and economic benefits [5] [6] [7] [8] [9]. This is in accordance with the mandate SK. MENTAMBEM No. 1211/1995, that the development of mining areas should be able to provide social and economic benefits of society and the protection of ecosystems.

Ecotourism development based on landscape character requires a good assessment of natural and man-made landscape. This is because each area in mining area has some real differences landscape character that expected to provide protection of landscape character value. Based on this, it was necessary the identification and analyze of landscape character in the Pongkor Mining Ecotourism Area. This study aims to identify and analyze the category of landscape character in the Pongkor Mining Ecotourism Area for the development of ecotourism destination.

## 2. Methodology

The research location was in Pongkor Mining Ecotourism Area, which was part of the conservation area of UBPE Pongkor, PT. Aneka Tambang (figure 1) and located at an altitude ranging from 300 meters to 900 meters above sea level [10]. Research began in July 2016 until August 2016.

The method used in this research was descriptive method through field surveys and interviews. This study refer to the study approach by [11]. The study consisted of two phases: 1) identifying landscape character and 2) analysis of the landscape character category.



**Figure 1.** The Research Location  
Source : ESRI (2016)

### 2.1. Research Data

Data collected in the form of primary data and secondary data. Primary data obtained from direct observation in the study site include:

- biophysical data obtained through direct observation were a visual data, contours, slope, and ground check to landscape character category. The results of data processing base maps, thematic maps and satellite imagery that had vectorized into spatial database using ArcGIS 10.1 software.
- observational data of landscape character elements. Checking the position of the elements in the region carried out by using a Global Positioning System (GPS). Scrutiny of the

landscape elements were directed to determine the key character to be the mainstay of area character as ecotourism destination.

## 2.2. Data Analysis

The analytical method that used is the landscape character analysis. Landscape character category analysis used as revealed by [2]. The Steps taken: 1) elevation and slope analysis, which consists of: (1) elevation analysis; (2) slope analysis; and 2) landscape character analysis.

### 2.2.1. Elevation and Slope Analysis

#### a. Elevation Analysis

Elevation analysis (altitude location of the earth's surface) to be done to create topographic maps and contour maps by Digital Elevation Method (DEM). Measures undertaken are: 1) created topographic data; 2) interpolated; 3) created a elevation digital map [12]. The formula for making interpolation as follows:

$$d/D = e/E$$

Where :

$d$  = distance between the grid intersection toward a measuring point elevation obtained (meters);  $D$  = the distance between the grid intersections (meters);  $e$  = elevation change between the grid the same intersection and the intermediate point (meters);  $E$  = total elevation change between the grid intersections (meters).

#### b. Slope Analysis

Slope analysis will be grounded by a contour map (contour map) region [12]. Grade slope (slope categories) were analyzed based on the number of changes of DEM. Class slope of the land will be divided into several classes: 1) 0-3%, 2) 3-15%, 3) 15-25%, 4) 25-45%, and 5) > 45 %. Formulated into an area with a slope (slope) is different is as follows:

$$L = DE/S$$

Where :

$L$  = length of the distance between the contour line;  $DE$  = contour intervals;  $S$  = the percentage of slope

#### c. Landscape Character Analysis

Landscape character maps derived from Landsat satellite imagery. Results obtained Landsat downloads the file containing metadata and files band, besides the image has geo-referenced on WGS 84 datum and projection UTM north orientation (product level 1). In the selection of the Landsat image, a reference used worldwide reference system (WRS) which is a catalog of Landsat data. Based on this, the coverage area of the study found only in one sheet (scene) that is on the path (path) 122 and the line (row) 65. Furthermore, the category processed before (pre-processing) which includes a correction cloud cover (cloud cover and clouds shadow mask), converted into a digital value and cutting reflectance image. Categories of landscape character based on [12] as follows: the mountain, stream, hill, canyon, forest, river, valley, tailings pond, and plain.

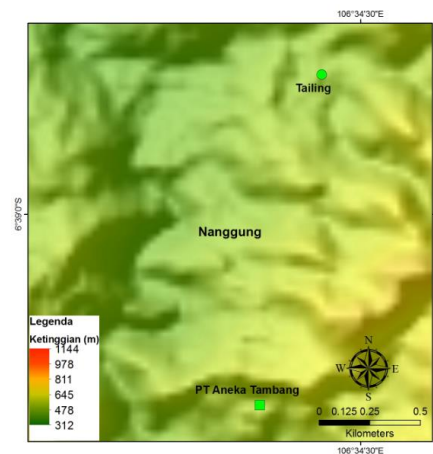
## 3. Result

### 3.1. General Condition

Location of the study are in Pongkor Mining Region. The research location is at 106°34'00"E - 106°35'00 E and 6°38'30 " S - 6°40'00 " S. This study was in the administrative region of Bantar Karet Village, Nanggung Sub-District, District of Bogor. There is a large river that flows in the western part.

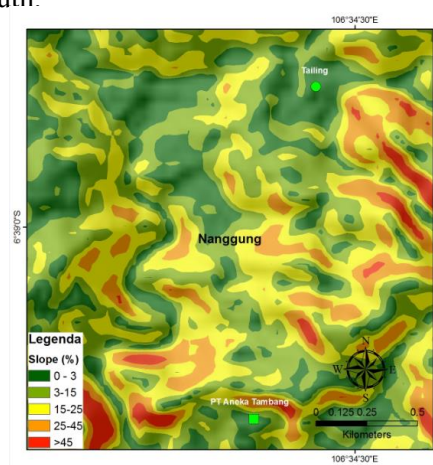
Based on the elevation analysis through DEM obtained approximate location was at 300 - 900 meters above sea level (asl) (figure 2). In general, location of study scattered dominant elevations

between 300 and 800 meters asl. DEM map showed this region had a fairly diverse elevation. To the east, and south increasingly visible elevation, reaches a height of  $\pm$  900-1000 meters asl.



**Figure 2.** DEM Analysis  
Source : data processed (2016)

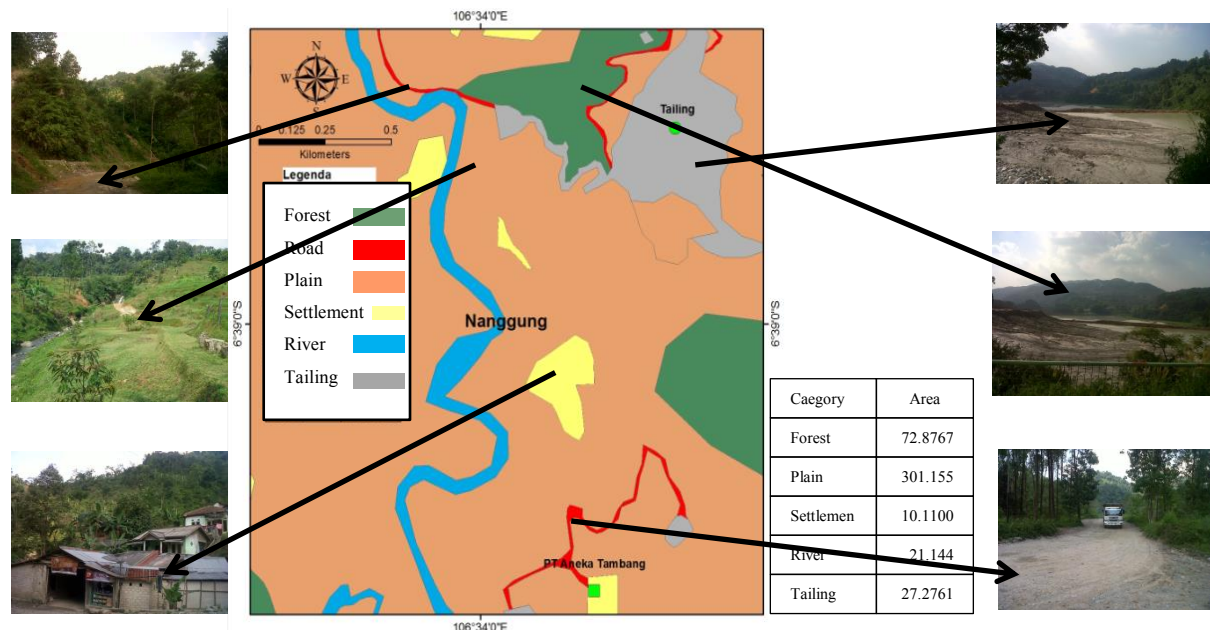
Based on the slope analysis, there was a Several classes: 1) 0-3%, 2) 3-15%, 4) 15-25%, 5) 25-45%, and 6) > 45% (figure 3). The results of the analysis showed that the slope at locations scattered research slope from flat to steep. The slope of the land is dominated by 0-3% and 3-15%. Dominant steep slope was in the east and south.



**Figure 3.** Slope Analysis Map  
Source : data processed (2016)

### 3.2. Landscape Character Analysis

The results of study showed that the category of landscape character refers to [2] are forests, plain, rivers, tailings ponds and the built environment (figure 4). In general the landscape character was dominated by forests and plain. The analysis showed a change in the landscape character in some locations, especially in the location of the tailings ponds, on the edge of the river and the built environment (settlements scattered irregularly).



**Figure 4.** Landscape Character Category Analysis  
 Source : data processed (2016)

### 3.3. Landscape Character Protection and Modification

In the location of study, landscape character distributed forests, plains, tailings dams, rivers and built environment. The landscape character that spread in the natural environment and the built environment is a potential for development of ecotourism destination area. The river is the major feature of landscape character, whereas the forest, plain, tailings dam, and the built environment are the minor feature of landscape character. The landscape character must be protected and modified such as elimination of incongruous element, accentuation of natural form, destruction of the natural form, alteration of the natural form, intensification and enhanced visual quality intensively (table 1).

**Table 1.** Landscape Character Protection and Modification in Pongkor Mining Ecotourism Area

No	Landscape Character	Protected	elimination of incongruous element	accentuation of natural form	destruction of the natural form	alteration of the natural form	Intensification	enhanced visual quality intensively
1.	Minor Feature							
a.	Forests	v	v	v			v	V
b.	Plains	v	v	v			v	V
c.	Tailing dams	v	v			v	v	V
d.	Built Environment		v	v		v	v	V
2.	Mayor Feature							
a.	River	v	v	v			v	V

#### 3.3.1. Protected The Landscape Character

Four types of landscape character in the location of study to be protected were forest, plains, tailing dams, and river. The development of ecotourism destination based on landscape character requires protection against natural character. This was because the natural landscape has a good diversity of biological resources. Protection also carried out on location that has hazards such as erosion, land use and land cover changed, water runoff from the tailing dams and river channel shape changed.



### *3.3.2. Elimination of incongruous element*

Five types of landscape character in the location of study conducted incongruous element were forests, plains, tailing dams, built environment and river. The elimination of incongruous element usually effects an improvement [2] as well as the area that will be used for the development of ecotourism destination. Elimination of incongruous elements do if it conflicts with the natural landscape character. Some of these were the enclave (built environment) in the middle of the forest area. In addition, the colour, texture, form elements and the space where the elements were that the impression of unity and harmony with the natural landscape character. Bizarre landscape elements and damaged the unity and harmony in the area of built environment and the river eliminated, such as colour, texture, form the house and change the form of the channel shape of the river.

### *3.3.3. Accentuation of natural form*

Four types of landscape character in location of study conducted accentuation of the natural form is forests, plains, built environment and the river. The accentuation of natural shape allows to achieve the optimal development of ecotourism destination. Landscape characters can be developed or improved by eliminating any negative elements and by the accentuating its positive qualities [2]. To improve the quality of the landscape needs to do accents in shaping the optimal character. The good view and their new experiences for tourists can be provided through the optimization of the landscape character accentuation through colour, texture, form and space.

### *3.3.4. Alteration of the natural form*

Alteration of the natural form occurs on the landscape character of the tailing dams and built environmental. Construction of the tailing dams and some construction of homes in the enclave changing the natural landscape character. Such Alteration may be can cause damage the landscape character as the land becomes denuded, land cover change from natural landscapes into open land and undeveloped land. This can adversely impact the landscape or to the security landscape beneath it, for example in the form of erosion, landslides and flooding. Restrictions expansion of the built environment to the natural location area needed to be done and used it as part of the landscape elements that can be utilized for the development of ecotourism destination area. The changing natural landscape character should be an effort to optimize the function while maintaining balance and preservation of existing landscape.

### *3.3.5. Intensification*

Landscape character may be intensified by strengthening the landscape character. Three natural landscape character types in the location of study that could be strengthened are forests, plains and river. Intensification was site dramatized. What is meant is the elements of the landscape in a natural landscape character presented following the landscape character profile as the original and did not alter or eliminate them. Intensification can also be done on the built environment and tailings dam in a way site negated. What is meant is giving the boundary with the elements of the natural landscape, constructing building construction preventing erosion and landslides, constructing of retaining wall to prevent damage tailing dams and the water runoff. Intensification of the built environment by balancing the natural landscape elements both of the colour, weight and distance and set the setting pattern and extract the full potential site.

### *3.3.6. Enhanced visual quality intensively*

Five type of landscape character in the location of study could be improved visual quality intensively to develop the area as an ecotourism destination. All of the action plan will be developed on the landscape should give priority to the achievement of the attribute of beauty. The landscape elements that presented must have suitability and beauty of the landscape character. The protection of the natural landscape character such as forests and river give the desired unity and harmony. In plain areas, landscape character profiles maintained and intensified form of character. The landscape

elements presented to give unity and harmony with the surrounding environment. The visual quality of the built environment can be improved through the planning and design that provides good value for unity and harmony such as colour, shape, balance, weight and distance to the surrounding environment. Contrast that are not predominantly be presented within the limits still achieve suitability, unity and harmony with the environment in which these elements are awakened.

#### 4. Conclusion

Pongkor Mining Ecotourism Area has a diverse landscape character as a potential landscape resources for the development of ecotourism destination. The development of ecotourism destination based on landscape character requires a good assessment of natural and man-made landscape. The category of landscape character are forests, plain, rivers, tailings ponds and the built environment, was dominated by forests and plain. The river is the major feature of landscape character, whereas the forest, plain, tailings dam, and the built environment are the minor feature of landscape character. The landscape character must be protected and modified such as elimination of incongruous element, accentuation of natural form, alteration of the natural form, intensification and enhanced visual quality intensively

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