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# Land capability analysis based on hydrology and soil characteristics for watershed rehabilitation

Ambar Kusumandari[a], Prasetyo Nugroho[b]*

[a]*Faculty of Forestry, Gadjah Mada University,Bulaksumur, Yogyakarta 55281, Indonesia*
[b]*Forestry Management, Vocational School of Gadjah Mada University,Bulaksumur, Yogyakarta 55281, Indonesia*

**Abstract**

The growing population in Indonesia impacts on increasing of human needs which influences on the larger area of land degradation. To reduce area of land degradation, land rehabilitation is a key to achieve sustainable development. In identifying area to be rehabilitated, land capability analysis is required. The objectives of this research are: a) to examine soil characteristics as a data base for rehabilitating critical area, b) to study water balance, and c) to analyze land capability. Moreover, this study applies data collection, both primary and secondary for its method. Primary data includes soil characteristics were collected by taking several soil samples at several types of land uses to be analyzed in laboratory includes: soil pH or acidity, organic matter, NPK contents and soil permeability. Secondary data such as, rainfall and temperature data were collected for evapotranspiration and total available water for runoff analysis.

This research results that soil pH mostly is very low (< 4.5) and 3 areas have the low soil pH of 4.5 – 5.5. Major soil organic matters are classified as high (3.1 – 5 %) to very high (> 5.5 %). Nitrogen content varies from low to very low, whereas the Phosphor content is very low at all location. Furthermore, K contents of soil ranges from low to moderate, whereas the CEC is classified as moderate. The soil permeability varies from very slow, slow, moderate to very fast. The water balance analysis shows that along the year there is surplus of the water, except during July to September.The study area has 4 land capability types.

Based on the research result, it can be concluded that the critical land that capable to be rehabilitated includes: open area, shrubs and grassland, with an area of 612.03 ha; 117.75 ha and 27.57 ha, respectively. The soil fertility level is low; the deficit period is July to September. It was recommended that to rehabilitate the area, the lime and fertilizer should be applied. Regarding the climatologically analysis, the best time to plant the trees for rehabilitation is in the period of September to June.


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* Corresponding author. Tel.: +62-816-426-3775; fax: +62-274-550-542.
*E-mail address:* ambar_kusumandari@yahoo.com


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## 1. Introduction

The increasing area of critical land of watershed is a result of the increasing exploitation of natural resources. To reduce critical land area, land rehabilitation is a necessity for such company or person who exploit the land to rehabilitate as stated in Ministry of Forestry Decree Number P.63, year 2011[1]. In order to rehabilitate the degraded land, land capability analysis is very important to support data base includes hydrological and soil characteristics. The objectives of this research are: a) to examine the soil characteristics as a data base for rehabilitating critical area, b) to study the water balance, and c) to analyze land capability as a data base for rehabilitating critical area.

The research was carried out at Meranti Sungai Merah Protected Forest (MSM-PF) covering 11,388.70 hectares. It is located in 4 villages, namely Lubuk Bintialo (52.08 %), Pangkalan Bulian (47.32%), Sri Mulyo (0.38%) and Sungai Napal (0.22%).

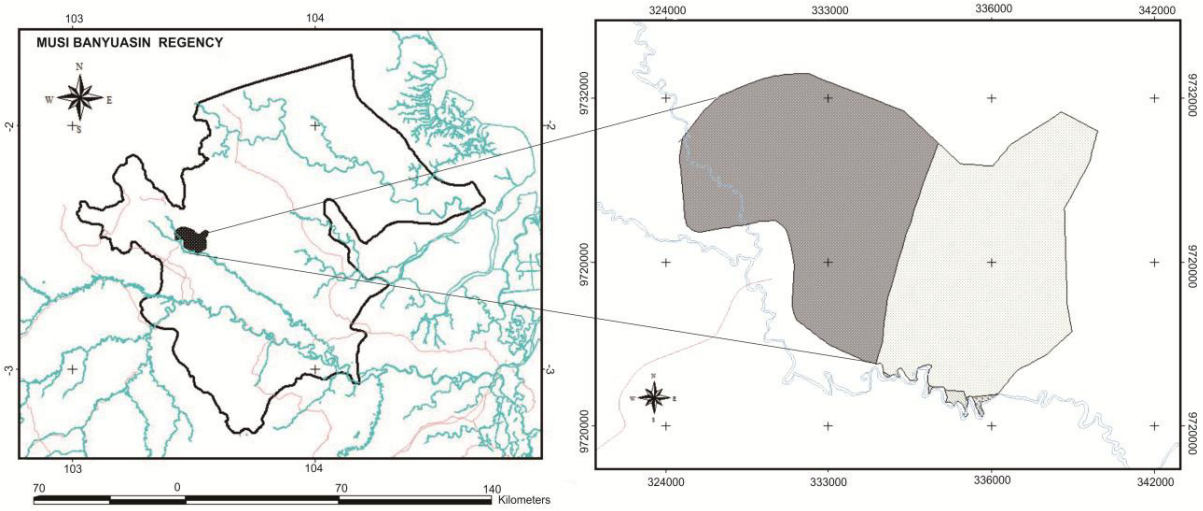


Fig1. Location of Meranti Sungai Merah Protected Forest

## 2. Material and Method

### *2.1. Data*

The description of main data to be analyzed is given in Table 1. The data were obtained from field surveys and scientific literature.

Table 1. Data collection

| No | Data | Description |
|---|---|---|
| 1 | Land cover map | Land cover map obtained by interpretation of Land sat ET+7 Path 125/Raw 62, January 2013. |
| 2 | Daily rainfall and temperature | Daily rainfall data were collected from Babatoman rainfall station, and temperature data were obtained from Kenten meteorological and geophysics agency (2003-2012). |
| 3 | Soil map | Soil map was collected from Watershed Management Agencies in Palembang. |