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The comparison of soil properties in heath forest and post-tin mined land: basic for ecosystem restoration

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Abstract

Heath forest is a restricted forest ecosystem in the world. In Indonesia, heath forest degradation caused by tin mining activity on Belitung Island emerges biodiversity lost and soil properties lost. In fact, they play important role as main aspect for rehabilitiation. This study aims to describe soil properties and vegetation in heath forest and two different ages of tin mined land. The result shows thatin 3 year tailing contains very high amount of sand, low organic matter, low CEC which effect to desertification that hindered plant to grow. Indeed, low organic matter affects low water absorbtion. Meanwhile, 130 year tailing results lower amount of sand than 3 year tailing. Adequate organic matter closes to organic matter in the forest and appropriate CEC. Soil development in tin tailing soil takes hundreds years to slightly improve naturally. Several soil amendments could be implemented to improve sandy soil, such by adding organic matterial, following with polymer fertilizer. Heath forest restorationby natural succession approach should select local species which well adapted as pioneer and apply seedbank from forest floor as seed source of native species.

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*Keywords:*soil properties; heath forest; tin mining; restoration; natural succession

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1. Introduction

Belitung Island produces the best tin deposit in the world[1]. It is one of World Tin's Belt islands[2]. Exploitation and producing process in tin mining activity gives negative impact to human health as well as environment, particularly radiation of radioactive substancee dan water pollution[3,4,5] shows units of land capability analysis of soil fertility in East Belitung. There are 218.101 hectares of land in poor condition (±87% of total district area).

Forest covers potential tin source in Belitung is called *kerangas* forest or heath forest. It is a fragile forest ecosystem derives from quartz parent material and standing on podzol soil, with poor nutrient and has low pH[6,7,8]. Degradation of heath forest has impacted to some environmental problems, particularly of soil. Heath forest might become the most endangered ecosystem in Sumatra. It should be restored as soon as possible.

Ecosystem restoration is as a key component in conservation programs and essential to the quest for the long-term sustainability of our life[9]. Soils are essential components of the environment and the basis of terrestrial ecosystems management[10]. Mined land is totally change the forest ecosystem then the rehabilitation is presented as an ideal case study for developing an ecosystem starting from point zero on "terra nova"[11]. We do not only have to recover the existence of ecosystem but also functions of its forest. The objectives of this study is to describe soil properties in heath forest and tin mined land, then recommend restoration techniques with natural succession approach.

2. Site Description and Method

2.1. Study Site

Research was conducted in East Belitung District, Belitung Island, Indonesia E 107º45' – 108º18' dan S 02º30' – 03º15' (Fig. 1). The average air temperature in East Belitung District is 25,8ºC-27,3ºC. East Belitung Distric has total area of 250.691 ha withvalley plateau topographyin larger, with elevation between 0-100 m above sea level. Rest of the area is mountains and hills. East Belitung land contains many minerals and tin ore mineral such as sand, quartz sand, granite, kaolin, clay and others. Soil type is podzols with soil texture particles dominated by clay (48,45%), coarse sand (27,43%) and remaining fine-textured (24,12%)[12].

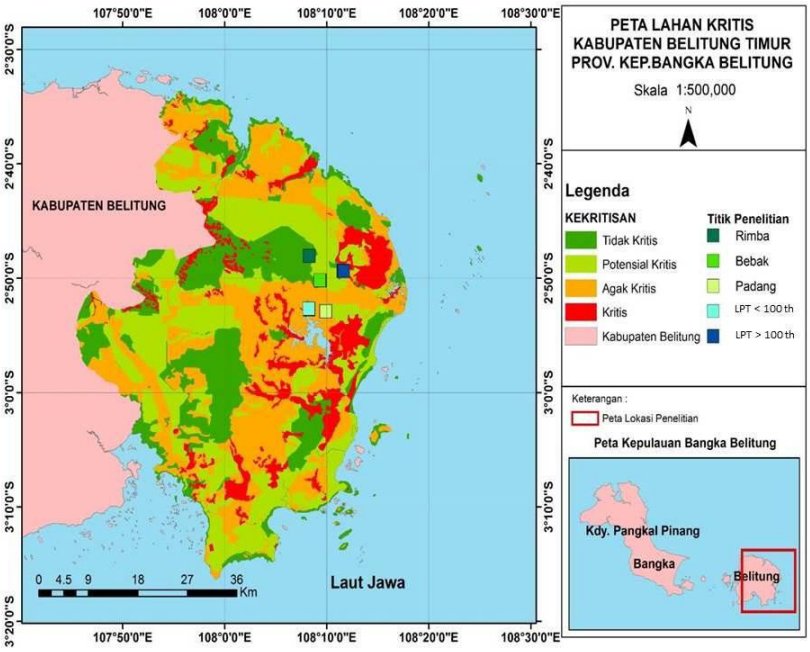

Fig. 1. East Belitung District