

Study on sustainable development of coastal communities by thinning practices of the rehabilitated mangrove trees

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1. Introduction

Mangrove trees act important roles in the coastal ecosystems to sequester carbon, protect community against high-tide and storms, control land erosion and provide fish and bio-diversity. In the last few decades, the massive areas have devastated and they have planted by *Rhizophora* spp. to rehabilitate the coastal ecosystems. The trees were in dense intervals of 1.0-1.5 m. And worse, minimal forest management has conducted after the plantation, resulted in light competition of the canopy and inhibition of their growth. Such poor quality of the trees contributes little to the multi-ecological services of the mangrove trees. It is essential to adopt forest management and cultivate the resurgent trees. We examined thinning practice in the rehabilitated mangrove trees to find effects of tree numbers. In addition, all thinned trees were quantified and their economic values as a local woody resource were evaluated.

2. Materials and Methods

Our study targets were the 20 year-old monoculture trees of *Rhizophora mucronata* in Lampung Mangrove Center Margasari, East Lampung Regency, Indonesia (05°35' S, 105°48' E). Three circle plots of 7 m in radius were set in each of the three transects, and which were divided into thinned plots (A and B) and control plot (C). Tree numbers, DBH (diameter at breast height), light intensity inside and outside the forest and above-ground tree biomass were compared before and after the thinning practice. The thinning was conducted in September, 2013 for the selected immature and dying trees by setting the numbers of the remaining trees in the plots of A and B decrease to a quarter and a half, respectively. Thinned trees were quantified in volume and dry weight and their economic values as a local woody resource were evaluated.

3. Results and Discussion

Tree numbers in the control plot of C were 5,500 trees ha⁻¹ and the tree biomass was 163 Mg ha⁻¹ (44.4 Mg C ha⁻¹) (Table 1). After the thinning practice, tree numbers decreased to 2,555 and 3,053 trees ha⁻¹ in the plots of A and B, respectively. Average value of the DBH in the remaining trees was 8.23 cm. The ratio of light penetration was 2.24% before the thinning, but increased to 15.6-18.6% after the thinning. Volumes of the thinned trunk were 52.9 and 20.3 m³ ha⁻¹ and the branches, taking a portion of 23.7% of the trunk biomass, were 12.5 and 4.82 m³ ha⁻¹ in the plots of A and B, respectively. The respective total volumes were 65.4 and 25.2 m³ ha⁻¹. It can be considered that such thinned trees are unused local resource in the rehabilitated mangrove areas. They can be used for charcoal production, poles and at-home firewood. Using the idea that thinning practice can be planned regularly such as every five years, this will certainly stimulate local economic activity to help sustainable development in the coastal community.

Table 1. Current condition of the rehabilitated trees of 20 year-old *Rhizophora mucronata* in Margasari, Lampung after the thinning practice.

Plot	Tree numbers (trees ha ⁻¹)	Dry weight (Mg ha ⁻¹) Total	Ratio of the thinning (%)	Thinned trees Volume(m ³ ha ⁻¹)		
				Trunk	Branch	Total
A	2,555	101	54.5	52.9	12.5	65.4
B	3,053	139	41.7	20.3	4.82	25.2
C	5,500	163	0	---	---	---