

UTILIZATION OF LAND IN OLD RUBBER PLANTATION AT GUNUNG LEUSER NATIONAL PARK, INDONESIA

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ABSTRACT-Meranti (*Shorea macrophylla*), damar (*Agathis Dammara*) and gaharu (*Aquilaria malacensis*) cultivation on rubber plantation sidelines has been carried out by members of *Kelompok Swadaya Masyarakat (KSM) Mitra Lestari and KSM Bagunda Lestari* as a partner of *Forum DAS Wampu*, District Bahorok. This study aimed to measure the growth (diameter and height) of meranti, damar, and gaharu as well as to determine the effect of tree planting on the production of latex from rubber trees that have been aged over 20 years. Meranti was planted in 2006 (in 1 hectare rubber plantation), damar was planted in 2007 (in 1 hectare rubber plantation), and gaharu was planted in 2008 (in 0.8 hectares rubber plantation). The results showed that diameter growth for meranti was ranging from 13 to 15 cm, damar was ranging from 11.5 to 12.5 cm, and gaharu was ranging from 2.5 to 3.5 cm. For height, meranti was ranging from 15-20 m, damar 8-10 m, and gaharu 2-3 m. The analysis showed that the trees was planted on rubber plantation sidelines with a spacing of 3x5 meters, did not decrease the production of latex from rubber trees that have been aged over 20 years. Efforts to maximize the utilization of a rubber plantation in District Bahorok have an important role in conservation of natural resources and environmental, in respect of this area is a buffer zone of Gunung Leuser National Park (TNGL).

Keywords: sidelines, rubber, plantation, Gunung Leuser National Park (TNGL).

1. Introduction

1.1. Background

Maximum utilization of land to meet the needs of food, shelter, and clothing is an action that is necessary not only for the present, but also for the future. Population growth and the reduction of productive land due to land use, then maximizing the use of land is not only aiming to get a tangible, but also to obtain the intangible benefits, such as to maintain germplasm and help prevent flooding. Intangible benefits also have some roles in term of helping to climate change mitigation, maintaining freshness and comfort, maintain the quantity and improve the quality of water resources, as well as educational facilities.

Gunung Leuser National Park (TNGL) is one of the Nature Conservation Areas in Indonesia with an area of 1,094,692

Hectares, are located in two provinces (BPS, 2010), namely Aceh (Southwest Aceh, South Aceh, Aceh Singkil, Southeast Aceh, Gayo Lues, and Aceh Tamiang), and North Sumatra (Dairi, Karo and Langkat) (Figure 1). The Ministry of Forestry (2007) reported that currently TNGL already deforested reached 18,089 hectares (1.65%), whereas degraded (the area that suffered a loss of quality due to various disturbances) reached 142,087 hectares (12.98%) including 65 critical points of interference. Extensive degradation in the region TNGL will continue to grow if not carried out preventive measures and repressive in a consistent and sustainable. Hence, to prevent the occurrence of forest and land degradation in TNGL is the empowerment of communities in the buffer zone (particularly in the core area of the buffer zone) in helping to suppress the entry of the encroachment. At least, people in the area is not involved (either as the main actors, as well as workers). In this regard, Forum DAS Wampu has set up and nurture *Kelompok Swadaya Masyarakat (KSM)* or Community Based Organization (CBO), which is located in Bukit Lawang, Bahorok, Langkat Regency.

There are three KSM that is located in Bukit Lawang, Bahorok, Langkat Regency, namely: KSM Mitra Lestari, Bagunda Lestari, and jelutung Lestari. The important activity of KSM in term of watershed-based management is using rubber plantation sidelines for forest tress cultivation (meranti, damar and gaharu). Based on explanation as mentioned before, so this study was became important in this area.

1.2. Objective

The study generally aimed to measure the growth (diameter and height) of meranti, damar, and gaharu as well as to determine the effect of tree planting on the production of latex from rubber trees that have been aged over 20 years.

2. Material and Methods

2.1. Description of the Study Area

The study was conducted in in Batu Jong-jong Village and Timbang Lawang Village, Bahorok Sub-district, Langkat

Regency (Buffer Zone of Gunung Leuser National Park) (Figure 1 and Figure 2).

2.2. Data Collection

Growth evaluation of meranti, damar, and gaharu that are planted in the rubber plantation sidelines with a spacing of 3x5 meters and its influence on the production of rubber latex plant in Batu Jong-jong Village and Timbang Lawan Village, Bahorok Sub-district, Langkat Regency was performed by the method of land survey. Meranti was planted in 2006 (in 1 hectare rubber plantation), damar was planted in 2007 (in 1 hectare rubber plantation), and gaharu was planted in 2008 (in 0.8 hectares rubber plantation). Sampling was done randomly as much as 5% of the total population (a total of 33 samples) on the land selected (purposive sampling). Diameter at breast height (dbh) measurements using a vernier caliper, while the tree height measurement using bamboo pole (*galah bamboo*). Rubber latex production data obtained from direct measurements made by the land owner (farmer).

3. Results and Discussions

The results of measurements of dbh and the tree height of meranti, damar, and gaharu, as is shown in Table 1. The dbh average of forest trees that were planted in the rubber plantation sidelines: for meranti was 13.68 cm (range 13-15 cm), damar 12.03 cm (range 11.5 to 12.5 cm), and gaharu 3.07 cm (range 2.5 to 3.5 cm), with average of tree height: 16.93 m (range 15-20 m) for meranti trees, 9.18 m (range 8-10 m) for damar, and 2.68 m (range 2-3 m) for gaharu. Growth of forest trees that were planted in the rubber plantation sidelines: at age 3-5 years (meranti was planted in 2006, damar was planted in 2007, and gaharu was planted in 2008) were considered to have normal growth, because of the area in was indeed an endemic area of the forest trees. In addition, the forest trees have properties that need shade for growth in the early stadia.

According to Duke (1983), Tapping on rubber tree begins when trees are 5–8 years old, depending on the area, and increases every year until a maximum at about 20 years, then yield sustained for 40–50 years or more. Rubber trees are highly suitable in the area with slope less than 8% (Ministry of Agriculture, 2003). In this area, the average of latex production in combination with forest trees (143.45 ml/tree/1xtapping or 71.73 liter/ha/1xtapping) was almost the same as with the average of latex production in monoculture plantations (144.32 liter/ha/1xtapping or

72.16 ml/tree/1xtapping). According to ICRAF (2001) that the agroforestry system of rubber plantations with other crops, particularly crop plants did not interfere of latex production. The trees was planted on rubber plantation sidelines with a spacing of 3x5 meters, did not decrease the production of latex from rubber trees that have been aged over 20 years (Figures 3,4,5).

4. Conclusions

The dbh for meranti was ranging from 13 to 15 cm, damar was ranging from 11.5 to 12.5 cm, and gaharu was ranging from 2.5 to 3.5 cm. For height, meranti was ranging from 15-20 m, damar 8-10 m, and gaharu 2-3 m. The trees was planted on rubber plantation sidelines, did not decrease the production of latex from rubber trees that have been aged over 20 years. Efforts to maximize the utilization of a rubber plantation in District Bahorok have an important role in conservation of natural resources and environmental, in respect of this area is a buffer zone of Gunung Leuser National Park (TNGL).

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Table 1. Dbh and height of meranti, damar, and gaharu, as well as the production of rubber latex.

Sample No.	DBH (cm)			Height (m)			Latex Productions (ml/tree/1x tapping)	
	Meranti	Damar	Gaharu	Meranti	Damar	Gaharu	Mix Cropping	Mono kultur
1	15.0	12.0	2.7	15.5	9.5	2.1	150.0	133.4
2	15.0	12.0	2.8	15.0	9.5	2.0	164.8	132.0
3	13.5	12.0	2.5	15.5	9.5	3.0	140.0	150.0
4	13.4	12.0	3.0	17.0	8.0	2.5	131.8	164.8
5	13.7	11.5	3.1	18.0	8.7	2.4	134.5	140.0
6	14.0	12.0	3.4	19.5	8.8	2.5	150.0	145.6
7	14.7	11.5	2.5	16.6	9.5	2.7	143.2	145.6
8	13.0	11.5	2.7	16.8	10.0	2.9	133.4	145.6
9	15.0	12.5	2.8	16.5	10.0	2.9	132.0	134.5
10	13.0	12.5	2.5	17.8	10.0	2.9	150.0	150.0
11	13.5	12.5	3.0	18.0	8.7	3.0	164.8	143.2
12	13.4	12.0	3.1	16.0	8.8	3.0	140.0	150.0
13	13.7	12.0	2.7	15.6	9.5	2.9	145.6	164.8
14	14.0	11.5	2.8	17.0	8.0	2.9	145.6	140.0
15	14.5	12.0	2.5	18.0	10.0	2.3	145.6	131.8
16	13.0	11.5	3.0	19.5	9.5	2.3	134.5	134.5
17	13.0	11.5	3.1	20.0	8.0	2.0	150.0	133.4
18	13.5	12.5	3.4	15.5	8.7	2.5	143.2	132.0
19	13.4	12.5	2.5	15.0	8.8	2.4	133.4	150.0
20	13.7	12.5	3.4	15.5	9.5	2.5	132.0	164.8
21	14.0	12.5	3.3	17.0	10.0	2.7	150.0	140.0
22	14.5	12.0	3.4	18.0	10.0	2.9	164.8	145.6
23	13.0	12.0	3.5	19.5	10.0	2.9	140.0	145.6
24	13.0	12.0	3.5	16.6	8.7	2.9	131.8	145.6
25	13.0	11.5	3.5	16.8	8.8	3.0	140.0	134.5
26	13.0	12.0	3.5	16.5	8.0	2.4	145.6	150.0
27	14.0	11.5	3.5	15.0	10.0	2.5	145.6	143.2
28	14.5	11.5	3.5	15.5	9.5	2.7	145.6	150.0
29	13.0	12.5	2.5	17.0	8.0	2.9	134.5	164.8
30	13.0	12.5	3.4	18.0	8.7	2.9	150.0	140.0
31	13.5	12.5	3.3	19.5	8.8	2.9	143.2	131.8
32	13.4	12.5	3.4	16.6	9.5	3.0	133.4	140.0
33	13.7	12.0	3.5	16.8	10.0	3.0	145.0	145.6
Average	13.68	12.03	3.07	16.93	9.18	2.68	143.45	144.32

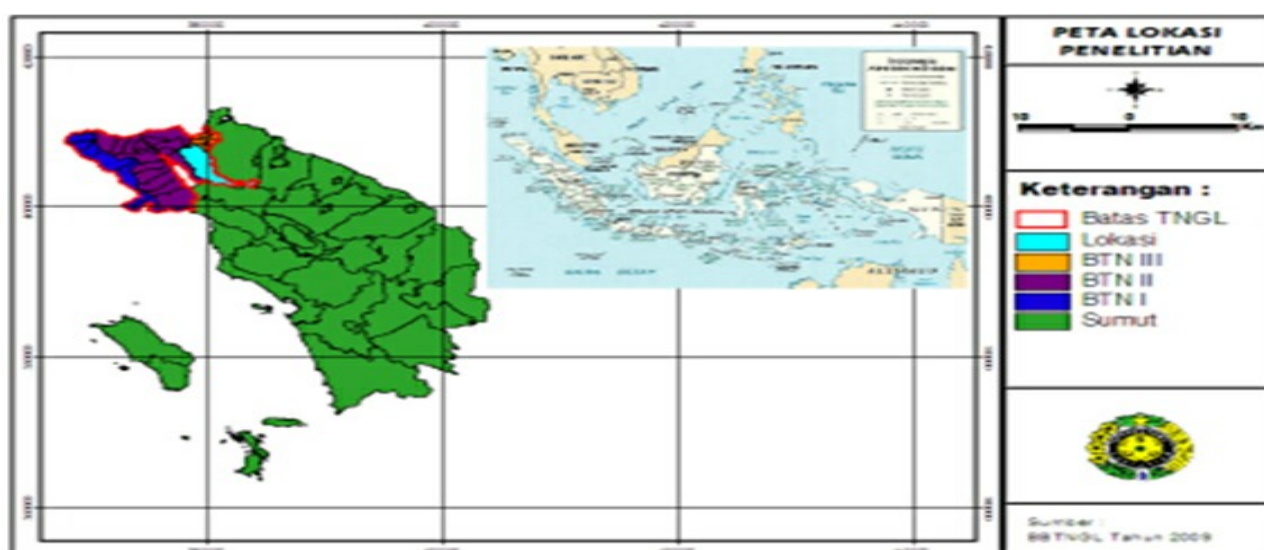


Figure 1. Location of Gunung Leuser National Park in Sumatera Utara Province and Nangro Aceh Darussalam Province (Rahmawaty, Syofyan, and Fadillah, 2011)

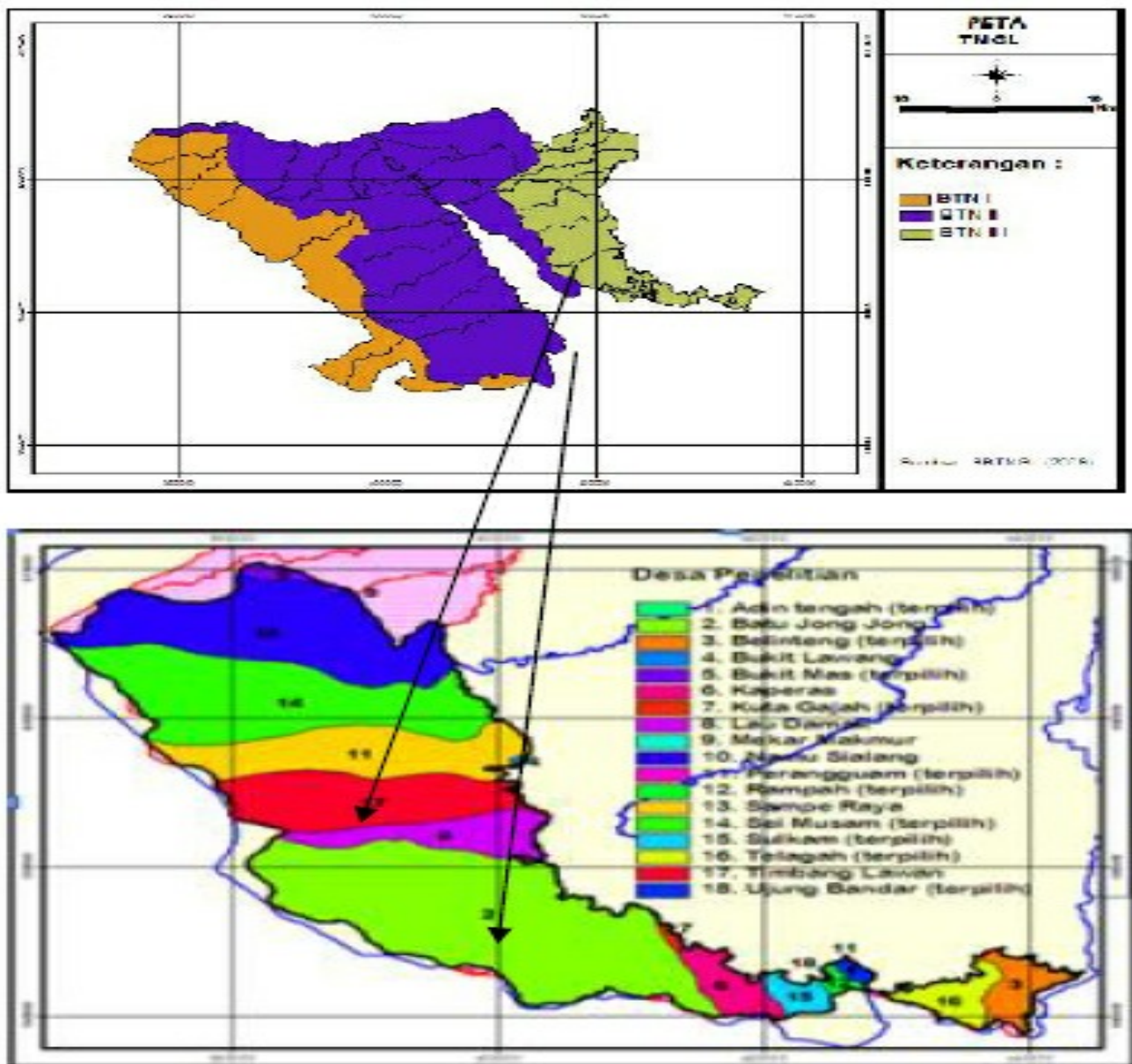


Figure 2. Map of study area (No.2 and No. 17) (Rahmawaty, Syofyan, and Fadillah,2011)



Figure 3. The combination of rubber trees with meranti in Batu Jong-jong Village, Bahorok Sub-district, Langkat Regency (Buffer Zone of Mount Leuser National Park)



Figure 4. The combination of rubber trees with damar in Batu Jong-jong Village, Bahorok Sub-district, Langkat Regency (Buffer Zone of Mount Leuser National Park)



Figure 5. The combination of rubber trees with Gaharu in Timbang Lawang Village, Bahorok Sub-district, Langkat Regency (Buffer Zone of Mount Leuser National Park)