

THE IMPORTANCE OF FOREST AND LANDSCAPE RESOURCE FOR COMMUNITY AROUND GUNUNG LUMUT PROTECTED FOREST, EAST KALIMANTAN

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ABSTRACT

The forest of Gunung Lumut in Pasir District, East Kalimantan was designated for a protection forest in 1983. It is surrounded by 15 villages and one settlement lies inside it. Communities in those villages are dependent upon the landscape and forest resources mainly for non timber forest products. This study was focused on the perception of the communities on the importance of the landscape and forests. The study was conducted in two settlements, located in and outside (near) the protection forest, namely Rantau Layung Village and Mului Sub-Village. Data collection was undertaken through general field observations, key-informant personal interviews and focus group discussions. In Rantau Layung, the most important land type was rice field, whereas in Mului was forest. There were 13 and 14 use categories of landscape resources in Rantau Layung and Mului, respectively, such as food, medicine, constructions and source of income. People in Rantau Layung and Mului ranked plants to be more important than animals. People also considered products from wild resources to be more important than those from cultivated and purchased sources. Communities living in both settlements considered the future uses of forests to be the most important as compared to those of the present and past. They suggested that sungkai (*Peronema canescens*) and telien (*Eusideroxylon zwageri*) to be the most important plants while payau (*Cervus unicolor*) and telaus (*Muntiacus muntjak*) to be the most important animals. People used the wildlife mainly for food and source of income. They also identified important and potential resources for economic development in the area, i.e. ecotourism and hydro-power for electric generator.

Keywords: Forest and landscape resources, biodiversity, use category, economy

I. INTRODUCTION

The protection forest of Gunung Lumut was gazetted through the Forestry Minister's Decree No. 24/Kpts/Um/1983. Previously, since 1970 the forest had been a production forest managed by PT. Telaga Mas. Gunung Lumut Protected Forest (GLPF) (116°02'57"-116°50'41" E; 01°19'08"-01°49'33" S) covers an area of 35,350 ha and stretches from the north to the south about 56.3 km in length and 8.3 km in width. It is surrounded by 15 villages and one settlement is located inside

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the protection forest (Tropenbos Kalimantan Program, 2005). Administratively, GLPF belongs to Pasir District and consists of four sub districts i.e. Long Kali, Muara Komam, Long Ikis and Batu Sopang. Saragih (2004) reported that there are 74,037 people living in and around the protection forest who are highly dependent upon forest resources mainly non timber forest products as well as environmental services.

The GLPF is mainly covered by dipterocarp lowland forest, part of which is dominated by trees of meranti (*Shorea* spp.) and kapur (*Dryobalanops lanceolata*). About one third of the protection forest (12,800 ha) was surveyed in 2004, and the result revealed that around 90% of the surveyed area was forested and the remaining 10% was covered by shrubs (UPTD Planologi Kehutanan Balikpapan, 2004).

Buffer zones of the GLPF are production and limited production forests, which unfortunately are in a degraded condition, wherein only a small number of big diameter trees can be found (UPTD Planologi Kehutanan Balikpapan, 2004). These buffer zones are inhabited by thousands of forest dependent people. Based on the Forest Land Use Agreement (*Tata Guna Hutan Kesepakatan*) and Regional Spatial Planning of Pasir District, the buffer zones of GLPF is designated for forestry purposes (*Kawasan Budidaya Kehutanan*).

Although forest of Gunung Lumut has been designated as a protection forest, logging activities have continued and even worsened in the period of 1999-2004 when a large number of small concessions (IPPK = *Ijin Pemungutan dan Pemanfaatan Kayu*) around the protection forest were granted by the *Bupati* (Head of the District) of Paser. Fortunately, the issuing of such small concessions has been put to an end in compliance with the Forestry Minister's Decree No. 541/Kpts-II/2002. Yet, recently the protection forest is still under a heavy pressure from various activities. Several big forest concessions still operate and forest encroachments are still taking place around the protection forest.

The designation of this forest area as a protection forest has been made 'top-down' by the central government without taking into consideration their social and economic dimensions or functions to the communities living within and around the forest. These communities, most of them are indigenous people, are relatively marginalized, with very limited access to basic services and financial and technical resources needed for improving their lot. They are heavily dependent on the existence of the forest for non-timber forest products and environmental services, but have no legal stake in management of the forest. In addition, the existing traditional rights of the local communities have been ignored and their access to the forest has been limited.

Lack of alternatives and low awareness about the environmental and social functions of the protection forest have resulted in a more active involvement of the local communities in logging activities in GLPF. Combined with ongoing intensive forest encroachment and conversion to (mainly oil palm) plantation, the logging activities by the companies and the communities, legally and illegally, have led to

a degradation of part of the forest. Currently only about 60% of the forest is still in a relatively pristine condition with various flora and fauna. Apart from the loss of flora and fauna and their habitat, the loss of part of the forest had also resulted in environmental problems. In the last few years, flooding during the rainy season and water shortages during the dry periods have occurred more frequently and more intensively causing immense problems to the people in the dependent settlements and industries in the lower watershed (Tropenbos Kalimantan Program, 2005).

In order to accommodate the traditional right of the local communities in the management of the GLPF, it is necessary to identify and to quantify the important level of lands and forest type, distribution of biodiversity and natural resource for local livelihood. A management model with active participation of local stakeholders (community based forest management) is needed in order to maintain the GLPF sustainable.

This report is the second part of two articles of the study conducted at the same location (see Murniati *et al.* (2008) for the first article). This report, focuses on identifying, quantifying (in percentage) and comparing the level of importance of lands and forest types by use categories, distance, source of products, and time (past-present and future) through Local User Value Index (LUVI). The previous report mainly discussed the most valuable parts of plants and animals being used by the local communities, the estimated value (nominal price) as well as the community household income and expenditure pattern.

The study was focused on the community perceptions on landscape and forest importance as well as local livelihoods of the community living in and around the protection forest. In order to address the objectives, data collected were those related to: (1) experiences and lessons on socio-cultural and socio-economic condition of the communities, (2) the importance of lands and forest type, distribution of biodiversity and natural resource for local livelihood, and (3) landscape and forest importance through LUVI.

II. METHODS

A. Locations and Time

The study was conducted during November and December 2005 in two settlement sites located around and within the GLPF, i.e. Rantau Layung Village and Mului Sub-Village. Both sites are located in Pasir District, East Kalimantan Province. Rantau Layung Village (18,913 ha) is administratively part of Batu Sopang Sub District, located about 150 km from Tanah Grogot (Capital of Pasir District) and can be reached only by four wheel drive vehicle for four hours from Tanah Grogot or six hours from Balikpapan. River and small road are the main transportation infrastructures in Rantau Layung. To travel from Rantau Layung to Batu Kajang, the capital of Batu Sopang Sub-District, villagers can only use

motor boat through Kasunge River for six hours. The small road, built in 2003, is the only ground access from Rantau Layung to the main road (actually logging road). Meanwhile, Mului is a part of Swan Slutung village and belongs to Muara Komam Sub-District. The settlement at Mului can be reached by car for six hours from Balikpapan. There is a logging road that connects Mului to the nearest town.

B. Data Collection

The primary data were collected through general observation, participatory mapping of land-types and natural resource, focus group discussions (FGD) and key-informant personal interviews. General observation was conducted prior to the participatory mapping, interviews and FGD, to describe landscapes characteristics and natural resources. The observation was also done to cross check the information collected from the communities. The data collection was initialized by a community meeting in each research site, which was attended by most of community elements: men and women, young and grown up as well as customary leaders. During the meeting, participants were asked to discuss how they recognize land types around them. In both villages, people defined some land types i.e. river, village, rice fields, garden, fallow (young and old), and forest (young and old). In this meeting, four groups of villagers in each research site participated in the FGD.

Participatory mapping of land-types and natural resources was developed to describe biodiversity resources distribution in the two villages, where they occur and their abundance in some types of landscape. The map construction began from the main river and its tributaries. Several key informants provided information on natural resources, important trees and animals, cultural sites, potential sites for ecotourism etc. To avoid sensitive issues from which a horizontal conflict might occur, the village boundaries were not discussed during this activity.

The FGD was carried out basically to obtain general data from various people representing different groups in the community. Four groups of villagers, based on gender and age (old men, old women, young men and young women), were participated in the discussion in each research site. Each group was composed by five to seven members. They all participated in focus group discussion facilitated by the researchers. Several topics discussed included specific information about useful natural resources, landscapes and forest as well as various products. Using Pebble Distribution Method (PDM) scoring exercise (Sheil *et al.*, 2003), a number of methods was explored to assess people's judgment on the relative importance of various products and landscape units. In each stage of the exercise, informants were asked to distribute 100 counters (buttons, seeds or pebbles) among labeled and illustrated cards in proportion to their 'importance'. The informants also ensured that the comparative nature of the exercise was understood by giving at least three examples at the start of each exercise. To identify important species of fauna, Payne *et al.* (2000)'s method was used.

Personal interview was conducted with some key-informants both in Rantau Layung and Mului in order to know how people manage their land and natural resources. They included the village head, customary leader, old villagers, informal community leaders like teacher and *ustadz* (Islamic teacher).

The secondary data consisted of demographic (population related ethnic composition), education level, public facilities and land use systems. The related literatures were collected from several sources (e.g. local government, research institutions and mass media).

C. Data Analysis

Data on community perspectives, including score or rank, on importance of landscape and products were recorded and tabulated. Each importance' score was expressed as percentage. Each score was always accompanied by explanation provided by the people. Among other perspectives, the top ten importance species of plants and animals from the forests was described in a series and was valued using LUVI (Sheil *et al.*, 2003).

III. RESULTS AND DISCUSSION

A. People and Livelihood

Rantau Layung Village is inhabited by 50 households or 217 people with a population density about 1 person/km² (Desa Rantau Layung, 2005). The dominant ethnic is Paser and most of them are indigenous people. Only 30 villagers completed their elementary school (*SD*), 10 villagers finished secondary school (*SMP*) and three people accomplished high school (*SMU*). The rest of the population did not finish elementary school and even some of them never went to school at all. Customary law was still applied in the daily life as traditional guideline and rules to define what is right or wrong for the whole community. Especially in managing natural resources, it was used to classify forest (*alas*) into categories according to its function, i.e. *Alas Tuo*, *Alas Adat*, *Alas Nareng* and *Alas Mori*. Definitions of these forest categories are explained in the discussion about landscape in the other part of this manuscript.













Most of the villagers cultivated upland rice fields by shifting cultivation system for their daily consumption. They went for hunting and fishing and collecting non timber forest products (NTFP) such as rattan, fruits, vegetables and honey and usually selling them to Batu Kajang town (capital of Batu Sopang Sub-District). Another important source of income for households in this village was timber endeavor (small-scale logging). From 1995 to June 2005, most of the villagers cut trees found around the forest area and sometimes even inside the Gunung Lumut Protection Forest. However, after Wana Lestari operation took place in this area in

July 2005 to combat illegal logging, the small-scale timber extraction significantly ceased.


In Mului, there are 18 households of 121 people, most of them belong to Paser Mului ethnic group (Desa Swan Selutung, 2002). Children and young people dominate the population. The children just started going to school less than two years ago. Previously, there was no formal school in the area. The older people never went to school except some outsiders who got married with Mului people. Separated from the other villagers, Mului people live inside the area of Gunung Lumut Protected Forest from which they gathered many types of products. Most Mului people cultivated rice field in a small area (\pm 1 ha per household) near their houses which provided insufficient yield per year for their consumption. People mixed the rice plant with vegetables plant and fruits trees. It seems that after people left the area for a new rice field, it will become a fruit garden or agro-forests in the future. They went hunting at least once a month, usually used snare and a few air-rifles. At the same occasion, they collected young sprouts and mushrooms as well vegetables. Fishes were also important for local protein source. Selling fruits, animals, and honey was the main source of income for Mului people. Customary rules concerning management of natural resources were still important in Mului.








B. Biodiversity and Natural Resources Distribution

1. Rantau Layung

In Rantau Layung, although most informants have good knowledge on what natural resources that are important for them, only a few including the customary leader and hunters can mention where the resources are usually found and put their input to the map. The main resources and special features drawn in the map (Figure 1) were: honey trees () , agarwood () , cave () , waterfall () , salt spring () , rattan garden () , and old villages () . Hunters were experts mainly in wildlife resources such as deer () , sun bear () , monkey () , snake () , and birds () .

2. Mului

In Mului, people were familiar with maps and very helpful in showing information on their territory. Young informants were knowledgeable on hunting sites and natural resources distribution. The old informants were helpful in providing their knowledge on cultural and historical aspects. They started by providing names for the main tributaries of the Mului, Kuaro, Sempangen and Payang rivers (already included on the base map), and drew many additional tributaries with their names. Further, other information such as important trees (honey tree, *Agathis*, *Shorea*) () , hunted

animals () , birds () , bear () , mountains () , lakes () , agriculture fields () , fruit garden () etc were also provided and drawn on the map (Figure 2). Villagers recognized specific sites that seem to be habitat for some endangered species of wildlife (e.g. sun bear, deer, and hornbills). The GLPF management may consider these sites as key biodiversity areas since most of them are located within and around protected areas. Springs, mountain and riverbanks are among these special areas.

C. Landscape

There are several types of landscape in Rantau Layung and Mului where communities do their daily activities and collect products as sources of revenue (Table 1).

Table 1. Identified land types in Rantau Layung and Mului, including their characteristics

No.	Land type	Rantau Layung		Mului	
		Topography	Main vegetation	Topography	Main vegetation
1.	<i>Umo/ladang</i> (Rice field)	flat, gently slope, steep	paddy, maize, rubber, oil palm	steep	paddy, banana, cassava, sugarcane, corn, vegetables
2.	<i>Kampong</i> (Village/Settlement)	flat, undulating	fruit trees, coconut	gentle	banana, rambutan, coconut, durian, jack fruit
3.	<i>Kebon</i> (Garden)	flat to steep, undulating	rubber, rattan, coffee, coconut	flat to steep	rattan, coffee, rambutan, other fruit trees
4.	<i>Lati/lati burok/lati tuo</i> (Fallow/young fallow/old fallow)	flat to gently slope	trees of <i>Peronema</i> , <i>Vitex</i> , <i>Artocarpus</i> , and bamboo	steep	trees, shrubs
5.	<i>Alas</i> (Forest)	slope to steep and undulating	mixture of dipterocarps trees	steep	trees of <i>Shorea</i> , <i>Peronema</i> and iron
6.	<i>Sunge/suong bosa</i> (River/gold mine)	gently slope to steep	ferns, trees of <i>Ficus</i> , <i>Litsea</i> , and <i>Kleinhovia</i>	steep	Trees
7.	<i>Sipung bua</i> (Fruit garden)	flat to steep	fruit trees and rattan	-	-

Note: Land type of *Sipung bua* (Fruit garden) was only identified in Rantau Layung Village

1. Landscape Importance by Use Categories

There are various uses from several local land types according to the communities. Analysis on PDM exercises with all community groups (old men, old women, young men and young women) in Rantau Layung and Mului resulted

in an average value of the importance of the landscape types for all use categories (Figures 3 and 4).

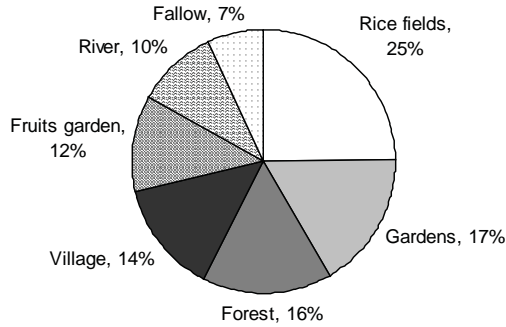


Figure 3. Land types importance (mean value) for all groups in Rantau Layung

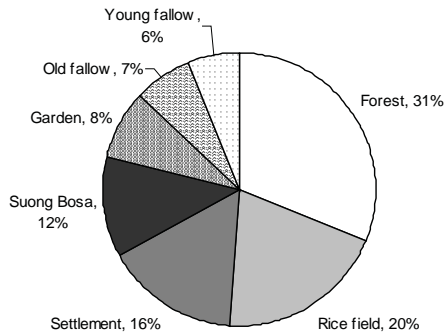


Figure 4. Land types importance (mean value) for all groups in Mului

Except old women group that valued ‘forest (*alas*)’ as the most important, all groups ranked ‘rice fields (*ladang*)’ with the highest score (25%) particularly because of its role as the main source of food. Garden is considered as the second most important (17%) landscape as most villagers plant rattan in their garden which becomes a valuable source of income. In Rantau Layung, forest (*alas*) is classified into four sub types of landscape, i.e. *Alas Tuo* (old forest), *Alas Adat* (customary forest), *Alas Nareng* (reserved forest) and *Alas Mori* (sacred forest). Scoring exercises results of land and forest types in Rantau Layung Village is described in Table 2. It shows the mean value of importance of each land type for each use category.

Table 2. PDM exercise summary of land and forest type importance (mean value) by use categories for all groups in Rantau Layung

Land type	Use Category												
	Food	Medicine	Light construction	Heavy construction	Boat construction	Tools	Firewood	Basketry/cordage	Ornament/ritual	Source of income	Hunting tools	Hunting places	Future
Village	6	8	2	2	3	0	1	0	16	1	1	0	3
River	15	6	4	7	10	1	2	1	0	12	1	8	2
Rice fields	29	23	3	2	1	3	15	0	1	14	0	0	10
Forest	19	35	30	54	61	50	16	25	26	20	42	53	32
Fallow	3	11	41	20	12	25	41	37	23	1	41	17	8
Fruit garden	14	8	5	4	2	3	17	3	10	23	8	20	17
Gardens	14	9	15	11	11	18	8	34	24	29	7	2	28
Total	100	100	100	100	100	100	100	100	100	100	100	100	100
Forest type													
Sacred forest	8	7	3	1	1	1	0	0	1	0	1	1	5
Customary forest	25	26	23	21	20	21	25	28	35	22	20	22	38
Old forest	32	42	38	56	54	42	36	33	39	46	50	48	28
Reserved forest	35	25	36	22	25	36	39	39	25	32	29	29	29
Total	100	100	100	100	100	100	100	100	100	100	100	100	100

In Rantau Layung Village, forest provides main resources for some uses i.e. medicine, house/building as well as boat materials, tools, ornament/ritual, hunting tools and hunting place. It is even considered as the most important land types in the future. Among all forest types, old forest is considered as the most important (Figure 5).

Table 3 shows that forest is the most important landscape in Mului on all use categories including for people’s future, simply because it provides many things for their livelihood. Rice field is the second most important since it guarantees the availability of food, firewood, and culture materials. Rice is the main type of people’s daily food. Young fallow is the least important landscape since it brings fewer benefits than the others.

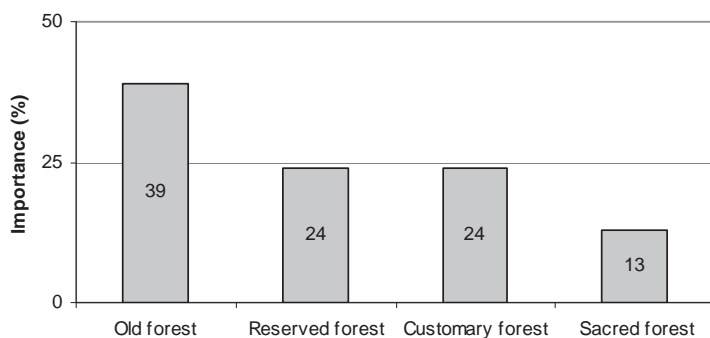


Figure 5. Forest types importance (mean value) for all groups in Rantau Layung

Table 3. PDM exercise summary of land and forest type importance (mean value) by use categories for all groups in Mului

Land type	Use Category													
	Food	Medicine	Light construction	Heavy construction	Bike construction	Tools	Firewood	Basketry	Ornament	Income source	Hunting material	Hunting place	Customary	Future
Settlement	9	6	1	0	0	0	2	0	1	3	3	0	8	8
Garden	12	9	2	0	0	2	5	0	2	10	0	5	12	12
Rice field	23	9	2	5	4	6	36	0	2	13	0	0	14	16
Young fallow	6	11	5	5	0	3	6	8	4	5	5	6	9	8
Old fallow	10	13	24	10	14	14	13	26	20	10	21	13	11	9
Forest	32	46	59	80	82	75	38	66	67	43	70	65	37	32
Suong Bosa	8	6	7	0	0	0	0	0	4	16	1	11	9	15
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Forest type														
Old forest	65	55	48	55	47	45	38	55	59	57	56	51	53	48
Young forest	35	45	52	45	53	55	62	45	41	43	44	49	47	52
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100

As explained previously, forests are divided by the villagers into two categories, e.g. old and young forest. Old forest is perceived by both men and women groups

as more important (70% and 68%; Figure 6) than young forest. This forest provides people with secure source of food and income either today or in the future.

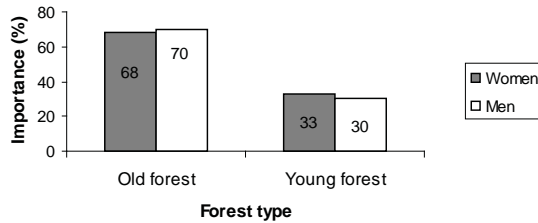


Figure 6. Men and women group perceptions (mean value) on forest type importance in Mului

Young forest is less important (30% and 33%) because fewer products come from this forest at present, but it is considered to be more important in the future. Some uses people gathered more from this forest than the old one were light construction, bike construction and tools (Table 3).

2. Landscape Importance by Distance

How important each landscape compared to the others according to the distance from the settlements was also assessed by using scoring exercises. Rantau Layung people considered rice fields as the most important land type, either near (half an hour walk) or far (more than two hours walk) from the village, as it provides the main source of food to the whole community (Figure 7).

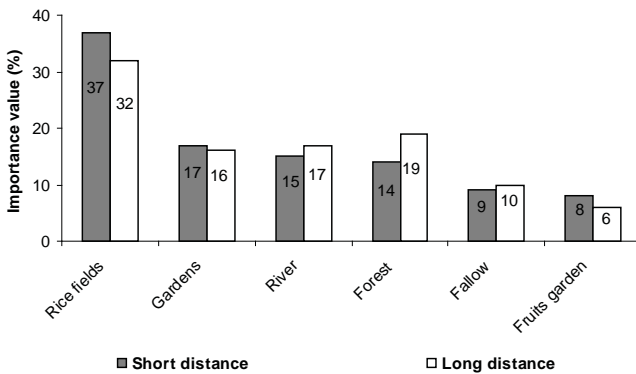


Figure 7. Importance of landscapes (mean value) by distance categories for all groups in Rantau Layung

Garden is the second most important if it is located near by the village so that people can cultivate fruits and rattan to be sold. If it is far from the village, then people suggested forest as the second most important which plays a significant role in providing many kinds of products such as materials for houses and building as well as boat construction.

Assuming total area of one certain land type is as extensive as the others, rice field is considered as the most important land type for most people in Mului (Figure 8). It provided daily needs for food, e.g. cassava, vegetables, etc. This perspective remains the same for both short and long distances. People described that in similar total area, they could collect more food from rice field than from the forest.

However, it is interesting to note that among the other groups only young men perceived forest as the most important landscape. They argued that either in short or long distance the forest will provide them more food and source of income such as fruits, meat and honey. This view is most probably related to their strengths which enable them to walk farther and work harder in the forest than the other groups.

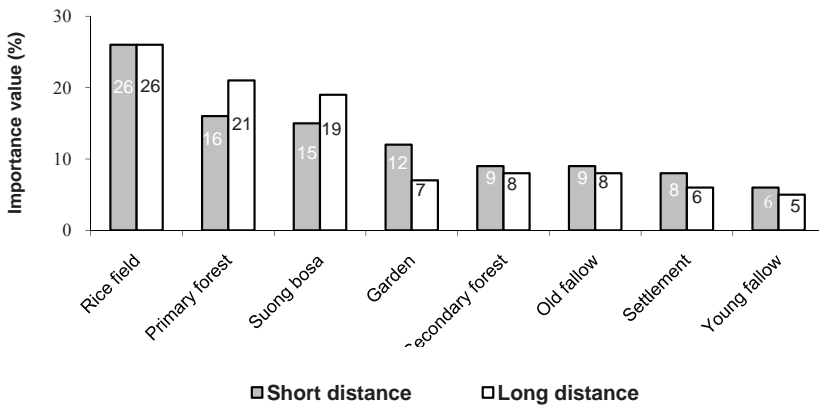


Figure 8. Importance of landscapes (mean value) by distance categories for all groups in Mului

3. Importance of the Source of Products

a. The most importance wild, domesticated and bought products

Scoring exercise using PDM among sources of products aims to compare the importance of the wild, cultivated/farmed and bought products, both plants and animals. Figure 9 shows that in general, local communities in Rantau Layung ranked

plants to be more important than animals. People also considered products from wild resources were more important than those from domesticated and purchased resources. Wild plants (score 32) are important as source of food (vegetables, fruits) and provide valuable products as source of income and other daily needs (basketry, construction, etc.). The second most important category is domesticated products especially rice as the main source of food and rattan as the major source of income. Bought resources are less important as people can still easily find what they need from the wild and from those they planted and farmed.

Domesticated and wild plants from the forest are perceived as the most important source for Mului people (Figure 10). Domesticated plants, taken from both wild and bought sources, are important because they provide villagers with food. Wild plants from the forest are important because there are more species of plants available than the cultivated sources. Wild animals either from the forest or other land types are the most important because they are the most available and are free sources.

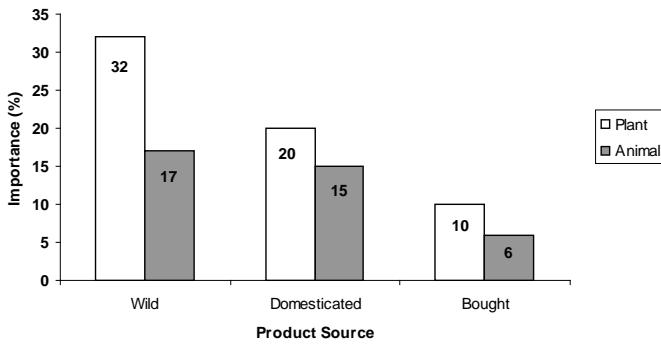


Figure 9. Product sources importance (mean value) for plants and animals by all groups in Rantau Layung

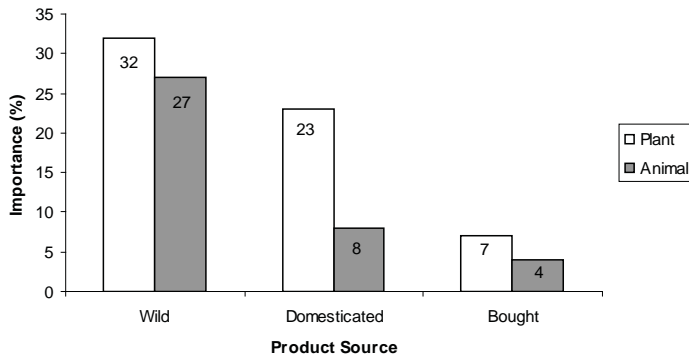


Figure 10. Product sources importance (mean value) for plants and animals by all groups in Mului

b. The most important plants and animals

The ten most important plant and animal species that the villagers gained from the forest were listed and ranked for all use categories in Rantau Layung and Mului settlements. People in Rantau Layung ranked sungkai (*Peronema canescens*) and telien (*Eusideroxylon zwageri*) as the two most important plants (Table 4) and used as resources for construction, tools, and living in the future. The two most important animals ranked by Rantau Layung people are payau (*Cervus unicolor*) and telaus (*Muntiacus muntjak* and *M. atherodes*) (Table 5) that are perceived as resources for food, income, and future expenditures.

In Mului, sungkai and telien are perceived as the two most important plants (Table 6) which are sources for medicine, construction, tool, firewood etc. Payau and telaus are perceived as the most important animals in Mului (Table 7). They are used by people for many uses mainly for food and cash income. As comparison, in Malinau District, people perceived that ulin (*Eusideroxylon zwageri*), kapur (*Dryobalanops lanceolata*), and meranti (*Shorea* spp.), are considered as the most important plants (Sheil *et al.*, 2006). In Papua, people perceived sagu (*Metroxylon sagu*) and wild pig (*Sus scrofa* and *Sus celebensis*) as the most important forest products (Boissiere *et al.*, 2006).

Table 4. Ten most important species of plants for all use categories (mean value) in Rantau Layung

Local Name	Scientific Name	Use Category												
		Food	Medicine	Light construction	Heavy construction	Boat construction	Tools	Firewood	Basketry	Ornament/ritual	Income source	Hunting tools	Hunting place	Future
Sungkai	<i>Peronema canescens</i>			√	√		√	√						√
Ulin/telien	<i>Eusideroxylon zwageri</i>				√		√				√	√		√
Rotan	<i>Calamus</i> sp.			√			√		√	√	√			√
Meranti/putang	<i>Shorea</i> spp.				√	√					√	√		√
Durian	<i>Durio zibethinus</i>	√									√			√
Kapur/sintuk	<i>Dryobalanops</i> sp.				√	√	√				√			√
Perari	<i>Neolitsea</i> sp.			√		√	√				√	√		√
Nyarau	<i>Elmerrillia Tsiampacca</i>				√	√					√	√		√
Bambu	Fam. Poaceae			√			√		√					
Sambu/mahlaban	<i>Vitex vestita</i>			√			√							

D. Forest

1. Forest Importance: Past-Present-Future

Scoring exercise helps compare the importance of forest in the past (10 years ago), at present, and in the future (next 10 years). For all categories of uses, Rantau Layung people considered forest in the future as the most important for them (43%) as it is the period when useful plants and animals will be more difficult to find. According to these people, the less number of resources available in the forest, the more difficult they can be found and the more important they are for local daily needs. Furthermore, local people thought forest was more important in the past (30%) compared to at present (27%), as it was source of materials for boat, tools, basketry, hunting tools and hunting places. People believed that animal resource was decreasing so that hunting will be more difficult in the future and people tend to depend more on domesticated animals.

In Mului, the period used to mark the past condition was six years, when people moved from Gunung Janas (old settlement) to current settlement in Tana Rian so that they will easily remember how important the forest.

Table 5. Ten most important species of animal for all use categories (mean value) in Rantau Layung

Local Name	Scientific Name	Use Category												
		Food	Medicine	Light construction	Heavy construction	Boat construction	Tools	Firewood	Basketry	Ornament/ritual	Income source	Hunting tools	Hunting place	Future
Rusa/payau	<i>Cervus unicolor</i>	✓	✓				✓			✓	✓			✓
Kijang/telaus	<i>Muntiacus muntjak</i> and <i>M. atherodes</i>	✓					✓			✓	✓			✓
Lebah	Fam. Apidae	✓									✓			✓
Ikan	Ichthyofauna	✓												✓
Pelanduk/kancil	<i>Tragulus</i> sp.	✓									✓			✓
Trenggiling/ayom	<i>Manis javanica</i>	✓	✓								✓			✓
Merak/jue	<i>Argusianus argus</i>	✓								✓				✓
Beruang	<i>Helarctos malayanus</i>		✓								✓			✓
Landak/tetung	<i>Hystrix brachyuran</i>	✓	✓				✓			✓				✓
Ayam hutan/sakan	<i>Lophura ignita</i>	✓								✓				

Forest is the most important landscape in Mului and it will be more important in the future (49%) compared to at present (33%) and in the past (18%). People described that in the future there will be more benefit from the forest. People believed that if no logging company disturbs their forest, it will grow larger in the future and they will have more access to use it. Forest will provide the people with more food, medicine, construction material, tools, ornament and income in the future. In the past, villagers had limited access to forest products because of restriction from logging company. At present, with no company in their territory they have more access to forest and to manage forest products.

Table 6. Ten most important species of plants for all use categories (mean value) in Mului

Local Name	Scientific Name	Use Category												
		Food	Medicine	Light construction	Heavy construction	Bike construction	Tools	Firewood	Basketry	Ornament	Income source	Hunting material	Hunting place	Customary
Sungkai	<i>Peronema canescens</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Telien	<i>Eusideroxylon zwageri</i>			✓	✓	✓	✓		✓	✓				✓
Putang	Dipterocarpaceae		✓	✓	✓	✓	✓					✓		✓
We	<i>Kortbalsia</i> sp.		✓						✓	✓	✓			✓
Lomu	<i>Canarium littorale</i>						✓			✓	✓	✓		✓
Durian	<i>Durio zibethinus</i>	✓								✓	✓	✓		✓
Nyarau	<i>Elmerrillia tsiampacca</i>			✓	✓	✓								
Puti	<i>Koompassia excelsa</i>						✓		✓				✓	✓
Nunuk	<i>Ficus</i> sp.											✓		✓
Perari	<i>Litsea</i> sp.			✓	✓	✓								

E. Specific Resources

Rantau Layung and Mului have many interesting features. Several objects and resources identified important and believed that they can potentially be developed and managed for economic and specific purposes such as for a source of drinking water, an electric generator and ecotourism which may attract outsiders. However, no proper development has been done for these specific potential features in the area, i.e. objects of ecotourism and hydro-power for electric generator.

Four objects in Rantau Layung, i.e water falls (*Sai River* and *Kepala Luayang*), *Riam (Lumbang)*, cave and *Batu utok uwok* are potential for ecotourism. The distances from the village are not far, however, path-ways still need to be established to reach them. Several objects that are potential to provide clean water and source of electricity for local community are waterfalls (*Kuaro River* and *Kepala Luayang*), *Riam* and spring (a water resource inside a cave).

Table 7. Ten most important species of animal for all use categories (mean value) in Mului

Local Name	Scientific Name	Use Category												
		Food	Medicine	Light construction	Heavy construction	Bike construction	Tools	Firewood	Basketry	Ornament	Income source	Hunting material	Hunting place	Customary
Payau	<i>Cervus unicolor</i>	√	√				√		√	√	√			√
Telaus	<i>Muntiacus muntjak</i> and <i>M. atherodes</i>	√					√		√	√	√			√
Juwe	<i>Argusianus argus</i>	√							√	√				
Bilaomban	<i>Copysychus malabaricus</i>									√				√
Sakan	<i>Tragulus javanicus</i>	√							√	√				√
Pelanuk	<i>Lophura ignita</i>	√								√				√
Biwang	<i>Helarctos malayanus</i>		√						√	√				
Lisio	<i>Rollulus rouloul</i>	√							√	√				√
Tetung	<i>Hystrix brachyura</i> and <i>H. crassispinis</i>	√	√				√		√				√	√
Pengulor	Bird species									√				

Three objects in Mului, i.e. waterfall, *bengenget* stone and cave are among the most potential sites for ecotourism. They are located relatively near the settlement, save and easy to reach. They offer some interesting features for visitors such as scenery of waterfall, fresh water for bathing in natural pool, underground adventures/caving and experience to observe thousand of bats in their natural habitat.

F. Implication to Policy on Protection Forest Management

Forest resource are considered to be more important than the other landscapes by communities around GLPF, particularly for the future. This implies that a management model of the protection forest with active participation of local stakeholders is extremely urgent. The model, which is promoting partnership between relevant stakeholders, should accommodate the needs to conserve the forest while recognizing the rights of the people live in and benefit from the forest.

The new paradigm “Community Based Forest Management” should also be implemented in managing this protection forest. Village and customary institutions that still exist in the area are potential to be used and should be strengthened to involve the communities in arranging, utilizing and conserving the forest. These institutions can also be used as media for socialization and/or extension about the legal status of GLPF, since the extension worker from forestry services are usually limited in number. Peoples’ recognition of the high importance level of the protection forest resource, indicates that the awareness of the communities in gathering and utilizing the forest resource wisely, especially non timber forest product, would increase.

IV. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

In Rantau Layung, the most important land type was rice field, whereas in Mului, is forest. There were 13 use categories of landscapes in Rantau Layung, among other are food, medicine, constructions and source of income. Whereas, in Mului there were 14 use categories. People in Rantau Layung and Mului ranked plants to be more important than animals. People also considered products from wild resources to be more important than those from cultivated and bought resources.

Communities living in both settlements considered forest as the most important in the future compared to the other periods (in the past and at present). They also suggested that sungkai and telien were the most important plants of forest while payau (*Cervus unicolor*) and telaus (*Muntiacus muntjak*) were the most important animals. People used the important wildlife mainly for food and source of income.

Specific natural resources in Rantau Layung and Mului such as waterfall, cave, spring, etc. including culture and local wisdom are potential to be developed to support local livelihoods. A management model of the GLPF with active participation of the local stakeholders may be developed to accommodate the needs to conserve the forest while recognizing the rights of the people live in and benefit from the forest.

B. Recommendations

As forest resources are of a high importance for local people, the protection forest management unit should ensure community involvement in the management. Some potential specific resources in the areas need to be developed to improve local livelihood as well as to reduce pressures on GLPF.

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