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The prospect of the utilization of Non-Timber Forest Products from Setulang Village forest based on local knowledge of the Uma Longh community in Malinau, North Kalimantan, Indonesia

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Abstract. Hutaauruk TR, Lahjie AM, Simarangkir B.D.A.S., Aipassa MI, Ruslim Y. 2018. The prospect of the utilization of Non-Timber Forest Products from Setulang Village forest based on local knowledge of the Uma Longh community in Malinau, North Kalimantan, Indonesia. *Biodiversitas* 19: 421-430. The establishment of Village Forest status gives local people assurance to manage the forest independently, but also limits its utilization. Communities are given freedom in the utilization of Non-Timber Forest Products (NTFPs) and environmental services, but they are prohibited to utilize timber forest products that can disturb and destroy the life of flora and fauna in it. The Uma Longh community utilize NTFPs to meet the needs for food, medicines, and craft material. The objective of this study was to know the prospect of the utilization of NTFPs from Setulang Village Forest. Data were gathered by interview, FGD, documentation, observation and field sampling in transects. The analysis method used in this research was CLAPS (Arquiza 2008; Bakkegaard et al. 2016). This research concluded that the NTFPs in Uma Longh community had good prospect so that the commodities included in the NTFPs category could be managed by the local community independently and sustainably, including *Calamus* sp. and *Gigantochloa* sp. In order for NTFPs to be available sustainably, the existence of village forest should be maintained, and this requires (i) the existence of government regulatory support that ensures its sustainability, (ii) the community support to comply with agreements and rules made, (iii) the availability of responsible management institutions, and (iv) the availability of adequate funding sources.

Keywords: CLAPS, NTFPs, Uma Longh, Village Forest

INTRODUCTION

The most effective way of reducing pressure on forests is to provide a sense of security to local communities in managing forest resources. Community involvement can be encouraged by granting them access to manage forest products, including access to manage Non-Timber Forest Products (NTFPs). It is important to know which NTFPs have market opportunities and have long-term prospect of utilization to be a reliable source of family income. Traditional communities not only utilize forests to supply products for local use but also to furnish the local or regional markets. The case study by Gönner and Seeland (2002) shows that this community has been for a long time and continues to be a player in the larger economic forum to get cash income.

The responsibility of forest resource management has been given mostly to technical experts such as foresters and biologists. This scientific approach has neglected, traditional resource management based on local people's knowledge, cultural values and needs (Melese 2016). The concept of indigenous or extractive reserves that has both reduced deforestations and contributed to improved local livelihoods in some Latin American countries could potentially be implemented in Malinau area (Boedihartono et al.

2007). Local communities have motivation to use NTFPs from forest around them. The uses of NTFPs are subject to seasonal changes because products are distributed unevenly over the year, so that a thorough investigation of various NTFPs requires different methods adapted to each situation (Gustad et al. 2004). The motivation of local communities in the utilization of NTFPs arises because of the pull and the driving factors. The pull factor occurs because of the demand for a non-timber forest product, either for direct use, or as raw material to be processed as an industrial standard. In addition, demand also occurs because the price margin is considered good by the local communities. Meanwhile, the need factor arises when local communities need forest products to meet immediate needs, such as food and medicines. Researches about the importance of NTFPs have been done by Boffa (1999), Bonkougou et al. (1999), Lamien et al. (1996), Cunningham (1997), Diallo and Paulsen (2000), Tabuti et al. (2003), Diarra et al. (1993), and Benjaminsen (1998). The local communities can benefit from the use of NTFPs, among others: (i) They may reduce household expenditure in daily shopping needs, (ii) They can determine the types of non-timber forest products needed for their own use or sale, (iii) They can manage the land to grow crops in the forest without the need to buy, and (iv) They can meet directly with the buyers or through

brokers and negotiate the price agreement. Generally, local people's decision-making in the utilization of forest products is based on local knowledge, i.e., knowledge gained from experience and customs of doing something their ancestors have done.

An increase in the issuance of permits for logging and plantations in Malinau has resulted in the decreased availability of NTFPs. It is assumed in a model that about 70% of local people are involved in forest product collection, but only 10% of migrants collect forest products (Sandker et al. 2007). Forest management involving local communities is much more effective in preserving the forest sustainability compared to commercial forest management by outsiders. The utilization of NTFPs conducted by local communities generally adheres to the principle of local wisdom, because this way will provide practical benefits for the sustainability of life economically, socially and ecologically. This means that harvesting forest products will not only affect local communities within and around the forest areas, but also in the larger communities. The local community in the study area was Uma Longh Community. The Uma Longh community is a sub-ethnic of the Dayak Kenyah ethnic group. Uma Longh community in Setulang is an immigrant from Long Saan Village Pujungan Sub-district (Anon. 2008). The population of Uma Longh Community is relatively small. They generally live together and spread in Long Pujungan, Long Saan, Pimping and Long Uli. They live by using forest products, either directly or processed into other forms that are done subsistently.

The objective of this study was to know the prospect of the utilization of NTFP from Setulang Village forest,

Selatan Hilir Sub-district, Malinau District, North Kalimantan, Indonesia.

MATERIALS AND METHODS

Study area

This research was conducted in Setulang Village, Sub-district of Malinau Selatan Hilir, Malinau District, North Kalimantan Province, Indonesia. It is approximately ± 32 km from the Capital of Malinau District. It borders on Sentaban Village in the north, Setarap Village in the south, Tanjung Lapang Village in the east, and Paking Village in the west (Figure 1).

Research procedure

This research began with a preliminary study, in the form of tracing information about research activities which had been previously conducted in the area of research and other information related to the purpose of this research. Then, literature search was done to review previous research results and strengthen basic research data.

The field survey was conducted after coordinating with related parties, particularly related to licensing issues, community preparedness, accommodation arrangements and transportation at the research sites. Implementation of field survey was divided into two kinds, namely the survey of information extracted from the community and the survey of object research validation. The resource persons in this study consisted of village officials, head of farmer group, handicraft group, Tane'Olen Forest Management Board, and Village Management Board (Figure 2).

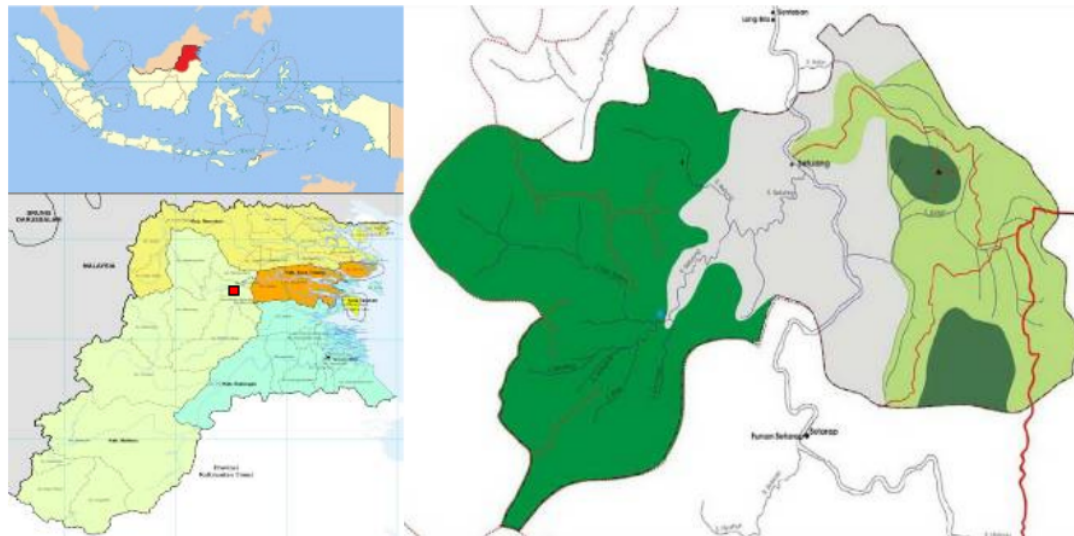


Figure 1. Setulang Village (■) of Malinau Selatan Hilir Sub-district, Malinau District is located at the coordinates of 03° 27'20.4" North Latitude and 116°29'36.8" East Longitude, and at an altitude of 70-500 m above sea level. While Village Forest (Tane'Olen) is in position between 03°20' North Latitude-03°30' North Latitude and 116°24' East Longitude-116°29' East Longitude

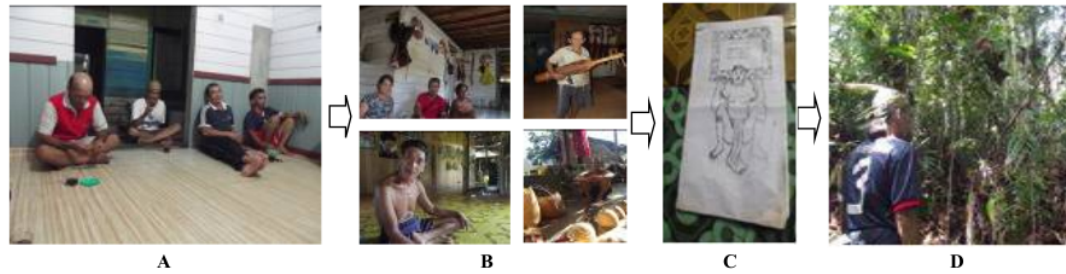


Figure 2. Data sources. A. Focusing Group Discussion, B. Deep interview, C. Documentation, D. Transect survey

Data analysis

To find out the prospect of NTFPs data analysis was done qualitatively using Community Lifehood Assessment and Product Scanning (CLAPS) method (Arquiza 2008; Bakkegaard et al. 2016). Data analysis was conducted based on FGD results, interviews with resource persons and combined with transect survey results. Data from the interview were inputted in a quantitative form, while data from transect survey were put in a map form.

The assessment of the prospects for NTFPs was based on the knowledge of the Uma Longh community in Setulang Village by giving a 0-4 profile (Table 1) on the following factors: (i) A strong group, i.e. a group of people actively utilizing NTFPs with sustainable enterprise development efforts. (ii) Good management, i.e., a group of people who consistently utilize NTFPs with a sense of responsibility, competent management and a desire to move forward. (iii) Availability of Market, i.e., the certainty of place to accommodate goods that result from the utilization of NTFPs. (iv) The accuracy of the product, i.e., the ability of the group to produce goods from the utilization of NTFPs in accordance with market demand. (v) Human resources, i.e., those who utilize available NTFPs and process them into required goods. (vi) Financial capital, i.e., the financial capacity of the group as working capital in order to utilize NTFPs into finished goods. (vii) Infrastructure, i.e., the availability of supporting equipment needed for the utilization of NTFPs. (viii) The availability of commodities, i.e., the assurance of the existence of NTFPs required as raw materials to meet market demand on a continuous basis.

Table 1. NTFPs prospect assessment

Score	Remarks
4	Always present
3	Yes, it is present but requires some strengthening
2	Yes, is is sometimes present and will require major support for development
1	No, but this can be developed
0	No, and it will be difficult to develop this

Scores of each NTFP obtained were ranked and described as follows (Tabel 2):

Table 2. Description of the results of NTFP prospect assessment

Total score	Description	Remarks
28-36	The community may have a good chance of having a sustainable enterprise.	Category I
19-27	A community enterprise is feasible but will require support and guidance.	Category II
10-18	There is a possibility to develop enterprise but will require a lot of intervention and more intensive support.	Category III
0-9	May be difficult to develop an enterprise.	Category IV

RESULTS AND DISCUSSION

Local knowledge of Uma Longh community near the forest

The behavior of human life is strongly influenced by the environmental conditions. So, the behavior of people within an ecosystem will be affected by the ability of the ecosystem to provide resources that can be used to maintain their life. Through the ability of reason and experience, one will take immediate resources available to support his daily activities or the needs of his group. Every family head in Setulang Village has a land of at least 2 hectares. The land is used to build houses, as well as open fields and orchards. The land that becomes private property is cleared together by the community members, but managed individually.

Local knowledge possessed by the Uma Longh Community included taboos (prohibitions), the consequences of an act, the knowledge of plant species and their uses, the stages of the field cultivation, and the preservation of the forest. Uma Longh Community holds the view that excessive use of forests will cause damage and can bring disaster to their survival. In managing natural resources, the communities of Dayak Ethnic use the knowledge and local wisdom so that they can be used sustainably for the next generation. Nature, to Dayak people, is understood as something sacred. They use symbols, namely the ground is the body, the water is the

blood and the forest is the breath of life. That is how they form the values of culture, belief and life as an identity. The Dayak and other indigenous groups who use traditional knowledge in their land use and cultural evolution also have adapted strategies to develop new techniques and ideologies in time of need. However, the value of indigenous knowledge of Dayak cultures remains influential in every aspect of their lives (Crevello 2004).

According to Iwan and Godwin (2009), forest is an important source of game animals (wild pigs and deer), frogs, fish, fruits, medicinal plants and building materials for the people of Setulang. They also use the river as a source of clean water for drinking, washing, and bathing, as well as means of transportation to the fields. □

The practices of the Kenyah community in the utilization of natural resources as written by Devung (1990) deal with many factors, among others: (i) the relationships among individuals involved in the utilization and management of forest resources, (ii) the influence of groups on individuals, (iii) the transparency of activities in utilizing and managing forest resources, and (iv) the nature of control in these activities. Devung (1990) says further that in activities with basic needs, the interdependence of individuals involved in the activities concerned and the group's influence on individuals is greater, the activities are more open, and control measures can be taken directly in the event of deviation. The Kenyah Dayak ethnic community utilizes nature to the extent of meeting their needs. Activities such as hunting, farming, searching for wood, etc. are carried out not only for economic purposes but also to ensure sustainability. Ethnic Kenyah people have a view that the natural world has a deeper and broader meaning not only in material sense but also in non-material one. Nature does not only mean physical objects such as trees or woods, but also has ritual and cultural aspects (Billa 2005).

Farming is still actively practiced by the Uma Longh Community, because it is the adhesive of family ties, the effort to preserve the culture, as well as one of the sources of the fulfillment of family basic needs. Farming activities are carried out at safe locations according to customary views, namely far from puddles, safe from pests or wild animals, and safe from interference with human activities. The practice of cultivation is done every year according to the season calendar which is believed to have been handed down from their ancestors. The season calendar is made according to the recurring cycle. Likewise, land use is done using 3-5 year rotation. Based on local knowledge, in the clearing of the Uma Longh field, people are paying attention to the signs of nature, which also apply to the Kenyan ethnic community in general. The signs are given by the bird Isit (a small bird). If the Isit bird flies from the back of a person and then turns right to indicate a good sign, then if he turns left there is a bad sign.

The cultivation activities of the Uma Longh Setulang community changed with the presence of village forests. The field is a stretch of land that is cleared by the community in mutual cooperation, located on the

riverbank. However, the existence of forest near the fields is also needed as a place to plant fruit trees and also the source of NTFPs. Conversely, if there is no cultivation, then the forest is likely to be damaged, because selling timber and non-timber forest products people can earn cash to buy their living needs.

Local knowledge of Forest Village benefits

For Setulang Uma Longh community, keeping forests means maintaining the values of tradition that are believed to be hereditary. The community recognizes that there are still customary rights over forest resources in their domicile. This understanding is in line with the opinion of Moeliono and Godwin (2009), that there are several criteria that must exist in the recognition of customary territories, namely customary rules are still implemented properly, custom leaders/institutions still exist, and the territory has clear boundaries.

People will be aware of species when they benefit from the goods (Negi et al. 2011). Like most ethnic Kenyah, Uma Longh Setulang Community lives in a gathering or concentrated pattern in one place. Even if one lives outside the group, usually he or she is not too far away. They also live not too far from the river bank, since the river is the main source of clean water for them. Figure 3 shows the pattern of population distribution in Setulang. Environmental factors will shape and define human culture. In this case the formation of culture is determined by geographical location, topography, climate and natural resources. These are what affect the Uma Longh Setulang community's perception of the forest in Setulang Village.

The presence of CIFOR in 1999 has changed the perceptions of Setulang Villagers to the existence of forests in their villages. Residents of Setulang who originally lived in the old village of Long Saan Village of Long Pujungan sub-district, Kenyah Umö Longh ethnic, cleared the field and eventually settled in Setulang (currently). They have high dependence on forests around the village. People meet the living needs of forest products, whether in the form of timber (building materials, furniture, boats, etc.) or non-timber (foodstuffs, medicines, herbs). So, the forest here serves as a place to produce and simultaneously a reserve of primary and secondary needs. In addition, Uma Longh Setulang community also views the forest as a refuge when a disaster or a danger threatens their lives. It is intended as a food reserve, especially local fruits, medicines and deliberate management with local knowledge compared to unintentional management (Apuy et al. 2017)

Cooperation (*hejagen hempeng*) was done by Setulang people with clear division of tasks. Activities that require power are performed by men (*lawie*), such as clearing (*lede*), cutting (*nepong*), burning (*nutuoang*), and building. The women (*letu*) perform activities, such as cooking, taking care of children, and making holes for planting, while harvesting (*majo*) is done jointly between men and women.



Figure 3. Distribution pattern of Uma Longh residents of Setulang Village, Malinau, North Kalimantan, Indonesia

The common perception of the Uma Longh community of the forest near the village fosters prudent harvest of forest products. NTFPs are not only obtained from dense forests, but also in the former fields and the settlements, depending on the community's experience to select and process them into NTFPs that are economically viable. Uma Longh Setulang community only utilizes non-timber forest products (NTFPs) in small volumes to meet the

needs of life and village interests. Uma Longh Setulang community also utilizes the remnants of timber in the former fields (*jakau*) outside of the protected Village Forest area. Similarly, if there are people who want to build a house, the timber to build a house is obtained from outside the protected forest area or bought from the village/elsewhere.

The prospect of NTFPS utilization

Setulang Village forest has natural vegetation classified as lowland mixed dipterocarp forest, dominated by trees in the families of Dipterocarpaceae (21 species in five genera: *Shorea*, *Dipterocarpus*, *Dryobalanops*, *Parashorea*, and *Vatica*), Myristicaceae (13 species in three genera: *Knema*, *Myristica*, and *Horsfieldia*), Lauraceae (12 species in seven genera, including the important timber species *Eusideroxylon zwageri*). (Sidiyasa et al. 2006). From this area, the NTFPs taken by the community to meet the most important needs were rattan (*Uei*, *Calamus* spp.), Sang (*Licuala valida*), Ta'lang, Soleng (*Diospyros macrophylla*), Large pandanus, fruits, resin, wild boar (*Sus barbatus*), and Bamboo (*reeds*) (Table 3).

Rattan (*Calamus* spp.)

Calamus spp. are species of plants well known by the people of Setulang. In the Setulang forest there are 20 species of *Calamus* that have been identified, i.e. *rattan semuleh*, *rattan seringan*, *rattan lalis*, *rattan merah*, *rattan lilin*, *rattan segah*, *rattan anyeq*, *rattan jae*, *rattan tevongen*, *rattan semut*, *rattan asa*, *rattan sanain*, *rattan bala mato*, *rattan jerit*, *rattan kelingan*, *rattan keras*, *rattan belongan*, *rattan besar*, *rattan kecil*, and *rattan selingan* (Sidiyasa et al. 2006). People generally use *Rattan sega* (*Calamus pogonocanthus*) as woven material, such as rice jar (*ta'peng*), and hat (*tagen luum we*). The rattans found in Tane'Olen Village Forest usually grow in clumps, each of which has only 5-7 stems of rattan. Rattan is harvested to make wicker craft and to be used for food (rattan soft stem or shoot or *umbut*). Rattan commonly used for wicker craft is the type of *Rattan Segah*. To make the wicker craft the amount of rattan taken is not too much, because the demand for these products is still low. Usually, woven rattan in the forms of rice jar and its lid can be sold out 1-2 pieces per request. The analysis resulted a score of 21 (included in category II, NTFPs are feasible to be cultivated local community, but need support and assistance).

Sang (*Licuala valida* Becc)

Licuala valida is a species of palm plant (Figure 4). The leaves of *L. valida* are widely used by Setulang communities as material to make a round hat (*saung*). The leaves are always dried in the open before they are woven into hats. Leaves are selected as a hat making material because they are flexible and not easily damaged when exposed to water. The *Licuala* leaves are taken by Setulang people from the Village Forest, because in this forest the plant grows well. The plants grow scattered. Setulang Village people take the leaves in accordance with the needs, because too many leaves will accumulate, get moist and moldy. To make a *saung*, 30-50 leaves are needed. The price of a *saung* depends on its size and accessories provided. The analysis resulted a score of 18 (included in category III, NTFPs are feasible for cultivation, but will require intensive support).

Penek lana (*Korthalsia furtadoana* J. Dransf.)

Korthalsia furtadoana can be found on the banks of Setulang River and Malinau River (Figure 4). *K.*

furtadoana has many benefits for Setulang people. Its leaves are widely used as woven craft materials, that is hat, or roof of the house. The midrib of *K. furtadoana* leaves which are flexible and strong can be used to make bullets of traditional weapon (*sumpit*) and brooms. Inside the stem of *K. furtadoana* there is a soft part called *umbut* that can be consumed as food. The rotting stem will bring in caterpillars. The caterpillars from the stem are also consumable. The leaves of *K. furtadoana* taken Setulang Community are still limited for their own use and not sold. The analysis resulted a score of 18 (included in category III, NTFPs are feasible for cultivation, but will require intensive support).

Soleng (*Diospyros macrophylla* Bl.)

Diospyros macrophylla is a species of tree whose bark is used by the Setulang people as a dye for coloring various woven crafts made from rattan. To get *D. macrophylla* takes a long journey into the Village Forest of Tane'Olen. This species of plant spreads over dense dipterocarp forests. The bark of *D. macrophylla* is used for coloring material because it can stick to rattan (cannot be separated) and its color does not easily fade. Dyed with *D. macrophylla*'s bark, the rattan handicrafts have an added value. The analysis resulted a score of 17 (included in category III, NTFPs are feasible for cultivation, but will require intensive support).

Pandan besar (*Pandanus* sp.)

Pandanus sp. is a long-leaved plant species which grows in a relatively shady place. *Pandanus* sp. was found in Tane'Olen and the banks of the river. This *Pandanus* sp. is easy to grow so that some residents plant it in the village. The leaves *Pandanus* sp. are widely used to make woven mats. Because they are relatively elastic and cold, pandan mats are used as sleeping or lying mats. Dried large pandanus leaves are often found in people's homes in small quantities, which are just enough to meet the needs for making wicker.

The analysis resulted a score of 16 (included in category III, NTFPs are feasible for cultivation, but will require intensive support).

Fruits

The local names of fruits in *Sengtung* are quite diverse. The fruits well known to the public are those of *Nephelium lappaceum*, *Durio zibenthinus*, *Durio kutejensis*, *Lansium parasiticum*, *Dimocarpus longan*, *Artocarpus integer*, *Parkia speciosa*, *Archindron pauciflorum*, etc. Setulang Village Forest has 52 species of fruit trees (Sidiyasa et al. 2006). Most of the fruit trees in Village Forest are naturally grown but some are grown by the community. The fruit of trees grown in the Village Forest may be consumed by anyone because the village forest is agreed on as common property. In addition to fruit trees in the Village Forest, there are other fruit trees belonging to individuals, i.e., those found in gardens and yards. The fruits that have been harvested are mostly consumed by the people themselves because the harvest is usually done simultaneously. The analysis resulted a score of 18 (included in category III,



Figure 4. NTFPs from Setulang Village Forest, Malinau, North Kalimantan, Indonesia. A. *Lucuala valida* Becc. B. *Korthalsia furtadoana*

NTFPs are feasible for cultivation, but will require intensive support).

Resin

Resin is a frozen sap generated from *Shorea pinanga*. Resin is used by Setulang people as a glue material to close the gap in the boat. In addition, resin is also used to glue machetes (*bazeng*) or knives (*eagle*). Resin was obtained from Tane'Olen Village Forest. To get resin takes a long time, because they have to find a *Meranti Kuning* (*Shorea pinanga*) located deep in the forest. In addition to being used for themselves, *Shorea* is also sold at a price of Rp. 10,000 per seedling. The analysis resulted a score of 6 (included in category IV, NTFPs are difficult to be developed as a business).

The wild boar (*Sus barbatus* Muller)

Sus barbatus was obtained by Setulang people by hunting. Hunting is done only at a certain time when the community is disturbed or during a holiday celebration. Wild boar is still found freely roaming the forest. However, Setulang people rarely hunt wild boar, because they have to go too far into the forest. In addition to wild boar meat, in Setulang Village there is also sambar deer meat, but this is rarely found. The analysis resulted a score of 8 (included in category IV, NTFPs are difficult to be developed as a business).

Medicines

The medicines referred to here are traditional herbs. Traditional herbal remedies are not widely known by most

Setulang Villagers. Only those who are experienced know the species of medicinal plants that can be utilized. The key informants mentioned that the species of medicinal plants are believed to be widely distributed in the Tane'Olen Forest. The results of research conducted by Karmilasari and Supartini (2011) in Tane'Olen Forest found 32 species of medicinal plants (which belong to 31 genera and 25 families). Traditional medicinal herbs made in Setulang Community were only for their own use and not for sale because there is no demand for this type of commodity. The analysis resulted a score of 14 (included in category III, NTFPS allows for cultivation, but will require support intensively).

Bamboo (*Gigantochloa apus* Schult f Kurtz)

Gigantochloa apus is one of the raw materials to make handicrafts in Setulang Village. The species of *Gigantochloa apus* is found on the banks of Setulang River. The collection of bamboo for woven crafts made by Setulang people was relatively little. In addition to make wicker, *Gigantochloa apus* is also used to make other handicrafts and musical instruments. In addition to taking bamboo sticks for crafts, Uma Longh community also pick bamboo bamboo as a source of food. Several species of bamboos known as food have local names, such as *ubut uwai tebungan*, *ubut uwai balamata*, and *ubut uwai pa'it* (Uluk et al. 2001). The analysis resulted a score of 19 (included in category II, NTFPs are feasible to be cultivated by local community, but require support and assistance).

Table 3. Prospect of NTFPs from Setulang Village Forest, Malinau, North Kalimantan, Indonesia

NTFPs	Score	Classification
Rattan (<i>Uei; Calamus</i> spp.)	36	Category II
Sang (<i>Licuala valida</i> Becc)	31	Category III
Penek lana (<i>Korthalsia furtadoana</i> J. Dransf.)	31	Category III
Soleng (<i>Diospyros macrophylla</i> Bl.)	29	Category III
Pandan besar (<i>Pandanus</i> sp.)	27	Category III
Fruits	18	Category III
Resin	10	Category IV
The wild boar (<i>Sus barbatus</i> Muller)	13	Category IV
Bamboo (<i>buluh; Gigantochloa apus</i> Schult f Kurtz)	33	Category II

The adoption of cash cropping, easily available through free access to and use of land, can meet the native peoples' cash needs (Lunkapis 2015). In addition to taking some important NTFP commodities, the Setulang people also pick the remaining timber in former fields (*jakau*). There is also a kind of roots that are commonly used to bind velvet (tool binder made of bamboo). The root is hard enough, but it becomes elastic when heated on fire, and when attached to a certain object and let it cool, it will bind tightly.

Uma Longh Setulang communities also took NTFPs in the form of clean water. Clean water was channeled directly to people's homes from a spring \pm 3 km away through 0.5-inch diameter pvc pipes. Because of latitude differences among homes, some people did not get clean water, but Setulang Village Government has planned to build a water reservoir of water, so the distribution would be more evenly distributed.

The habitats of plants producing NTFPs used by Uma Longh Setulang communities spread over the banks of rivers and in forests. The species of plants producing NTFPs scattered on the banks of rivers are *K. furtadoana*, *Gigantochloa apus* Schult f Kurtz and *Pandanus* sp. The plants are very easy to find in the fields or around the village. While in the forest of Tane'Olen and Village Forest, there are *Shorea pinanga* as producer of resin, *Calamus* sp., *L. valida*, *Diospyros macrophylla*, *Pandanus* sp., as well as various species of fruit-producing trees, medicinal herbs and animals. Some of the sources of NTFPs are located deep inside the forest, for example, the species of Soleng which is found only in certain places, make it difficult for the woven craftsmen to obtain them, so that their use is done with caution. Most of the plants producing NTFPs are not intentionally cultivated by the community, except for certain species of fruit trees. The Kenyah maintain fruit orchards and vegetable gardens, while cassava and sugarcane are planted either in or around rice swiddens, either during the harvest or after the harvest. Taro is planted in specific damp spots or on dykes around wet paddies. Vegetable gardens are usually located near the village—or even around the house—or near the swidden. Fruit trees are kept near or in the village, as well as in old and current swidden (Eghenter et al. 2003). The

species of animals, such as sambar deer and boar, however, can only be found in several places in Tane'Olen region. The NTFPs distribution is given in Figure 5.

Of the 21 types of NTFPs successfully administered in the study area, 18 (85.71%) of the species were used alone for individual or family purposes, 18 (85.71%) sold at home or in Setulang Village, 4 (19.05 %) sold at Inai Market in Malinau City, and only 2 (9.52%) sold elsewhere, outside Malinau. Several previous studies have calculated the amount of contribution from NTFPs to income. A study of 18 cases of commercialization of NTFPs in Bolivia and Mexico (Moko 2008) reported that NTFPs were of great importance to the livelihoods of the rural poor. NTFPs contributed 7-95% of family income per year, and provided food reserves when other sources of income failed.

In India about 50% of forest revenue was from NTFPs (Sekar et al. 1996). NTFPs also accounted for 10-40% of revenue for 50 million tribal households in India. In Indonesia, the rattan industry was able to provide employment for 200,000 people (Haury and Saragih 1997). More than 320,000 people were involved in NTFPs production in Vietnam (Tien 1994) and in Bangladesh, NTFPs employed nearly 300,000 people (Basit 1995). In Malaysia, it was estimated that rattan crops contributed about 14.8% of the community's economic activity in swamp forests (Kumari 1995). Several case studies indicated that in Sri Lanka, Indonesia and India (Enters 1997) the communities around the forest utilized about 50-75% of forest products in the form of NTFPs.

The Uma Longh community has local knowledge on NTFP-producing plants that can be utilized in terms of species, parts, age, harvest techniques, locations and conservation efforts. This local knowledge is derived from the experiences and teachings of their parents. The selection of types of NTFPs was based on considerations, such as the ease of forming or processing and affordability. Overall, it was concluded that long-term resilience by farmers could only be achieved by integrating the traditional methods with the modern technologies. The integration process can be achieved if promoters of modern technologies engage the locals and incorporate some of their traditional methods in order to make the modern technologies locally driven for easy adoption (Mubanga and Umar 2014). Utilization of NTFPs in the Setulang Forest can effectively reduce disturbance to Ketrok Protected Forest which provides environmental services for the surrounding lives.

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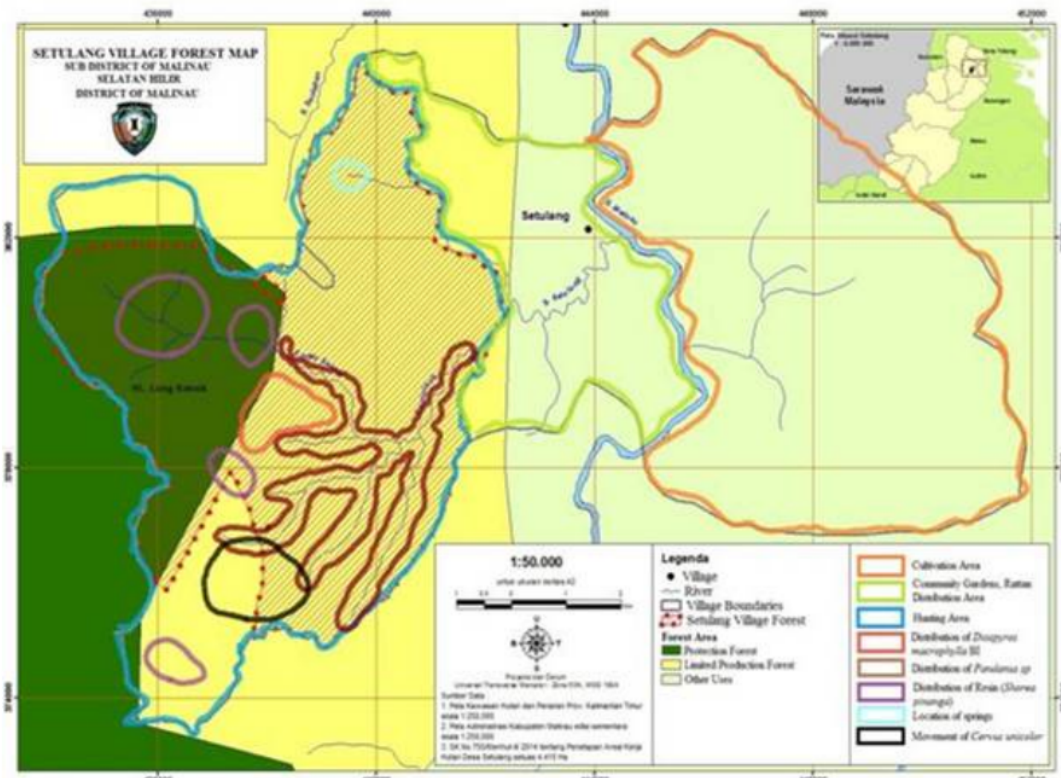


Figure 5. Habitat distribution of NTFPs sources in Setulang Village, Malinau, North Kalimantan, Indonesia

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