ASIA-PACIFIC NETWORK FOR SUSTAINABLE FOREST MANAGEMENT AND REHABILITATION

COMMUNITY-BASED SUSTAINABLE FOREST MANAGEMENTOF SUNGAI MEDIHIT WATERSHED, SARAWAK
(PROJECT SERIAL NO: APFNet /2013 /PP/05)

FINAL REPORT ACTIVITY1.3 DEMONSTRATE SUSTAINABLE COMMUNITY FOREST MANAGEMENT PRACTICES

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PROJECT DETAILS

Project Title	:	Community-Based Sustainable Forest Management of Sungai Medihit Watershed, Sarawak, Malaysia
Project Serial No.	:	APFNet/2013/PP/05
Donor Agency & Status	:	Asia-Pacific Network for Sustainable Forest Management & Rehabilitation, Beijing, Peoples' Republic of China
Supervisory Agency	:	International Tropical Timber Organization, Japan
Executing Agency	:	Forest Department Sarawak
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		(01 July 2016-30 June 2017)
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		(01 July 2017-31May 2018)
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APFNet Budget for AWP11	:	USD 126,000
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Executing Agency Contrib.	:	USD 133,000
Project Technical Advisor	:	YBhgDatuk Dr Freezaillah Bin CheYeom
PSC Chairman & Project Coordinator	:	Tuan Hj Sapuan Ahmad, Director of Forests
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Project Manager & PSC Secretary	:	Morris Kapong Senap
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BACKGROUND

The APFNet Project ***Community-Based Sustainable Forest Management of Sungai Medihit Watershed, Sarawak, Malaysia***was formulated with the following **Goal**:

> *to promote Sustainable Forest Management (SFM) in Sungai Medihit Watershed through community capacity building, innovative operational model demonstration and establishing a new governance mechanism on community development*.

and**Specific Objectives:**

- *to improve SFM through rational forest management plans applying innovative forest management techniques and establishing effective forest management mechanisms;*
- *to enhance the communities' capacity for SFM and livelihood development and to improve the community living conditions by renovating the service infrastructure.*

Two Project outputswere established:

- Output 1: Improvement in Community Forest Management, and
- Output 2: Capacity of the Community on Development Enhanced

The Project Document identified four (4) Activitiesto be implemented to achieve Output 1. One of these, Activity 1.3, was entitled ***Demonstrate sustainable community forest management practices.***This consultancy involved conducting Activity 1.3.

Activity 1.3 comprised five sub-activities, namely:

Activity 1.3.1 Summarise traditional models for protection and sustainable use of forest resources within communities through interviews and field survey

Activity 1.3.2 Establish Sustainable Forest Management demonstration sites

Activity 1.3.3 Identify and protect High Conservation Value Forest with the guidance and support of experts

Activity 1.3.4 Introduce and demonstrate suitable high value tree species to increase local farmers' Income from forest plantations

Activity 1.3.5 Demonstrate the sustainable harvesting and mode of processing NTFPs (Non-Timber Forest Products).

OBJECTIVES

To fulfil requirements for Activities 1.3.1, 1.3.2, 1.3.3, 1.3.4 and 1.3.5 as set out in the Annual Work Plan.

METHODOLOGY

Field trips were conducted from 11-18 Oct. 2015 and 11-13 Dec. 2016. On both occasions the Consultant interviewed local informantsand viewed selected useful species*in situ,*and locations. The Kelabit community experts were: En TaminSepuluhRibuh (Pun Alan), said to be 102 years old,who had extremely lengthy experience of village (kampung) affairs, having been in school before the Japanese Occupation (1941), and at the timerepresenting TK JanginTaibilong,Headman of Long Napir; En KasimTaminSepuluhRibuh, who works as a forest surveyor forLimba Jaya, Lee Ling Timber;John Iboh, and, on behalf of the womenfolk, SinaNabang Ayu and also Pun Ngiti and Pun Mesipun, older ladies who were knowledgeable about local wild vegetables and fungi. William AganIbuhprovided transportand information during site visits;The Penan community experts were: TK LejoRigung, Kampung Bahagia Headman, and his representative and brother, TipongRigung. The Plant Resource List (Annex I), pp. 39-45 in the Pre-Project Technical Report, ITTO Pre-Project PPD 135/07 Rev. 1(F) Community-based Forest Management of Sungai Medihit Watershed (2009) was used as a basis for the discussions. After the discussions, the informants brought the consultant to see some species that they themselves had planted that have potential for introduction under the project. Specimens of some of these were collected for further identification in Kuching.

FINDINGS

ACTIVITY 1.3.1 Summarise traditional models for protection and sustainable use of forest resources within communities through interview and field survey

Traditional Kelabit community model for forest resources'protection and sustainable use

En TaminSepuluhRibuh (Pun Alan), representing Long Napir HeadmanTK JanginTaibilong(away from Long Napir during the field trip) was the informant for this Activity.

The Long NapirKelabit community entered the Sg Medihit catchment in the early 1890s.The community, who farmed hill rice (padi bukit), their staple,for subsistence, moved from place to place, each time setting up settlements (longhouses) in areas of forest on the hilly terrain that they wished to fell in order to carry out shifting cultivation for a few years, until the land'sfertility was exhausted. This continued for about 60 years.Abandoned shifting cultivation areas were allowed to regeneratesecondary forest (amug) that could be farmed again after a fallow period. The resources the community needed during these times were simple: rice, fish from the rivers and game from the forests, timber to construct longhouses, fruit from wild fruit trees, non-timber forest products (NTFPs) including wild vegetables and fungi and materials to make mats, hats, blowpipes, dart poison, cordage, medicines, adhesives etc. and occasionally for products they could barter at the market (tamu[1]) that was arranged from time to time.

Timber

[1] '... in 1906 the Brooke regime instituted a form of government-supervised barter-trade meetings between the Penan and longhouse traders which came to be known as tamu' (Langub, Jayl. 2013. Tamu: institutionalized barter trade, the Penan and their encounter with the colonial and post-colonial state).

The trees providing the various types of timber that the kampong people needed to construct their longhouse were available close by in the undisturbed Mixed Dipterocarp Forest. As their needs were minimal, and also because they moved regularly from area to area, there was always sufficient timber of the type they needed. The community felled trees using axes in a cooperative effort (gotongroyong) and just took as much as they needed. They did not think of replanting trees as there was always sufficient timber and timber trees produced sufficient seedlings for regeneration, until commercial timber companies started logging in the 1970susingmechanical equipment and machinery.

The best timber tree was Rangarsia (*Shorea,* Dipterocarpaceae), which grows very tall and whose timber lasts longer in dry situations than that of other species, and it was used for rafters and planks for house building and to make boats (perahu). The second most important timber species was Nesuan (Dryobalanops – Dipterocarpaceae) which supplied hard wood for rafters and fences. Belian or sagat (*Eusideroxylonzwageri*and *Potoxylonmalagangai* – Lauraceae) was also cut for timber but was considered poor quality in comparison with Bintulu belian. Other species mentioned as used were Temangin(said to be *Shorea* of the Selanganbatu group), Perak baya(?*Calophyllum*– Clusiaceae - producing a heavy timber used for posts) and Bayur (*Pterospermum*- Sterculiaceae).

Fruit trees

The Kelabit community valuesfruit from a wide range of wild forest fruit tree species. Kelabit individuals have long planted fruit trees around their shifting cultivation fields. This practice marks the land as the individual's amug, and the fruit trees last decades so they can be used to identifya particular individual's amugeven after the forest has regrown.

The Kelabit distinguished two different categories of fruit treespeciesdepending on the behaviour of the fruit when ripe. The ripe fruit

of some species (e.g. durian) drops while the fruit of other species (e.g. petai) remains on the tree, never dropping. The community was pragmatic in its treatment of these two categories. Species whose fruit drops were not felled while those whose fruit does not drop were climbed while they were still small enough and felled once they became too big to climb. As in the case of timber species, there were always plenty more fruit trees in the forest, even of the species that had to be felled in order to get the fruit.

The most important of the local fruit trees were durians (*Durio* – Bombacaceae) - found wild in the forest.Four species of wild durian are:datukbirar, buah badui, durian kala / beruah, durian sia and the 'domesticated' durian biasa also occurs. Other fruit trees mentioned were the highly popular buah kiran (*Artocarpus odoratissimus* – Moraceae) as well as less popular *Artocarpus* species such as terap and cempedak; rengurannipiskenyalang (*Dacryodes* – Burseraceae); buahbupu (*Dimocarpus malesianus* - Sapindaceae), rambutan(*Nephelium* – Sapindaceae) species found wild in the forest; lengad (*Lansiumdomesticum* – Meliaceae), petaihutan(*Parkia* – Fabaceae) and wild mango species (*Mangifera* – Anacardiaceae) including those known locally as bua sum and alim (*M. pajang*). There are also three wild mangosteen species(*Garcinia*- Clusiaceae) – buah main, kesi and kerakuk. Other fruit trees recorded were buahki(*Baccaurea angulata* - Euphorbiaceae); buahsepulau (*Dialium* – Fabaceae) and meritam(*Nepheliumramboutan-ake* – Sapindaceae) as well as other less important fruits species.

Non-timber forest products

The Kelabit community'sneeds for NTFPsfor various subsistence, hunting and household purposes could be met by the resources available in the forest.

The Kelabit community traditionally harvested wild sago (kenangan - *Eugeissonautilis* - Arecaceae) for the immature palm cabbageshoots, used as a vegetable. They used to poison blowpipe darts with latex from tajemtrees

(*Antiaristoxicaria* – Moraceae), which they preserved. Other useful species collected from the forest included rattans: rotan sokor (*Calamus optimus* – Arecaceae) taken to make rattan strip mats (ugam way) and other rattan species: way ajat, way pusa, way nanit and way sebuli, used for various purposes including weaving baskets (way sebuli).To weave mats they collected fibres of various plants including beban *(Donax*– Marantaceae),siar(*Fimbrystylisglobulosa* –Cyperaceae) andkabar (Pandanus – Pandanaceae).

The Kelabit community of Long Napir seldom collected agar wood (gaharu), the resin-impregnated diseased wood of *Aquilaria beccariana* and *A. microcarpa*(Thymelaeaceae) which commanded high prices in town markets since the 1960s for export foruse inincense or perfumes.

Fish and game

Fish and game were available in the rivers and forests in abundance and no special measures were needed to protect these resources. The rivers were pristine with no pollution issues and the forests extensive. Kelabit hunters had a culture of sharing game with the less able in the community.There wereno regular markets for fresh fish and meat, so supplies could meet demand.

Traditional Penan community model for forest resources' protection and sustainable use

TK LejoRigung, Kpg Bahagia Headman, whois elderly and has long experience of the local forest both before and after the Penan community settled at Kpg Bahagia in 1972, was the informant for this Activity. His younger brother, deputy Headman Tipong Rigung, also provided information during interviews and took us for a field visit, accompanied by William Agan Ibuh. Two other Penans - Peter and Augustine – were also involved.

Traditionally the Penan moved from place to place over wide areas, processing wild sago or 'uvut' (*Eugeissona utilis*) and also Jaka (*Arenga*) to

produce starch, their staple food, hunting with blowpipes and poisoned darts and living in temporary shelters constructed from small timbers and leaves. Prior to the 1970s the Kpg Bahagia Penan community wassemi-nomadic, roaming from the Baram headwaters to the Medihit headwaters and back. The resources the community needed were simple:wild sago groves, game, trees and plants providing materials for hunting equipment (blowpipes, dart poison), fruit from wild fruit trees; rattans to weave sleeping mats and baskets for personal use and barter trade at the tamuand plant medicines etc. Agar wood or gaharu (the resin-impregnated diseased wood of *Aquilaria*species – Thymelaeaceae) was also bartered. The State Government established Kampung Bahagia in 1972 to settle the Penan –Kpg Bahagia is the first Penan settlement in the Sg Medihit catchment.

Timber

The Penan timber needs, traditionally only for blowpipes mostly for personal use, were minimal and always sourced from the forestso sufficient timber of the desired species was always available. The Penan used to cut the tree they needed for timber and let any seedlings grow by themselves. The preferredspecies produce hard, fine-grained timber and are,in order of preference, tanyit (*Koompassiaexcelsa* – Fabaceae), nyagang(*Strebluselongatus* - Moraceae) and Pa (*K. malaccensis*).

TK Lejo Rigung with his blowpipe

Durio kutejensis (lai (P)/kala (K) wild durian in flower at Kpg Bahagia

Fruit trees

Fruits from wild fruit trees are an important part of the Penan diet. The Penan community, just like the Kelabit community, distinguished two different categories of fruit tree species depending on whether the fruit drops when ripe or remains on the tree. They did not fell species whose fruits fall by themselves(e.g. durian spp. and alim(*Mangiferapajang* – Anacardiaceae)). They climbed trees to collect fruits for species whose fruits do not fall and felled those that are too big to climb. The informant noted that fruit trees always produce seedlings that will grow into a new generation.

Important to the Penan are belaletik[2] (leteh)(*Durio graveolens*), lai(*D. kutejensis*), buabela (*D. oblongus*) and tungan (*D. oxleyanus*) as well as the familiar durian (*D. zibethinus*). Also important werebuamedang (*Artocarpus odoratissimus*). Others mentioned were mata kuching (*Dimocarpus malesianus* -Sapindaceae), bualasat(*Lansiumdomesticum* -Meliaceae), petaitanah(*Parkiajavanica* – Fabaceae), buapidau (*Baccaurea angulata* – Euphorbiaceae)and rambutanandmaha (*Nephelium*species - Sapindaceae).

Non-timber forest products

Traditionally, the Penan community valued two products in particular – certain rattanspecies, which they processed and used to weave very fine and intricately decorated sleeping mats and baskets for their own use and to barter at the tamu; and gaharu, resin-impregnated diseased wood that is worth a lot in barter trade.

The most useful rattan species in the area, in order of preference, are waibukui(*Calamus caesius*), the #1 rattan, split, dyed and woven into baskets and mats; waiinang (*C. optimus*), the rattan of choice for rattan strip mats (makwai), waisaput (*C. laevigatus*) and other species including waisemui (*C.*

[2]Durian identifications tentative at this stage

axillaris), used for mats and baskets. The useful rattan species grow in clumpsthat perpetually produce new side shoots. The Penan traditionally harvested the rattan by taking mature canes (those that had lost their stem sheaths),leaving the immature stems of the clump to continue to growand mature.

The Penan collected agar wood or gaharu from diseased telakortrees (gaharu baa'and gaharu bukit- *Aquilaria beccariana* and *A. microcarpa*– Thymelaeaceae, respectively) from their specific habitats in the forest. To produce gaharu a treemust have been wounded in some way and therefore become diseased. If unsure whether a telakor tree contained gaharu the Penan would cut the tree with a parang. If there was no gaharu they left it to develop gaharu.

Game

The Penan traditionally survived on the game they shot using blowpipes (not shotguns) in the forest. Under pristine forest conditions game was available, and as they relied on low-tech equipment such as blowpipes and spears rather than shotguns, the Penan did not have to worry about protecting and conserving the resource.

The two field trips were short and only preliminary data were collected. Further trips are needed to get a more complete list of useful species,based onfertile(flowering or fruiting) specimens whose identifications have been confirmedwith reference to specimens in the Herbarium, Forest Department Sarawak, in Kuching, and the literature.

ACTIVITY 1.3.2 Establish Sustainable Forest Management Demonstration Sites

Sustainable Forest Management (SFM) has been defined as: the process of managing forest to achieve one or more clearly specified objectives of management with regard to the production of a continuous flow of desired

forest products and services without undue reduction of its inherent values and future productivity and without undue undesirable effects on the physical and social environment.[3]

TheInternational Tropical Timber Organisation (ITTO), in the context of the tropical timber resource base,considers that SFM can embrace aspects such as planning, reduced impact logging (RIL), community forestry, fire management and biodiversity and trans-boundary conservation. Reduced Impact Logging, anaspect of SFMimportant in commercial logging operations such as those that take place in the Sg Medihit catchment,is not meaningful in the context of Community Forest Management as local community members do not carry out their own commercial logging operations.

Table 1 shows Potential SFM initiatives for demonstration sites.

Table 1: SFM Demonstration Sites objectives and potential initiatives

	Objective of SFM demonstration	**Initiative forSFM demonstration**
1	Establish resources (e.g. fruit and gaharu trees, fish-rearing) that could be used to raise cash and thus take pressure off forest resources.	• Set up nurseries and raise seedlings of prime timber, fruit and gaharu species • Plant out seedlings of prime species in the demonstration site
2	Raise awareness, including among children, of the need to harvest resources sustainably and protect as well as replant resources	Plant useful species (e.g. rattans, gaharu) in the demonstration site and label them
3	Leverage local community members' interest and knowledge to identify locations	Survey the demonstration site and label relevant resources. Introduce new resources from elsewhere in

[3]International Tropical Timber Organisation (ITTO)

	Objective of SFM demonstration	Initiative forSFM demonstration
	of resources, biodiversity, habitats and potential ecotourism destinations that need conservation	the catchment
4	Maintain and protect river banks	Demonstrate replanting river banks with kayu abang (P) (*Shorea macrophylla*) and ensurai (*Dipterocarpus oblongifolius*)
5	Rehabilitate degraded areas	Demonstrate replanting pioneer species such as kayu dat (P) (*Cratoxylon),* perak baya (K) / boto baya (P) (?*Calophyllum*(both Clusiaceae) and belaban (*Tristaniopsis* - Myrtaceae)

Two Sustainable Forest Management Demonstration Sites (SFMDS), one at Long San for the Long Napir Kelabit community and one at Ulu Sg Terasak for the Kpg Bahagia Penan community, were agreedon by the communities in 2018, late in the Project. Community agreement for the Long San site had been difficult to achieve due to conflicting views on its 'ownership' since the start of the Project.Both sites selected needed to have good forest cover in order to be able to establish desirable species. Part of Objective 1 (Table 2) has been achieved in that nursery establishment has begun in locations near the two settlements to raise seedlings of the desired species so that the demonstration sites can be planted.

Table 2: Parameters of SFM Demonstration Sites

Name	Long San SFMDS	Ulu Sg Terasak SFMDS
Approx. location	N $4^0$9'59.5" E $115^0$6'16.2"	N $4^0$7'31.0" E $115^0$6'57.3"
Max. elevation (m)	610	530
Size (ha)	753	678
Land status	State land	Within LPF 0038 issued to Limba Jaya Company (contractor: Lee Ling

		Timber)
Access	By longboat from Long San or by logging road direct from Long Napir	Logging road to Long Seridan beyond Jambatan Terasak
Description	Virgin forest	• Logged in the past • Large trees present

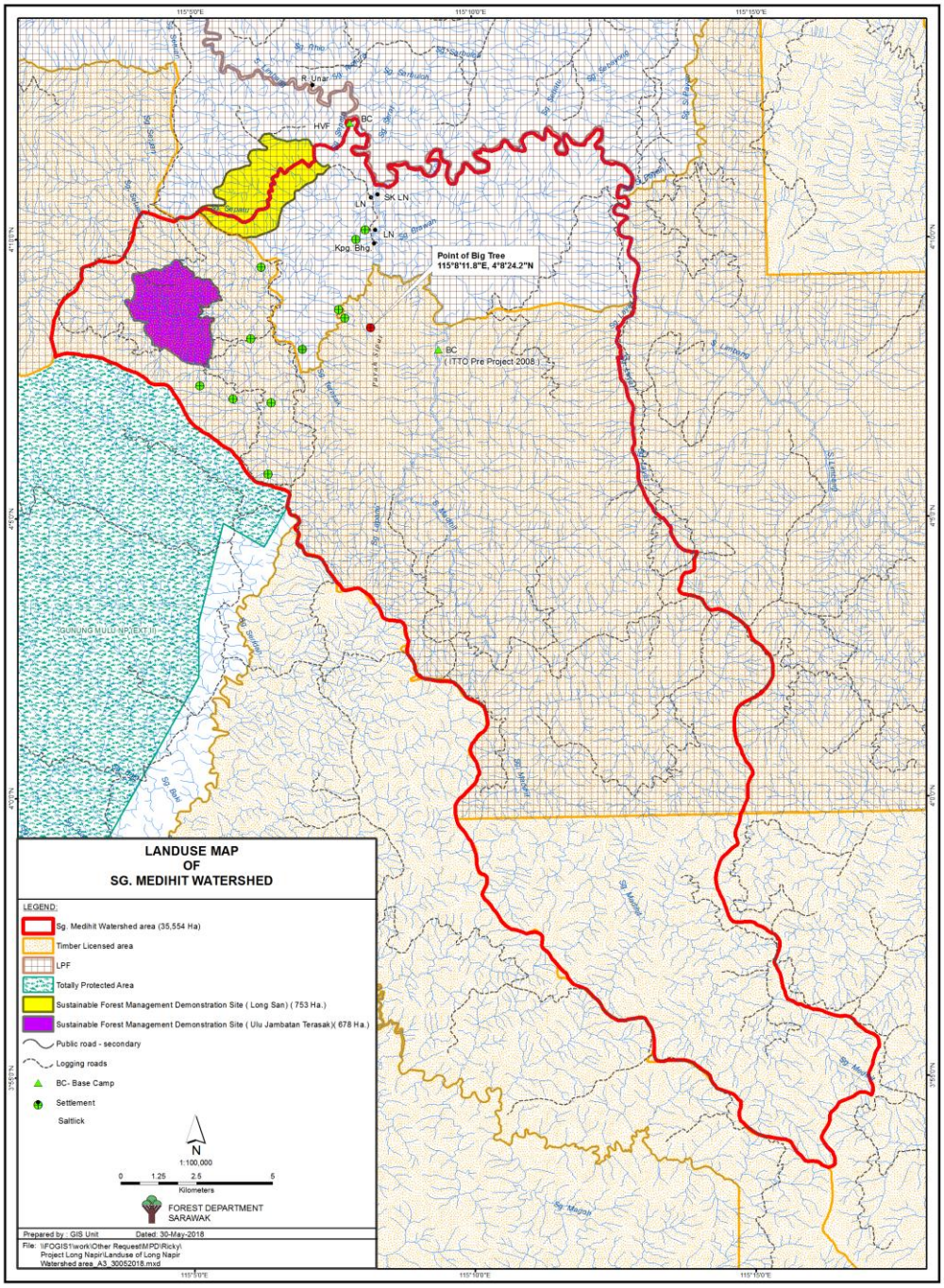

Figure 1: Location of Kelabit(yellow) and Penan (purple) SFM Demonstration Sitesand other conservation areas

ACTIVITY 1.3.3 Identify and protect High Conservation Value Forest with the guidance and support of experts

The Long Napir Kelabit community and Kpg Bahagia Penan community have each now agreed on and earmarked an area of forest to be reserved for their community use (Figure 1). The Kelabit community had reserved Long San, north of Long Napir, for a long time. During the first fieldtrip the consultant was not able to access the area, ostensibly because a boat (perahu) to access the area by river was not ready. However, it later emerged that we were not welcome to visit the area. The central part of the reserve has never been logged, though the margins may have been,and is still primary forest. The community prevented roads from being constructed through the area, prevented loggers from going inand has not allowed hunting in the area so its wildlife and fish are preserved.

The Penan community of Kpg Bahagia had located an area at ulu Sg Terasak, beyond Jambatan Terasak, which, although previously logged,has large trees. They hadearly requested Lee Ling Timber to set it aside as their own reserve forest. In a further initiative towards the end of the project, a specific area was finally agreed. (Figure 1; Table 2). Due to the late identification of the two areas, measures to protect them have yet to be taken.

ACTIVITY 1.3.4 Introduce and demonstrate suitable high value tree species to increase local farmers' income from forest plantations

Various high value tree species occur naturally in the Sg Medihit catchment. These include trees that produce saleable NTFPs, such as gaharu and tongkat ali, trees producing valuable timber and trees whose fruits are saleable in towns.

- Gaharu or eagle wood contains a resin produced by diseased trees of *Aquilaria* spp. Gaharu baa' (*A. beccariana*) is common in the Sg

Medihit catchment and grows near rivers; gaharu bukit or telakor (*A. microcarpa*[4]) is less common but does occur in the hills of the Sg Medihit catchment on sandy land (according to Kasim Tamin). When planted it will grow near the kampung. Good quality grades of gaharu command prices of more than USD 2,500 per kilogram. Gaharu species are protected plants under Sarawak's Wildlife Protection Ordinance 1998. Currently Penans collected gaharu from the wild and sell it but they get a poor price for it as there is no officially sanctioned way to trade wild-collected gaharu in Sarawak. Gaharu plantations are being established in the Limbang areaand elsewhere in Sarawak as the crop is seen to have great potential. There is also a market for gaharu seedlings in some places. Forest Department Sarawak needs to issue licences to collect/cultivate/cut/remove/burn/sell or possess any protected plants and to own, establish or maintain an commercial wild life farm for these protected plants.

- Tongkatali; Sekaliew (P) (*Eurycomalongifolia*- Simaroubaceae), occurs widely in the project area. This species is also a protected plant under Sarawak's Wildlife Protection Ordinance 1998. Wood of the tap root is believed to contain an aphrodisiac and is in demand in local markets (e.g. the Thursday and Friday market at Limbang town patronised by Sarawakians and Bruneians) although it is illegal to sell it without the necessary licenses. The Penan use sekaliew as a component of blowpipe dart poison.In Peninsular Malaysia,where the species is not protected, there is a market for tongkat ali as an additive to instant coffee powder sachets.
- *Goniothalamus velutinus* (kelikud (P) - Annonaceae), also a protected plant, is a small tree whose stem is bought by Malays - burning the bark is thought to scare away mosquitoes.

[4]TFSS key cannot distinguish sterile material

Timber trees

Rangar sia (K), rangga bala (P) (*Shorea* sp.) grows fast and may be harvestable after 10 years. It fruits every year but not so well in some years. It is better to plant seeds than wildings as wildings may not survive transplanting. Rangga mabeng (P) is another useful species.

Nesuan (P), Kapun (P) (*Dryobalanops*), Sagat (K) Taha (P) (*Eusideroxylon zwageri* [considered poorer than *E. zwageri* from Bintulu] and *Potoxylon melagangai*), Temangin (K) *Shorea* (selangan batu), Perak baya (K) Piru baya (P), Boto Baya (P) are useful timber species.

Wild fruit trees

Durian (*Durio* spp.[5]). Four wild species occur in Sg. Medihit catchment:

Species	**Local name**	**Remarks**
D. graveolens	Belaletik or leteh (P)	Red and yellow aril varieties occur
D. kutejensis	Lai (P), durian kala (K)	Low tree, flowers red, fruit yellow, aril yellow, valuable, always fruit
D. oblongus	Bua bela (P)	Aril yellow (one source says red)
D. oxleyanus	Tungan (P)	Fruit big, round; aril white
D. zibethinus	Durian biasa (K), durian (P)	The common durian, aril white, slightly bitter

A taxonomic revision of the durian family (Bombacaceae) in Sarawak is yet to be competed. Thus the *Durio* species could not be identified with certainty. Further work is needed to collect and identifyflowering /fruiting specimens

Buakiran (K) (*Artocarpus odoratissimus*) is very popular in the kampong and in Limbang. It can fruit five years after planting.

Other wild fruits with potential for planting are mata kuching (*Dimocarpus malesianus*) though bats tend to harvest the fruit as soon as it is ripe; langsat

(*Lansium domesticum*), petai tanah (P)/petai hutan (Malay) (*Parkia javanica*) popular in the kampong and in Limbang, where it can be sold; *Baccaurea angulata, Nephelium* spp. (rambutan, meritam) etc.

These fetch a good price in markets in Limbang, especially the red durian - as much as RM 30 a set. They can fruit in five years. However, potential sellers must be able to transport them to Limbang. Durians and kembayau (*Canarium odontophyllum*) were fruiting in early September in 2015.

Category	Local name (Penan; Kelabit)	Scientific name	Remarks
Saleable product (all Protected Plants under the Wild Life Protection Ordinance)	Garu baa,Telakor (P)	*Aquilaria beccariana*	Diseased wood for incense
	Gaharu bukit,Telakor (P)	*Aquilaria microcarpa*	
	Sekaliew (P)	*Eurycomalongifolia*	
	Kelikud (P), Sapu (K)	*Goniothalamusvelutinus*	Scares off mosquitos etc.
Timber (construction)	Pelayor (P),Tumuh (K)	*Agathis*	
	Pirur (K)	*Dacrydium/Dacrycarpus?*	
	Keruin (P& K)	*Dipterocarpus*	
	Nesuan, Kapun (P)	*Dryobalanops*	
	Merawan	*Hopea spp*.	
	Binato'	*Shorea argentifolia*	
	Jit (P), Ubong (K)	*Shorea* sp.	3m diam.tree
	Keranga	*Shorea leprosula*	
	Kayuabang (P)	*Shorea macrophylla*	
	Rangarbala (P), Rangarsia (K)	*Shorea*	Meranti (red?)
	Taha (P), Sagat (K)	*Potoxylonmelagangai & Eusideroxylonzwageri*	
	Meranti daunmatalembing	*Shorea sagittata*	Strip 5, Ba Uvut
	Rangamabeng (P)		
Wild fruits	Bua' sum (K) Buaalim (P)	*Mangiferapajang*	
	Lengat (K) Bualasat (P)	*Lansiumdomesticum*	
	Buamedang (P), Bua' kiran (K)	*Artocarpus odoratissimus*	
	Belaletik, leteh (P)	*Durio graveolens*	
	Lai (P)	*Durio kutejensis*	
	Buabela (P), nyakak	*Durio oblongus*	
	tungan (P), isu	*Durio oxleyanus*	
	Petaitanah (P) (petaihutan)	*Parkiajavanica*	

Figure 2: Trees with potential that occur in Sg Medihit catchment

ACTIVITY 1.3.5 Demonstrate the Sustainable Harvesting and Mode of Processing NTFPs

The Kelabit and Penan communities at Long Napir and Kpg Bahagia respectively use a wide range of NTFPs. Many are for their own use, for example wild sago starch and palm cabbage, wild vegetables and mushrooms, leaves for wrapping cooked rice, fibres for making mats, hats and other handicraft items, rattans etc. for cordage, timber to make blowpipes, poisonous latex to tip blowpipe darts, dyes for rattan, bark to burn to get rid of mosquitoes and various medicinal plants. The local community members manage these plants for sustainability and convenience by planting some near their dwellings so that they are easily available in sufficient quantity.

The Kelabit ladies plant daun isip (*Phacelophrynium maximum*) whose leaves they use daily to wrap cooked rice, and kabar (*Pandanus*) which they harvest to make rough mats for drying padi. Some Penan have planted wild sago - a long-term crop that will eventually yield starch and palm cabbage.

Figure 3: Pandan and daun isip planted by Kelabit (L) and wild sago planted by Penan (R)for own use

Jungle vegetables used by the Kelabit are:

- palm cabbage and immature shoots: kenangan (*Eugeissona utilis*), nibong(*Oncosperma horridum*), wai lalit(*Plectocomiopsis geminiflora*), pulod(*Arenga undulatifolia*), tubu buan (?*Etlingera elatior*), ubud

sibak(*Musa*); three types of bamboo shoots: puluh pering (small), buluh betong (sweet) and bulu baloi (astringent)

- three types of edible fern: pa'or fa; pa'or ira (*Stenochlaena palustris*), pa'or buda
- pot herbs: tungion(*Hyrtandra hirta*), keriap(*Poikilospermum*), ranudur, daun bago'.
- many types of edible fungus (kulat teria, kulat alun, kulat senungar, kulat alang, kulat si'ang and kulat kicap).

Jungle vegetables used by the Penan are:

- palm cabbage: uvud(favourite for starch and palm cabbage; good to plant)
- Jaka (No. 2 for starch)
- immature shoots: tubu buan, tubu salah, (wild gingers); upak lalis(*Plectocomiopsis geminiflora*)
- fruits: tubu maha, tubu kemanan, tubu peleng(wild gingers); pusid(*Pentaspadon motleyi* -Anacardiaceae)
- tasty edible fungi: kulat bungan, kulat buah, kulat ki'ang, kulat selangan medok (jelly type) as well as kulat mebeh, kulat polong and kulat pemong.

<u>Rattans</u>

Wai bukui (P), way ajat (K) (*Calamus caesius*) is the most preferred rattan species and used for woven mats. Planting material (seed and/or wildlings) may have to be sourced at Sg Magoh, Sg Sepangih. Wai semui (*Calamus axillaris*) is also popular.

Wai inang (P)/ Way sokor (K) (*C. optimus*) is used for tikar lapit. Seed or wildings maybe available at Sg Selidung.Wai saput (P) (*C. laevigatus* var. *laevigatus)* is used for a type of basket(gawang); wai janan (P) (*C. laevigatus* var. *mucronatus*) is used for the uprights of rice baskets (bu'an), way pusa, nanit and sebuli (all K) are good for making carrying baskets (gawang).

Timbers for handicrafts

The Penan need, and would like to plant: pa (*Koompassia malaccensis*), tanyit (*K. excelsa*) and nyagang (*Streblus elongatus*) to make blowpipes.They need tajem (P) trees (*Antiaris toxicaria*) for poison for blowpipe darts.

The species in the Sg Medihit catchment that have commercial potential are: gaharu, wild and cultivated durians and other fruits, petai hutan, rattans (used to make mats and baskets) and sekaliew.

Figure 4:Species with commercial potential planted by Penan

DISCUSSION AND CONCLUSIONS

STATUS OF ACTIVITIES

Activity 1.3.1*Summarise traditional models for protection and sustainable use of forest resources within communities through interviews and field survey:* Completed.

Activity 1.3.2 *Establish Sustainable Forest Management demonstration sites:* Nurseries have been establishedwithfruit tree, belian and gaharu seedlings to plant out in the demonstration sites later on.

Activity 1.3.3 *Identify and protect High Conservation Value Forest with the guidance and support of experts:*Potential forest reserves

and some issues have been identified for each community. Next steps will be to visit Long San and Ulu Teresak with local community guides to see the extent of good forest remaining, take GPS readings of the perimeter and note some important trees (identity, abundance and condition).

Activity 1.3.4 *Introduce and demonstrate suitable high value tree species to increase local farmers' Income from forest plantations:*High value tree species have been identified. Next steps will be to call a meeting and see how to arrange the demonstration sites (e.g. alot areas to different families as TK Leju suggested). Collect and plant (in poly pots in the nurseries) further material of gaharu, sekaliew, fruit and timber trees.

Activity 1.3.5 *Demonstrate the sustainable harvesting and mode of processing NTFPs (Non-Timber Forest Products)*: Gaharu and rattans have been identified as the NTFPs to be included. Next steps: call a meeting to decide how and where to establish gardens (in the demonstration sites).

The main achievement of this fieldwork was to form a comprehensive list of tree and NTFP species the Kelabit and Penan communities consider useful and worth planting. This is a necessary precursor for Activities 1.3.4 and 1.3.5.

RECOMMENDATIONS

Develop a Phase 2 for the Project so that some of these valuable initiatives can proceed further.

REFERENCES

The Plant Resource List (Annex I), pp. 39-45 in the Pre-Project Technical Report, ITTO Pre-Project PPD 135/07 Rev. 1(F) Community-based Forest Management of Sungai Medihit Watershed (2009).

APPENDICES

APPENDIX 1 ITINERARIES

11 Oct. 2015	Kuching – Limbang Met En David Chua, Purnama Hotel, Limbang, and interviewed him about growing gaharu, tongkatali, local fruits and local markets
12	Limbang – Long Napir Talked with En Ricky Jonathan and En Sulaiman (Forest Department Sarawak) about their newly-completed forest survey in the Sg Medihit watershed. Talked with En Ajang Gabar about Long San reserve forest just downstream of Long Napir; En Philip Lepun (Kpg Asap) about gaharu and local fruits culture; Dr Petrus Bulan about local varieties of *Durio* found at Long Napir
13	Talked with En TaminSepuluhRibuh (Pun Alan), WakilTuaiRumah Long Napir, and with En TipongRigon, WakilTuaiRumah Kpg Bahagia, about local species that could be planted at Long Napir including timber, wild fruit tree, rattan and other species.
14	Visit of YB Datuk Henry Sum Agong to Long Napir regarding APFNet Project Talked with En KasimTamin (forest surveyor, Limba Jaya, Lee Ling Timber) about timber species and gaharu occurring in Sg Medihit watershed. Continued to talk with Pun Alan and En Tipong about local fruit trees and rattan and other handicraft species and how they manage these.
15	Walked to Kpg Bahagia and talked to TuaiRumahLejuRigong about the Penan traditional management of timber trees, local wild fruit trees, wild vegetables and species used for handicrafts in the Sg Medihit watershed, their potential for replanting and the location of an area of less-degraded forest which the Kpg Bahagia Penan are requesting as a reserve.
16	Went by 4WD with En William and En Tipong to visit and take samples of potential timber, fruit tree, gaharu and other species via logging roads running through the watershed. Talked with En Tipong about how he planted and managed such species. Took photographs of the potential Penan forest reserve area. Talked about local wild vegetables including wild fungi with Pun Mesipun at Long Napir.
17	Went to Kpg Bahagia to see En Tipong's garden of useful species (fruit trees, timber trees, medicinal plants, rattans etc.) and to talk to him about these plants. Long Napir – Limbang
18	Limbang - Miri

12 Dec. 2016	Kuching – Limbang
13	Limbang – Long Napir Visited NTFPs planted by Kelabit ladies and Penan homestay, obtained additional data on rattans used by Penan
14	Photos of Kelabit lady making mat from Kabar; Long - Napir to Limbang
15	Limbang - Kuching