Pleione 11(2): 420 - 428. 2017. **ISSN: 0973-9467**

doi:10.26679/Pleione.11.2.2017.420-428

Documentation of non-timber forest products in Lengteng Wildlife Sanctuary of Mizoram (India)

Grace Lalawmpuii Sailo and **H. Lalramnghinglova**[1]

Department of Environmental Science, Mizoram University, Tanhril, Aizawl
[1]*Corresponding Author; e-mail:* lalramnghinglova54@gmail.com

[Received 24.10.2017; Revised 20.11.2017; Accepted 13.12.2017; Published 31.12.2017]

Abstract

Forests produce more than timber, wildlife and water. They are vast storehouses for non-timber forest products; the diversity of which complicates development of appropriate management policies and practices. These products have enormous social, economic and ecological values to the residents, communities and forests. Yet, they are neither adequately recognized as natural resources, nor managed as such. Present study was conducted during March 2013 – 2015 at Lengteng Wildlife Sanctuary and highlights 18 timber species, 17 species of fuel-woods, 38 edible plants, 57 wild fruits and 10 commonly used medicinal plants.

***Key words*:** Lengteng Wildlife Sanctuary, timber, fuelwood, fruits, fodder, edible plants.

INTRODUCTION

The contribution of Non-Timber Forest Products to improve livelihoods can best be assured through a process of gradual domestication of NTFP-plants in human-modified (agro) forest types. The way NTFPs contribute to peoples' livelihoods can best be understood by taking livelihoods rather than NTFPs as the central focus of study. Various terms (e.g., non-traditional, secondary, minor, non - wood, and special or specialty) have been used to describe products that come from the forests that are not timber based. Recent legislation uses the term "Forest Botanical Products" to describe these products. But, a more common and widespread term is "non-timber forest products." NTFPs are biological materials harvested from within and on the edges of natural, manipulated or disturbed forests. It includes fungi, mosses, lichens, herbs, vines, shrubs, or trees. Plant parts harvested include the roots, tubers, leaves, bark, twigs and branches, fruits, sap and resins, as well as the wood (Chamberlain *et al.* 1998). Non-Timber Forest Products also include a part from/ inter alia plant origin, mineral origin (seed, mica etc.) hosts like honey, lac; services like agroforestry. Non-Timber Forest Products are the basic cash and commodities in many cultures (Lalremruata *et al.* 2007). Recognition of intellectual property rights is important for many NTFPs. While preservation of NTFPs is fundamental to maintenance and continuation of many traditional ways of life, sources of these are increasingly threatened by deforestation and land development activities (Rocky *et al.* 2004).

These products are currently classified into four major product categories: culinary, wood - based, floral and decorative, and medicinal and dietary supplements. Traditional herbal therapy is an age old practice (Rawat & Chaudhury 1998) and such medicinal plants are also treated as NTFPs.

Since the early 1990s the role of NTFPs for sustainable forest use and poverty alleviation has received increased attention. Starting with the (in)famous article by Peters *et al*. (1989) which has since been widely criticized (Sheil & Wunder 2002) – the original idea on the potentials of NTFP exploitation as a way to sustainable forest management was primarily based on the assumption that the commercial extraction of these from natural forests could simultaneously serve the goals of biodiversity conservation and poverty alleviation (De Beer & McDermott 1996; Nepstad & Schwartzman 1992; Ros-Tonen & Wiersum 2003; Ruíz Pérez & Byron 1999). Proponents of the 'NTFP-strategy' pointed to important benefits of NTFP exploitation for local communities, such as goods (food, fodder, fuel, medicine, construction material and small wood for tools and handicrafts), income and employment. Compared to timber, the harvesting of NTFPs seemed to be possible without major damage to the forest and its environmental services and biological diversity. In sum, NTFPs were expected to offer a model of forest use which could serve as an economically competitive and sustainable alternative to logging. Traditional medicine is the main stay of primary health care in virtually all poor and developing countries. The use of herbal medicines in developed countries is also expanding rapidly, with many people turning towards alternative treatments that they hope will be less harmful and have fewer side effects than western synthetic chemical medicines. Present study concentrated on the usefulness of plant species among local people living in the vicinity of Lengteng Wildlife Sanctuary.

MATERIALS AND METHODS

Study area

Lengteng Wildlife Sanctuary (LWLS): The area of Lengteng sanctuary is 58.26 sq km. The word Lengteng is derived from Paite. 'Leng' means, Cicada (Rengchal/Thereng) and 'Teng' means 'to dwell, to live or to exist' and so, the word 'Lengteng' may be defined as 'The place where cicada (Thereng) dwell or exsist'. In olden days in this particular plain area there used to live Rhinoceros and so it was called Samakzawl (Samak = Rhinoceros, zawl = plain). There is another place called Nauzuarzotlang at the highest point of Lengteng Wildlife Sanctuary peak, this peak is 2141 m high. In western part of Lengteng Wildlife Sanctuary, there is one wide cave called 'Vamurpuk' (Swallow cave) since swallow birds can be sighted every time inside this cave.

Location: Located in the eastern of Mizoram in Champhai district, 198 km from Aizawl via Ngopa village (12 km from Ngopa village). It lies between 23° 42' N Latitude and 93° 10' E longitude (Figure 1).

Surrounding villages: The area is surrounded by seven villages *viz.,* Ngopa. Kawlbem, Lamzawl, Selam, Lungphunlian, Pamchung and Tualcheng.

The population structure of these villages has been presented in Table 1.

Study Method and data collection

The method used for firsthand information was Participatory Rural Appraisal (PRA) technique. PRA is a methodology for interacting with villagers, understanding them and learning from them. It involves a set of principles, a process of communication and a menu of methods for seeking villagers' participation in putting forward their points of view about issue and enabling them to do their own analysis with the view to make use of such learning (Mukherjee 2003). Taxonomical survey of plants in Mizoram has certain feedback mechanism as evidenced by such collections conducted by different researchers (Gage 1899; Parry 1932; Fischer 1938; Sawmliana 2003; Lalramnghinglova 2003)

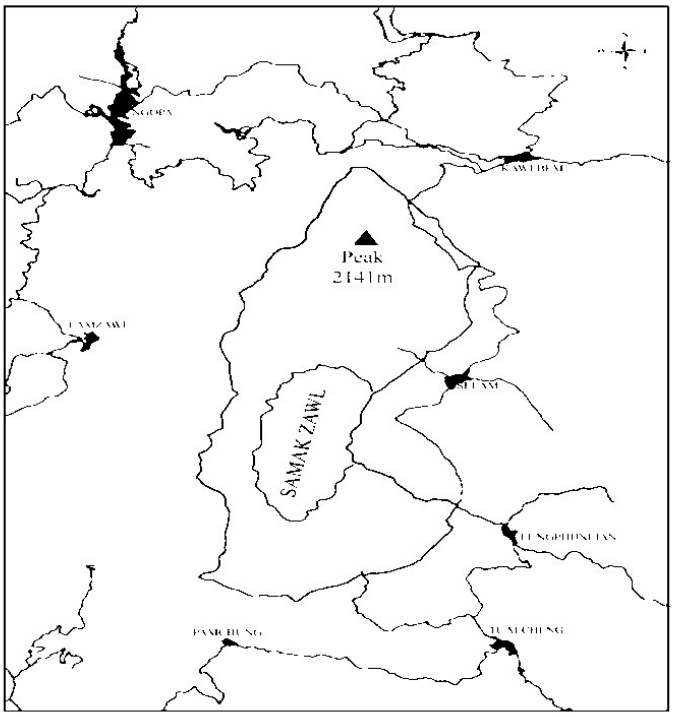

Figure 1. Location map of surrounding villages of Lengteng Wildlife sanctuary

Table 1. Number of households and population structure in seven villages surrounding LWLS.

Name of village	Total no. of Houses	Population		
		Male	Female	Total
Ngopa	945	2,168	1,987	4,155
Kawlbem	268	735	744	1,479
Selam	209	524	493	1,017
Tualcheng	157	364	386	770
Lungphunlian	81	204	180	384
Lamzawl	72	183	167	350
Pamchung	63	151	152	303

Information for use of timber, fuel-wood, charcoal, food, fruit, and medicinal herbs were recorded through personal interview based on pre-structured questionnaire from women, men and children from the surrounding villages using PRA technique. During 2014 – 2015, the president and members of the Village Council, leaders of the Young Mizo Association, and several local people of the adjacent villages of the study area were interviewed to know about the socio-economic conditions of their respective villagers. Different houses covering 70 % households were visited to obtain their lifestyle preferences, their dependencies on NTFPs including animal food and were recorded in the field note book.

The study was conducted during March 2013 to April 2015 during which all the seven surrounding villages viz. Ngopa, Kawlbem, Selam, Lamzawl, Pamchung,Tualcheng and Lungphhunlian were surveyed. For collecting information, simple random sampling was

adopted. Firstly, complete lists of households were prepared, and selection of households was done randomly. Data was collected through a well framed questionnaire. Cross checking of collected information was done by interviewing members of village council, leaders of Y.M.A., teachers at primary and secondary schools and employee of forest department.

RESULTS AND DISCUSSION

From the present study it was observed that collection of firewood is a daily chore as most of the village population depends on the forest for running their fire-places. Villagers, even today, are largely dependent on fuel wood. The LWLS has suffered horribly from illegal collection of timber and the incidence is happening at very high rate. Illegal logging has been most commonly carried out in small groups of local villagers, using machineries introduced from Myanmar which can saw more timbers in a short period. Community members also fell trees for their domestic uses. However, majority of the timbers collected were for selling purposes. Logging causes serious and fast forest degradation. Timber logging includes harvesting, transporting, processing, buying or selling of timber in violation of forest conservation laws. This is mainly due to a conflict between the authorities and Selam villagers. Actions taken by the government since 2014 substantially reduced those illegal activities. And, less illegal activities were observed in 2015. However, continuous enforcement of better restriction rules to stop timber collection from the sanctuary is recommended.

The following tables (Tables 2 – 7) show uses of timbers, fuel-wood, fodder, charcoal, fruits, edible and commonly used medicinal plants in and around the sanctuary:

Table 2. Common fuel-wood plants recognized in LWLS.

Sl No.	Botanical Name	Family	Local Name	Habit	Status
1.	*Albizia chinensis* (Osb.) Merr.	Fabaceae	*Vang*	Tree	Common
2.	*Betula alnoides* Buch.-Ham ex D.Don	Betulaceae	*Hriang*	Tree	Common
3.	*Castanopsis tribuloides* (Sm). A.DC.	Fagaceae	*Thingsia*	Tree	Common
4.	*Derris robusta* (DC.) Benth.	Fabaceae	*Thingkha*	Tree	Frequent
5.	*Glochidion lanceolarium* Muell. Arg.	Phyllanthaceae	*Thingpawnchhia*	Tree	Frequent
6.	*Helicia erratica* (Roxb.) Blume	Proteaceae	*Sialhma*	Large tree	Common
7.	*Leucomeris decora* Kurz	Asteraceae	*Tlangham*	Shrub	Common
8.	*Litocarpus pachyphyllus* (Kurz) Rehder	Fagaceae	*Thil*	Tree	Common
9.	*Macaranga denticulata* (Blume) Müll.Arg.	Euphorbiaceae	*Hnahkhar*	Small tree	Common
10.	*Phyllanthus emblica* L.	Phyllanthaceae	*Sunhlu*	Small Tree	Frequent
11.	*Quercus helferiana* A.DC.	Fagaceae	*Hlai*	Tree	Frequent
12.	*Quercus serrata* Murray	Fagaceae	*Sasua*	Large tree	Common
13.	*Quercus spicata* Sm.	Fagaceae	*Fah*	Tree	Common
14.	*Quercus xylocarpus* (Kurz.) Markgr.	Fagaceae	*Then*	Tree	Ommon
15.	*Schima wallichi* Choisy	Theaceae	*Khiang*	Tree	Common
16.	*Vaccinium donianum* Miq.	Vacciniaceae	*Sirkam*	Small tree	Frequent
17.	*Wendlandia grandis* (Hook.f.) Cowan	Rubiaceae	*Batling*	Small tree	Common

Table 3. Commonly foraged fodder trees of LWLS

Sl. No.	Botanical Name	Family	Local Name	Habit	Status
1.	*Ficus prostrata*(Wall. ex Miq.) Buch.-Ham. ex Miq.	Moraceae	*Theitit*	Small Tree	Unknown
2.	*Ficus semicordata*Buch.-Ham. ex Sm.	Moraceae	*Theipui*	Tree	Frequent
3.	*Morus alba* L.	Moraceae	*Thingtheihmu*	Tree	Unknown
4.	*Trema orientalis* (L.) Blume	Ulmaceae	*Belphuar*	Tree	Common
5.	*Vernonia volkamerifolia* DC.	Asteraceae	*Khupal*	Shrub	Common

Table 4. Trees commonly harvested for making charcoal from LWLS

Sl. No.	Botanical Name	Family	Local Name	Habit	Status
1.	*Castanopsis tribuloides* (Sm). A.DC.	Fagaceae	*Thingsia*	Tree	Common
2.	*Glochidion lanceolarium* Muell. Arg.	Phyllanthaceae	*Thingpawnchhia*	Tree	Frequent
3.	*Helicia excels* (Roxb.) Blume	Proteaceae	*Sialhma*	Tree	Frequent
4.	*Lithocarpus pachyphyllus* (Kurz) Rehder	Fagaceae	*Thil*	Tree	Common
5.	*Macaranga denticulate* (Blume) Müll.Arg.	Euphorbiaceae	*Hnahkhar*	Small Tree	Frequent
6.	*Quercus helferiana* A.DC.	Fagaceae	*Hlai*	Tree	Common, excellent charcoal
7.	*Quercus spicata* Sm.	Fagaceae	*Fah*	Tree	Common, excellent charcoal
8.	*Quercus xylocarpus* (Kurz.) Markgr.	Fagaceae	*Then*	Tree	Common, excellent charcoal

Table 5. Plants of LWLS those are harvested for wild edible fruits

Sl. No.	Botanical Name	Family	Local Name	Habit	Status
1	*Aganope thyrsiflora* (Benth.) Polhill.	Fabaceae	Hulhu	Shrub	Unknown
2	*Aglaia perviridis* Hiern.	Meliaceae	Luakthei	Tree	Rare
3	*Boehmeria rugulosa* Wedd.	Urticaceae	Lumler	Tree	Rare
4	*Bursera serrata* Wall. ex Colebr.	Burseraceae	Bilthei	Tree	Frequent
5	*Calamus gracilis* Roxb.	Arecaceae	Kawrtai rah	Climber	Rare
6	*Calamus tennuis* Roxb.	Arecaceae	Hruipui	Climber	Not common
7	*Caryota mitis* Lour.	Arecaceae	Meihle	Palm Tree	Frequent
8	*Elaecoarpus tectorius* (Lour.) Poir.	Elaeocarpaceae	Kumkhal	Tree	Common
9	*Embelia ribes* Burm.f.	Myrsinaceae	Naufadawntuai	Climber	Rare
10	*Ficus racemosa* L.	Moraceae	Hmawng	Tree	Frequent
11	*Ficus semicordata* Buch.-Ham. ex Sm.	Moraceae	Theipui	Small tree	Common
12	*Garcinia lanceifolia* Roxb.	Clusiaceae	Chengkek	Tree	Frequent
13	*Juglans regia* L.	Juglandaceae	Khawkherh	Tree	Rare

Sl. No.	Botanical Name	Family	Local Name	Habit	Status
14	*Laurocerasus jenkinsii* (Hook. f. & Thomson) Browicz	Rosaceae	Keipui	Tree	Not Common
15	*Mangifera sylvatica* Roxb.	Anacardiaceae	Ram theihai	Tree	Frequent
16	*Meliosma punnata* (Roxb.) Maxim.	Sabiaceae	Buangthei	Tree	Frequent
17	*Myrica esculenta* Buch.-Ham ex D.Don	Myricaceae	Keifang	Tree	Common
18	*Passiflora edulis* Sims	Passifloraceae	Sapthei	Climber	Cultivated
19	*Pyrus pashia* Buch.-Ham. ex D.Don	Rosaceae	Chalthei	Tree	Rare
20	*Rhus chinensis* Mill.	Anacardiaceae	Khawmhma	Tree	Rare
21	*Syzygium cuminii* (L.) Skeels	Myrtaceae	Lenhmui	Tree	Not Common
22	*Tetrastigma obovatum* (M.A. Lawson) Gangnep.	Vitaceae	Puarpeng	Shrub	Not Common
23	*Toddalia asiaica* (L.) Lam.	Rutaceae	Nghardai	Shrub	Common
24	*Ziziphus incurva* Roxb.	Rhamnaceae	Hel	Tree	Frequent

Table 6. Edible plants procured by the villagers from the LWLS.

Sl. no.	Botanical Name	Family	Local Name	Parts used
1	*Acacia pennata* (l.) Willd.	Fabaceae	*Khanghu*	Young leaves with a strong smell used as vegetable
2	*Acmella oleraceae* (L.) R.K. Jansen	Asteraceae	*An sapui*	Leaves cooked as vegetable
3	*Acmella paniculata* (Wall ex DC.) R.K. Jansen	Asteraceae	*An salai*	Leaves cooked as vegetable
4	*Alocasia fornicate* (Roxb.) Schott	Araceae	*Baibing*	Spadix cooked as vegetable
5	*Amomum dealbatum* Roxb.	Zingiberaceae	*ai du*	Young buds eaten as vegetable
6	*Amorphophallus paeonifolius* (Dennst.) Nicolson	Araceae	*Tel hawng*	Boiled corm eaten as curry
7	*Aralia foliosa* Seem. ex C.B. Clarke	Araliaceae	*Chimchawk*	Young shoots and leaves cooked as vegetable
8	*Arenga pinnata* (Wurmb) Merr.	Arecaceae	*Thangtung*	Young shoots eaten as vegetable
9	*Calamus erectus* Roxb.	Arecaceae	*Thilthek*	Young shoots eaten as vegetable
10	*Calamus flagellum* Griff.	Arecaceae	*Hruipui*	Young shoots eaten as vegetable
11	*Calamus gracilis* Roxb.	Arecaceae	Kawrtai	Young shoots eaten as vegetable
12	*Calamus sp*	Arecaceae	*Thilte*	Young shoots eaten as vegetable
13	*Calamus tennuis* Roxb.	Arecaceae	Hruipuizik	Stem pith cooked as vegetable
14	*Caryota mitis* Lour.	Arecaceae	*Meihle*	Upper shoot part used as vegetable
15	*Caryota urens* L.	Arecaceae	*Tum*	Terminal buds cooked as vegetable
16	*Centella asiatica* (L.) Urban	Apiaceae	*Lambak*	Stalks and leaves cooked as vegetable
17	*Cephalostachyum capitatum* Munro	Poaceae	*Nat tuai*	Young shoots eaten as vegetable
18	*Clerodendrum glandulosum* Lindl.	Verbenaceae	*Phuihnam*	Young leaves and shoots cooked as vegetable
19	*Dendrocalamus longispathus*	Poaceae	*Raw nal*	Young leaves and shoots cooked as vegetable

Sl. no.	Botanical Name	Family	Local Name	Parts used
20	*Dysoxylum excelsum* Blume	Meliaceae	*Thingthupui*	Young shoots and leaves with stinky smell are cooked as vegetable
21	*Eryngium foetidum* L.	Apiaceae	*Bahkhawr*	Leaves used for salad
22	*Eurya japonica* Thunb.	Theaceae	*Sihneh*	Leaves are cooked as vegetable
23	*Fagopyrum acutatum* (Lehm.) Mansf. ex K. Hammer	Polygonaceae	*An bawng*	Stalks and leaves cooked as vegetable
24	*Gynura bicolor* (Roxb. ex Willd.) DC.	Asteraceae	*Tlangnal*	Stalks and leaves cooked as vegetable
25	*Marsdenia formosana* Masam.	Apocynaceae	*Ankhate*	Leaves cooked as vegetable
26	*Melocanna baccifera* (Roxb.) Kurz	Poaceae	*Mau*	Tender shoots cooked as vegetable
27	*Oroxylum indicum* (L.) Kurz.	Bignoniaceae	*Archangka wm*	Young leaves and pods cooked as vegetable
28	*Parkia timoriana* (DC.) Merr.	Fabaceae	*Zawngtah*	Pods eaten as vegetable
29	*Plantago major* L.	Plantaginaceae	*Kelba an*	Leaves eaten raw or cooked as pot herb
30	*Pteris vitata* L.	Pteridaceae	*Chakawk*	Young shoots and leaves cooked as vegetable
31	*Solanum nigrum* L.	Solanaceae	*Anhling*	Young stalk and leaves cooked as vegetable
32	*Solanum rudepannum* Dunal	Solanaceae	*Tawke*	Fruits cooked as vegetable
33	*Solanum torvum* Sw.	Solanaceae	*Tawkpui*	Green fruits cooked as vegetable
34	*Tresesia palmate* (Roxb. ex Lindl.) Vis.	Araliaceae	*Kawhtebel*	Fruits cooked as vegetable
35	*Wendlandia budleioides*Wall. ex. Wight & Arn	Rubiaceae	*Batling*	Flowers cooked as vegetable
36	*Zalacas ecunda* Griff.	Arecaceae	*Hruitung*	Young shoots eaten as vegetable

Table 7. Some common wild medicinal plants harvested by villages from the LWLS

Sl. No.	Botanical Name	Family	Local Name	Part used	Uses
1	*Centella asiatica* (L.) Urban	Apiaceae	*Lambak*	Whole plant	Whole plant is boiled and eaten against malaria, eye problems and kidney troubles
2	*Blumea lanceolaria* (Roxb.) Druce	Asteraceae	*Buar ze*	Leaves	Leaves used for Kidney problems, asthma, tooth ache; leaf-juice applied on skin diseases and dandruff
3	*Artemisia vulgaris* L.	Asteraceae	*Sai*	Leaves, fruits	Decoction of leaves/fruits taken against malaria fever
4	*Chromolaena orata* (L.) R.M.King & H.Rob.	Asteraceae	*Tlangsam*	Whole plant	1. Leaf-juice applied on fresh cuts 2. Juice of whole plants taken against ulcer, antiseptic, kidney problem
5	*Lobelia angulata* G.Frost.	Campanulaceae	*Choakathi*	leaves and fruits	1. Crushed leaves extract is taken for stomach ulcer diarrhea and Tooth ache 2. pounded leaves and fruits are applied on placental problems
6	*Ipomoea batatas* (L.) Lam.	Convolvulaceae	*Kawlbahra*	Leaves	Leaves are eaten against diarrhea, dysentery, digestion problems and food poisoning
7	*Gomphogyne cissiformis* Griff.	Cucurbitaceae	*Lalruanga dawibur*	Fruits	Empty fruit is filled with water and taken against stomach ache, fever
8	*Erythrina stricta* Roxb.	Fabaceae	*Fartuah*	Spines	1. Crushed leaves extract is taken for stomach ulcer, diarrhea and tooth ache 2. pounded leaves and fruits are applied on placental problems
9	*Osbeckia stellata* Buch.-Ham. ex Ker Gawl.	Melastomataceae	*Builukham / Khampa*	Root bark	Cold infusion of root bark is used for stomach problems and kidney failure; prevents miscarriage
10	*Hedyotis scandens* Roxb.	Rubiaceae	*Kelhnamtur*	Whole plant	Stalk and leaves are boiled and taken against urinary problems and kidney inflammation

Sustainable management for NTFPs requires consideration of three types of issues – ecological, economic and social. The potential ecological impact of over-harvesting under current management strategies could be devastating for entire NTFP populations. Shifting cultivation is the single largest factor affecting bio-environmental degradation in Northeast India (Lalramnghinglova 2016). The biological material, harvested for NTFPs, is a critical part in the functioning of healthy forest ecosystems. The loss of access to gathering areas, or a significant decline in plant populations could have tremendous economic impact to the collectors and associated businesses. Knowledge from research about the economic impact of NTFP activities is needed to influence policies to support the sustainable management of the region's forests.

Acknowledgements

The authors express their thanks to The Local field guide and forest personnel for their kind help and support during the course of field work.

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