Utilization of Non Timber Forest Products by Duyoh Community, Bau District, Sarawak, Malaysia

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Abstract:

Non-Timber Forest Products (NTFPs) are natural resources collected from forests apart from timber. The use of NTFPs based on traditional knowledge is widely known among the natives in Borneo including Bidayuh community in Sarawak. An interview was undertaken with the villagers cum vendors at Duyoh Weekend Market along with a brief NTFPs survey at the nearby community forest (CF) recorded 76 NTFPs species belonging to 65 genera from 46 families used by this community. Of these, 64 species or 84.21% were recorded in the nearby forest while 33 species or 43.42% at the village’s Weekend Market. Based on four major uses, more than 68.0% of them were edible or used in food preparation and 27.6% for medicinal purposes. Only 6 species (7.9%) were used for handicrafts, and was considered the least. More than 17% were used for various other purposes including as ornamentals. Among the edible species, majority (54%) were fruits. Most (89.2%) of the edible species were also used for medicinal purposes. Most, if not all, households had collected the NTFPs from the forest, but only close to 20% of the village’s household actually sold these products at the village’s Weekend Market earning an average of RM400 to RM640 per month with higher income during fruiting season (October to December) which can reach RM200 per day. Although majority grew the commonly used plants in their own land, substantial NTFPs (43.4%) sold were collected from the forest. Although this study is very short, at least it gave an idea that NTFPs are being used and its value to the community in terms of income. Thus suggest to have a longer-term study to cover all seasons/periods of the year to understand more on the products being sold and their values. More efforts in conserving the nearby forest is also warranted to ensure a continue supply of NTFPs for sustainable supply for the present and future community use and to supplement their income.

Keywords: Non-Timber Forest Products, valuation of NTFPs, sustainability
1 Introduction:

Non-timber forest products (NTFPs) are natural resources collected from forests besides sawn timber (Wickens, 1991) used within the household, be marketed, or have social, cultural and religious significance. These could be the whole plant or parts of it, fungi, and other biological materials harvested from within and on the edges of natural, manipulated or disturbed forests (Chamberlain et al, 1998). They had been used worldwide since time immemorial but have only attracted considerable global interest in recent years due to the increasing recognition as they help provide needs for improved rural livelihood; contribute to household food security and nutrition; help to generate additional employment and income; offer opportunities for NTFP based enterprises; contribute to foreign exchange earnings; and support biodiversity and other conservation objectives (FAO, 1995). In 1993, the International Union for the Conservation of Nature (IUCN) estimated that 80% of the world’s population is using plant materials for health purposes despite the advances of modern medicine. According to Bishop (1999), it is estimated that Malaysians spend about RM1 billion in the consumption of traditional medicines compared to only RM600 million on pharmaceutical medicines.

Malaysian forests provide important sources of livelihood for the local communities living within or surrounding the forests. These resources meet not only subsistence needs but also serve as an important source of income. Like many developing countries, the main emphasis of forest management in Malaysia in the past has been mainly for timber with little attention given to NTFPs. Due to the tremendous decrease in forest areas, Ismail et al. (1993) stressed that there is a need to draw up strategies to manage, develop and protect the NTFPs having socio-economic values. In many areas, traditional uses of many NTFPs have been forgotten or lost (Findlay et al., 2015, Sayok and Ulrich, 2018) so that most of the local studies of NTFPs had put much emphasis on documentation on the variety of plants in different climatic zones and among different ethnic and cultural groups (Shrestha, 1993, Singh et al, 2019). Hence, this study was undertaken to obtain information from locals residing nearby community forest on how they use these products for both daily sustenance and supplemental income apart from documenting the NTFPs that are commonly used so that more efforts towards sustainable use and management can be undertaken.

2 Materials and Methods:

The study was undertaken in Jagoi area, Bau District, Sarawak, some 45km south-west of Kuching City (Fig. 1). The area is predominantly settled by Bidayuhs who moved from nearby mountain, Bung Bratak, in late 1830s (Sayok et al., 2014) and established their village, Bung Jagoi, at Mount Jagoi. After they moved to form nine villages (kampung) downhill, the ancestral village (Bung Jagoi) was almost abandoned in late 1970s making the mountain and its immediate surroundings presently as a quasi-lowland dipterocarp forest with pockets of secondary forest near the foothill. A multidisciplinary study undertaken earlier in the Jagoi area showed that the forest houses rich non-timber forest products (NTFPs) among the 400 plant species (Sayok et al, 2014). The locals considered the forests as their community forest and collected NTFPs for various needs. Some also sold them at the nearby Duyoh and Serikin border-town weekend markets.

For this study, only the community in Duyoh village were involved as they are the nearest to the forest at Mount Jagoi. The vendors at the village’s weekend market are also composed mainly villagers from this village itself. The three approaches used in the study are as follows: First, a market survey was undertaken whereby the types of NTFPs displayed for sale in 30 stalls were recorded on 12 December 2015 and 10 January 2106. Direct valuation method on the NTFPs was used in which vendors were interviewed on their basic demographic background apart from products collected and sold in the market as well as uses of the products and parts used, in addition to the prices of each of the products. Finally, field trips to the nearby forest at Mount Jagoi were made on 12, 22 and 23 December 2015. During the trips, with the help of the accompanied knowledgeable locals use of plants, NTFPs along both sides of the 2 km trail from Duyoh to Bung Jagoi were recorded.
3 Results and Discussions:

Socio-demographic Information of the Non-Timber Forest Products (NTFPs) users

From the 30 respondents who were also vendors interviewed at the Duyoh Market show that almost all (90%) vendors are Bidayuh as all the vendors were from Kpg Duyoh itself. The other two races (Iban and Chinese) were those married to the villagers there. Majority (70%) were 15-59 years old and the rest were older. The remainder 30% from the older group (60 years and above), comprising males who were mainly pensioners while the ladies were widows; some were also assisting their immediate family to man the stall. Most (77%) were married and 73% were farmers who grew the vegetables in their farms, but also collect some of the NTFPs from the nearby forest. Those employed also took the opportunity to sell for extra income. Majority (80%) had formal education, with 50% having secondary level while almost a quarter (23%) finished primary education. The 20% who did not have any formal education composed solely of those aged 60 and above, although more than a third of those within this age group especially men had attended school including secondary level. The remaining portion (7%) was represented by a young university lady graduate who happened to participate in the sale of NTFPs while waiting for a more regular job outside. Majority of the respondents (63%) were women because most of the men went out to work in the nearby town or city such as Kuching and elsewhere in Sarawak.

The NTFPs in Jagoi Area:

Based on the field survey along the trail from Kpg Duyoh to Bung Jagoi and at the Kampung Duyoh Weekend Market stalls as well as interviews with the vendors, a total of 76 NTFP species belonging to 65 genera under 47 families were documented (Table 1). The plant family with the most species encountered were...
Zingiberaceae with five species followed by Euphorbiaceae, Moraceae and Poaceae with four species each as close seconds. There were 29 families with just one species each. From the NTFPs above, there were three protected species under the Sarawak Wild Life Protection Ordinance, 1998 namely *Ficus grossularioides*, *Nepenthes ampullaria* and *Begonia* sp. As expected the numbers of species were much smaller than those by Sayok et al. (2014) because data for the later study were obtained from plots along both sides of the same trail.

Among the NTFPs, 26 were trees, 17 herbs/grasses, 11 shrubs, 6 climbers, 5 gingers, 5 ferns, and 3 palms. The higher number of trees was due to their higher visibility as compared to others especially the smaller vegetation (gingers, ferns, and climbers) which were less noticeable unless more time were spent in observing them. The most common trees observed were fruit trees such as *Artocarpus integer* (*Tibodak*), *Baccaurea bracteata* (*Topui*), *Lansium domesticum* (*Lasot*) and Durian (*Durio zibethinus*).

From the total 76 NTFPs, 64 species or 84.21% were recorded in the nearby forest while 33 species or 43.42% at the village’s Weekend Market. Close to 29% or 22 species were found in both locations while 8 species sold in the market were not found in the forest namely *keladi* (*Colacasia esculenta*), ulam raja (*Cosmos caudatus*), cangkuk manis (*Sauropus androgynous*), bolak (*Musas sp*) and boid (*Piper sp*) as the vendors brought from them from their gardens whereas Paku pakis (*Diplazium esculentum*), paku uban (*Nephrolepis actifolia*) and terong pipit (*Solanum torvum*) are usually collected in the open areas.

Based on observation in the forest, there were some NTFPs species found but were not recorded by the informants for various reasons. Among them were the various palms namely Inyuok (*Arenga undulata*), Opit (*Arenga undulata*), Nibong (*Onocosperma tigillarium*), Sidudui (*Caryota mydis*), and Trism (*Salacca affinis*) which may be overlooked although their pulps/ cabbage are commonly used for food. The same case with sirumah (*Ploiarium alternifolium*) although there were quite obvious at the secondary forest patches. Poles of this species were widely used for frames in wooden houses due to its strength. The durability of the poles also made popular as fences, fishing tackles and support for beans and gourds. Also missed were some medicinal plants such as Tabak/ gaharu (*Aegicularia macrophylla*) which are found sparingly among the undergrowth along the trail. Their lack of knowledge on the use of some species could also be the reasons why some were not recorded such as Sirieng buai (*Dipteris conjuta*) which were seen to dominate at the summit and that of the numerous Gromang (*Curculigo latifolia*) at the secondary forests. Dowon kapal (*Hoya coronaria*) were also missed though often eaten as ulam and chewed for medicinal purposes because this climber is small making it less obvious under the shade of trees.

**Table 1: List of non-Timber Forest Products along with their use and location where they were recorded**

| No | Family         | Species                  | Local Name     | Habit & Life form | Uses | Location found |
|----|---------------|--------------------------|----------------|-------------------|------|----------------|
|    |               |                          |                |                   | E    | M  | A  | O  | Forest | Stall |
| 1  | Acanthaceae   | *Andrographis paniculata*| Pudun tana’    | H                 | x    |    |    |    | x      | x     |
| 2  |               | *Justicia gendarussa*    | Pinyongoh      | H                 | x    | x  |    |    | x      | x     |
| 3  | Achariaceae   | *Pangium edule*          | Poyang         | T                 | x    |    |    |    | x      | x     |
| 4  | Anacardiaceae | *Mangifera indica*       | Asom           | T                 | x    |    |    |    | x      | x     |
| 5  |               | *Mangifera pajang*       | Bowang         | T                 | x    |    |    |    | x      | x     |
| 6  | Anisophyllaceae | *Anisophyllea disticha* | Pijurud        | S                 | x    |    |    |    | x      |       |
| 7  | Annonaceae    | *Annona muricata*        | Dian belanda   | T                 | x    |    |    |    | x      | x     |
| 8  |               | *Goniathalamus sp.*      | Kenamai        | S                 | x    | x  |    |    | x      | x     |
| 9  | Apiaceae      | *Centella asiatica*      | Pegaga         | H                 | x    |    |    |    | x      |       |
| 10 | Araceae       | *Colacasia esculenta*    | Keladi         | H                 | x    |    |    |    | x      |       |
| 11 | Arecaaceae    | *Calamus sp.1*           | Wi inang       | C                 |     | x  |    |    | x      | x     |
| 12 |               | *Calamus sp.2*           | Wi simoi       | C                 |     |    | x  |    | x      | x     |
| No. | Family       | Genus/Species       | Usage                  | C | F | H | T |
|-----|--------------|---------------------|------------------------|---|---|---|---|
| 13  | Asteraceae   | Daemonorops sp.     | Wi (rotan)             |   |   |   |   |
| 14  | Asteraceae   | Blumea balsamifera  | Downon sisuoh          | H | x |   |   |
| 15  | Asteraceae   | Cosmos caudatus     | Satek Manis            | H | x | x |   |
| 16  | Athyriaceae  | Diplazium esculentum| Gilis (Paku pakis)     | H | x |   |   |
| 17  | Begoniaceae  | Begonia sp.         | Sijobet                | H | x | x |   |
| 18  | Blechnaceae  | Blechnum orientale  | Sonu                   | F | x | x |   |
| 19  | Stenochlaena palustris |         | Midin                 | F | x | x | x |
| 20  | Bombacaceae  | Durio graveolens    | Dien Muot              | T | x |   |   |
| 21  | Bombacaceae  | Durio zibethinus    | Dien                  | T | x |   |   |
| 22  | Bromeliaceae | Ananas comosus      | Nenas                  | H | x | x | x |
| 23  | Burseraceae  | Canarium odontophyllum | Dabai                | T | x | x | x |
| 24  | Clusiaceae   | Garcinia mangostana | Sikuk                  | T | x |   | x |
| 25  | Costaceae    | Costus speciosus    | Sijujut                | H | x | x | x |
| 26  | Dilleniaceae | Dillenia suffruticosa | Buah                  | T | x | x | x |
| 27  | Tetracera akara |                   | Ties                  | C |   |   |   |
| 28  | Euphorbiaceae| Manihot esculenta   | Banuok                 | S | x |   | x |
| 29  | Elaterispermum tapos |             | Lopi                  | T | x |   |   |
| 30  | Macaranga gigantea |         | Badad                 | T | x | x | x |
| 31  | Sauropus androgyrus |       | Cangkuk manis         | S |   | x | x |
| 32  | Fabaceae     | Archidendron jiringa| Joring                 | T | x |   | x |
| 33  | Cassia alata |                    | Downon suluok          | S | x | x | x |
| 34  | Parkia speciosa |               | Potah                 | T | x |   |   |
| 35  | Gleichnaceae | Dicranopteris linearis | Dumam                | F | x | x | x |
| 36  | Lamiaceae    | Orthosiphon acutifolia | Misai kucing         | H |   |   | x |
| 37  | Gnetaceae    | Gnetum gnemon       | Dodah                  | S | x | x | x |
| 38  | Lauraceae    | Lindera lucida      | Pola                   | T | x | x | x |
| 39  | Litsea garciae |                   | Buah kala'            | T | x |   | x |
| 40  | Lycopodiaceae| Lycopodium cernuum  | Sorin 'eng            | F | x | x | x |
| 41  | Melastomaceae| Melastoma malabathricum | Rusak                | S | x |   | x |
| 42  | Meliaceae    | Lansium domesticum | Lasot                  | T | x | x | x |
| 43  | Menispermaceae| Pycnanrhena borneensis | Downon sisong        | S | x |   | x |
| 44  | Moraceae     | Artocarpus integer  | Tibodak                | T | x | x | x |
| 45  | Moraceae     | Artocarpus kemando  | Puduh                  | T | x |   | x |
| 46  | Moraceae     | Artocarpus odoratissimus | Terap               | T | x |   | x |
| 47  | Ficus grossularioidel |       | Rokan                 | S | x |   | x |
| 48  | Musaceae     | Musa sp             | Bolak                  | H | x |   | x |
| 49  | Myrsinaceae  | Labisia pumila      | Kacip fatimah          | H | x | x | x |
| 50  | Nepenthaceae | Nepenthes ampullaria| Dawon tiramu          | C |   | x | x |
| 51  | Nephrlepidaceae| Nephrlepis actifolia | Paku uban             | F |   | x | x |
| 52  | Passifloraceae| Passiflora foetida  | Downon pok             | C | x |   | x |
Table 1: Utilization of Non Timber Forest Products by Duyoh Community, Bau District, Sarawak, Malaysia

| No. | Family               | Species/Local Name | Habitat | Life Form | Other Uses | Usage |
|-----|----------------------|--------------------|---------|-----------|------------|-------|
| 53  | Phyllantaceae        | Baccaurea angulata | Gruming | T         | x          | x     |
| 54  | 0                   | Baccaurea bracteata | Topui   | T         | x          | x     |
| 55  | 0                   | Baccaurea molleyana | Rame    | T         | x          | x     |
| 56  | 0                   | Piper nigrum       | Lada    | C         | x          |       |
| 57  | 0                   | Piper porphyrophyllum | Popar doya’ | C   | x          |       |
| 58  | 0                   | Piper betle        | Boid    | C         | x          |       |
| 59  | 0                   | Plantago major     | Suut kosuon | H   | x          |       |
| 60  | 0                   | Bambusa sp.        | Puti    | B         | x          | x     |
| 61  | 0                   | Bambusa spp.       | Toring, buluh, | B   | x          | x     |
| 62  | 0                   | Cymbopogon citratus | Sorai   | G         | x          | x     |
| 63  | 0                   | Imperata cylindrica | Lalang  | G         | x          |       |
| 64  | 0                   | Drypetes sp.       | Ensabi  | S         | x          |       |
| 65  | 0                   | Morinda citrifolia | Bikudu  | S         | x          | x     |
| 66  | 0                   | Citrus limon       | Lemon   | S         | x          | x     |
| 67  | 0                   | Nephelium lappaceum | Limutan | T       | x          | x     |
| 68  | 0                   | Selaginella sp.    | Sangur rigu | F   | x          | x     |
| 69  | 0                   | Eurycoma longifolia | Pudun naga (Tongkat ali) | S   | x          | x     |
| 70  | 0                   | Solanum torvum     | Tiung piit | H   | x          |       |
| 71  | 0                   | Leucosyke capitellata | Kerangan | S   | x          |       |
| 72  | 0                   | Alpinia galanga    | Rikug   | H         | x          | x     |
| 73  | 0                   | Etlingera elatior  | Bunga Kantan | H   | x          |       |
| 74  | 0                   | Curcuma domestica  | Um’et    | H         | x          | x     |
| 75  | 0                   | Etlingera coccinea | Tepus   | H         | x          |       |
| 76  | 0                   | Zingiber officinale | Ro’ie   | H         | x          | x     |

Total: 52 21 6 13 64 33

1Local names based on Bau-Jagoi Bidayuh although variations may occur among villages in the area. Equivalent name in different dialects such as Malay and Iban were also used when none

2Habits and Life forms follows methods used by Soepadmo and Chai, 2000. H, T, S, F, C, G

3E = mean that the NTFP are edible or used in preparation of dishes as additives for better taste, preservation, etc as well as wrappers; M = having medicinal or health values as well as perceived to have effect on warding bad spirits; A = handicrafts such as baskets, mats, hats, fish-traps, and toys; O = others include construction materials, ornamentals, and items used in rituals and spiritual healings

4Based on total 76

3.2 Usage of NTFPs in Kampung Duyoh:

The villagers were found to have used NTFPs in numerous ways with main ones as materials for food, medicinal, and handicrafts. Others included as materials in rituals and spiritual events. They also used some species in a few ways. For examples, poles of buan (Dillenia suffruticosa) as support for pepper vines while the young leaves for vegetables and medicine apart from mainly using its mature leaves to wrap something especially cooked rice for outings such as to their gardens. Many gingers were used in preparation of food while they are also important ingredients in medicines. Also observed that many NTFPS of plants origin were used for ornamentals grown in flower pots such as the Begonia (Begonia sp.) and Sijujut (Costus sp) for their beautiful leaves and flowers. Some shrubby species were used also as hedges around their compounds. Wood
of many mature fruit trees even make good construction timber as they possess the required durability and strength for the purpose. It will not be surprising that floors and walls of some houses were made from planks of durian (Durio zibethinus) trees. Roofs of huts in some farms were made of leaves or palm fronds. To simplify classification of usage, they are divided into three most common uses namely edible, medicinal, and arts/handicrafts with others as secondary uses as shown in Figure 2.

![Figure 2: Number of species for each use type](image)

### 3.2.1 NTFPs as food:

Among the 76 species, 52 species that were edible or used in preparation of food with 40.7% (22 species) were fruits, which can be brought back home for consumption while some for sale. The most popular fruits were durians (Durio spp.) and Dabai (Canarium odontophyllum). Durians are eaten fresh or salted as ‘tempoyak’ to be used as flavor in many Bidayuh delicacies. Dabai are usually eaten after being blanched with warm water. Because the survey coincided with the fruiting season, other fruits such as Rambutan (Nephelium cuspidatum), Petai (Parkia speciose), Lasot (Lansium domesticum), Tibodak (Artocarpus integer), Gruming (Baccaurea angulate), Rame (B. bracteata), and Sikuk (Garcinia mangostana) were also sold in the market. Christensen (2002) stated that the Ibans in rural areas of Nanga Sumpa, gathered wild vegetables from various vegetation types such as young secondary forest, mature forest, hill rice fields, open grass pastures and others, on the way to or from the fields mostly by the women. Similar pattern was also recorded in the study. A survey in the Duyoh market revealed that there were 15 types of vegetables sold with six (40%) collected from the forest.

### 3.2.2 NTFPs as medicines:

Despite the close proximity to modern medical facilities and medicines, the study showed that the community still depend on plant-based medicines for primary health care. Out of 76 plant species documented, there were 21 species used for medicinal purposes; fever, skin disease, and wound each consist of four species (16%), followed by diarrhoea, hypertension, weakness, wind disease and post-partum each consist of two species (8%), and blood clot, stomach ache. There was only one species that was used for stopping bleeding. This number is much lower by 35 species than those recorded in Jagoi area by Baling et al (2017) mainly because the recording was only undertaken along a single trail from Kpg Duyoh, while Baling collected her data from various locations within the area. Nonetheless, data obtained from the present study somewhat represented the usage of NTFPs by the vendors cum collectors from Kpg Duyoh. During the survey, the plants used to treat common illnesses were fever, skin disease and wound with four species each.
The four species that used to treat fever were Pudun tanak (Andrographis paniculata), Dowon sisuoh (Blumea balsamifera), Sorai (Cymbopogon citratus), and Rikug (Alpinia galanga). Plants that were used to treat skin disease were Sonu (Blechnum orientale), Dowon suluok (Cassia alata), Sorin i’eng (Lycopodium cernuum), and Sangur rigu (Selaginella sp.); while Buan (Dillenia suffruticosa), Poyang (Pangium edule), Rusak (Melastoma malabathricum), and Pinyongoh (Justicia gendarussa) to treat wounds. A. galanga is commonly used by the Bidayuh to reduce fever by crushing the leaves and stem and boil in the water. At Duyoh market, only roots of A. galanga were sold but mainly as food flavoring. In Sarawak, Cassia alata is well known among the ethnic communities as a very effective remedy for ringworm and scabies while M. malabathricum is used to treat wounds or cuts (Chai, 2006) and can be readily picked in the open spaces whenever needed. The eight medicinal plants sold were Boid (Piper betle), Dawon sisuoh (Blumea balsamifera), Roei (Zingiber officinale), Sorai (Cymbopogon citratus), Misai kucing (Orthosiphon acutifolia), Pudun naga (Eurycoma longifolia), Kenamai (Goniothalamus sp) and Satek mani/ Ulam Raja (Cosmos caudatus).

The above usages of the plants for medicinal purposes in Sarawak are quite similar to that of some other countries. For instance, a study done by Hariyadi and Ticktin (2012) showed that the local people in Indonesia also use some plants as medicines such as A. paniculata to treat scurvy, J. gendarussa to treat headache, and C. alata to treat ringworms. In India, Rahul (2013) stated that Z. officinale is commonly used to treat asthma, colds, coughs, diarrhoea, ear infection, fever, flu, headache, etc.

3.2.3 NTFPs for arts/handicrafts/:

Table 1 shows that only 6 of 76 species were used as materials for arts or handicraft. Half of these (3 of 6) are rattans alone. Indeed, during the study villagers were collecting rattans for handicrafts such as mats and baskets. These items were also displayed for sale at the village market. The informants said that they used Dumam (Dicranopteris linearis) and Tramuok (Nephenthes ampullaria) to make strings in fish traps. On the other hand, many of these handicrafts were made from materials not mentioned by them though quite common in the forest there. Among them are bamboos (Bambusa sp) which were found weaved into mats and baskets. Boyuh (Artocarpus elasticus) bark were also commonly used as strings/ropes in basketry and mats.

3.2.4 Other uses of NTFPs:

A total of 13 species fall into this category consisting of ornamentals with 4 species, while materials for wrapping, tools, and rituals with 2 species each and the rests one each as insect repellent, masking body odour and smoothing woody surfaces. In this category are plants with multiple uses such as Sijujut (Costus speciosa) and Suluok (Cassia alata) which are mainly used as medicinal purposes while begonia (Begonia sp) and Bambo shoots from Toling and Puti (Bambusa spp) as food but also planted in pots or beds as ornamentals because of their beautiful features. Materials for making whole or part of the tools such as dibbling poles are usually made from woody plants or saplings which can grow into timber trees. The big leaves of Buan (Dillenia suffruticosa) are plucked for wrapping food especially rice for lunch in their farms and other outings. Apart from that, a plant called Ties (Tercera akara), is used occasionally as a sandpaper to smoothen rough surfaces such as wooden machete handles. According to Chai (2006), T. akara is widely known by various ethnic communities in Sarawak as the sand paper plant, especially the Iban. They often used it for sanding blowpipes and other implements made of wood. Because of the relatively easier for the locals in Duyoh and many other villages near to town obtaining sandpaper, T. akara may not be used anymore.

3.3 Values of NTFPs:

In this study, direct valuation method was used whereby market survey and interview sessions with the traders/vendors were conducted. Trading of NTFPs species in Kampung Duyoh is concentrated on the village-based market which is the Duyoh Market. In the market, the traders were from Duyoh village itself with hardly
any from neighbouring villages involved except those spouses married to the villagers. According to some of them, brokers from somewhere else sometimes would come and buy NTFPs in bulk from them such as Banduok (Manihot esculenta), Lemon (Citrus sp), Cangkuk manis (Sauropus androgynous), and Sorai (Cymbopogon citratus). Some of the traders also mentioned that most of their customers were actually going to nearby Pekan Serikin, an established and more famous weekend market near the border of Sarawak and Kalimantan, Indonesia, who dropped by at Duyoh market on their way back from there.

From the survey in Duyoh market, 39 species were found on sale (Table 1). Out of these, 74% were used for food (both fruits and vegetables), 21% for medicine, 10% for food flavouring and 3% for handicrafts/tools. The unusually higher number of fruits on sale than vegetables was because the survey coincided with the fruiting season.

The common factors that determine prices of the products in this market were cost to produce/obtain, customers’ demand, availability of the product at that period, competitors, profits and positioning. The prices of the products commonly found in the market were similar among stalls as they had earlier agreed among themselves. Thus each vendor had to use their own method to attract customers to buy their products such as presentation of the products. The price of products obtained from the forest were determined by distance to collecting locations, hence the amount of time spent, and relative availability, as well as their popularity and demand. For those that require more preparation and processing before sale, the time for these activities were also be considered. Generally, the price of medicinal plants and wild fruits were usually higher compared to wild vegetables and other products. For example, in order to get the medicinal plants such Kenamai (Goniothalamus sp.) and Pudun naga (Eurycoma longifolia), the collectors spent more time to look for these in the forest. Then, they need to process the collected materials before selling them in the market; drying process is needed for both Kenamai and Pudun naga. Sometimes tools such as wooden or bamboo sticks were used to collect the fruits such as Dabai (Canarium odontophyllum) that are high up on the trees. Sometimes, they also might need to climb the trees to collect the fruits.

According to the vendors, their estimated minimum net income from the sales during the weekend was RM50 per day, indicating that they can generate a minimum income of RM400 per month from the market. Their income increased to more than triple during the fruiting season (usually occur during October to December). The fruits that were in high demand were the Dien (Durio zibethinus) and Dabai. During this season, some would also sell their fruits on most weekdays not just at the Duyoh market but in nearby Bau town, so that these vendors can actually get as much as RM3,000 to RM4,000 within each of the three months from the sale of the fruits. Base on this trend, the vendors could generate RM4,800 to RM7,680 per year just by selling vegetables and non-seasonal fruits at the weekend with extra RM9,000-12,000 during fruit season. While the amount may be not substantial but comparable or even better than those who presently earns a minimum monthly salary of RM1,350 in town. This is so because the former can live in the comfort of their homes without rental equipped with basic facilities comparable to those in town while the latter will have to pay rent and buy vegetables and fruits commonly found in the village, emphasizing the importance of maintaining the NTFPs for communities who live off the forests for sustenance and supplemental livelihood.

3.4 Sustainability:

Since the Jagoi community who are mainly descendants of the old village on the hill top, they consider the forests at Mount Jagoi as their heritage. So this community still collect various NTFPs from the forests here for daily uses and even sale, resulting in scarcity of some species. Some incidences of encroachment and poaching had also been detected. Because of the above reasons, efforts had been made to ensure that the forests will be able to provide these NTFPs for many generations to come. Apart from encouraging collectors/gatherers to cultivate some of the commonly used species, the committees documented these assets,
undertook awareness raising events and made regulations to reduce poachers and intruders into the area. The effectiveness of these efforts, however, is yet to be seen though there are signs towards this end. The challenge is keep the momentum going and continue to conduct awareness raising activities and those that attract the local community especially the young ones to make them participate. Such activities will hopefully increase their sense of pride on the area and be future custodians to continue the efforts towards sustainable use and management of the area.

4 Conclusion:

The study on the respondents in Kampung Duyoh who used the NTFPs on a regular basis both for daily sustenance and supplemental livelihood had similar socio-economic characteristics with those in many rural areas having easy access to towns. A total of 76 NTFP species were used with majority (52 species or 68%) for food and food preparation followed by 21 medicinal species (26.7%). Only 6 species (8.0%) were used as materials for handicrafts/arts while 13 (17%) for other needs. This number is considered as quite substantial but comparable to typical rural villages elsewhere in Sarawak though the area has easy access to modern and alternative products in nearby towns.

The fact that 64 species or 84.21% were still found in the nearby forest denotes that the forests were still rich in NTFPs and providing the locals their main source of the products for daily needs and contributed substantially (43.42%) to the number of products on sale in the market, hence, their supplemental income.

Although the study was very short, it gave an idea that NTFPs are being used and that it revealed its value to the community in terms of income as well as importance to the local community. Thus suggesting a longer-term study which can cover all seasons/periods of the year to understand more on the products being sold and their values. More efforts towards promoting conservation of the nearby forest and sustainable use of the products is warranted to ensure a continue supply of NTFPs for sustainable supply for the present and future community use and to supplement their income.

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