

LOCAL USE OF FOREST PRODUCTS IN KUYONGON, SABAH, MALAYSIA

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ABSTRACT

This study examines the use of forest products in Kuyongon, Sabah, Malaysia. An interdisciplinary approach is applied in order to combine determination of species of forest products with measurement of the importance of these products in terms of subsistence and as income generation. It is concluded that forest products are used extensively in the villagers' daily lives for a wide range of purposes. Especially wild vegetables, firewood and products for construction and handicrafts are used on a daily basis in the households. For most households, the income from forest products is rather limited, but, especially for low-income groups, the income from forest products accounts for a rather large portion. The majority of forest products are collected in different stages of secondary forest, and therefore shifting cultivation, with long periods of fallow, is important for the growth of the forest products mostly used by the villagers. Therefore, the nearby Crocker Range National Park is not a widely used gathering site for most of the villagers, but is mainly used for hunting and collection of special products. Since the rules of the national park in terms of ban of use of forest resources presently is not enforced, the report finishes by discussing different scenarios for the future park management, taking both local people's needs and rights and the conservation of the parks flora and fauna into consideration.

2 INTRODUCTION

The peoples of Borneo have a long tradition of using and relying on forest resources, not only in terms of arable land for cultivation, but also in terms of gathering forest products. Although most people today are more or less integrated in the modern market economy, shifting cultivation, hunting and gathering continue to be an important part of the daily life (Brookfield et al. 1995). This is to be understood in terms of subsistence and income generation as well as important cultural practices (Ibid; Mertz et al. 1999; Cleary & Eaton 1992).

It has been estimated that 80% of the population in the developing countries use forest products for subsistence, consumption and/or income (Johari et al. 1998). In this light, there is an increasing interest in getting a better understanding of the importance that forest products have for these people. (FAO 1995). This interest can furthermore be seen as a result of the increasing interest in developing forest management systems that involve the local communities living in or on the brink of forests. In Sabah these issues are highlighted by Johari et al. (1998) and Sabah Parks.

With the increasing recognition of the contribution of forest products to household economy and daily consumption, several workshops and studies have been carried out. These include assessments of the actual use of forest products in specific societies, investigations of the significance of forest

products to local communities, and analysis of the potential utilisation of forest products (Christensen 1997; Colfer & Soedjito 1996; Mertz et al. 1999; FAO 1995; Johari et al. 1998).

An extensive ethnobotanical survey has been made of plants used in two subsistence communities in the interior of Sarawak (Christensen 1997) and a somewhat similar, but not as thorough, study has been made (Colfer & Soedjito 1996), investigating dietary patterns in a small community in Sarawak. Both studies are made in rather remote areas, and conclude that the daily use of forest products is extensive. However, no real assessment of the income-generating value was attempted by any of the authors.

Other publications are not based on data from one community, but from many different communities (FAO 1995; Johari et al. 1998). The publication from FAO is based on contributions from different specialists and researchers participating in a workshop concerning the importance of forest products in different Asian countries. The different articles focus on the importance by analysing the subsistence and income-generating value, both for local communities and countries as a whole. However, articles on Malaysia are studies of rattan, and therefore the publication does not give a holistic assessment of the importance of forest products in Malaysia. Johari et al. (1998) focuses on Malaysian Borneo as a region, and differs from the studies mentioned above in the sense that it mainly focuses on assessing and analysing the potential prospects of the utilisation of medicinal plants.

Studies investigating the local people's use of forest products are valuable in the sense that it makes the local knowledge on the use of forest products accessible for further investigation, e.g. the use of medicinal plants¹. Furthermore, knowledge on the collection of forest products, especially gathering sites and importance for local people's livelihood, can provide park managers with crucial information when developing policies on future park management.

2.1 Problem identification

The present study attempts to supplement the studies mentioned above by contributing with a case study on plants used by the people in a small village surrounded by vast areas of forest. Furthermore, we wish to contribute to the present research by investigating the importance of forest products both for consumption and income generation, thereby seeking an integration of ethnobotanical and social aspects. Studies of the use of forest products have mainly been done in quite isolated ar-

¹ Thereby we are not implying that the local knowledge does not belong to the local people, and profit from the local knowledge should be beneficial to the local community.

areas, and in this regard the village where we have conducted our study, Kuyongon, is quite interesting. On one hand, the village is situated on the border of the Crocker Range National Park (CRNP) and surrounded by vast forest areas. On the other hand, the villagers cultivate products and have access to many products at the local market that in principle could substitute the forest products. Therefore we find it interesting to investigate the actual use of forest products and their importance in Kuyongon.

This leads us to the following main research question:

To what extent do the villagers of Kuyongon use forest products, where do they collect them, and how important are forest products for the villagers' livelihood?

In order to answer the research question we have worked out the following sub-questions:

- Which forest products are collected, and what kind of categories of forest products can be identified?
- What are the products used for?
- Are the forest products important for the villagers' consumption and/or income?
- Is there any difference in the collection of products between income groups and/or gender?
- Where are the products collected, and how important is the CRNP compared to the forest not enacted as a national park?

2.2 Limitations

We have chosen not to focus on the religious and potential large scale commercial use of forest products in Kuyongon. Furthermore, we have excluded the preparation of food plants even though we investigate the use of these products. Finally we have chosen to limit ourselves from writing about changes in use of forest products in Kuyongon, since we were not capable of getting sufficient information regarding the past.

3 STUDY AREA

3.1 Introduction to Kuyongon

The village of Kuyongon was established in 1964 when people mainly from Longkogungan, a village in the Penampang district, settled down in this area. Their reason for moving to Kuyongon was to create better livelihoods by settling down in an area closer to a market and with access to more land

and better infrastructure. The village was given the name Kuyongon, which is taken from the word *muyung-kuyung* which means "describing a person who has been walking for a long distance and looks tired, but still continues to walk".

Kuyongon is almost entirely inhabited by people belonging to the ethnic group Dusun. According to the Tambunan Deputy District Officer, the number of inhabitants was 262 in 1997. There are about 35 households in the village. The average size of the households is 8-10 people, ranging from one household consisting of one Chinese business man living alone, to a household consisting of a couple with 15 children.

The political structure of the village is complex. Rose Mosudang is the head-woman and she functions, among other things, as a mediator when problems or conflicts arise within the village. She inherited the title from her father, which was one of the first people to settle down in the village. However, the head person of a village is normally chosen by consensus by the villagers (Gausett et al. 1999). There is also a village council, which too has authority. The council is normally elected, however, in the case of Kuyongon the chairman, Alex Sakim, was pointed out by the district authorities.

Kuyongon, which is about 4 km long and stretches along a narrow valley, is surrounded by rather large areas of secondary and primary forests and scattered cultivated fields. It is situated near CRNP, and the park border crosses the valley. One household is situated on the border of the national park. However, most of the households are situated ½ to 1½ hour walking distance from CRNP. The villagers rely mainly on subsistence farming as their livelihood. Most of them grow rice combined with some cash crop production like vegetables and ginger. Few of the households have title to their land but most of them have applied for it.

3.2 The forests around Kuyongon

The forests around Kuyongon are 800- 1000 m. above sea level and can therefore be classified as tropical, evergreen, lower montane forests (Whitmore 1984). The forests are mostly secondary forests, but this term covers a wide range of vegetation types. The villagers practise shifting cultivation on slopes around the village, which means that

Different forest types (after Whitmore 1984).

Primary forests are forests that are undisturbed by human activity and have never been logged. They are often characterised by the presence of large trees, dead trees and of a diverse and specialised flora and fauna.

Secondary forests are forests that have been logged or burned. They are often characterised by pioneer tree species, absence of very large trees.

Climax forests are old secondary forests that have reached a point in the succession where it is difficult to distinguish them from primary forest.

forested areas are burned and cultivated for a few years. After the plot is left fallow, the area under-

goes secondary succession where pioneer or light demanding species such as bamboo, *Macaranga spp.* and woody climbers develop in the abandoned fields, and eventually a secondary forest is established (Whitmore 1984).

Due to the shifting cultivation practice the land around the village is in many different stages of succession. There is cultivated land, land that has just been left fallow and areas with very young pioneer species on an early successional stage and different types of more forest-like vegetation. Near the village most forests are secondary forests, but further away the forests are less disturbed and some have reached a climax stage, but might be primary forests. Due to the many different stages of succession it is very difficult for outsiders as well as the local villagers, to classify a gathering site as e.g. secondary forest.

We have no knowledge of the history of old growth forests in the area, so we are unable to distinguish between climax and primary forest. However, the forests in CRNP are undisturbed (Phillips 1988). Therefore, the national park and areas with large and dead trees will be referred to as primary forests.

4 METHODS

Most of the methods used during our fieldwork in Kuyongon can rightly be termed participatory, in the sense that our data collection was done together with local people. However, if one follows Mikkelsen (1995) in her distinction between Rapid Rural Appraisal (RRA) and Participatory Rural Appraisal (PRA), our methods cannot fully be termed PRA. According to Mikkelsen, PRA enables people to analyse and reflect over their own situation and problems, whereas RRA is a cost-effective way for outsiders to gain knowledge about the area (ibid.). Our aim was never in itself to make people analyse their own use of forest products, but in the short time available to use participatory methods in order to extract as much of people's knowledge as possible. When we used methods normally regarded as PRA techniques (e.g. mapping and ranking), it was done only to the extent it was thought valuable for our empirical work. It would have been possible to involve people more, and encourage them to reflect more on their situation (e.g. group interviews, more people in the map session), but considering that the use of forest products is very individual, we judged that it would be better to spend our time on individual interviews. Therefore we find the term RRA, with the use of different PRA techniques, best suitable for our work.

The methods used were:

- Participatory mapping of the village

- Household survey
- Forest walks, including plant collection and determination
- Semi-structured interviews, including matrix scoring and ranking
- Visit to the market

The following part goes into detail with each method, explaining its purpose, how it was conducted and our experiences.

4.1 Mapping

The purpose of the mapping was to provide us with some basic geographical features of the village. The map was not intended to be very precise regarding geographical characteristics, but provided relevant information on the location of the different households and the location of the households in relation to the national park.

We provided three guides with pens and paper, and asked them to sketch a map which included the road, the river, the households, and the forest areas. Later we compared the drawn map with a drawn map at the local school and added some households not included in the map drawn by the guides. In other aspects, the map drawn by the guides proved to be more accurate, because the map at the school was compressed to a specific size so that households actually placed far apart were grouped together and because it was more recent than the school map. During the survey, when we visited most households, the map was revised, often because people had moved from the village.

4.2 Household Survey

In order to select households with different characteristics for in-depth interviews, it was decided to do a household survey, trying to include as many households as possible (see appendix 1). The survey was done in collaboration with the group studying income-generating activities who also stayed in Kuyongon. The survey was done according to a relatively structured questionnaire. Most interviews were done in the respondents' own houses which proved quite useful because fields, handi-crafts, fruit trees etc. were often visible, making it possible to ask more specific questions, and to double check the information given by the informant.

The questions in the survey were not intended to be closed as it is often practised (Casley & Kumar 1988). Even though we wanted answers to very specific questions, we also needed information from open-ended questions, simply because we lacked background information. Due to lack of time, the questionnaire was not tested and reversed, as suggested by Casley & Kumar (1988), but made in

Denmark and changed a bit during the interviews which means that not all the data is completely comparable. An example is that we included direct questions about the villagers' income because we learned that they were not offended by these questions. What we also experienced was that questions quite easily answered by one respondent, could not be answered by another, and therefore had to be changed or followed by extra questions. This was for example very evident when asking for monthly income. Some respondents listed a range of income generating activities, summing them up themselves, from others it was more difficult extracting this information.

Based on the survey, the main parameters used for choosing household representatives for forest walks and in-depth interviews were:

- Level of income
- Age and number of persons in the household
- Diversity of forest products used
- Location of the household
- If the household made handicraft
- If the household was selling forest products at the market

| Name | Level of income | No. of persons (adult/children) | Location | Handicraft. made |
|-----------|-----------------|------------------------------------|-----------------|---------------------|
| Jimin | Low | 2/2 | Extreme North | No |
| Iking | Low | 2/10 | North | Yes |
| Gusinki | Low | 6/2 | North | Yes |
| Justin | No estimate | 1/0 | Northern Middle | No |
| Thadius | High | 2/7 | Southern Middle | No |
| Liddy | Middle | 2/9 | Southern Middle | Yes |
| Ongguling | Middle | 1/2 | Southern Middle | Yes |
| Rose | High | 1/3 | South | Yes |

Table 1. Characteristics of the key-informants. Names in the table refer to the head of household. The level of income has been grouped into three categories. Low equals a monthly income (money available in the household) of less than RM 200; Middle equals a monthly income between RM 200 to 500; High equals an income of more than RM 500. Numbers of persons in the household refers to persons staying permanently in the household. Justin was selected due to his young age, but not in the survey treated as living in an independent household.

These parameters were chosen because we considered them important for the households' use of forest products. As a note to the survey it was added if the respondent was a good informant or not. Respondents who were shy and less informative were chosen, but it was regarded as a plus, if the respondent was talkative. Actually our experience was that the importance of the respondent's engagement and eagerness to talk to us probably was underestimated. Interviews with very shy or unmotivated respondents were often of little use. The different characteristics of the chosen informants can be seen in **Table 1**.

The validity and reliability of the survey can be questioned. Cross-checking questions and later questions in the in-depth interviews often revealed both a low degree of reliability and validity². It was difficult getting a precise answer to some of the categories, like level of income, diversity of forest products used, even the number of people staying in the household. However, the survey was useful in the sense that it gave us indicators to work with. Regarding income it was our impression, after doing in-depth interviews, that the actual income was much higher than the survey showed, but that the reply to the survey said something about the money available in the household. Thereby it also said something about the household's financial status in the village. Because most families have children or other family members occasionally living elsewhere, the number of persons in the household was also not precise, but again it said something in relation to other households - was it a big or small household. The question on handicrafts was confirmed by the interviews, showing a high validity. For the question on diversity of forest products used, the answers were almost useless, because later interviews showed that most informants only gave examples of some forest products used.

4.3 Forest walks, plant collection and determination of species

We did 7 forest walks in 4 days, and most of the forest walks and semi-structured interviews with each respondent were done in one day, walking in the forest in the morning until lunch, and interviewing in the afternoon for 2-4 hours. We considered it a good idea for the same interviewers to stay with the respondent during the whole day, partly because the experiences from the forest could be used in the interviews, partly because it made the interview less disturbed and more relaxed if the persons interviewing remained the same.

The people who took us to the forest were asked to take us where they usually collect forest products and find the most commonly used forest products. When a local used plant was found, one specimen was collected, ideally including fruits, flowers, etc. A number was added to each specimen, and the local name, use and preparation of the plant were noted. Due to a trade-off for more time to collect plants and do interviews, features recommended by Martin (1993) like the dominant vegetation, the relative amount of sun, soil type, direction, altitude and the steepness of the slopes were not noted. Characteristics about the plant itself and ethnobotanical details like the life form (the global category which the local people place it into, e.g. a tree) and the characteristics by which the local people identify the plant were also not done (ibid.). It takes much time doing all the notes, and

² The concepts of validity and reliability are understood according to Neuman (1997). Reliability refers to something dependable, answers that does not change and are stable; validity to the degree of fit between the construct (the question) and the indicators of it (the answer) (ibid).

we found it more important to have a large collection, where some plants might not be determined, than only a few plants with many notes. After the collection of the plants, they were cut into suitable samples, pressed and dried for later identification. Most of the plants have been determined, partly with help from researchers at Universiti Malaysia Sabah (UMS), partly by botanists at the herbarium in Sandakan³. Now the collection can be found at the herbarium in Sandakan.

4.4 Semi-structured interviews, ranking and matrix scoring

Once the plants were collected, the interviews were meant to measure the importance of the forest products to the household. This include socio-economic features of the specific household and the respondent's view of the national park, in order to find out whether the establishment of the park has affected the collection of forest products. A few informal interviews with people coming to the community house were used, but the interviews were mostly done in a semi-structured way, using a list with open-ended questions (see appendix 2). The advantage for us of doing the interview in this relatively structured way was that it makes it much easier to compare the different interviews and it is less time consuming than less structured interviews (Casley & Kumar 1988). The major set back of the semi-structured interview is that the interviewer tends to follow the questionnaire too tightly (ibid.). This we tried to avoid by pursuing interesting hints and sometimes cross-checking the information given.

The process of making a detailed list of the different forest products used by the villagers took some time. First, the products collected in the forest had only little connection to the plants considered important by the respondents. This is probably because we were not good enough to explain that we wanted the plants most used. Secondly, there was not a correlation between the products immediately recalled, and the products regarded the most important in the following ranking. Gradually we were able to make a list of different types of forest products, which we could use in the interviews. This leads to an important limitation; as the interviews conducted in the beginning of the fieldwork are less reliable, the possibility of missing an important product is higher at that stage. Eliminating this factor would have required a second visit.

When the list of forest products began to develop, and we got an idea of which kind of categories was used the most, we began ranking the products. We used pair-wise ranking, inspired by Mikkelsen (1995), in order to identify the most important vegetables for both selling at the market and own use. The information from the ranking is seen as an indicator of the most important vegetables. As a

³ Due to complex administrative procedures, it was decided not to collect and bring duplicates back to Denmark.

supplement to the ranking we added questions including the forest type in which the plant was collected, when it was collected last time (functioned mainly as a cross checking for importance), if it was sold at the market and the market price.

In the last part of the fieldwork we also did matrix scoring, inspired by Mikkelsen (1995), where different categories of forest products were ranked against different categories of purpose. The matrix scoring, like the ranking, was a part of the interview, and the method helped to extract information on the importance and different gathering sites of the forest products.

4.5 Visit to the market

In order to get an idea of the products sold at the market and their price, we went twice to the market in Tambunan. We interviewed people selling forest products, asking them the name and price of the different forest products, how much they earned, and where they had collected them. The first visit helped to make the list of vegetables that we used when interviewing. The second visit were made to check whether new vegetables were sold at the market and to buy vegetables not already collected. In addition, the visits at the market made it possible to double-check the local names of forest products.

4.6 Integration of natural and social science

We want to stress, that we follow the assumption that an interdisciplinary approach to the use of forest products will address more different aspects than a purely natural (collecting plants and listing the names and uses of the different plants) or social scientific analysis (concerned with the local use, knowledge and conceptualisation of the plants) would have done. Two group members have a natural scientific background and two have a social scientific background, and during the forest walks and the following interviews we divided the group in two, one natural scientist and one social scientist. We found this way of integrating our different backgrounds very rewarding and instructive, since we were able to support and supplement each other. The natural science provided the methods and knowledge that made us able to collect and identify the different plants. In turn, the social science made tools available that were needed for extracting information on the importance of forest products for own consumption and as an income-generating activity. This, we think, provides a more holistic picture of the use of forest products, which is needed, if one wants to understand the complexities of the local use of forest products.

4.7 Summing up

It is clear that only 10 days of fieldwork cannot give extensive material. No social scientist can on the basis of such a short fieldwork claim to say anything conclusive about the importance of access to the forest for Dusun culture, their local knowledge about the forest or how they conceptualise the forest and the use of it. Neither can any natural scientist get anywhere near a complete list of forest products collected and used, or say something about overexploitation. Christensen (1997) has estimated that it requires 4-5 months of fieldwork in order to record a near complete picture of a community's ethnobotanical knowledge, and obviously the task of including the importance of the forest products extends the needed time for fieldwork.

However, the material we collected can, with the limitations we have made clear in this methodological part, be used to say something about which kind of forest products are used in the everyday life of the villagers and for what purposes they are used (not presuming we know them all). Also, it gives an indication of the importance of the forest products in relation to selected categories and, indicators on the most important kinds of forest products in terms of consumption and income generation.

5 THE USE OF FOREST PRODUCTS IN KUYONGON

5.1 The general use of forest products in Kuyongon

The household survey showed that 21 households out of 22 collect forest products, and in-depth interviews revealed the great variety of forest products that are actually used by the villagers. Since the villagers often do the collection of forest products when they walk to their fields, the forest products are mainly collected near the villagers' own fields and as close to the household as possible, in both primary and secondary forest. When asked to estimate the importance of forest products for their daily livelihood, all the informants answered that forest products generally are important, but not as important as rice and other cultivated products. Many villagers also collect forest products when they go hunting for a longer period of time. As a supplement to this, Nair (1995) and Colfer & Soedjito (1996) have observed that many of the forest products used domestically or sold are collected during brief periods of bloom (e.g. mushrooms) or during periods of low labour input (e.g. when the agricultural requirements are low).

The term forest products covers a seemingly endless range of forest products. However, the household survey revealed the following widely used product categories:

- Medicinal plants
- Food plants
- Plants for handicrafts and construction
- Firewood
- Game

To investigate the variety of forest products in each product category, we collected as many samples as possible of the products used by the households, except hunting and firewood. During four days of forest walks we collected 110 specimens of plants representing at least 40 families, grouped in 5 different categories (See **Figure 1** and appendix 3 and 4).

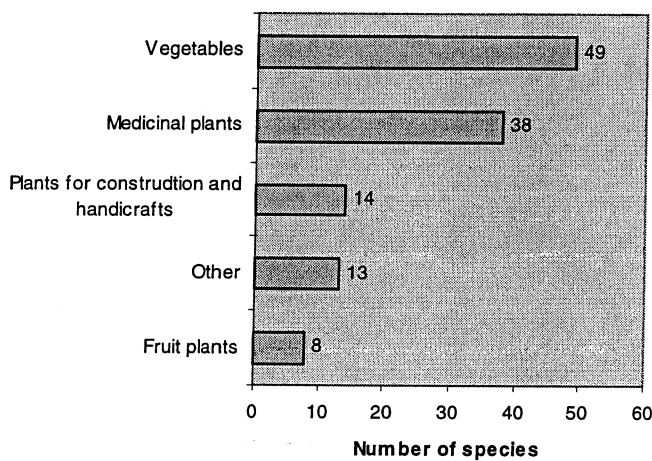


Figure 1. The number of plant specimens collected in each product category.

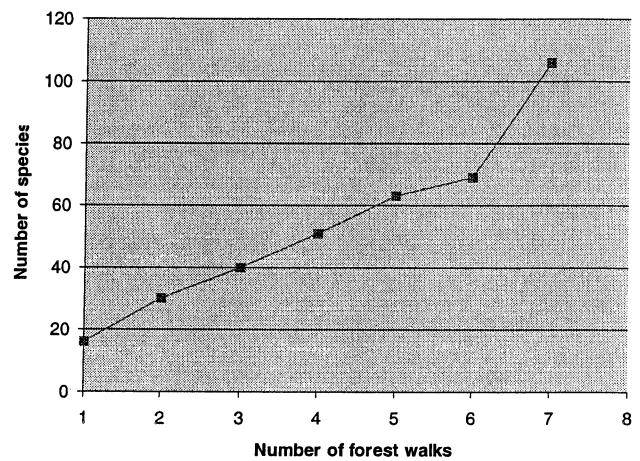


Figure 2. The accumulated number of plant species collected as a function of the number of forest walks.

The number of plants collected can be seen as an indicator of the high diversity of plants used by the villagers in Kuyongon. It also reflects the villagers' extensive knowledge about the use of forest products and local names of the products, a knowledge, which is most often passed from generation to generation, from parents to children. However, the number of plant species that we managed to collect can only be seen as a sample of the plant species actually used by the villagers, since the last forest walk still revealed a large number of new species (see **Figure 2**). To assess the actual diversity of plant species used in Kuyongon a much longer period of fieldwork is required.

The following part will investigate the specific categories of forest products in depth.

5.2 Medicinal plants

A medicinal plant is here regarded as a plant that is used to ease, cure, or prevent symptoms perceived as diseases.

| Plant family | Scientific name | Local name | Description of use |
|------------------------------|------------------------------|--------------------|--|
| Acanthaceae | <i>Acanthus sp. 3</i> | Tahipai | Sap used for ears |
| Actinidiaceae | <i>Saurauria sp.</i> | Longugan | Leaves used against scalding |
| Araceae | <i>Alocacia sp. 1</i> | Sisial | Ground rhizome is cut and put on itch from caterpillar to relieve the itch |
| Arecaceae | <i>Areca catechu</i> | Logus | Roots of young plant is boiled: As anti-poison and against toothache |
| Arecaceae | <i>Caryota sp.</i> | Botu | Palm heart is boiled to make tea: For women to produce more milk |
| Asclepiadaceae | <i>Hoya sp.</i> | Bina | A cure for cancer |
| Asteraceae | <i>Blumea balsamifera</i> | Tawawo | Against insect bites |
| Asteraceae | <i>Chromoleana sp.</i> | Nonokot | Medicine for chicken when cut |
| Asteraceae | <i>Elephanthopus sp.</i> | Saraman | Crushed leaves and shoots stops bleeding when put on cut |
| Chloranthaceae | <i>Chloranthus sp.</i> | Total | Crush leaves and put on wound: stops bleeding when cut |
| Draceneae | <i>Cordyline sp. 2</i> | Rolok | ? |
| Drypteridaceae | <i>Diplazium cordifolius</i> | Giman-giman | Boil the roots and drink as tea: Against cold fever, especially for young mothers |
| Euphorbiaceae | <i>Bischofia javanica</i> | Tongon | Young stem eaten: against stomach ache |
| Euphorbiaceae | <i>Homalanthus populneus</i> | Boto-boto | Against sprain: Burn leaves, mix with coconut oil and put on skin |
| Fabaceae | <i>Dalbergia sp.</i> | Sikat | Pasta of leaves against pain from twisted joint; Tea against asthma, makes you dizzy |
| Fabaceae | <i>Desmodium sp.</i> | Rupot-rupot | Against flu: roots is boiled to make tea; crushed leaves is rubbed on the throat |
| Lauraceae | <i>Cinnamomum sp.</i> | Kusur | Against stomach ache |
| Lauraceae | <i>Litsea sp.</i> | Lindos | Bark is used to relieve pain from leech sting |
| Malvaceae | <i>Urena lobbata</i> | Pong/ Tongilopang | Boil the roots: Drink as tea against stomach ache; wash mouth against toothache |
| Melastomataceae | <i>Melastoma sp.</i> | Gosing-gosing | Eat young leaves against diarrhoea |
| Menispermaceae | <i>Fibraurea chloroleuca</i> | Tapa bohuang | For chest pain |
| Menispermaceae | <i>Tinospora sp.</i> | Wakau | Sap from the liana is used against stomach ache and eye infection |
| Moraceae | <i>Ficus deltoidea</i> | ? | For birth control |
| Moraceae | <i>Ficus septica</i> | Lintotobou | Boil the roots and drink as tea: For women after giving birth |
| Oleandraceae | <i>Nephrolepis sp.</i> | Monumpuru | Crushed young leaves against headache |
| Piperaceae | <i>Piper betle</i> | Daing / Daun Sirih | Against insect bites |
| Piperaceae | <i>Piper sp. 1</i> | Bonsodon | Against ant bite: Crush leaves and put on skin |
| Polygalaceae | <i>Polygala paniculata</i> | Mentimagas | Against high blood pressure; against toothache |
| Rosaceae | ? | Terukakang | Tea from boiled sheaths used for mouth wash against toothache |
| Rubiaceae | <i>Hedyotis sp.</i> | Mompu-ompu | Against swelling |
| Simaroubaceae | <i>Eurycoma longifolia</i> | Tonkat ali | The plant is boiled: For the potency of men; for women after delivery; anti-malaria |
| Urticaceae | <i>Leucosyke capitellata</i> | Mandahasi / Tahpoi | Plant sap is used as eye-drops and for pain in ears |
| Verbenaceae | <i>Callicarpa sp. 2</i> | Subol-subol | Crushed young leaves are put on twisted joint to relieve pain |
| Zingiberaceae | <i>Costus speciosus</i> | ? | Against asthma and headache |
| Collected but not identified | - | Mandoringin | Medicine for stomach ache (diarrhoea) |
| Collected but not identified | - | Numog nuli | Against bleeding when cut |
| Collected but not identified | - | Rohori | Against headache |
| Collected but not identified | - | Walahan | Latex used against bleeding in open wounds |

Table 2. List of collected medicinal plant species, their local names and their uses.

A total of 38 plants with medicinal uses representing at least 25 plant families⁴ were collected during the forest walks (see **Table 2**). Most villagers have some knowledge about medicinal plants and collect medicinal plants themselves. However, we got the impression that some are experts in medicinal plants since an informant, due to her own insecurity, had to have the name of a plant confirmed by her sister who apparently was the expert. There was only little overlap in the species found by the different informants, indicating that the actual number of plants used for medicinal purposes by the village is somewhat greater than 38.

The plants found are used for a great variety of medicinal purposes. **Table 3** shows the problems that can be treated by medicinal plants. The total number of medicinal uses is higher than the number of recorded species since some species have more than one use.

Most of the plants are used against daily problems and injuries such as insect/leech bites, headache and diarrhoea/stomach problems. We also found plants to relieve the pain from minor physical injuries such as twisted joints and sprains. Also, we found a plant that apparently cures cancer. It is important to stress that the effect of the medicinal plants were never investigated and only rarely cross-checked with different informants. Furthermore, we are not able to say whether the terms used for diseases by the villagers have the same meaning as in our understanding, since we did not ask specific questions about how they conceptualise diseases like ‘cancer’, ‘chest pain’ etc⁵. There seems to be some overlap between our findings and the findings of Christensen (1997), but it is difficult to assess properly since most of our specimens are only identified to a botanical genus. However, in our study *Bischofia javanica* and *Eurycoma longifolia* have similar uses as in the study of Christensen (1997).

5.2.1 Gathering sites

Medicinal plants are collected near the houses, in secondary forest and in the primary forest by both men and women. However, the primary forest seems to be the most important gathering site, which

| Problem | Number of spices |
|--------------------------------|------------------|
| Stomach problems /Diarrhoea | 7 |
| Insect/leech bite/sting | 5 |
| Stops bleeding when cut | 4 |
| Toothache | 4 |
| Headache | 3 |
| Asthma | 2 |
| Ear problems | 2 |
| Eye infections | 2 |
| For women after giving birth | 2 |
| Joint pains | 2 |
| Lack of potency | 1 |
| Cancer | 1 |
| Chest pain | 1 |
| Cold fever | 1 |
| Flu | 1 |
| For birth control | 1 |
| For women to produce more milk | 1 |
| Malaria | 1 |
| Scalding | 1 |
| Sprain | 1 |
| Swollen parts of the body | 1 |
| Total number of uses | 44 |

Table 3. Problems that can be treated by medicinal plants.

⁴ 89% of the collected specimens were identified to a botanical family.

is probably because some species are only found here. A few people actually cultivated some medicinal plants, but even for them the primary forest was a more important gathering site.

5.2.2 Importance of medicinal plants for the villagers' livelihood

Medicinal plants are almost exclusively collected for use in the household, and only one informant occasionally sells medicinal plants at the market. The collection of medicinal plants is not done regularly since the villagers only collect them when they actually need them. This is also due to the fact that only very few of the plants can be stored for later use.

The villagers in Kuyongon have access to hospitals and modern medicine, but despite this they possess a lot of knowledge about medicinal plant species and their uses. The villagers mostly use traditional medicine for minor diseases and injuries, and use modern medicine or go to the hospital in case of more serious disease. The villagers believe that modern medicine is more effective, but some still prefer to try the traditional medicine first when they become sick. The two types of medicine can therefore be seen as complimenting each other. A similar conclusion has been reached by Christensen (1997).

It was our impression that traditional medicine was not regarded by the villagers as particularly important for their health and welfare, but was more seen as a relatively cheap and sometimes easy way to get medicine to cure minor diseases and injuries. However, it is likely that some of the households with low or middle income have to rely on medicinal plants if they cannot afford to buy medicine or go to the hospital.

5.3 Food plants

This category includes mainly wild vegetables, mushrooms and fruits. Since it was not fruit season at the time we were in Kuyongon, we have chosen to focus our study on vegetables, including mushrooms. We are aware that vegetables in biological terms do not include mushrooms. However, in this report we follow Christensen (1997) and treat mushrooms, which are prepared and eaten as a vegetable dish, as vegetables. It is further important to stress that wild vegetables are defined as vegetables not planted. Wild vegetables seem to grow almost everywhere, including in the farmers'

⁵ As an example Christensen (1997) notes that the villagers in one of her study areas did not perceive head ache as a separate illness, but as part of the stomach or the back, which has to be treated in order to make the head ache disappear.

fields, and we have not treated plants outside the forest any differently than plants inside the forest⁶. The vegetables growing in the fields are in this report grouped together with the ones growing in secondary forest.

A total of 75 species of plants used as food, representing at least 25 plant families⁷, were collected during the forest walks (see **Table 4**). This reflects a comprehensive knowledge on food plants possessed by the villagers. 49 of the collected species were used as vegetables, and from the interviews we gathered additional information about 17 vegetables that we never came across during the forest walks. In total we recorded 66 different local names for wild plants used as vegetables. There is some overlap between the species used as food plants by the Dusuns in Kuyongon and by the Kela-bit and Iban people in longhouse-communities in Sarawak (Christensen 1997). The overlap can probably be explained by the fact that these species are widespread and have a good taste.

| Plant family | Scientific name | Local name | Specimen collected | Vegetable | Fruit | Other | Sold |
|---------------|----------------------------------|--------------------|--------------------|-----------|-------|-------|------|
| Acanthaceae | <i>Acanthus sp. 1</i> | Lomboi | √ | √ | | | |
| Acanthaceae | <i>Acanthus sp. 2</i> | Ruhoi | √ | √ | | | |
| Acanthaceae | <i>Acanthus sp. 4</i> | Tombai | √ | √ | | | |
| Acanthaceae | <i>Pseuderanthemum borneense</i> | Tondoloung | √ | √ | | | |
| Actinidiaceae | <i>Saurauria sp.</i> | Longugan | √ | | √ | | |
| Amaranthaceae | <i>Amaranthus sp.</i> | Ruhoi | √ | √ | | | √ |
| Apiaceae | <i>Enjugium sp.</i> | Rembah seribu | √ | | | √ | |
| Araceae | <i>Aglaonema sp. 1</i> | Tupa-upa | √ | √ | | | |
| Araceae | <i>Aglaonema sp. 2</i> | Gumpoi | √ | √ | | | |
| Araceae | <i>Alocacia sp. 3</i> | Sunsulag | √ | √ | | | √ |
| Araceae | <i>Alocasia sp. 3</i> | Gumpoi | √ | √ | | | √ |
| Araceae | <i>Amorphaphallus sp.</i> | Lopong | √ | √ | | | |
| Araceae | <i>Homalomena sp. 1</i> | Botu | √ | √ | | | |
| Araceae | <i>Homalomena sp. 2</i> | Buntui | √ | √ | | | √ |
| Araceae | <i>Homalomena sp. 3</i> | Lonlondu/ Gultapai | √ | √ | | | |
| Araceae | <i>Homalomena sp. 4</i> | Telingo tambang | √ | √ | | | |
| Araceae | <i>Homalomena sp. 5</i> | Tukaruk | √ | √ | | | |
| Araceae | <i>Schizomatoglotis sp.</i> | Dukaruk | √ | √ | | | √ |
| Arecaceae | <i>Areca catechu</i> | Logus | √ | √ | | | |
| Arecaceae | <i>Arenga undulatifolia</i> | Lihuan | √ | √ | | | √ |
| Arecaceae | <i>Calamus convallium</i> | Lambat | √ | | √ | | |
| Arecaceae | <i>Caryota sp.</i> | Botu | √ | √ | | | |
| Arecaceae | <i>Daemonorops didymophylla</i> | Tamborua | √ | √ | | | √ |
| Arecaceae | <i>Pinanga sp.</i> | Bumburing | √ | | √ | | |
| Arecaceae | <i>Plectocomia mulleri</i> | Longohodan | √ | √ | | | √ |
| Arecaceae | <i>Daemonorops didymophylla</i> | Tamborua | √ | √ | | | |
| Asteraceae | <i>Crassosepalum sp. 1</i> | Kuyondai | √ | √ | | | √ |

⁶ We have not, like Christensen (1997), attempted to separate semi-managed from naturalised plants. The boundary is, as Christensen (ibid.) points out, often very blurred, and a much longer field study is needed in order to get this kind of information.

⁷ 93% of the collected specimens were identified to a botanical family.

| | | | | | | | |
|------------------------------|-------------------------------|-------------------|----|----|---|---|----|
| Asteraceae | <i>Crassosephalum sp. 2</i> | Menggali | √ | √ | | | |
| Blechnaceae | <i>Stenochlaena palustris</i> | Lembiding | √ | √ | | | √ |
| Commelinaceae | ? | Nonobulon | √ | √ | | | √ |
| Dennstaedtiaceae | <i>Pteridium sp.</i> | Logub | √ | √ | | | |
| Dracaenaceae | <i>Cordyline sp. 1</i> | Mandaringin | √ | √ | | | |
| Dracaenaceae | <i>Dracaena sp.</i> | Lompoyou | √ | √ | | | √ |
| Drypteridaceae | <i>Diplazium sp.</i> | Pakis | √ | √ | | | √ |
| Hypoxidaceae | <i>Curculigo sp. 1</i> | Rumbisan | √ | | √ | | |
| Hypoxidaceae | <i>Curculigo sp. 2</i> | Tondilom | √ | √ | | | |
| Joinvilleaceae | <i>Joinvillea sp.</i> | Tapi | √ | √ | | | |
| Maranthaceae | <i>Donax sp.</i> | Kobu | √ | | | √ | |
| Melastomataceae | ? | Komburiong | √ | √ | | | √ |
| Melastomataceae | ? | Tongkurangok | √ | | √ | | |
| Melastomataceae | <i>Melastoma sp.</i> | Gosing-gosing | √ | √ | | | |
| Menispermaceae | ? | Tapa | √ | | | √ | √ |
| Moraceae | <i>Ficus sp.</i> | Runtuh-runtuh | √ | | √ | | |
| Musaceae | <i>Musa sp.</i> | Togutui | √ | √ | | | √ |
| Pandanaceae | <i>Pandanus sp.</i> | Boribi (Tapi) | √ | √ | | | |
| Piperaceae | <i>Piper sp. 2</i> | Kuyoh | √ | √ | | | |
| Poaceae | <i>Bambusa sp. and others</i> | Poring | | √ | | | √ |
| Poaceae | <i>Dinochloa sp.</i> | Wadan | √ | √ | | | |
| Poaceae | ? | Tagiung | √ | √ | | | |
| Rubiaceae | <i>Hedyotis sp.</i> | Mompu-ompu | √ | √ | | | |
| Solanaceae | <i>Solanum nigrum</i> | Tutan /Tutan pura | √ | √ | | | √ |
| Solanaceae | <i>Solanum turvum</i> | Lintaromg | √ | √ | √ | | |
| Verbenaceae | <i>Callicarpa sp. 1</i> | Ruttol | √ | √ | | | |
| Zingiberaceae | <i>Etingera elatior</i> | Topu/ Tompu | √ | √ | | | √ |
| Zingiberaceae | <i>Etingera punicea</i> | Tuhau | √ | √ | | | √ |
| Collected but not identified | - | Kodop – mushroom | | √ | | | √ |
| Collected but not identified | - | Korong - mushroom | | √ | | | √ |
| Collected but not identified | - | Pakis hutan | √ | √ | | | |
| Collected but not identified | - | Papason | √ | √ | | | |
| Collected but not identified | - | Rohori | √ | √ | | | |
| Collected but not identified | - | Tunda | √ | √ | | | |
| Not found | - | Birid | | √ | | | √ |
| Not found | - | Giman | | √ | | | |
| Not found | - | Kukaruk | | √ | | | √ |
| Not found | - | Luba | | √ | | | |
| Not found | - | Polod | | √ | | | √ |
| Not found | - | Pongoi | | √ | | | |
| Not found | - | Rungkugan | | √ | | | √ |
| Not found | - | Tadalaoung | | √ | | | √ |
| Not found | - | Talibong | | √ | | | |
| Not found | - | Timadang | | √ | | | |
| Not found | - | Tiwak | | √ | | | |
| Not found | - | Tolibung | | √ | | | √ |
| Not found | - | Toubung | | √ | | | |
| Not found | - | Uhuan | | √ | | | √ |
| Total | | | 58 | 66 | 7 | 3 | 29 |

Table 4. List of all food plants recorded and their uses.

Despite the relatively high number of species found and recorded, the last forest walk revealed a high number of new vegetables. This indicates that the actual number of plants used, as food is higher than the one stated here.

5.3.1 Gathering sites

The vegetables are gathered from a wide range of habitats. Especially areas along streams are good gathering sites. When looking into the type of forest, secondary forest is the most important gathering site. 35% of the wild vegetables we know of is collected in the primary forest, but most of these are not regarded important. Of the 6 species of vegetables most important for selling at the market, 5 are mainly found in secondary forest (see **Table 5**, page 20). Also for own consumption, our data strongly indicates that secondary forest is most important. Reasons for this include the distance of the forest (secondary forest is closer) and the fact that the vegetables found in secondary forest are of better quality and grow faster – apparently because there is more light on the forest floor in the secondary forest.

5.3.2 The importance of food plants for the villagers' livelihood

As the high number of collected vegetables indicates, vegetables constitute an important part of the diet for the people in Kuyongon. This is confirmed by our interviews which showed that most of the villagers eat at least one kind of wild vegetable in their daily meals, and wild vegetables are never bought at the market. The diversity of wild vegetables used is also high, ranging from 2-3 to as much as 11 kinds of vegetables eaten per week. However, cultivated vegetables are in general considered to be more important than wild vegetables. They taste better, grow closer to the house and are more reliable. Therefore, the collection of wild vegetables has a low priority, and it is dependent on the time needed for other activities. Nevertheless, the consumption of these plants remains high, and the wild vegetables are an important buffer when the harvest is poor. The large diversity of species used as vegetables makes it reasonable to assume that a villager with good knowledge will always be able to find forest vegetables enough for daily consumption. Data show that the wild vegetables are more important for low-income groups. The relative consumption of wild vegetables seems to be higher, and since they cannot afford to buy vegetables at the market, the function of wild vegetables as a buffer is more important for these households.

Besides a regular collection for daily consumption, forest vegetables are also collected for selling at

the local market⁸. Most of the villagers sell forest vegetables at the market on a regular basis, which means almost every week. For our informants, the income from wild vegetables varies from only a few percent to as much as 30-40% of the monthly cash income. One exception from this is one month of season for a specific kind of mushroom, where this mushroom alone, for some households, makes up about 50% of all food plants sold.

It is very clear that the households belonging to the lowest income groups, are the ones with the relatively highest income from wild vegetables. This is not because wild vegetables

| Plant family | Scientific name | Local name | Seen at the market | Most important gathering site |
|----------------|-------------------------------|------------|--------------------|-------------------------------|
| Araceae | <i>Alocacia sp.</i> | Sunsulag | | Secondary forest |
| Araceae | <i>Schizomatoglotis sp.</i> | Dukaruk | | Primary forest |
| Blechnaceae | <i>Stenochlaena palustris</i> | Lembiding | √ | Secondary forest |
| Drypteridaceae | <i>Diplazium sp.</i> | Pakis | √ | Secondary forest |
| Solanaceae | <i>Solanum nigrum</i> | Tutan | √ | Secondary forest |
| Zingiberaceae | <i>Etilingera punicea</i> | Tuhau | √ | Secondary forest |

Table 5. 6 vegetables important for selling at the market. The list is based on information from interviews and pair-wise ranking of vegetables.

make up a higher percentage of the total amount of vegetables sold, but because the lower income groups have a relatively much higher total income from vegetables. This observation is supported by Warner (1995), stating it is common that the poorest households do not have a high actual income from the forest products (in Kuyongon it amounts to approx. RM 5-100 per month), but they may provide a high portion of the household's total income.

Still, the sale of cultivated vegetables is more important than forest vegetables. For our informants the cultivated vegetables constitute about 60-80% of the vegetables sold. Villagers explain this by referring to the many wild vegetables already sold at the market, the low price, and the limited number of forest products that can be collected in the nearby forest.

Of the large number of species collected and used as vegetables, some are used much more than others. Some species are collected in relatively large quantities because they sell well at the market or because the villagers eat them more frequently. We have knowledge of 29 species sold at the market, (see **Table 4**). It is important to stress that the diversity of products sold is probably higher, and some informants told us that the kind of wild vegetables they sell varies a lot. However, six species could, at the time of the fieldwork, be identified as particularly important for selling at the market (see **Table 5**).

For household consumption, Christensen (1997) found that the taste was the single most important factor in two villages in Sarawak. Other factors include easy finding, picking and preparation. In

⁸ Market visits reveal that this is a significant income for people in the Tambunan district.

Kuyongon it seems reasonable to assume that these factors are important. Normally people eat the forest vegetables they like the best, and would not spend too much time either looking for or picking them⁹. The range of vegetables used for consumption was wider than the range of vegetables sold at the market, one reason being that the market demand does not have to be taken into consideration.

Both men and women collect vegetables. However, there seems to be a difference in their gathering patterns. Usually women go to the forest with the purpose of collecting forest vegetables, whereas the men mostly collect the vegetables while in the forest doing something else. Women also sometimes collect vegetables in groups, making the gathering a social activity. Christensen (1997) also made these observations. Also, women apparently know much more than men about collecting wild vegetables with the highest quality do. The two interviews made with women revealed much more detailed information on collection and importance of different vegetables than the interviews with men did.

5.4 Plants for construction and handicrafts

Regarding plants for construction and handicrafts, we have chosen to focus on fibres used for making handicrafts and for tying and binding purposes in construction. These plant fibres include rattans and bamboo. The term 'handicrafts' is to be understood in a broad sense, covering all sorts of hand-made objects ranging from rat traps to plaited backpacks.

What is rattan?

Rattans are climbing palms which are often able to grow high up in the canopy of the forests, clinging to the trees with armed climbing organs (cirrus or flagellum) (Dransfield 1984). The core of the rattan stem is woody and very flexible, and this part is used for handicrafts (Dransfield et al. 1993). However, the armed climbing organ, *cirrus*, extending from the end of the leaf, is also used for making traps for birds. Rattan stems come in all diameters ranging from a few millimetres to more than 4 centimetres. Since the diameter of the stem of most rattans is fixed throughout the entire growing period of the stem, different species of rattans are used for different purposes. Furthermore, the rattan canes have different colours and features and together with the frequency and nature of the nodes this contribute to the specific use of a particular species (ibid.).

A total of 14 plants used for handicrafts or construction purposes, representing only 2 families, were collected (see **Table 6**). 13 species are rattans belonging to the palm family (Arecaceae), and the last specimen is a screw-palm (*Pandanus* sp., Pandanaceae). We have recorded the uses of bamboo¹⁰ but not collected any specimens. In total we recorded 22 local names for plant species used for construction and handicrafts and 20 of these are rattans. About half of the species of rattans used by the

⁹ We have no information about how easy a plant is to prepare.

¹⁰ Bamboo is not one species, but a vast amount of species representing some 45 genera in the grass family (Poaceae) (Mabberley 1997).

people in Kuyongon were also used by either the Ibans or the Kelabit people in Christensen (1997). This is probably due to the fact that these species are widespread and have plant fibres of good quality.

| Scientific name | Plant family | Local name | Type | Description of use |
|---------------------------------|--------------|----------------------|------------|------------------------------------|
| <i>Calamus acuminatus</i> | Arecaceae | Podos pura | rattan | String |
| <i>Calamus convallium</i> | Arecaceae | Lambat/ Tu'uh | rattan | Low quality rattan for handicraft |
| <i>Calamus javensis</i> | Arecaceae | Podos rana | rattan | String |
| <i>Calamus pogonacanthus</i> | Arecaceae | Sumiliu | rattan | Barait |
| <i>Ceratolobus discolor</i> | Arecaceae | Logong | rattan | Bags |
| <i>Daemonorops didymophylla</i> | Arecaceae | Tomborua | rattan | Barait, Wakid |
| <i>Daemonorops longistipes</i> | Arecaceae | Kopit | rattan | Many handicrafts |
| <i>Daemonorops periacantha</i> | Arecaceae | Dahandang | rattan | Low quality rattan for handicrafts |
| <i>Daemonorops sabut</i> | Arecaceae | Sulak | rattan | String |
| <i>Daemonorops sparsiflora</i> | Arecaceae | Dahandang/Sansaraban | rattan | For nyiru, trap for birds, bags |
| <i>Korthalsia cheb</i> | Arecaceae | Podtung | rattan | Bags |
| <i>Korthalsia jala</i> | Arecaceae | Saro | rattan | Handicrafts |
| <i>Korthalsia robusta</i> | Arecaceae | Lasas | rattan | Handicrafts |
| Not found | Arecaceae | Bii | rattan | Handicrafts |
| Not found | Arecaceae | Borit | rattan | Handicrafts |
| Not found | Arecaceae | Loguhodan | rattan | Handicrafts |
| Not found | Arecaceae | Losun | rattan | Handicrafts |
| Not found | Arecaceae | Misulak | rattan | Handicrafts |
| Not found | Arecaceae | Sibu | rattan | Handicrafts |
| Not found | Arecaceae | Sogo | rattan | Handicrafts |
| <i>Pandanus sp.</i> | Pandanaceae | Boribi (Tapi) | woody herb | Handicrafts |
| <i>Bambusa sp.</i> and others | Poaceae | Poring | bamboo | Handicrafts and construction. |

Table 6. Recorded species used for construction and handicrafts. Rattans not found are still put in the Palm family (Arecaceae) since all rattans belong in this family.

5.4.1 Gathering sites

The villagers collect rattans in both primary and secondary forest. We did not learn about any rattan species used by the villagers that could only be found in either primary or secondary forest. It is difficult to say which forest type is the most important gathering site for rattan since different informants have different preferences. However, we were informed that most rattan is collected in the secondary forest, but that the villagers have to go to the more undisturbed forest to find very long rattans.

Bamboo is mainly found in the near surroundings of the houses and the very disturbed secondary forests. There is very little bamboo in primary forests. Although there is much bamboo in the surroundings of the houses in the village, bamboo is never planted. It seems that the wild populations of bamboo can easily supply the villagers with the bamboo they need.

5.4.2 Importance of plants for construction and handicrafts for the villagers' livelihood

Plants for construction and handicrafts are not collected regularly, but mostly when they are needed. However, a 'good' rattan is often collected even if the purpose for being in the forest is not collection of rattan. It is likely that people selling rattan products at the market collect it more often than those who do not sell it, but we have no data showing this. We got the impression that collection of rattan was most often done by men, which corresponds to the findings by Fui & Noor (1995) when investigating the collection of rattan in Malaysia. Though, when making the handicraft there is no clear division of labour between the genders; in some households the man solely makes the handicraft and in others the woman makes it.

Plant fibres from rattan have a vast amount of uses in the village. For tying various construction parts together, for fish traps and traps for rodents, for making all kinds of containers varying from small, simple baskets to large complicated hunting backpacks. The thin rattans (2-4mm) are probably the rattans with the widest range of uses - from tying material for fences and houses to plaiting material for baskets and other handicrafts. Thick rattans (up to 4 cm) are often used for the bearing elements in the handicrafts or split to make flat fibres for plaiting material. Bamboo also has a great diversity of uses. Apart from various handicrafts, bamboo is used for construction of fences, bridges, walls, floors etc.

All the informants have some knowledge about the collection and uses of rattan. Most of the households in Kuyongon make their own handicraft, and with help from the Malay student in our group, we made a list of 30 different handicrafts used or made by the villagers. The list, which can be seen in **Table 7**, reveals a large diversity of products and the list is probably not complete.

| Local name | Materials | | | | Explanation | Sold |
|----------------|-----------|--------|------|-------|--|------|
| | Rattan | Bamboo | Palm | Other | | |
| Balatak | √ | √ | | | Small Basket for meat/ vegetables | √ |
| Bangkala | √ | √ | | | Used for catching fish | |
| Barait | √ | | | | Basket-like backpack | √ |
| Basung | √ | √ | √ | | Lightweight, funnel-shaped backpack | √ |
| Bubu | √ | √ | | | Fish trap | |
| Burung | √ | √ | | | Baskets – many different sizes | √ |
| Gado | √ | √ | | | Squirrel trap | |
| Gigimpuan | √ | √ | | | Nest for chicken laying eggs | |
| Gulung | √ | √ | | | Device for storing vegetables and rice | |
| Kalawang | √ | | | | Hunting backpack | √ |
| Karaban | √ | | | | Bag | √ |
| Kasip | √ | √ | | | Rat trap | |
| Kayaba | √ | | | | Bag | √ |
| Kukurungan | √ | | | | Cage for chicken | √ |
| Lampik | √ | | | | Bag | |
| Nyiru (riribu) | √ | √ | | | Device for cleaning rice | √ |
| Palangko | √ | √ | | √ | Small container for salt, spices etc. | |
| Robu | √ | √ | | √ | Music instrument | √ |
| Sabat | √ | | | | Small basket-like backpack | √ |
| Sirung | √ | √ | | | An 'Asia-style' sun-hat | √ |
| Siud | √ | | | | Device used for catching fish | √ |
| Sodik | √ | | √ | | Bird trap | |
| Sungul | √ | √ | | | Rat trap | |
| Tangkob | √ | √ | | | Barrel for rice | |
| Taus | √ | | | √ | Trap | |
| Togiwis | √ | | | | Straps for baskets | √ |
| Tovod (burung) | √ | | | | Small basket for fish and snails | √ |
| Tuai polos | √ | | | | Rattan-rope | √ |
| Tungkakub | √ | √ | | | Trap | |
| Wakid | √ | √ | | | Funnel-shaped backpack | √ |
| Number | 30 | 17 | 2 | 3 | | 15 |

Table 7. A list of handicrafts used or made by the villagers.

All the handicrafts are made from at least one species of rattan, and most of them consist of two or more species of rattan. About 60% of the handicrafts recorded also contain bamboo, and only 15% of the recorded handicrafts include plant species other than rattan and bamboo. Rattans are probably therefore valued the most important forest product for making handicrafts, but bamboo is also of great importance. We did not manage to make any assessment of the relative importance of the different species of rattan. However, it was clear that the thin-stemmed species (*Calamus acuminatus*, *Calamus javensis*) were very important and that most of the rattans possess different qualities which

make them suitable for different purposes. The rattans with very frequent and pronounced nodes¹¹ were regarded as low quality rattan.

For construction in terms of everyday use, bamboo and rattan are regarded equally important – both somewhat more important than e.g. wood logs and bark. It is obvious, though, that since a large part of the houses in the village are made from wood, the households need large wood logs when building a new house. This area was not investigated in depth, but no one in the village seems to buy wood logs. One informant told us, that even though the creation of CRNP had caused some trouble, he managed to find the required wood for his new house in old secondary forest near his fields.

Only 3 of our informants sell handicrafts or rattan rope at the market. It is difficult to assess the income generation in relation to other products, which may be due to the fact that income earned from selling handicrafts is relatively varying. One informant said that he only sells handicraft after receiving orders by the customers, which is usually once or twice a month. However, it seems that the actual income from handicrafts is not very important.

The village is almost self-sufficient since few people buy handicrafts at the market. The households not making their own handicraft most often exchange rattan in turn for having relatives or friends making handicrafts for them. One informant told us that she made the easy parts herself and then brought it to her husband's sister who were able to finish the work.

The villagers regard the self-made handicrafts made from plant fibres as very important for their daily living, even though there is a large amount of products at the market that can substitute handicrafts and tools made of plant fibres. Buckets, bowls and many other types of containers made of plastic and metal were sold at the market, and many were also extensively used in the village. However, these products do not seem to replace the use traditional handicrafts, merely to supplement them.

Once in a while, some villagers will substitute rattan fibres with nylon when making handicrafts. One villager had recently made a complicated backpack almost entirely out of nylon. He stated that nylon was easier to work with compared to rattan and that some people liked nylon better because it lasts longer. Often nylon was also used to repair older handicrafts, but the general impression was that nylon plays a minor role as a material for making handicrafts.

¹¹ The node is the points on the stem where the leaves originate. On some rattan species there is a pronounced notch in the rattan cane at the node. This feature makes the rattan less usable – especially if the nodes are very frequent.

5.5 Firewood

We did not identify plant species used for firewood, since we assumed that the main criterion for collection of firewood was availability, and not species specific. However, Christensen (1997) shows that people are careful when they collect firewood. They seek woods with very specific qualities based on following criteria: Easy to find, easy to split, fast drying, easy to catch fire and burning time. In Kuyongon, knowledge about firewood also seemed to be widespread, but we did not investigate this further.

5.5.1 Gathering sites

The firewood is preferentially collected near the houses, either in the semi-cultivated areas or in secondary forest. It is collected on a regular basis in order to supply the needs of the household. Both men and women collect firewood, but we got the impression that women use more time on this activity than men. A similar observation has been made by Vanclay (1993) who states that fuelwood is usually collected by women. However, Christensen (1997) has investigated the use of firewood in two different communities in Sarawak and finds that in one of the villages, collection of firewood was considered men's job.

5.5.2 Importance of firewood for the villagers' livelihood

Bark, branches, small wood logs and bamboo are all used as firewood. Although many households have gas cooker, firewood still plays an important role for daily cooking. All our informants collect firewood and considered it very important, even households belonging to the high income group.

5.6 Hunting

Most households use the surrounding forests and CRNP as hunting grounds. One informant explained that hunting is an important part of Dusun culture, and that a man is not a real "Dusunman" unless he goes hunting. Brookfield et al. (1995) and Cleary & Eaton (1992) support this by pointing out that in Borneo, hunting is still an important activity in present day.

5.6.1 Hunting sites

Most informants considered primary forest more important for hunting than secondary forest, which is apparently because most of the large animals e.g. different kinds of deer, monkeys and wild pigs can only be found in the primary forest. Wild pigs can, however, be found in the secondary forests as well, and are often caught there. It varies a lot how often villagers go hunting. Some men go hunting several times per week, while others go only once per year.

The animals are either caught by traps or shot with guns. Traps are set out both in secondary and primary forest, but for longer hunting trips the villagers most often go to the primary forest, including CRNP. Our general impression of the hunting in secondary forest was that the villagers mainly hunt there by setting out traps for small animals while doing other things, like collecting vegetables or rattan. Hunting trips in the primary forest seem to be well-organized events since the men often go together in a group for 2-4 days into CRNP. Primitive hunting huts made of branches and palm leaves are used as shelters on those trips and sometimes a wife to one of the hunters comes along to cook for them. When the hunting is done in a group, the pray is shared among the hunters.

Some of the informants indicated that a decrease in the wildlife populations has been taking place in recent decades due to hunting. Some informants said that they now had to go deeper into the forest and go hunting more often than before to get the same quantities of meat. They explained that increasing possessions of guns since the 1960's probably was the main reason for this. Before the introduction of guns, blowpipes with poisonous arrows were used for hunting. However, this technique is very difficult to master compared to using guns, and this might explain the decrease in numbers of animals experienced by the hunters. One informant named some species of animals' e.g. orangutan and gibbon, that his father and grandfather had caught, that are rarely found in the forest today. According to Cleary & Eaton (1992) this decrease is an overall problem in Sabah where over-hunting has been exacerbated by the increased use of firearms.

Cleary & Eaton (1992) have pointed out that there are taboos and prohibitions regarding hunting in Borneo that actually have helped protect wildlife. Ibans and Melanau in Borneo hunters have taboos on killing certain species, and Muslims are neither allowed to eat wild pigs nor monkeys which prevents killing of those species (ibid.). Brookfield et al. (1995) notes that all non-Muslims hunt every kind of wildlife, and in Kuyongon there did not seem to be any species, including threatened ones, that are not hunted due to tradition or religious reasons. The only criterion is that the animal should not be too small to be eaten, but since we had very limited time in the village, there could be cultural structures that prevent over-hunting which we do not know about.

Although hunting in CRNP is illegal, the villagers do not seem to be afraid of getting caught in the act of illegal hunting, which is probably due to the fact that none of them has ever seen a park ranger in the area. They are careful about selling meat at the local markets, since The Wildlife Department has people looking for illegal meat there. The penalty for selling it is a fine and imprisonment. One villager from Kuyongon once got a RM 500 fine for selling illegal meat at the market.

5.6.2 Importance of hunting for the villagers' livelihood

Traditionally, wildlife has represented a valuable resource by being a major source of meat in a diet often deficient in protein. Today, domestic animals such as fowl and buffaloes are kept and consumed on a more regular basis, which is also the case in Kuyongon, and has to a certain degree replaced the importance of meat from wildlife (Cleary & Eaton 1992). It seemed that the meat from the forest is not an important part of the villagers' diet. Most of our informants said they eat meat from the forest only a few times a year, probably indicating meat of larger mammals. Meat from rats and squirrels is probably consumed more often since they seem to be caught more frequently. Rat traps outside almost every house in the village supports this. Although rats are caught because of the damage they make in the fields, they are also eaten. Overall the meat from wildlife is most often consumed within the household, but it is also exchanged between friends and relatives.

It is clear that the meat from the forest is not an important source of income or consumption for the villagers, but the amount of time that some of the hunters spend in the forest indicates that it is an important cultural practice.

6 IMPORTANCE OF CRNP COMPARED TO OTHER FOREST AREAS

The largest quantities of forest products are extracted from the secondary forest areas around the village but CRNP also seems to be important as a hunting site and for collection of certain plants. Most villagers possess rather limited knowledge about the national park and had heard about it only within the last two or three years. Probably because of this, and due to the fact that the national park border was not demarcated until September 1999, most people did not distinguish very precisely between areas within CRNP and areas outside, when talking about gathering sites for forest products.

Most of the primary forest in the area is situated within CRNP and for most of the villagers the national park is rather far away. On the basis of these facts, we make the crude assumption that when informants state that forest products are gathered/hunted in primary forest far away this is mostly referring to CRNP. We were also able to make direct observation on collection of forest products in CRNP since informants took us to the park on two of the forest walks.

6.1 The importance of CRNP for hunting and collection of forest products

There is a difference in how much and for what purposes the different households use the national park. The primary criterion for choosing gathering sites for the villagers is the short distance to their house, which means that households bordering the park have areas inside the park as important

gathering sites. However, most of the households situated further away from the park, primarily use CRNP for hunting and to a lesser extent collection of other products, like larger wood logs for construction, cinnamon, poisonous latex (not really used), long stemmed rattans, and some medicine plants which cannot be found in the secondary forest. When going to the national park for hunting as the primary reason, forest products are collected, which would normally be collected in secondary forest.

Most of the villagers go hunting in groups for periods up to 4 days, and in this way the national park offers the men in Kuyongon an opportunity of practising an important part of their traditional way of living as also suggested by Cleary & Eaton (1992).

6.2 Importance of areas outside CRNP

The areas outside CRNP used for collection of forest products consist of a range of different types of habitats covering semi-cultivated areas, secondary forest in different stages of succession and seemingly primary forest. Most forest products are collected from the areas outside CRNP and these forest areas are of great importance for the livelihood of the villagers, supplying them with a range of products. The importance of the forest areas close to the village is partly explained by the very fact that people do not have to walk far to reach them. However, the heterogeneity in terms of different habitats in these areas may also be important. Colfer & Soedjito (1996) supports this by stating that significant numbers of forest products derive from the various stages of forest growth, and therefore it is an advantage to have different stages from which to harvest different products.

The heterogeneity is to a wide extent explained by the shifting cultivation practice that is used by the villagers on the steeper slopes around the village. This practice ensures that land in many different stages of succession is present within relatively short distances compared to primary forest where this kind of succession is restricted to light gaps after a tree has fallen (Whitmore 1984). The qualities of shifting cultivation in relation to collection sites for forest products rely, to some extent, on the length of the fallow period. Long fallow periods ensure large fallow areas and a wide range of succession stages. In the case of Kuyongon it seems that the agricultural practices of the villagers do ensure sufficient fallow period since cultivated land plots appear rather scattered on the slopes, interspersed with areas of continuous secondary forest.

The fallow land belongs to the farmer who cultivated it, but according to the traditional land-use system (the adat), all villagers can collect most kinds of forest products in these areas when it is for own consumption. This ensures that all villagers have sufficient access to collection of forest products, even if they do not own much land themselves.

Due to the many different stages of succession in the secondary forests some species are more abundant here compared to the national park. Certain products, such as Bamboo, are found only in the secondary forest areas outside CRNP and hunting of wild animals in the areas outside CRNP are also important.

Considering all these aspects the forest areas outside CRNP function as a buffer zone relieving the pressure on the natural resources of the National Park. This effect of land-use in the areas adjacent to CRNP is a positive side-effect of the shifting cultivation practises used by the villagers. If the agricultural system is intensified in terms of shortening of the fallow period or turning towards permanent crops, it is therefore reasonable to assume that the pressure on the resources of CRNP will increase.

6.3 Conflicts over the national park – future perspectives

It is common that conflicts arise, when villages are being denied access to areas they have used for hunting and collection of forest products for decades (Ghimire 1994). In Kuyongon, this conflict is mainly manifested in a conflict over access to arable land. A few families lost land due to the enactment of the park, and the farmers cannot expand their areas for cultivation. The restriction on access to new arable land is stressed as the most important adverse effect of the establishment of the national park. In terms of hunting and gathering of forest products, the villagers have not changed their way of using the park.

The park authorities are aware that the national park to some extent is being illegally used by the local villagers, though they assess the level of encroachment to be low. They see encroachment by outsiders coming in large groups to hunt as a larger problem. The park authorities turn a blind eye to what they see as minor collection of forest products by the local villagers, maybe because they do not have the adequate resources to enforce the ban on collection of forest products. They seem to concentrate the efforts on preventing cultivation of land within the park. In Kuyongon this ban is apparently respected, although not agreed with.

The current situation is unsatisfactory for both the local people living near the CRNP and for the conservation of the flora and fauna of the park. Among local people, dissatisfaction with the park seems mostly to be connected to the loss of land, prohibition of hunting and gathering and the lack of participation and information. These factors all contribute to the people not respecting the rules of the park. Therefore we find it interesting to discuss possible effects of different ways of managing the CRNP, and for the purpose of this discussion we have set up three different scenarios:

1. *Status quo scenario.* The current rules of CRNP and the practice of the authorities are not changed. The local use and perception of CRNP remain unchanged.
2. *Enforced ban scenario.* The current rules are enforced by the park authorities, leading to no use of forest resources from CRNP.
3. *Limited access scenario.* The rules of the national park are changed, allowing the villagers limited access to forest resources of CRNP. This scenario implies enforcement of these new rules.

Generally the people in Kuyongon perceived the national park as a constraint for the development. The whole process of making the national park was also criticised since the villagers were not involved in the decision making. Therefore, the lack of local involvement and participation has led to an outspoken lack of understanding and a limited appreciation of the status of the area now enacted as CRNP. Furthermore, suspicion among the villagers and rumours about the government's intentions appear. One informant suspected that the reason for establishing the national park was to prevent the local people from using this land in order to secure future logging activities for the government.

If the current way of managing CRNP by not enforcing the rules of the national park is upheld, it is very likely that the villagers in Kuyongon will proceed using the area without regard to its status. Thereby the villagers will continue to have the status as illegal encroachers in an area they have used for decades. There will be little chance of the villagers appreciating the protection of the forest resources since they have little to gain from the protection. Therefore, if the CRNP should maintain its intended purpose to protect the flora and fauna of the area, *the status quo scenario* does not seem to be a desirable solution.

The enforced ban scenario may be the least desirable solution. Firstly, it will have adverse effects on the local people's livelihood. Even though most forest products are collected in the secondary forest, the villagers' access to the park is important. This is partly because of cultural practices, partly because villagers living close to the park depend on its resources. Secondly, the strict rules can be seen as violating the traditional rights of the local people to the area. Furthermore, people living close to the park with neither traditional nor legal rights to the land cannot just be neglected. In Kuyongon people with land in the CRNP are poor people who need access to the land, and probably have no other place to go. Thirdly, it would require considerable increase in allocation of resources in terms of manpower to enforce the restrictions, which is not likely to be possible. Finally, since the villagers in Kuyongon are dependent on arable land for cultivation, the lack of new land may lead to a higher pressure on the land currently in use as observed by Ghimire (1994) in Thailand, Madagascar and

Nepal. This might cause erosion and pollution of the river, and considering that the village is situated in a water catchment area, this would be a critical situation.

Most likely the best solution to the current situation would be to develop a policy that to some extent allows local people access and utilisation of resources from the CRNP as suggested by *the limited access scenario*. In this process participation by the local people would be crucial. Experiences from many parts of the world have shown that the conventional institutional conservation approach, which only allow top-down decisions, have had limited success (Erni 1995). This is also recognised by the United Nations, several global environmental NGOs like WWF and IUCN (World Conservation Union), and has been written into international agreements like "The Convention on Biological Diversity" and "The Rio Declaration" (McNelly 1995; Posey 1995) – agreements that have been signed by Malaysia. Participation offers better opportunities to pay respect to the local people's rights and needs, and furthermore it leaves room for creating a better understanding between park authorities and users of the forest (Posey 1995; Erni 1995; Ghimire 1994).

It is at the moment very difficult to say how and to what extent the local people surrounding the CRNP will be involved in developing plans for the future management of the park. Indications in direction of participation include the park warden's awareness of the local people needs, and the fact that he finds top-down decisions rather problematic because it makes the local people unappreciative towards restrictions of the use of CRNP. Another sign in this direction is that the local people are seen as "minor park rangers", reporting intruders coming for game or logging activities. Also, a co-operation between local people and ethnobotanists searching for valuable medicine plants is at present taking place, and the project recognises that the profits should benefit the local people. Finally, the local peoples' rights is to a certain degree accepted, in the sense that people living in the area before the construction of the national park, is permitted to stay¹².

Signs in the opposite direction show that the local people's knowledge on resource management is presently little valued. Publications on the plans for the management of Sabah Parks (Chong & Wong 1992) and in the enactment on wildlife (State of Sabah 1997) and forest conservation (State of Sabah 1996) make no references to local knowledge or participation in term of forest management¹³. According to a local NGO, this is a general attitude among forest and park officials (Interview with

¹² An example of this is a village situated inside the CRNP, which has not been resettled, but instead the villagers have been provided with land to cultivate and a buffer to the park has been created.

¹³ When discussing Kinabalu Park, it is recommended that cultural and historical values are preserved, but this is only understood as preserving "sites" that possess cultural and historical features (Chong & Wong 1992).

PACOS¹⁴), and it was clearly reflected in interviews with park authorities who argued that the local people's knowledge on forest protection is limited, and that they therefore must be taught. In this respect, participation by the people is seen to be of little importance. Another issue is that before considering permitting local people access to the park, further research for about 10 years apparently has to be conducted. The reason being that sensitive areas and forest products have to be identified. We find that this is not a comprehensive argumentation, because people continue to enter the CRNP, and a solution for them and the park is urgent.

The lack of participation has to be seen in the light of the political traditions in Malaysia, which is very centralised (Eccleston & Potter 1996). However, we consider the park authorities' remarks as steps towards a more participatory approach and find it very positive. Our hope is therefore that resources towards participation in the CRNP are allocated in order secure the park's future.

7 CONCLUSION

The villagers of Kuyongon have a comprehensive knowledge about the use of forest products, and a wide range of different forest products is used. Forest products are generally important for their livelihood, but not as important as rice and other cultivated products. Further analysis showed that forest products are generally used extensively for own consumption, and to a lesser extent sold at the market. Many products, like food plants, firewood and handicrafts, are used on a daily basis. Hunting and collection of medicinal plants are done more irregularly. Furthermore, the village is close to self-sufficient in the supply of forest products, since the villagers rarely buy forest products at the market. Another indicator of the importance of forest products for the villagers' livelihood, is that collection of forest products can function as a buffer in case of poor harvest.

Products like nylon and gas cookers do not seem to replace the use of forest products like rattan and firewood, merely complementing them. For medicinal plants it is different since access to hospitals and modern medicine to a large extent has substituted traditional medicine. For minor injuries and illnesses or when modern treatment is not affordable, medicinal plants remain widely used.

The importance of forest products for the households' income is generally limited. Sale of cultivated products and other sources of income account for a higher part of the villagers' income. However, we found variation in how important collection of forest products is to households from different income groups. The households belonging to the lower income group are apparently more depend-

¹⁴ Partners of Community Organisations.

8 LIST OF REFERENCES

- Brookfield, H., Potter, L., Byron, Y. (1995):** In Place of the Forest. Environmental and Socio-economic Transformation in Borneo and the Eastern Malay Peninsula. United Nations University Press. Tokyo.
- Casley, D. J. & Kumar, K. (1998):** The Collection, Analysis, and Use of Monitoring and Evaluation Data. World Bank, Washington D.C., pp: 10-25, 54-75.
- Chong, S. & Wong (1992):** Management and Development Masterplan for the Board of Trustees of Sabah Parks. Coopers & Lybrand Management Consultants. Kota Kinabalu. Malaysia.
- Christensen, H. (1997):** Uses of plants in two indigenous communities in Sarawak, Malaysia. In: An ethnobotanical survey of the flora used by two longhouse communities in Sarawak and an evaluation of their agronomic potential for agroforestry based farming systems. Ph.D. University of Aarhus.
- Cleary, M. & Eaton, P. (1992):** Borneo Change and Development. Oxford University Press. Singapore.
- Colfer, C. J. P. & Soedjito, H. (1996):** Food, Forests, and Fields in a Bornean Rain Forest. Toward Appropriate Agroforestry Development. In: Padoch, C. & Peluso, N. L. (eds.) (1995): Borneo In Transition; People, Forests, Conservation, and Development, pp: 162-187.
- Dransfield, J. & Manokaran, N (eds.) (1993):** Rattans. Plant Resources of South East Asia 6. Pudoc Scientific Publishers. Washington.
- Dransfield, J. (1984):** The rattans of Sabah. Sabah forest record 13. Forest Department Sabah. Sandakan.
- Durst, P. B. & Bishop, A. (eds.), (1995):** Beyond Timber: Social, Economic and Cultural Dimensions of Non-Wood Forest Products in Asia and the Pacific. Proceedings of a Regional Expert Consultation 28.11-2.12 1994. FAO/RAP, Bangkok. RAP Publications. Bangkok.
- Eccleston, B. & Potter, D. (1996):** Environmental NGOs and different political context in South-East Asia: Malaysia, Indonesia and Vietnam. In: Parnwell, M.G. J. & Bryant, R. L. (eds.), (1996) Environmental Change in South-East Asia: People, Politics and Sustainable Development. Routledge London, pp: 49-66

- Erni, C. (1995):** Indigenous Peoples, Environmental and Development: Approaching the Issue. In: Büchi, S., Erni, C., Jurt, L., Rüegg, C. (eds.), (1995): Indigenous peoples, Environment and Development. Proceedings of the conference in Zurich, May 15-18 1995, pp: 19-39.
- Fui, L. H., Noor, N. S. M. (1995):** Social, Economic and Cultural Aspects of Rattan in Malaysia. In: Durst, P. B. & Bishop, A. (eds), (1995): Beyond Timber: Social, Economic and Cultural Dimensions of Non-Wood Forest Products in Asia and the Pacific. Proceedings of a Regional Expert Consultation 28.11-2.12 1994. FAO/RAP, Bangkok. RAP Publications. Bangkok, pp: 165-181.
- Gaussett, Q., Mertz, O., van der Keur, P., Mohamed, M. (1999):** The Crocker Range Parks. www.cyberct.com.my/arbect/intro1.htm (Date: 5.12'99).
- Ghimire, K. B. (1994):** Parks and People: Livelihood Issues in National Parks management in Thailand and Madagascar. In: Development and Change. 25, 1, January 1994, pp: 195-229.
- Johari, M. Y. H., Mohamed, M. & Sintoh, M. (1998):** Sustainable utilisation of Non-Timber Forest Products. Issues and Prospects. Institute for development studies. Sabah. Malaysia.
- Mabberley, D. J. (1997):** The plant book. 2nd ed. Cambridge University press. Cambridge.
- Martin, G. (1993):** Ethnobotany. A Methods Manual. Chapman & Hall, London, pp: 28-31, 37-47, 49 and 51.
- McNeely, J. A. (1995):** Interaction between Biological Diversity and Cultural Diversity. In: Büchi, S., Erni, C., Jurt, L., Rüegg, C. (eds.). Indigenous peoples, Environment and Development. Proceedings of the conference in Zurich, May 15-18 1995, pp: 173-197.
- Mertz, O., Christensen, A. E., Højskov, P. & Birch-Thomsen, T. (1999):** Subsistence or cash: strategies for change in shifting cultivation. In: Geografisk Tidsskrift. Danish Journal of Geography, Special issue, 1, 1999, pp: 133- 142.
- Mikkelsen, B. (1995):** Methods for Development Work and Research: A guide for Practitioners. Sage, New Delhi, India, pp: 67-70.
- Nair, C. T. S. (1995):** Income and Employment from Non-wood Forest Products: What Do We Know? In: Durst, P. B. and Bishop (eds.), (1995): Beyond Timber: Social, Economic and Cultural Dimensions of Non-Wood Forest Products in Asia and the Pacific. Proceedings of a Regional Expert Consultation 28.11-2.12 1994. FAO/RAP, Bangkok. RAP Publications. Bangkok, pp: 87-96.

- Neuman, L. W. (1996):** Social research methods. Qualitative and Quantitative approaches. Allyn & Bacon. London.
- Phillips, A. (1988):** A guide to the Parks of Sabah. Sabah Parks Publications no. 9. Kota Kinabalu.
- Posey, D. A. (1995):** Biodiversity Conservation, Traditional Resource Rights, and Indigenous Peoples. In: Büchi, S., Erni, C., Jurt, L., Rüegg, C. (eds.), (1995): Indigenous peoples, Environment and Development. Proceedings of the conference in Zurich, May 15-18 1995, pp: 219-241
- Sabah State (1997):** Wildlife Conservation Enactment 1997. State of Sabah.
- State of Sabah (1996):** An Enactment to amend the Parks Enactment 1984. No 7 of 1996. State of Sabah.
- Vanclay, J. K. (1993):** Saving the Tropical Forest: Needs and Prognosis, *Ambio*, 22 (4), pp: 225-231.
- Warner, C. (1995):** Marketing, Valuation and Pricing of NWFPS. In: Durst, P.B. and Bishop (eds.), (1995): Beyond Timber: Social, Economic and Cultural Dimensions of Non-Wood Forest Products in Asia and the Pacific. Proceedings of a Regional Expert Consultation 28.11-2.12 1994. FAO/RAP, Bangkok. RAP Publications. Bangkok, pp: 97-108.
- Whitmore, T.C. (1984):** Tropical rain forests of the Far East. Clarendon press. Oxford.

9 APPENDICES

- 1. HOUSEHOLD SURVEY**
- 2. SEMI-STRUCTURED INTERVIEW**
- 3. A COMPLETE LIST OF COLLECTED PLANT SPECIMENS**
- 4. THE DISTRIBUTION OF NUMBERS OF SPECIES IN THE DIFFERENT PLANT FAMILIES.**
- 5. PARTICIPATORY MAP OF KUYONGON**

Appendix 1

Household Survey

Information on household:

1. Household location:
2. Age and name of respondent:
3. Household status of the respondent (man, woman, child):
4. Number of persons in the household:

Household activities:

5. What is your monthly income?
6. What are your main sources of income?
7. What is the most time consuming activity in the household?
8. What kind of crops do you grow?
9. How large are your fields (less, same or larger than average)?
10. How much time do you spend growing crops (average)?
11. If cash crop, how important is the income for you household?
12. Who work in the fields?

Forest:

13. What kind of forest products do you collect? Do you sell them at the market?
14. Do you make handicrafts. Do you sell them at the market?
15. Do you consider access to the forest important?

Appendix 2

Semi-structured interview

Household:

1. Household number
2. Name of respondent
3. Number of people living in the house

Farm:

4. Size of field:
5. How much land does the farmer own?
6. Type of crops grown?
7. Time spent on cultivating (average)?
8. Who has which responsibilities in farm-work? Do the children help with work?
9. How much is sold at the markets? Income from cultivated vegetables?

Other activities:

10. What other activities are there besides farming?
11. Is there any form of handcraft in the household?
12. Is it sold in markets?
13. Is wood used as fuel?
14. Who collects it?
15. Where is it collected?

Income/expenses

16. Does the farmer have other source of income?
17. Does any family member work elsewhere and support the family?
18. How much does the farmer earn each year/ each harvest?
19. Is the income from crops important to the household?
20. Is he satisfied with the economic situation of his family?
21. Other fixed expenses such as school-fees and uniforms?

NTFP:

22. What kind of NTFP's are collected?
23. For which purposes are the NTFP's collected?
24. Food
25. Construction
26. Fodder
27. Medicine

For each product category the following questions will be asked:

28. Does the gathering of NTFP change according to season?

29. Are the NTFP's important for the household?
30. Where do they collect NTFP's?
31. How often are they collected? (every day, every week) ?
32. Who does the collecting of NTFP?
33. Are the NTFP's sold at the market?
34. Is there steady income from NTFP's?
35. Is the income from NTFP's important to the household?
36. Who does the selling of NTFP's?
37. Is collection of NTFP's important to the farmer for other reasons than income and consuming?
38. Is the knowledge of NTFP's passed on to future generations?
39. Who passes it on to whom?

Crocker Range National Park:

40. What can the farmer tell about CRNP?
41. Does he/she know why it is a national park?
42. Do they agree with this area being a national park?
43. Do they still use the area for collecting NTFP's?
44. Will they keep on using the area for collecting NTFP's?
45. Are there other areas they collect NTFP's from?
46. Have they had any contact with park authorities from CRNP?
47. Have they had any problems with park authorities?
48. Have they had any information about the park from the authorities from CRNP?
49. What would be a reasonable solution to combine conservation and the need of NTFP for local people?
50. Can you have your voice heard? Do you have any contact to NGO's supporting your views?

Appendix 3: A complete list of collected plant specimens

| Family | Scientific name | Local name | Type | Medicine | Vegetable | Fruit | Handicraft/ construction | Other |
|----------------|----------------------------------|----------------------|-------------|----------|-----------|-------|-----------------------------|-------|
| Acanthaceae | <i>Acanthus sp. 1</i> | Lomboi | herb | | 1 | | | |
| Acanthaceae | <i>Acanthus sp. 2</i> | Ruhoi | herb | | 1 | | | |
| Acanthaceae | <i>Acanthus sp. 3</i> | Tahipai | woody | 1 | | | | |
| Acanthaceae | <i>Acanthus sp. 4</i> | Tombai | woody | | 1 | | | |
| Acanthaceae | <i>Pseuderanthemum borneense</i> | Tondoloung | herb | | 1 | 1 | | |
| Acanthaceae | - | Lomboi-lomboi | woody | | 1 | | | |
| Amaranthaceae | <i>Amaranthus sp.</i> | Ruhoi | herb | | 1 | | | |
| Apiaceae | <i>Enjugium sp.</i> | Rembah seribu | herb | | | | | |
| Araceae | <i>Aglaonema sp. 1</i> | Tupa-upa | herb | | 1 | | | |
| Araceae | <i>Aglaonema sp. 2</i> | Gumpoi | herb | | 1 | | | |
| Araceae | <i>Alocacia sp. 1</i> | Sisial | herb | 1 | | | | |
| Araceae | <i>Alocacia sp. 2</i> | Sunsulag | herb | | 1 | | | |
| Araceae | <i>Alocasia sp. 3</i> | Gumpoi | herb | | 1 | | | |
| Araceae | <i>Amorphaphallus sp.</i> | Lopong | herb | | 1 | | | |
| Araceae | <i>Homalomena sp. 1</i> | Botu | herb | | 1 | | | |
| Araceae | <i>Homalomena sp. 2</i> | Buntui | herb | | 1 | | | |
| Araceae | <i>Homalomena sp. 3</i> | Lonlondu/ Gultapai | herb | | 1 | | | |
| Araceae | <i>Homalomena sp. 4</i> | Tukaruk | herb | | 1 | | | |
| Araceae | <i>Homalomena sp. 5</i> | Telingo tambang | herb | | 1 | | | |
| Araceae | <i>Schizomatoglotis sp.</i> | Dukaruk | herb | | 1 | | | |
| Araceae | - | Telingo tambang | herb | | 1 | | | |
| Arecaceae | <i>Areca catechu</i> | Logus (Betel nut) | palm | 1 | 1 | | | |
| Arecaceae | <i>Arenga undulatifolia</i> | Lihuan | palm | | 1 | | | |
| Arecaceae | <i>Calamus acuminatus</i> | Podos pura | rattan | | | | 1 | |
| Arecaceae | <i>Calamus convallium</i> | Lambat / Tu'uh | rattan | | | | 1 | |
| Arecaceae | <i>Calamus javensis</i> | Podos rana | rattan | | | | 1 | |
| Arecaceae | <i>Calamus pogonacanthus</i> | Sumiliu | rattan | | | | 1 | |
| Arecaceae | <i>Caryota sp.</i> | Botu | palm | 1 | 1 | | | |
| Arecaceae | <i>Ceratolobus discolor</i> | Logong | rattan | | | | 1 | |
| Arecaceae | <i>Daemonorops didymophylla</i> | Tomborua | rattan | | 1 | | 1 | |
| Arecaceae | <i>Daemonorops longistipes</i> | Kopit | rattan | | | | 1 | |
| Arecaceae | <i>Daemonorops periacantha</i> | Dahandang | rattan | | | | 1 | |
| Arecaceae | <i>Daemonorops sabut</i> | Sulak | rattan | | | | 1 | |
| Arecaceae | <i>Daemonorops sparsiflora</i> | Dahandang/Sansaraban | rattan | | | | 1 | |
| Arecaceae | <i>Korthalsia cheb</i> | Podtung | rattan | | | | 1 | |
| Arecaceae | <i>Korthalsia jala</i> | Saro | rattan | | | | 1 | |
| Arecaceae | <i>Korthalsia robusta</i> | Lasas | rattan | | | | 1 | |
| Arecaceae | <i>Pinanga sp.</i> | Bumburing | palm | | | 1 | | |
| Arecaceae | <i>Plectocomia mulleri</i> | Longohodan | rattan | | 1 | | | 1 |
| Asclepiadaceae | <i>Hoya sp.</i> | Bina | liana/ herb | 1 | | | | 1 |
| Asreraceae | <i>Chromoleana sp.</i> | Nonokot | liana | 1 | | | | |
| Asteraceae | <i>Blumea balsamifera</i> | Tawawo | herb | 1 | | | | |
| Asteraceae | <i>Crassosepalum sp. 1</i> | Kuyondai | herb | | 1 | | | |
| Asteraceae | <i>Crassosepalum sp. 2</i> | Menggali | herb | | 1 | | | |
| Asteraceae | <i>Elephanthopus sp.</i> | Saraman | herb | 1 | | | | |
| Blechnaceae | <i>Stenochlaena palustris</i> | Lembiding | tree | | 1 | | | |
| Chloranthaceae | <i>Chloranthus sp.</i> | Totol | herb | 1 | | | | |
| Commelinaceae | <i>Amischolotype molissima</i> | Tonkur-onkur | herb | | | | | 1 |

| Family | Scientific name | Local name | Type | Medicine | Vegetable | Fruit | Handicraft/ construction | Other |
|-------------------|--------------------------------|--------------------|---------|----------|-----------|-------|-----------------------------|-------|
| Commelinaceae | <i>Pollia sp.</i> | - | herb | | | | | 1 |
| Commelinaceae | - | Nonobulon | herb | | 1 | | | |
| Dennstaedtiaceae | <i>Pteridium sp.</i> | Logub | fern | | 1 | | | |
| Dilleniaceae | <i>Tetracera sp.</i> | Mampalas | woody | | | | | 1 |
| Dracaenaceae | <i>Cordyline sp. 1</i> | Mandaringin | woody | | 1 | | | |
| Dracaenaceae | <i>Cordyline sp. 2</i> | Rolok | woody | 1 | | | | |
| Dracaenaceae | <i>Dracaena sp.</i> | Lompoyou | woody | | 1 | | | |
| Drypteridaceae | <i>Diplazium cordifolius</i> | Giman-giman | fern | 1 | | | | |
| Drypteridaceae | <i>Diplazium sp.</i> | Pakis | fern | | 1 | | | |
| Euphorbiaceae | <i>Bischofia javanica</i> | Tongon | woody | 1 | | | | |
| Euphorbiaceae | <i>Homalanthus populneus</i> | Boto-boto | woody | 1 | | | | |
| Euphorbiaceae | <i>Macaranga sp.</i> | Pangi | tree | | | | | 1 |
| Euphorbiaceae | <i>Mallotus lackeyii</i> | Longhodan | tree | | | | | 1 |
| Fabaceae | <i>Dalbergia sp.</i> | Sikat | woody | 1 | | | | |
| Fabaceae | <i>Desmodium sp.</i> | Rupot-rupot | woody | 1 | | | | |
| Hypoxidaceae | <i>Curculigo sp. 1</i> | Rumbisan | herb | | | 1 | | |
| Hypoxidaceae | <i>Curculigo sp. 2</i> | Tondilom | herb | | 1 | 1 | | |
| Joinvilleaceae | <i>Joinvillea sp.</i> | Tapi | ? | | 1 | | | |
| Lauraceae | <i>Cinnamomum sp.</i> | Kusur | woody | 1 | | | | |
| Lauraceae | <i>Litsea sp.</i> | Lindos | woody | 1 | | | | |
| Malvaceae | <i>Urena lobbata</i> | Pong/ Tongilopang | woody | 1 | | | | |
| Maranthaceae | <i>Donax sp.</i> | Kobu | herb | | | | | |
| Melastomataceae | <i>Melastoma sp.</i> | Gosing-gosing | woody | 1 | 1 | | | |
| Melastomataceae | - | Komburiong | herb | | 1 | | | |
| Melastomataceae | - | Tongkurangok | woody | | | 1 | | |
| Menispermaceae | <i>Fibraurea chloroleuca</i> | Tapa bohuang | woody | 1 | | | | |
| Menispermaceae | <i>Tinospora sp.</i> | Wakau | liana | 1 | | | | |
| Menispermaceae | - | Tapa | liana | | | | | |
| Moraceae | <i>Ficus deltoidea</i> | - | tree | 1 | | | | |
| Moraceae | <i>Ficus septica</i> | Lintotobou | tree | 1 | | | | |
| Moraceae | <i>Ficus sp.</i> | Runtuh-runtuh | tree | | | 1 | | |
| Musaceae | <i>Musa sp.</i> | Togutui | herb | | 1 | | | |
| Oleandraceae | <i>Nephrolepis sp.</i> | Monumpuru | fern | 1 | | | | |
| Orchidaceae | <i>Apendicula sp.</i> | Orchid | herb | | | | | 1 |
| Orchidaceae | <i>Dendrobium sp.</i> | Orchid | herb | | | | | 1 |
| Orchidaceae | <i>Eria sp.</i> | Orchid | herb | | | | | 1 |
| Pandanaceae | <i>Pandanus sp.</i> | Boribi (Tapi) | woody | | 1 | | 1 | |
| Piperaceae | <i>Piper betle</i> | Daing / Daun Sirih | climber | 1 | | | | 1 |
| Piperaceae | <i>Piper sp. 1</i> | Bonsodon | woody | 1 | | | | 1 |
| Piperaceae | <i>Piper sp. 2</i> | Kuyo | liana | | 1 | | | |
| Poaceae | <i>Dinochloa sp.</i> | Wadan | grass | | 1 | | | |
| Poaceae | <i>Saccarum arundinafolium</i> | Bidan | grass | | | | | 1 |
| Poaceae | - | Tagiung | grass | | 1 | | | |
| Polygalaceae | <i>Polygala paniculata</i> | Mentimagas | woody | 1 | | | | |
| Rosaceae | - | Terukakang | tree | 1 | | | | |
| Rubiaceae | <i>Hedyotis sp.</i> | Mompu-ompu | herb | 1 | 1 | | | |
| Sauractinidiaceae | <i>Saurauria sp.</i> | Longugan | woody | 1 | | 1 | | |
| Simaroubaceae | <i>Eurycoma longifolia</i> | Tonkat ali | woody | 1 | | | | |
| Solanaceae | <i>Solanum nigrum</i> | Tutan /Tutan pura | herb | | 1 | | | |
| Solanaceae | <i>Solanum turvum</i> | Lintaromg | woody | | 1 | 1 | | |
| Urticaceae | <i>Leucosyke capitellata</i> | Mandahasi / Tahpoi | woody | 1 | | | | |
| Verbenaceae | <i>Callicarpa sp. 1</i> | Ruttoil | herb | | 1 | | | |

| Family | Scientific name | Local name | Type | Medicine | Vegetable | Fruit | Handicraft/ construction | Other |
|----------------|---------------------------|-------------|-------|-----------|-----------|----------|-----------------------------|-----------|
| Verbenaceae | <i>Callicarpa sp. 2</i> | Subol-subol | tree | 1 | | | | |
| Zingiberaceae | <i>Costus speciosus</i> | - | herb | 1 | | | | |
| Zingiberaceae | <i>Etilingera elatior</i> | Topu/ Tompu | herb | | 1 | | | |
| Zingiberaceae | <i>Etilingera punicea</i> | Tuhau | herb | | 1 | | | |
| Not identified | - | Mandoringin | liana | 1 | | | | |
| Not identified | - | Numog nuli | woody | 1 | | | | |
| Not identified | - | Papason | herb | | 1 | | | |
| Not identified | - | Rohori | ? | 1 | 1 | | | |
| Not identified | - | Tunda | woody | | 1 | | | |
| Not identified | - | Walahan | liana | 1 | | | | |
| Total | | | | 38 | 49 | 8 | 14 | 13 |

A total of 110 specimens were collected. 6 could not be ascribed to a botanical family and 8 specimens were identified to a botanical family but not be ascribed to a plant genus.



Appendix 4: The distribution of numbers of species in the different plant families

| Family | Number of species |
|------------------|--------------------------|
| Arecaceae | 18 |
| Araceae | 13 |
| Acanthaceae | 6 |
| Asteraceae | 5 |
| Euphorbiaceae | 4 |
| Commelinaceae | 3 |
| Dracaenaceae | 3 |
| Melastomataceae | 3 |
| Menispermaceae | 3 |
| Moraceae | 3 |
| Orchidaceae | 3 |
| Piperaceae | 3 |
| Poaceae | 3 |
| Zingiberaceae | 3 |
| Drypteridaceae | 2 |
| Fabaceae | 2 |
| Hypoxidaceae | 2 |
| Lauraceae | 2 |
| Solanaceae | 2 |
| Verbenaceae | 2 |
| Actinidiaceae | 1 |
| Amaranthaceae | 1 |
| Apiaceae | 1 |
| Asclepiadaceae | 1 |
| Blechnaceae | 1 |
| Chloranthaceae | 1 |
| Dennstaedtiaceae | 1 |
| Dilleniaceae | 1 |
| Joinvilleaceae | 1 |
| Malvaceae | 1 |
| Maranthaceae | 1 |
| Musaceae | 1 |
| Oleandraceae | 1 |
| Pandanaceae | 1 |
| Polygalaceae | 1 |
| Rosaceae | 1 |
| Rubiaceae | 1 |
| Simaroubaceae | 1 |
| Urticaceae | 1 |
| Lauraceae | 1 |

Number of plant families: 40

6 specimens were not identified to a botanical family:



