

Level of Dependency and Participation in Forest Management of the Villagers from Ban Tone Kloy Village, Ranong Province, Thailand



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Abstract

Preservation and Sustainable management of forests need a holistic approach to include participation of all stakeholders especially the local community because they depend on the forests for their livelihood. However, in Thailand community participation in forest management is not clear because many natural forests are either converted to strict conservation forests or protected areas. In Ban Tone Kloy, the management of the wildlife sanctuary and the village forest allow the villagers to harvest NTPFs for own consumption even when the law does not permit. According to basic information report 2009, the relationship between the villagers and authority appeared to be good. Our study therefore was aimed at finding out how the two forests are managed and the extent of villagers' dependency on the forest. Data for this study was collected using a mixture of mainly social sciences methods which included; semi-structured interview, questionnaires, and relevant PRA methods. The results showed that villagers' level of dependency on forest is lower than expected. They dependent on the forest mainly for NTPFs like vegetables, fruits, herbs and honey. They also depend on the forest as their only source of clean water. The result also showed that these are the main incentives for their participation in the preservation of the forest. Core management activities of the forests is strictly the responsibility of the government. Villagers are participating mainly in preservation and management by report illegal activities and fire control. NPC is also collaborating with the authorities in sensitizing villagers on conservation issues.

Preface

This report was completed as part of the requirements for the Interdisciplinary Land Use and Natural Resource Management course (SLUSE). The field work was conducted in Ban Tone Kloy, in the province of Ranong, Thailand from the 10th to the 21st of March 2010. The purpose was to investigate the management of natural resources in this vilage. Eight students participated in the data collection: four students from Kasetsart University, Bangkok and four students from the faculty of Life Sciences, Copenhagen University.

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1. Introduction

Our research study was conducted in Ban Tone Kloy, a village located near the Andaman coast, close to the frontier with Burma. It is a small village with only 293 inhabitants placed in 60 households. It is spread out over an area of 6710 acres (Basic Information Report, Ranong, 2009) and comprises two forested areas. Our main interest in the village relates to these forests and their management.

In Thailand, there have been major modifications over the last 60 years regarding forest management. In the early 1940s, forests were used as a driver for economic development. Large logging companies and plantations, with whom the Royal Forest Department (RFD) solely dealt with at that time, cleared some of the forest. This trend was accelerated with the development of important infrastructures, such as roads and dams, and the transformation of part of this land to agricultural fields (Pragtong, 2002). In the early 1970s, the Thai government continued on supporting the concessions, which covered approximately half of the country (Pragtong, 2002). However, around the same time, the RFD started to establish protected areas. Originally, the main reason for it was to prevent the clearing and exploitation of the forest by farmers practicing shifting cultivation and by migrants looking for land (Ghimire, 1994).

In the late 1980s however, several events lead the government to reconsider its policies and to shift from exploitation to a conservation approach to the forests. First of all, because of logging, the forest cover had diminished to 32% by 1980 (Pragting, 2002). Also in 1988, important floods and landslides which were linked to deforestation resulted in a push from the Thai population and in a national logging ban in 1989 (ITTO, 2005). Moreover, the development of tourism and the growing awareness about environmental issues increased the demand for protected areas (Ghimire, 1994). Nowadays, 25% of the Thai territory is protected areas (Trisurat, 2007). These areas, which main objective is the protection of biological diversity, include national parks, wildlife sanctuary and watershed forests. A special department, the Department of National Park, Wildlife and Plant Conservation (DNP) is managing these areas since 1992, while other forests are under the regulations of the RFD (Trisurat, 2007).

One of the main disagreements about forest management in Thailand concerns the access rights, uses and involvement of local communities in the management. All forests belong to the government and until the early 1990s, the management of these areas was very centralized and

exclusionary. The matter of the people living in the forest before the creation of the protected areas was not considered a top priority and most of them were displaced (Ghimire, 1994). Also, the management took little into account the needs and knowledge of the villagers living around the forests (Nepal, 2002) and the rules and access rights were often strict, so as the regulations about the harvest of NTFPs. This is still true to a certain extent today, even though the government has voted for several acts in an effort to decentralize the management power. This is the case for example with the Tambon Administration Act (TAO) in 1992, which objective is to delegate more managerial power to each tambon (sub-district). This act was further , supported in the 1997 Constitution, which encouraged communities to participate in forest management. However, very limited specific policies have been fully put into place, which leaves projects involving local communities with little legal support (Pragtong, 2002). The Community Forest Bill, which had been revised for the last 15 years, was finally approved in 2007 and gives legal rights to communities to manage their local forest (Soontornwong, 2009). This bill is an important step towards recognizing the knowledge, rights and dependency of some Thai groups on the forests.

Forests in Thailand are indeed highly diverse and can provide a whole range of resources for the local people (Fisher et al., 1997). The harvest of non timber forest products (NTFPs) is a traditional activity for local Thai people and in Northern Thailand is carried out by up to 80% of households (Boonchote and Pasandhanatorn, 1998). Common NTFPs found in this area are mushrooms, bamboo shoots and wild vegetables. (Boonchote and Pasandhanatorn, 1998). Generally, the uses of NTFPs vary a lot, going from medicinal purpose to source of energy. The reliance on these products is well known, as it can reduce their expenses on food for example and provide an alternative source of income if the NTFP is sold (Fisher et al., 1997).

However, in Ban Tone Kloy harvesting is not as high as we had initially expected even though villagers still rely on the forests. Their main livelihood strategies contributing to their income is agriculture (rubber plantations) and trading. Selling of NTFPs is only restricted to a few villagers. Nonetheless, harvesting of NTFPs meets some of their food needs and reduces their expenses. Other livelihood aspects linked to the forests relate to the village's social assets, such as the Niyom Prai Club which is interested in forest preservation and the bird competition ground, and to natural assets such as the water source, the Khlong Naka wildlife sanctuary and the village forest "2484". Villagers from Ban Tone Kloy are thus dependant on the forests to support their livelihood:

for economical reasons, food supply as well as medicine and small building material, for their water supply and for their social activities.

The situation in Ban Tone Kloy therefore leads us to think that there is an interdependent relation between the forests authorities and the community. The authorities need the villagers to follow the rules of the sanctuary and the village forest in order to respect the objective of nature conservation set for these areas and the villagers needs the authorities to understand that their livelihoods depend on the forests. One way for both parties to reach their goals is for the villagers to participate in the forest management and preservation.

According to the pre-survey, the relation between the villagers and the management of forest department and the wildlife sanctuary seems to be good, and the two authorities allow the villagers to harvest NTFPs for their own consumption. However, there is no official information about their level of participation as well as the extent of their dependency on the two forests resources.

1.1. Research question

- How do the villagers participate in the forests management and to what extent do they depend on the forests for their livelihood?

1.2. Objectives

- To establish how the forests are managed
- To determine how the villagers dependency on the forests has influenced their participation in forest management

According to Thailand's Constitution of 1997, we define participation as "the involvement of an individual, groups, and organizations in receiving news and information, identifying problems, planning and management, monitoring and evaluation, and solving problems of forests and natural resources management". We distinguish however throughout our report participation through collaboration (when villagers work with the forests authorities) and through the villagers own initiatives (Makarabhirom, 2002).

1.3. *Change of objective*

Our initial thought was to assess the ecological impact of the harvest of NTFPs on the wildlife sanctuary and the main research question was to explore the extent to which the harvest of NTFPs from the wildlife sanctuary by the villagers in Ban Tone Kloy is sustainable. Pre survey exercise we conducted on the first two days however revealed that the level of harvest of NTFPs in the wildlife sanctuary has no significant impact on the forest ecosystem and the forest is actually not as degraded as we had anticipated. A walk in the forest with Wildlife sanctuary Officer and the discussion that followed revealed that the sanctuary is a strict conservation forest in which harvest of forest products and hunting of animals are strictly prohibited except for limited harvest of NTFPs by villagers for own consumption and the forest is actually undisturbed. In assessing ecological impact of the NTFPs harvest, we had planned to carry out a rapid forest assessment in three places where there is no harvest of NTFPs and three in places where harvest of NTFPs is taking place and compare the results. However, it was not possible to distinguished areas of harvest from areas which are not harvested as the forest looked undisturbed. The current state of the sanctuary and the limited level of harvest of NTFPs in our view do not suit to the theme of the initial planned study and would not adequately answer our research question. In view of that, we decided to change the theme of our study and the research question as stated earlier in this report.

2. Methods

To answer the research question, different types of data were collected, and collected in a variety of ways from several sources. These data forms were triangulated to increase accuracy.

2.1. *Questionnaire*

The largest data set was gathered through the use of structured questionnaire. The questionnaire was devised to provide a mixture of both quantitative and qualitative data. Questionnaires were used to collect information mainly on household characteristics, land use changes, the villagers' level of dependency on forest and forest management issues. Questionnaires were given out to respondents and collected after they had completed filling them. Due to limited time, pre-testing of the questionnaires was not done.

2.2. Key Informant Interview

Semi-structured interview was conducted to generate mainly qualitative data to support and enhance the quantitative data collected through the questionnaire interview. Due to time limitation eight semi-structured interviews were conducted. Key informants included the village headman, wildlife sanctuary officer, a member of Niyom Pari Club, a local herbalist, a middleman dealing in NTFPs, two villagers living close to the wildlife sanctuary and an army officer. Respondents for semi-structured interview were purposively selected based on their in-depth knowledge of the local context. Most of them are either participating in the harvest of none timber forest products or involved to some extent in the management of the forest and wildlife sanctuary. To generate relevant data for this study, a number of background and demographic questions were minimized. Instead, the method of asking significant issues more than once in different words at different stages of the interview was utilized. Questions about the significance of forest, its uses, its degradation and impact on local people, sufficiency and possible competition over forest resources, conservation issues, forest management and villagers participation in forest management issues were included in these interviews. A slightly different set of questions was prepared for the village headman interview to gain background information of the village. Prior to actual data collection exercise, the research team had a meeting and interview with the village headman to explain to him the purpose of the study, ask for permission to conduct the research in the village and request for possible key informants for interview. Data collected through the interviews were condensed and categorized by the research team and presented in a tabular form.

2.3. Informal Talk

Informal talks were conducted with the Imam (Muslim leader) and an army officer, Major Phuan Phot to get an overview of how the wildlife sanctuary and the forest reserve are managed and different NTFPs harvested by the villagers. The informal talks were very useful, as a lot of information on harvest of NTFPs from the two forests and how they are managed were obtained which were used to identify key informants for the semi-structured interviews. The informal talk with the Imam helped us to cross check some of the information obtained from the village headman.

2.4. *Participatory Mapping*

Participatory Village mapping was conducted mainly to get information on the major natural resources and community assets available in the village and their location within the villager. Information on land use and settlement patterns was also obtained using participatory mapping. Participants were divided into the two gender groups and separately, the groups drew their maps which were discussed during the plenary session and the two maps were emerged into a single village map.

2.5. *Seasonal calendar*

Seasonal calendar was designed to generate information on the different products the villagers harvest from the wildlife sanctuary and the forest reserve, seasons of harvest, and the amount harvested, purpose of harvest and who harvests the NTFPs. Basic information on the agricultural crops grown in the village, period of different field activities and gender roles were gathered. This data was particularly important in answering the research question on dependency of villagers on forest resources. Men and women were mobilized to participate in the exercise with an aim of obtaining views from the different gender groups.

2.6. *Transect walk*

Transect walk across the village was conducted to obtain information on the land use systems, crops and NTFPs being grown by the villagers, soil types and soil management practices, natural resources, vegetation and the general topography of the village. The walk with the local guide saw us transect across the village. During the transect palm oil, rubber and coconut plantations and their ages were noted and recorded. GPS was used throughout the transect walk in order to locate each point where there was change in land use.

2.7. *Participants Observation*

Observation was a supplementary method. It was used in a rather unsystematic way, but the purpose of the descriptive observations written down in the field diary was to provide a general view of the situation. Observation had an aim also to crosscheck the information

whenever possible. This included observing both physical environment and the people and their actions. The advantage of having to use the interpreter was that it allowed observation of nonverbal communication during the interviews. This method was particularly useful to identify illegal activities like use of forest for building poles and timber. It was not possible to get adequate information on illegal activities by the villager through semi-structured interview and other methods used.

2.8. *Secondary Data*

Besides the material gathered by the means described above, documents were used as source of data. Scientific publications and internet sources were specifically useful in building up understanding of the research topic and research questions as much as possible. Furthermore maps form one source of information for this study.

2.9. *Limitations:*

Several elements affected the quantity and quality of our results.

First of all, time on the field was limited. As a result, the number of questionnaires was restricted to 25. Also, we would have liked to make another interview with a representative of the RFD in order to have more details about the management of the village forest, but the office was located quite far from our village. Instead, we managed to get information about it through secondary data (papers and governmental websites) and through the wildlife sanctuary officer.

In order to better respond to our first objective, we would have also liked to see the management plan of the sanctuary but were not able to, mostly because of the language barrier.

Regarding the methods, the layout of our questionnaires had some drawbacks. Some of the questions were very leading which made it hard for us to get good interpretations and questions related to the harvesting of NTFPs were not always adapted to the situation in the village. Since we removed some of our original methods (rapid forest assessment and soil samplings), we were able to reformulate part of our questions and go back to interview the villagers which had previously filled in the questionnaires. However, we were not able to get

more information from two of the villagers which were not at home. Furthermore, since we were divided in different teams, we did not always have the same criteria on how detailed the answers should be, which further limited the number of respondents for certain parts of the questionnaire.

In addition to that, the sampling of the respondents, which should have been random, was probably biased. Questionnaires were handed out to the villagers who came to the monthly village meeting. The respondents will possibly tend to be the ones which are more strongly involved in the community, such as members of the Niyom Prai club or the weaving group. Thus this may have had an influence on the results concerning their knowledge about natural resources. Also, the respondents to the questionnaires were part of the ones who did the PRA (village mapping and seasonal calendar). Luckily, during the community meeting, we were able to get some feedbacks from a different group of villagers on the results of the PRAs and part of our findings. A pilot-test would have been a good way to rectify our questionnaires early in our fieldwork and a more thorough debriefing with our team members and translators on the type of data needed would have helped us to get more precise results.

Regarding the interviews, one of the limitations might be that the views of the village headman and of the sanctuary officer are biased since part of their responsibilities is to ensure that villagers follow the forest regulations,

One of the technical limitations we had concerned the accuracy of the GPS. During the transect walk, we took measurements with two different apparatus and the difference in the altitude at each point was quite significant. As a matter of consistency, we decided to stick to the results of one of the GPS.

Our last limitation regarded the language, which is the case in every context when the interviewer and interviewee cannot understand each other without the help of a translator. Because of this, we probably missed out on some details on the situation in the village. By comparing our notes with the ones our Thai counterparts took, we managed to get clarifications and answers to most of our questions.

3. Results

3.1. *Results from the questionnaire*

1) Gender:

Out of the respondents, 57% are men and 43% are women.

2) Age:

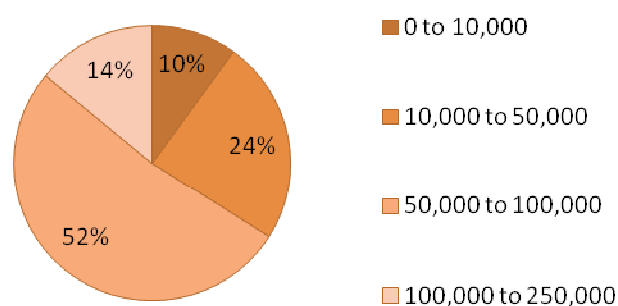
The average age of the respondents is 41 years old.

3) Members of the Niyom Prai Club:

Nine of the respondents (43%) are members of the Niyom Prai Club.

4) Figure 1. Villagers' income:

Income of respondents in baht per year

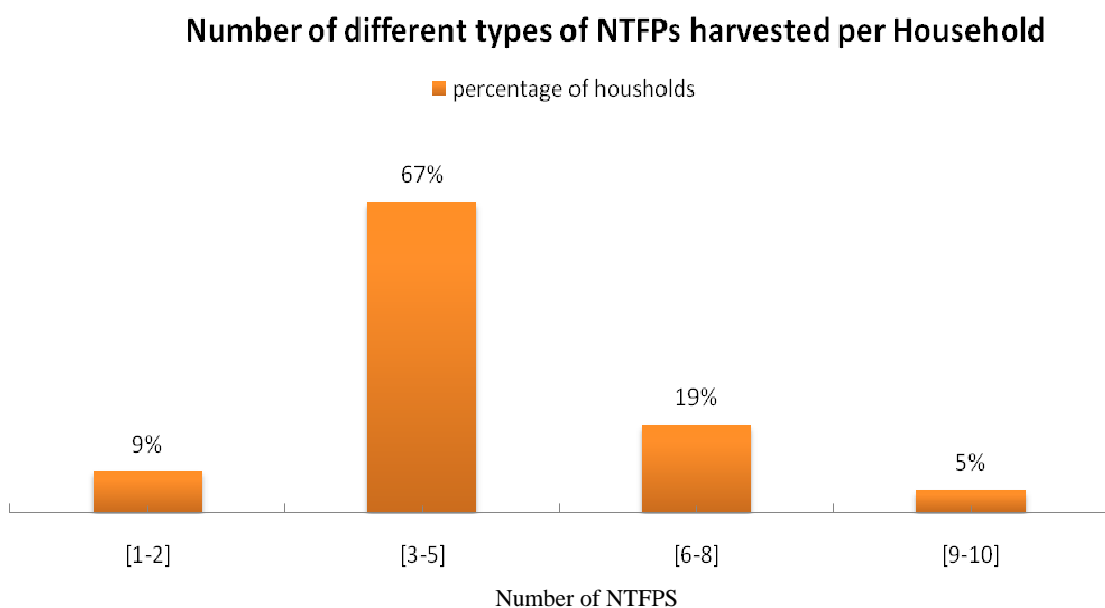


Half of the respondents have an average yearly income of 50,000 to 100,000 baht. A quarter has a lower income of 10,000 to 50,000 baht per year. 14% have an income between 100,000 and 250,000 baht and only ten percent have an income between 0 and 10,000 baht.

5) Respondents' land size:

The average land size for the respondents is 19 rai (minimum: 5 rai; maximum: 38 rai and standard deviation: 9).

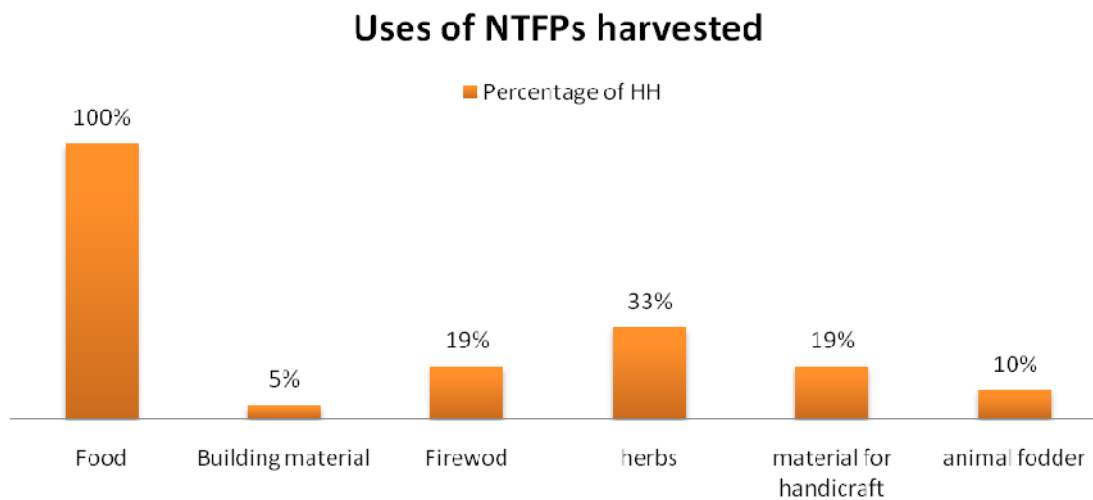
6) Figure 2. Number of NTFPs:



All respondents of the questionnaires harvest at least one type of NTFPs.

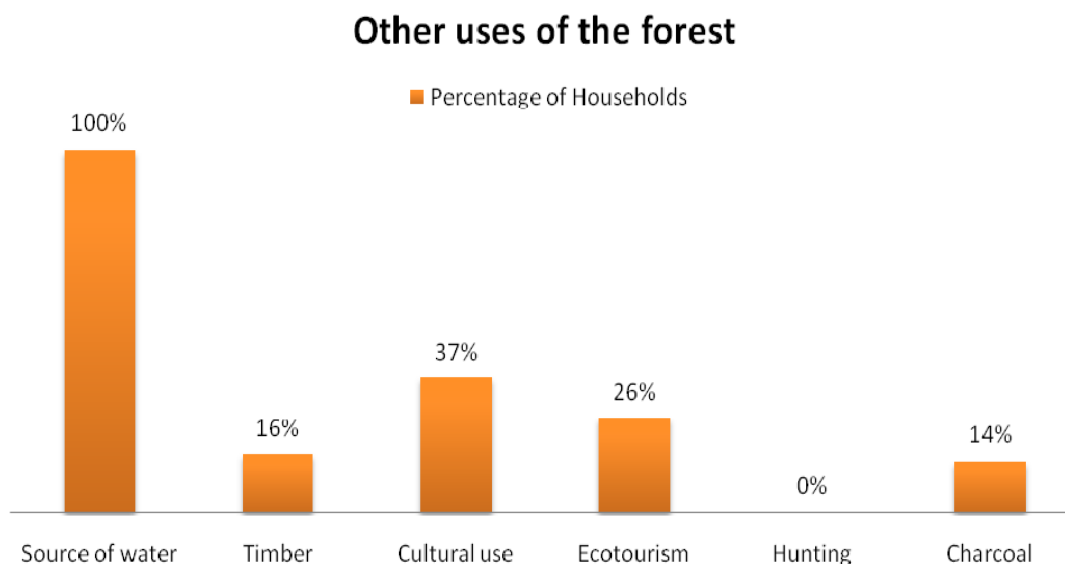
A large majority of the respondents (67%) harvests between 3 and 5 different types of NTFPs. About 20% harvest between 6 and 8 NTFPs. 9% of respondents harvest 1 to 2 NTFPs, and only 5% collect 9 to 10 NTFPs.

7) Figure 3. Uses of the NTFPs:



All of the respondents collect NTFPs for food. A third of them harvest herbs (medicinal use). Approximately 20% of the respondents harvest firewood and material for handicraft. 10% collects animal fodder and a small percentage collects building material.

8) Figure 4. Uses of the forests:

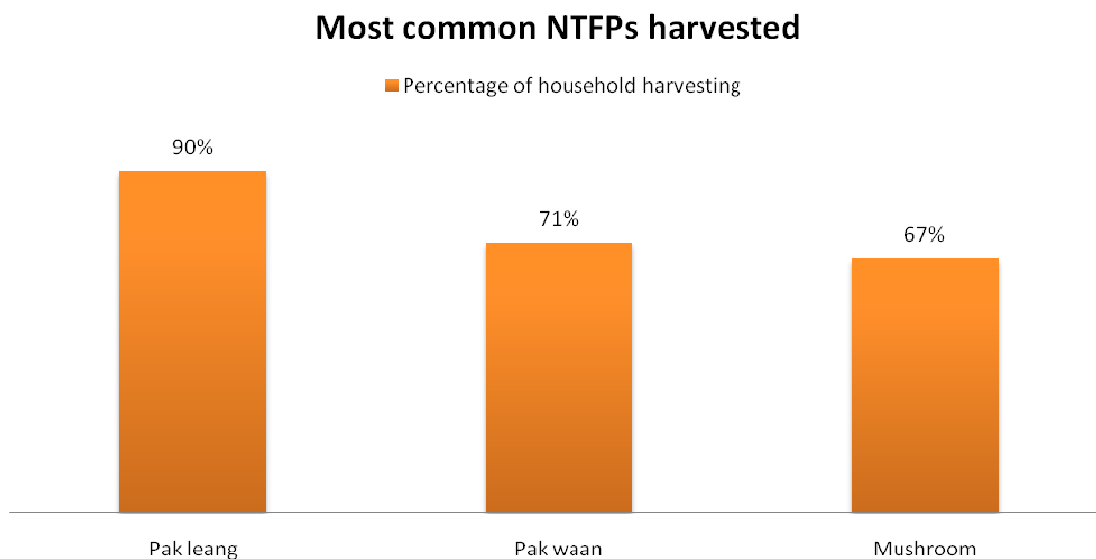


All of the respondents use the forests as a source of water. Approximately a third uses the forest for cultural uses. 25% use the forests for ecotourism. Approximately an equal number of respondents use the forest as a source of timber and charcoal. None of them go to hunt in the forests.

9) Percentage of respondents selling NTFPs:

Eight respondents (38%) sell some of the NTFPs they harvest. Out of these eight respondents, half of them sell products which come from their garden only, 3 of them sell products coming from both the forest and the sanctuary and for the last respondent, the products he is selling comes from both the sanctuary and his garden.

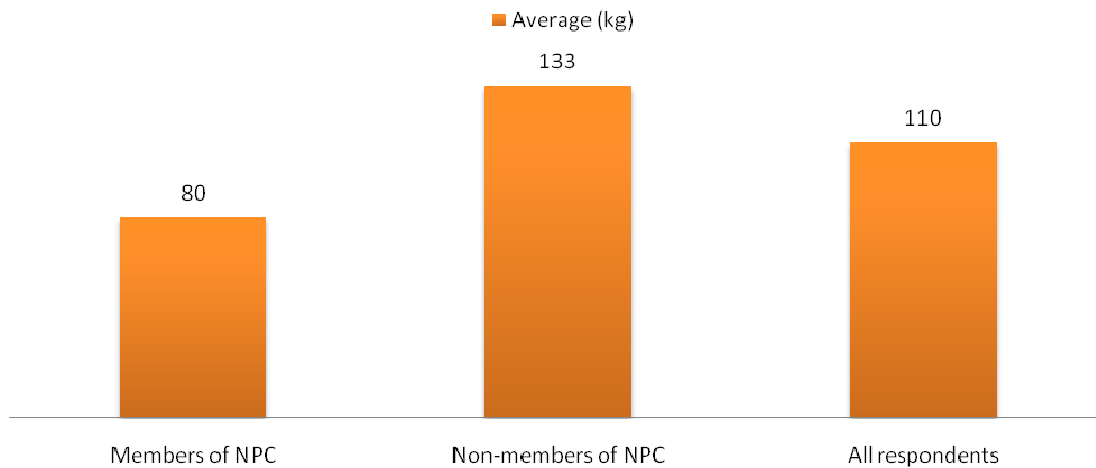
10) Figure 5. Most commonly harvested NTFPs:



The three NTFPs which are the most common for the respondents are Pak leang, Pak waan and mushrooms. 90% of the respondents harvest pak leang, 71% collect pak waan and 67% harvest mushrooms.

11) Figure 6. Quantity harvested in all areas of the three most common NTFPs (pak leang, pak waan, mushrooms) in kg per year:

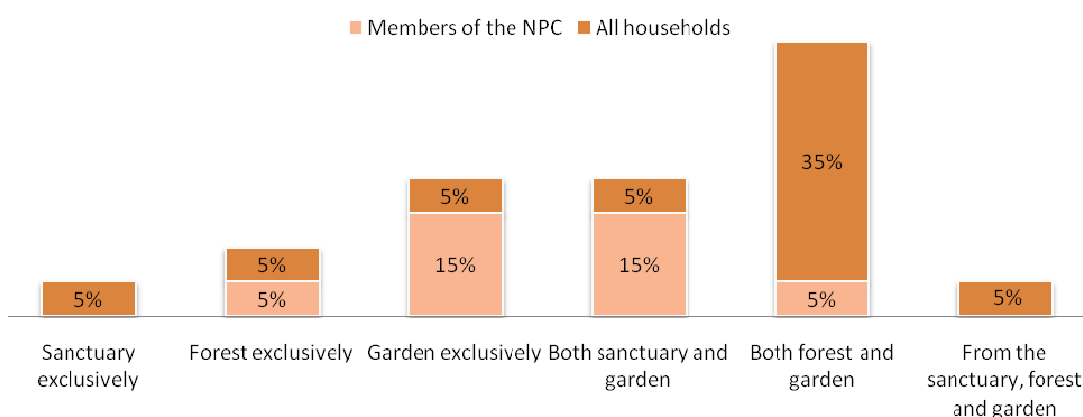
Quantity harvested of the three most common NTFPs per year



Respondents collect on average 110kg per year of the three most common NTFPs (standard deviation: 132). Members of the NPC harvest 80 kg whereas respondents which are not member harvest on average two thirds more (133 kg).

12) Figure 7. Areas of harvest:

Areas where villagers harvest

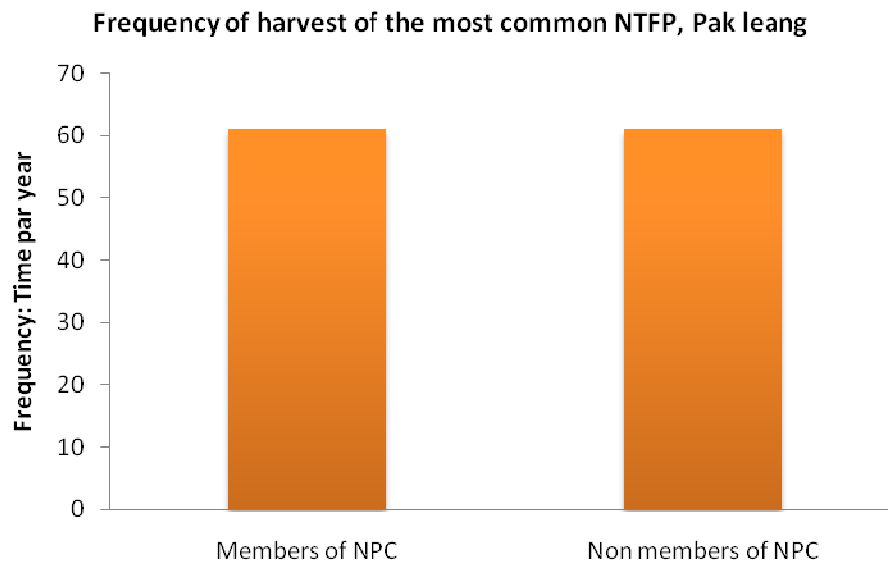


A majority of respondents (40%) collect both from the forest and their garden. An equal number of respondents (20%) collect from their garden exclusively and from both the sanctuary and their garden. 10% of respondents harvest from the village forest exclusively.

Only 5% of respondents collect from the sanctuary exclusively and from the sanctuary, forest and their garden.

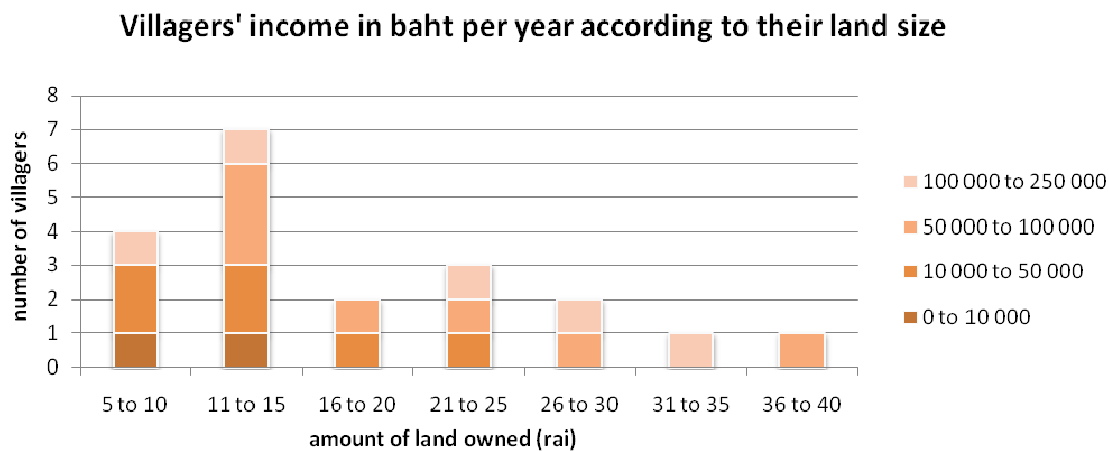
Members of the NPC on the contrary harvest mostly either from their garden exclusively or from both the sanctuary and their garden. A small proportion harvest from the forest exclusively or from both the forest and their garden, but none of them collects from the sanctuary only or from the 3 different areas.

13) Figure 8. Frequency of harvest of the three most important NTFPs (pak leang, pak waan and mushroom) per year:



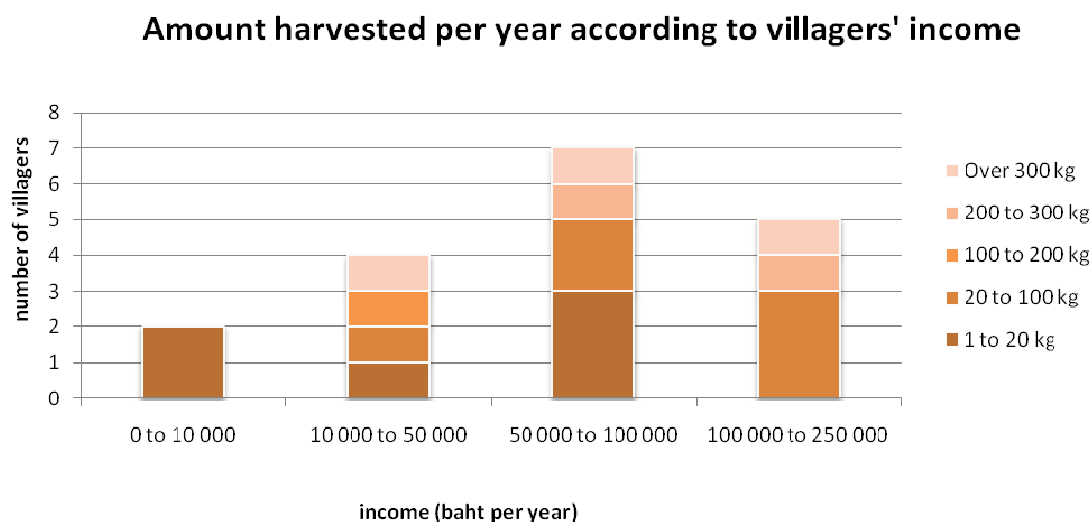
Both members and non members of the NPC harvest Pak leang about 60 times per year in average.

14) Figure 9. Respondents' income in baht per year according to their land size:



Respondents with the lowest income range (0 to 10 000 and 10 000 to 50 000) have land which are of smaller size. Respondents with an income range between 0 and 10 000 baht per year have a maximum of 13 rai and the ones with incomes between 10 000 and 50 000 baht, a maximum of 22 rai. However for respondents with higher incomes, their land sizes cover all range.

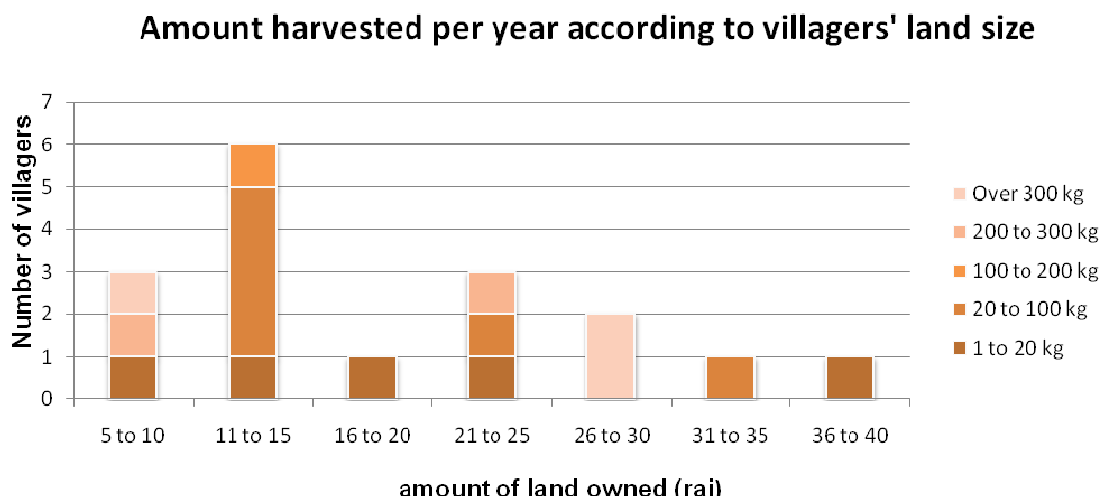
15) Figure 10. Quantity harvested of the three most common NTFPs according to the respondents' income:



Respondents with an income between 0 and 10 000 harvest only between 1 and 20kg. Those with an income between 10 000 and 50 000 harvest very different amounts, from 12kg up to

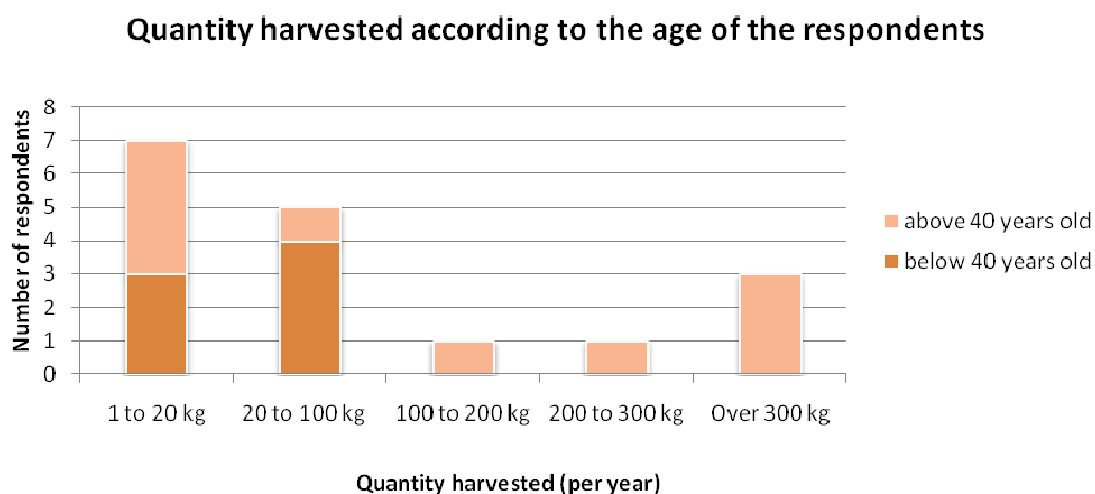
364 kg. The same thing can be noted with those with an income between 50 000 and 100 000, although a higher proportion collects between 1 and 100kg. For the respondents with the highest income level, they harvest mostly between 20 and 100kg and the others harvest over 200kg.

16) Figure 11. Quantity harvested of the most common NTFPs according to the respondents' land size:



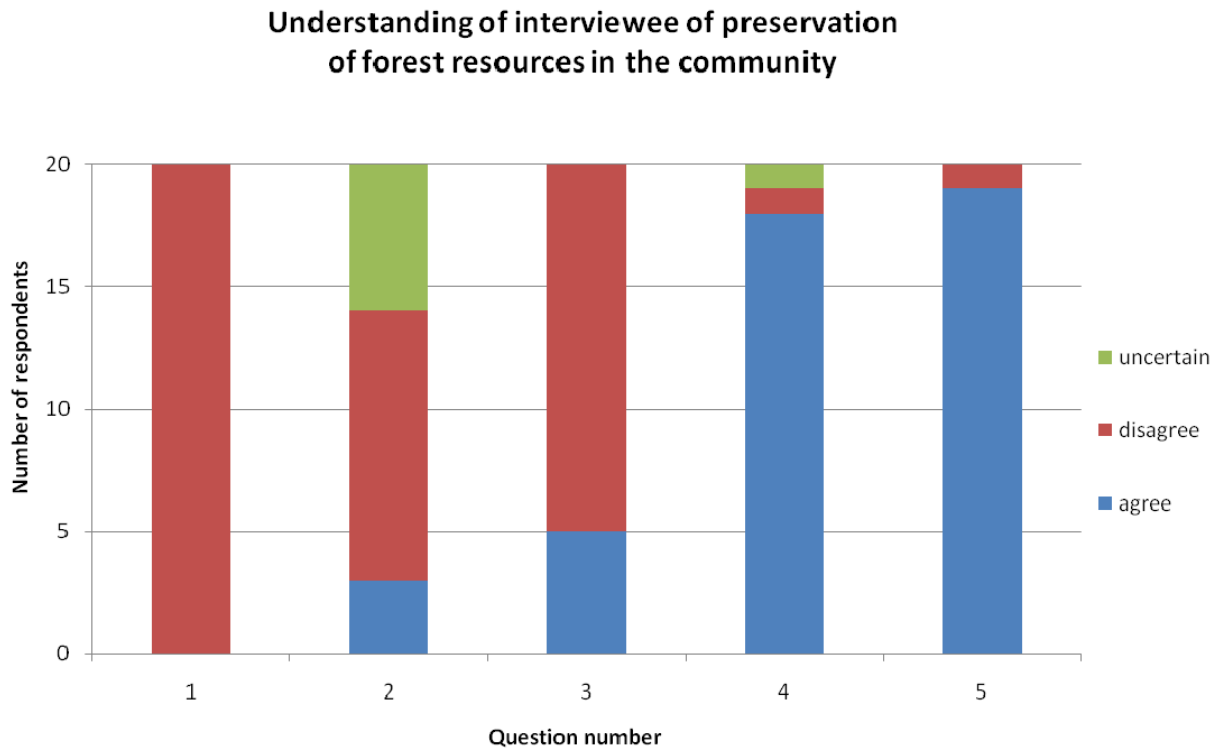
Respondents, irrespectively of the size of their land, harvest all different amounts of NTFPs.

17) Figure 12. Quantity harvested according to the age of the respondents:



Respondents over 40 years old harvest all different quantities of NTFPs, however the youngest ones, below 40, harvest only up to 76kg per year.

18) Figure 13. Understanding



1. It is the responsibility of the forest officers only in taking care of forest resources:

All of the villagers disagree.

2. The declaration of the preserved area prevents villagers from making use of the land.

The majority disagrees. A number of them also are uncertain if they can make use of the land or not.

3. Participating in the forest preserving activities is a waste of time.

Most of them disagree.

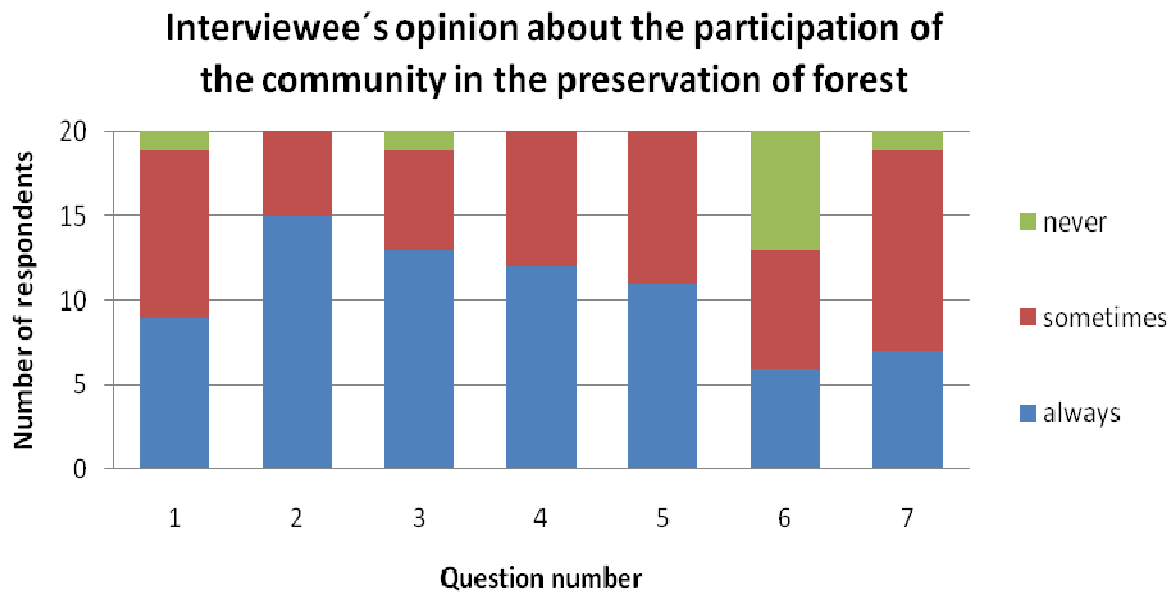
4. There should be a training that informs the people about the importance and the benefits of forest resources.

Most of them agree.

5. Successful forest resources preservation requires people participation.

A large majority of them agree.

19) Figure 14. Opinion



1. You cooperate with the government sector in preserving the forest.

The majority cooperates does.

2. You support the activity in preserving forest resources.

All of them do and a majority always supports these activities.

3. When attending community meeting, you exchange your idea about preserving forest resource.

Most of them give their idea about preserving the forests.

4. You attend the meeting and are informed by the government sector about forest resources.

All of them attend meetings most of the times.

5. You tell your children and make them see the importance of forest resources.

All of respondents talks to their children about the importance of forest resources.

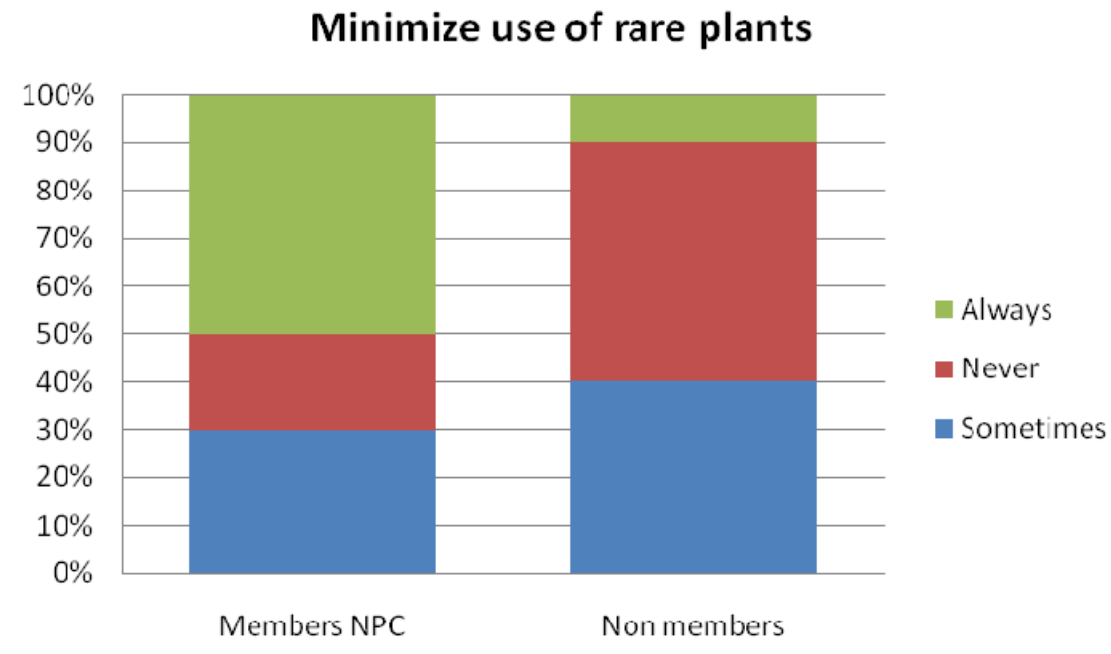
6. You take the rare plants and grow in the community in order minimize the dependency on forest resources.

Two thirds grow the NTFPs in the community; however, a third never does so.

7. You join the training activities regarding the preservation of forest resources.

A vast majority of them join the training about the preservation of the forests.

20) Figure 15. You take the rare plants and grow in the community in order minimize the dependency on forest resources.



50% of NPC members always try to minimize their use of rare plants compared to 10% of the non members.

4. Discussion:

4.1. Dependency of the villagers of Ban Tone Kloy on forest resources

An important part of our study deals with the dependency on natural resources like NTFPs. It has been one of our key issues to determine the level of that dependency. As a part of the result we can see that every respondent of the questionnaire harvest NTFPs, from either their garden the village forest or the wildlife sanctuary, figure 3. It tells us that it is common practice to collect NTFPs. We can see from the questionnaire and the seasonal calendar (appendix D) that the list of NTFPS is long but that they mainly collect different kinds of vegetables and mushrooms. These products are in most cases used for own consumption within the households. But in some cases the products are also sold locally and outside the province. Like the middle man we spoke to, she sells vegetables and mushrooms from Ranong province. She said “I go to Pang Nga every week, and can make 2-3000 baht per time” (middle man). She told us that those products from Ranong province have a good reputation: “my products are valuable because this province have a good reputation” (middle man). It means that there is a bigger demand for them and she can sell them for a higher price than NTFPs or vegetables from elsewhere. Therefore NTFPs from the sanctuary and forest brings an income to the village. 20% of the people who answered our questionnaire harvest from their own garden exclusively. A majority of these people are members of the Niyom Prai Club figure 7. One of the core goals of the Niyom Prai Club is to be more independent from the sanctuary, for example by growing NTFPs in their own gardens. So this means that 20% of the people do not depend on either the forest or the sanctuary when we talk about NTFPs only. When we move on and look at the questionnaire we can see that all villagers depend on the sanctuary as the main source of drinking water, figure 4. That is a very important resource and one of the main motivators to protect and preserve the sanctuary. The risk of running short of water is higher by the end of the dry season, especially in very dry years. Investments in water tanks for water storage or water stations with water drillings would minimize this dependency, but capital or support from elsewhere is needed. It is an important issue in the village and a highly discussed problem which we saw during the village meeting we attended. In that occasion a set of rules concerning care about water were been handed out.

Wood from the forest is a valuable resources and an important part of the building sector providing the village with poles used for building houses. No big scale timber logging can take

place in the sanctuary because the forest is patrolled regularly. So export of timber is not an option. Wood for fuel wood is surprisingly only used in a very limited extent. The need for fuel wood is very low because most villagers use gas for cooking, . Numbers from 3 show that only 19% collect fuel wood. In those 19%, most of the fuel wood is collected within their own plantations as we were told that the plantations were providing enough fuel wood for their needs. For cultural or traditional reasons almost 40% of the villagers are used to show gratitude to the nature for providing resources, see figure 4. One practical way of doing so is by collecting NTFPs and then offering it back to the nature as gifts.

The sanctuary does not only provide NTFPS for own consumption, it also bring possibilities for an extra income for the villagers. Trekking routes in a barely undegraded forest is a popular attraction for eco tourism. An initiative like the Niyom Prai Club is working on possibilities like these to promote ecotourism and bring more people into the area. A similar phenomenon took place in the Northern Thailand around Chang Mai some 20 in the 1980s. That part of the country is now heavily influenced by tourists.

We see that everybody harvest NTFPs to some extent. We have looked more into who harvest and if there are groups of people that are more dependent on NTFPs than others. In an interview with the village leader we were told that villagers with low income were more dependent on NTFPs. Results from the questionnaire however doesn't support that statement. In figure 10 it shows that people with the highest level of income collect as much NTFPs as any other groups of income. This shows that the income is not the important factor of who collect most, other parameters such as land size has a much higher influences on who collect more NTFPs. There is a clear trend that people with most land collect a smaller quantity of NTFPs, figure 11. This could be explained by the extra time used in work related to agriculture. According to age there is difference in habits of harvesting NTFPs. We were told by the local expert on herbs that the young generation has a lower interest in for example medicinal plants. Modern medicine has replaced this need and only the parts of the older generation with a strong belief in the medicinal plants continue to collect and use them. Figure 12 support that statement as we can see that those under 40 years old collect the smallest quantity.

A clear tendency shows that most of the harvest is done in their own gardens and in the village forest. NPC have an interest in encourage the villagers to do that and also villagers

have an interest in harvesting as much as possible from their own garden since it is much easier and faster to do so. The stricter rules of the sanctuary make people prefer harvesting NTFPs from the village forest. That is also why we see a much higher level of degradation in the village forest, when we compare them. Even though most prefer using the village forest for harvesting we see when comparing places of harvest with placement of the households that those living closest to the sanctuary collect most from there and those living close to the village forest prefer to collect from that forest.

The frequency of the most common NTFP (pak leang) varies quite a lot, from 2 times per year to 365 times per year in the two most extreme cases. This leaves us with a high standard deviation sample value that is important to keep in mind when we talk about average numbers, as they end up high because of a few high numbers. However the average number of times pak leang is harvested per year is 61 times. This number account for both non members of the Niyom Prai club and members respectively. This tells us that both members and non members harvest approximately at the same frequency. Figure 15 shows clearly that members of NPC do more to minimize their dependency, in this case on rare plants. It corresponds well with the goals they try to achieve.

Knowing that villagers are dependent on the forests, we are therefore interested in how these resources are managed.

4.2. Forest management in Ban Tone Kloy

4.2.1. Overview of the forest management:

The village contains two types of forest, the village forest and the wildlife sanctuary which are both owned by the government of Thailand. These forests are regulated by two different bodies: the Royal Forest Department for the village forest and Department of National Park, Wildlife and Plant Conservation for the wildlife sanctuary (DNP). The DNP only manages protected areas, which are considered critical in the preservation of biodiversity. Due to the different status of these forests, their rules also differ. The laws of the sanctuary are officially stricter than the ones of the village forest.

The Wildlife Sanctuary was established in 1972. According to the sanctuary officer, villagers did not resist the idea of the establishment as population density was low and other forests

were available for them to depend on. Some of the lands for the establishment of sanctuary were given by the villagers. There are 8 staff members working in the wildlife sanctuary in Ban Tone Kloy. For the village forest however, there is no staff apart from a soldier which supervises it locally.

The overall rules for the villagers are that they must respect the biodiversity of the sanctuary. The sanctuary officer and village headman seemed to insist more on illegal activities they are not allowed to do rather than what they can do. These illegal activities included poaching, logging and planting for agricultural purposes. If a person is caught encroaching several times in the sanctuary, the officer gives him a warning the first 2-3 times. However, if he continues, the officer brings that person to the police. According to the sanctuary officer, villagers rarely encroach and the last time they had to bring someone to the authorities was 4 years ago. Villagers indeed seem aware of these rules and have mentioned them during several informal talks.

According to the three focus groups interviewed on the management issue and informal talks, villagers are not involved directly in the management of those forests in the area, and especially they are not involved in official decision making, such as planning. Up to 3 years ago, this situation was common in all of Thailand since no policies allowed local communities to manage their forest resources even though it was encouraged in the national constitution. In November 2007 however, the Community Forest Bill was issued, authorizing villagers to manage their forest. It is not clear however how this bill works in the case of protected areas, such as the Khlong Naka wildlife sanctuary. That does not mean however that villagers are completely excluded of the management of the forests. Villagers are involved indirectly by helping to protect the forest and receiving news about the sanctuary meetings. Villagers have also shown interest in managing the village forest. They intend to apply for part of it to establish a community forest which they would manage on their own. Up to now, there is also no formal and written agreement about the harvest of NTFPs. The officers allow them to harvest for their own consumption, but it is not clear to us how much and how often they allow the villagers to harvest. It appears however, through the questionnaires and interviews that villagers are well aware that they are not allowed to log or hunt.

4.2.2. Ways in which the special status of the sanctuary influences the villagers' uses of the forest:

Because of the particular status of the sanctuary as a protected area, access rules are stricter and more staff is present to supervise the sanctuary, which can act as a deterrent for the villagers. The headman and the imam mentioned that villagers are more dependent on the sanctuary but from our questionnaire, we got that they actually harvest more from the village forest. This result might just be due to the fact that our questionnaire was not representative of the whole village. However, the villagers did mention that the laws are a disincentive for them.

The special status of the forest also means that they cannot get a formal agreement with the officer concerning the harvest of NTFPs and that technically, unless the official laws change, it will always be considered illegal. This puts them in a precarious situation. For example, if a new forest officer is appointed, he might not allow them to harvest and the livelihoods of many in the village will be affected which makes their situation quite precarious. Also, the fact that they have no written agreements and that they have been different officers with different opinions maybe also creates some confusion as to which extent they are allowed to harvest. For example, the imam of the village which collects honey, clearly mentioned that he goes in the sanctuary to harvest at night time to make it less obvious to the sanctuary officers. Also, when asked in the questionnaires if the declaration of the preserved area prevents villagers from making use of the land (figure 13), the response varied a lot. The majority disagrees, indicating that the officers do allow them to make use of the forests. However, a third of them were uncertain, indicating that it might not be clear to all of the villagers what they are allowed to do exactly in the sanctuary.

4.2.3. Relationship between the forest authorities and the villagers:

One of the particularities in this village is the relationship between the forest authorities and the villagers, which is described as good. Both parties probably have an interest in maintaining it this way. For the sanctuary officer, a good relationship means that villagers are more likely to follow the rules. Moreover, during an interview, the officer pointed out that in his view, the sanctuary is understaffed and that they rely on villagers to help them with some of their daily activities. In turn, a good relationship for the villagers probably

implies that the sanctuary officer are more flexible in regards to their activities in the forest. This flexibility relates not just to the harvest of NTFPs but also their access rights to the sanctuary. According to villagers and the sanctuary officer, villagers are allowed to go in the sanctuary without much restriction, whereas any outsiders, such as tourists or ourselves need a special permission each time they need to step in. Informal talks also revealed that sanctuary officers help the villager in organizing social function like weddings and during funeral events. Interdependency is therefore a strong emerging trait of their relationship. According to a villager, the relationship with the forest officer has not always been good and the previous officers were much stricter about the rules. The current officer however has been working there for three years and is more flexible about the laws, which seems to be the main reason of their good relationship. Interviews with two villagers revealed that some of the villagers have legal issues concerning their land, but this did not seem to affect their relationship with the officer. According to the two villagers, these issues have been ongoing for many years and maybe the villagers have come to realize that the fate is out the officer's control.

Since the management of the forest resources is officially handled by the forest authorities solely, our next aim is to establish how villagers participate to it.

4.3. Participation of the villagers of Ban Tone Kloy in the conservation and management of the two Forests

The word "*participation*" as stated in the present Thailand constitution of 1997 is the involvement of an individual, groups and organizations in receiving news and information, identifying problems, planning and managing, monitoring and evaluating, and solving problems of forest and natural resource management. Therefore Participatory Forest Management in the general context means involvement of the local community in the management, decision making, utilization and protection of the forest resources (Mann Hares, 2006). It involves different approaches which include but not limited to the following; community forestry, joint forest management, collaborative forest management and social forestry (Anorld, 1998; Hobley, 1996). Our findings in Ban Tone Kloy revealed that the local population is not directly involved in the management of the two forests. The overall decision

making and the management of the wildlife sanctuary and the village forest is by the Department of National Park, Wildlife and Plant Conservation and the Royal Forest Department respectively. The local people however, are voluntarily participating in a few activities that promote and contribute to the preservation of the forest resources.

4.3.1. Incentive for villagers to participate in forest conservation and management

Successful participation of community in natural resource management can be achieved when benefits accrue to local managers. This requires that participation should be planned and negotiated to involve transferring of assets, rights, power and entitlements to local managers in addition to responsibilities (Sayer & Maginnis 2005a, 185). A direct linkage between livelihoods and conservation provides an opportunity for local people to directly benefit from biodiversity and a healthy environment, and hence incentives for conservation. The present case showed, however that much as the community are participating in some forest conservation and management activities, there is no deliberate plan and negotiation to involve them in the management of the two forests. It was clearly stated by the entire people interviewed that the two resources are strictly under the responsibilities and management of the authorities. However, as revealed in our findings, villagers are allowed to harvest NTFPs for own consumption and the Niyom Prai Club with permission from the wildlife sanctuary authority, can implement eco-tourists activities in the sanctuary. According to the villagers interviewed these are some of the reasons which motivate them to participate in the preservation of the two forests. Our findings from semi-structured interviews and questionnaire revealed that the forest is the main source of water in the village both for domestic and agricultural use and to them this is the main incentive for the villagers to participate in conservation of the forest resources. Members of the Niyom Prai Club, however, brought up a further aspect why they had intensified the protection of forests and other natural resources in the village: They want to keep their lands and other village natural resources out of the investors and government who plan to set up tourist facilities like resort hotels and beaches and use the beautiful forests and waterfall as scenery for the increasing number of tourists in the Province and Thailand in general (Box 1).

Box no. 1. Views of respondents about the importance of forest to village

“Because the forest in this area is rich in biodiversity and a good resource for tourist attraction, investors have expressed interest in building resort hotels in this village. We fear that this will affect the quality and supply of our water. We members of NPC and the whole village are concerned about the issue. Currently, there are less wild animals near the forest fringes. We want to preserve these animals and forest for the future generation”

Source: Semi-structured interview with the Chairperson of Niyom Prai Club

Apparently, NBC is providing information to villagers on the danger of the planned projects to the village's natural resources with specific emphasis to the resultant degradation of their water quality and the disappearance of wildlife. It is however, not clear if the actions of the club are motivated by the financial benefits they get from providing guided tours to tourists in the wildlife sanctuary and around the waterfall. Another motivation for villagers' participation in forest conservation and management, as revealed by all the key informants is that the forest should be preserved for children so that they can learn “about the trees and nature”

4.3.2. Involvement of local villagers in forest management

Chamber (1997, 181-2) acknowledged that forest management, in order to be sustainable, presumes that the local people and their objectives and views are involved. Agrawl & Gibson (1999) argued that communities, as heterogeneous local actor groups, and their involvement in decision making is regarded as crucial for conservation and management of the forests. In addition to the right to make decisions, forest communities are regarded as needing the authority to protect their resources from outsiders (Brown et al. 2005). Results of our field study indicate that the villagers' involvement in forest management is restricted mainly to reporting illegal activities such as poaching, logging and encroachment on forest land for establishment of rubber plantation. Our findings further revealed that the villagers are also involved in forest fire fighting in case of an outbreak. However, our study did not explore if villagers' participation in reporting illegal activities and fighting forest fire is voluntarily done or the forest act demands them to participate. Questionnaire result (Figure 13) indicates that majority of the respondents recognize that successful forest preservation should involve the

participation of community. This finding suggests that the villagers are willing to get involved even more in the core management activities like decision making.

4.3.3. Cooperation: central for conservation and management of the forest

Two types of cooperation in conservation and management of the village natural resources could be distinguished from the villagers' point of view: agreement among the villagers about the utilization of NTFPs and protection of the forest and the collaboration between the NPC and the wildlife sanctuary office in conserving the forest.

Cooperation amongst villager: cooperation among the villagers seemed in the village headman's views to be central for conservation of the forests in the village. According to him, there is general agreement among the villagers on the level of harvest of NTFPs that will ensure sustainability of the resource. Furthermore, logging, hunting and cultivation in the sanctuary are strictly illegal are there is equally general agreement amongst villagers against those activities.

Collaboration between the NPC and the government: collaboration especially between NPC and the government in the conservation and management of the wildlife sanctuary is critical in the preservation of the resource. Interviews with all the key informants revealed that Niyom Prai Club are collaborating with the authority in a number of activities which support the conservation of the wildlife sanctuary and environment in general and these include but not limited to: training and sensitizing the general public with specific emphasis to young generation on natural resource conservation, encouraging the villagers to diversify their production and domesticate tree species that provide them with NTFPs in order to reduce their dependency on the forest resources. Our findings from the questionnaire also reveal that government sectors cooperate with villagers (NPC) in preserving the forests (Figure--). The club also participates in activities such as garbage collection and cutting bushes along the village roads. It was also noted during the study that the wildlife sanctuary officer on invitation , participate in the activities of NPC and the village in general like training and sensitization of the villagers and the youth on natural resource conservation. The finding also revealed that he participates in the village meeting whenever necessary.

4.3.4. Programs and activities which help to reduce pressure on the forest resource

Table 1: Programs and activities in the village

No	Program/activities	Objective	Target group
1	Tree bank project	To make people less dependent on the forest resources for livelihood and reduce pressure on the forest.	For the whole Thai population
2	Para-rubber	To help villagers replant their old rubber plantation	Farmers whose plantation are not located in the forest
3	Domestication of tree species which provide NTFPs and other forest products to villagers	To reduce pressure on forest resources and villagers dependency on NTFPs with the ultimate goal of conservation of the forest	Entire villagers
4	Multi cropping	To help villagers diversify their income and food sources as well as maximizing the use of their lands	Entire villagers

Source: Field interview with the village headman

Our study discovered a number of programs and activities initiated in the village by different actors which help to reduce pressure on the village's forest resources. As highlighted in table 1, the main programs are Tree bank, domestication of some of the main NTFPs tree species, multicropping and Para -rubber scheme. The main objective of the Tree bank is to provide villagers with financial loan to plant trees on their lands. According to village headman, the loan is repaid after harvest of the trees. Interview with the village headman and the manager of the program in the village further revealed that all the villagers have joined the program. However, interviews with the middleman and a villager who live close to the sanctuary contradicted their views. The two admitted that they have not joined the program because it is still new and they would want to learn about the benefit of the program from those who have joined it. They estimated that only half of the villagers have so far joined the Tree bank program. Mean while Para-rubble loan scheme targets only framers whose plantation are located outside the forests. The main purpose of the program is to

support the production of rubber but also to encourage plantation establishment outside the forest as a mean of conserving the forest. NPC is encouraging the villagers to practice multicropping and to domesticate important NTFPs tree species according to the interview with the chairman of the club. His view is supported by the result from the questionnaires (Figure 14) where more than five respondents admitted that they always take rare plants from the forest and grow them in their garden to reduce their dependency on forest resources.

5. Conclusion

From the results and discussions, we came to the following conclusions. In regards to dependency, the villagers rely less on NTFPs than we had expected. We have seen that everybody harvest NTFPs and are dependent on resources like water, so that up to a certain level, all are dependent on the forest. It is hard to give an exact answer of how dependent people from Ban Tone Kloy are on the two forests. It differs from person to person, and it is even hard for them to express their own dependency. Also, some people might be more dependent than they think. In addition to that, our estimation of how developed Thailand is has been wrong. A fully developed and well working system of infrastructure even in remote places means that trading of goods can take place all over, and people have access to all kinds of products. A higher income and standard of living than expected means that they can afford products like gas, so they don't depend on fuel wood from the forest anymore. The NPC and Tree Bank Project are both affecting and minimizing their dependency on the forests. Many of the things we thought they were dependant on like medicine plants is now history. Possibly our expectations would have fitted better into reality if we had been there some 30 years ago. Another important factor is that Thailand has made a political shift. From being a country with severe problems of degraded forest, big scale timber logging, and even problems with species threatened by extinction, Thailand is now a country with a strict preservation policy and a high number of protected areas, such as the Khlong Naka wildlife sanctuary in Ban Tone Kloy. This area and the village forest are both owned by the government of Thailand. Management of those forests lies on the hands of the two departmental heads of Royal Forest Department and Department of National Park, Wildlife and Plant conservation only. Because the wildlife sanctuary is a protected area, the rules are stricter. Our result for interviews and

informal talks shows that villagers are not involved directly in the management of forest especially in the planning, but that the villagers are aware of the rules and regulations which they do follow. However, the villagers do not seem to be certain to which extent they can harvest. Even though the livelihood of many villagers depends in the forest resources and that the Community Forest Bill was issued, the higher government authorities fully implemented the policies which will support the villagers to participate in the management of their forest resources. Moreover, the villagers have no formal agreement concerning the harvest of NTFPs, it is still considered illegal. Therefore, this puts them in a precarious situation. Nevertheless, this does not seem to affect the relationship between the villagers and the forest authorities, which is described as good from both parties: villagers follow the rules and sanctuary officers are flexible in regards to the harvest of NTFPs.

The results and discussion also revealed that villagers' participation in conservation and management of the forest is mainly motivated by the need to protect the forests as it is the main source of fresh and clean water for both domestic and agriculture use in the village, and its contribution to their livelihood. Their participation includes reporting illegal activities like encroachment, logging and poaching, and protecting the forest against wild fire. NPC involvement in forest management centered majorly on sensitization of villagers and the young generation on forest conservation issues. Cooperation amongst villagers and collaboration between the NPC and the wildlife sanctuary authorities has been noted as very key in promoting conversation of the forest resources.

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Appendix A: Questionnaire

Questionnaire in household level

Name of interviewee..... House number Moo

Village Sub-district DistrictProvince

Name of interviewer..... Date.....

Part 1 Basic information of interviewee and household

1. Age

2. Gender ☐ Male ☐ Female

3. Education

☐ Uneducated/Don't understand Thai language

☐ Primary school

☐ Secondary school (Grade 7-9)

☐ High school

☐ Others.....

4. Religion

☐ Buddhist

☐ Christian

☐ Muslim

☐ Others (Specify).....

5. Marital status

☐ Single ☐ Married ☐ Widowed

☐ Others

6. Number household members-----

7. Are you a member of Ni Yom Prai Club?

☐ Yes ☐ No

Part 2 Economic and social information

1. Occupation

1.1 Main Occupation

☐ 1. Farming

- ☐ 2. Trade
- ☐ 3. Employed
- ☐ 4. Community leader (leader of village, assistant)
- ☐ 6. Forest product harvester
- ☐ 7. Handicraft
- ☐ 8. Tourist guide
- ☐ 9. Other

1.2 Alternative occupation

Use the choice of 1.1

2. Average income and expense of per year

2.1 a. Income

- ☐ 1. 0-10,000 bath
- ☐ 2. 10,001 - 50,000 bath
- ☐ 3. 50,001 - 100,000 bath
- ☐ 4. 100,001 - 250,000 bath
- ☐ 5. > 250,000 bath

b. Expense

- ☐ 1. 0-10,000 bath
- ☐ 2. 10,001 - 50,000 bath
- ☐ 3. 50,001 - 100,000 bath
- ☐ 4. 100,001 - 250,000 bath
- ☐ 5. > 250,000 bath

2.2 Do you think your income is enough?

- ☐ 1. No
- ☐ 2. Yes

If it is not enough you

- ☐ 1. Do you get loan or borrow,

If so from where.....

What is the amount of money do get as loan or borrow..... bath

If you seek for loan, what is the purpose of loan.....

- ☐ 2. Not loan
- ☐ 3. Other.....

Part 3 Land use

1. Do you own land?

☐ Yes

☐ No

- If yes, what is the average size of land owned in "Rai"-----
- If no, do you rent land from others? ☐ Yes ☐ No and if you rent what is the average size in "Rai"-----

2. Do you want to expand your land?

☐ Yes

☐ No

- If yes, how would you want to expand it?-----

- If no, why-----

3. Have you ever wanted to change your land use pattern?

☐ 1. Yes

☐ 2. No

☐ 3. Uncertain

- If yes, what new things would you like to have/plant on your land?
(List).....

4. How much of your total land do you use?

☐ All

☐ 1/4 of the total land I have

☐ ½ of my total land

☐ Others (specify)

- If no why?.....

Part 4 Harvest and usage of forest resources

1. What kind of forest resources do you and your family harvest?

☐ 1. Harvest NTFPs

☐ 2. building materials

☐ 3. Fire woods

☐ 4. As the water resource

☐ 5. Herbs

() 6. Handicraft

() 7. Give the emotional support/ cultural/religious value

() Animal fodder

2. Harvesting of NTFPs

Kinds of NTFPs	Harvest for				Harvesting place			Quantity (kg.)		Setting price (bath/kg.)	Income (bath)	The frequency in harvesting per year
	Not harvest	for consumt	Harvest for sale	harvest but buy	sanctuary	Other forest	Garden	for consumt	For sale			
Vegetable and fruit.....												
Mushroom.....												
Fire wood.....												
Herb.....												
Handicraft material.....												
Bamboo shoot.....												
Other (Specify).....												

Part 5 Respondent's understands of the importance of forest

Understanding of the interviewee	Agree	Disagree	Uncertain
1. Help in provision of rain 2. Acts as water catchment and provide quality water. 3. Modifies temperature. 4. Source of food and herb. 5. Maintains soil humidity and store water. 6. Forest helps to prevent landslide. 7. Wind breaks function. 8. Forest helps to minimize the strong water current. 9. Forest helps to make the country to be more beautiful and to be a better place for relaxing. 10. Encroaching and destroying the forest is one of the factors that causes draught. 11. Lesser forest means lesser wild animals. 12. Without forest, human can still live their lives normally.			

Part 6 Participation in the forest preservation activities

Expectation of the benefits	Expected result		
	Possible	Uncertain	Impossible
1. Better living condition of an individual. 2. Better living condition of the community. 3. Better living condition for the children in the future. 4. The pride of preserving resources of the country. 5. Maintain of the forest in the community.			

Part 7 Preservation of forest resource in the community

Understanding of the interviewee	Agree	Disagree	Uncertain
1. It is the responsibility of the forest officers only in taking care of forest resources. 2. The declaration of the preserved area prevents villagers from making use of the land. 3. Participating in the forest preserving activities is a waste of time. 4. Those who illegally cut down trees without being seen by the officer are not considered against the law. 5. The government should allow people to make better			

Understanding of the interviewee	Agree	Disagree	Uncertain
<p>use of the sanctuary.</p> <p>6. The preservation of forest resource would be effective only when it was supported financially.</p> <p>7. Declaring the ownership of land in the sanctuary is considered illegal.</p> <p>8. There should be a training that informs the people about the importance and the benefits of forest resources.</p> <p>9. Successful forest resources preservation requires people participation.</p>			

8 Participation of the community in preserving forest resources

Participation of the community in preserving forest resources	Always	Sometimes	Never
<p>1. You cooperate with the government sector in preserving the forest.</p> <p>2. You cooperate with the government sector in the growing trees in the forest activities.</p> <p>3. you support the activity in preserving forest resources.</p> <p>4. When attending community meeting, you exchange your idea about preserving forest resource.</p> <p>5. You inform the officers if you see someone illegally cut the trees in the sanctuary.</p> <p>6. You help to set the rules of forest usage.</p> <p>7. You attend the meeting and are informed by the government sector about forest resources.</p> <p>8. You tell your children and make them see the importance of forest resources.</p> <p>9. You take the rare plants and grow in the community in order minimize the dependency on forest resources.</p> <p>10. You join the training activities regarding the preservation of forest resources.</p>			

Appendix B: Extended questionnaire

Harvest and usage of forest resources

1. What are the uses of the NTFPs you harvest?

- ☐ 1. Food
- ☐ 2. building materials
- ☐ 3. Fire woods

- ☐ 4. Herbs
- ☐ 5. Handicraft
- ☐ 6. Give cultural support
- ☐ 7. Animal fodder

2. Harvesting of NTFPs

Kinds of NTFPs	Harvest for		Harvesting place			Quantity (kg.)		Setting price (Bath/kg.)	Income (bath)	Frequency in harvesting per year
	for consumption	Harvest for sale	sanctuary	Other forest	Garden	for consumption	For sale			

3. Other than NTFPs what do use the forest/sanctuary for?

- ☐ Sources of water
- ☐ Timber
- ☐ Cultural/religious use
- ☐ Eco-tourism
- ☐ Hunting
- ☐ Charcoal

Appendix C: Resume of semi-structured interviews with key informants and villagers

Semi-Structured Interviews Results

*Interview with Village Headman***Table 1. Condensation and Compilation of Forest Management issues**

	Focus point	Responses from Respondents
1	Who own the Sanctuary and the forests	The Government of Thailand owns both the Sanctuary and the Forest reserve-
2	Management of the Sanctuary and the Forest reserve	The Royal Forest Department (RFD) manages the Forest Reserve Department of National Park Manages the wildlife sanctuary
3	Roles of villagers in forest and sanctuary management	Reporting illegal activities in both the sanctuary and the forest Fighting fire in case of out break The village Headman attends meetings organized by the sanctuary staff and report the outcomes to the villagers
	Aspiration of Villagers in forest management	The villagers are interested in managing the forest, particularly the forest reserve under the management of The RFD. They intend to apply for part of the forest reserve to establish community forestry.
4	Relationship between the villagers and the authorities	There is good relationship.
5	Agreement between villagers and the authorities concerning harvest of NTFPs	There is no written agreement concerning the harvest of NTFPs. However the authorities allow the villagers to harvest NTFPs for own consumption. They are however not allowed to cut trees and hunt in the wildlife sanctuary
6	Access rights	Villagers have access to the forest and the sanctuary to harvest NTFPS only

*Interview with the Village Headman***Table 2. Condensation and Compilation of Dependency issues**

	Focus Point	Responses from Respondents
1	Proportion of villagers who depend on NTFPs	Most villagers depend on the forest for NTFPs and water source
	Who depend most on NTFPs	The low income villagers Both women and men harvest NTFPS but honey are harvested by men only
2	Why do they harvested NTFPs	They harvest it mainly for own consumption (Vegetables and fruits) Others harvest for sale Some households harvest both for own consumption and sale.

3	Frequency of harvest	Between 3 to 10 times a year
		The frequency has reduced because majority of the villagers have domesticated most of the plants
4	Quantity of NTPFs harvested per month	The quantity harvested is not known to the village headman
5	Where the NTPFs are harvested	Wildlife sanctuary
		Forest Reserve
		Own gardens
6	Conflicts among harvesters over the resource	There is no conflict among the villagers over the resources. People are aware of the law and do not encroach the forests.

Interview with the Niyom Pari club member

Table 3. Condensation and Compilation of Forest Management issues

	Focus point	Responses from Respondents
1	Formation of the club	The club was formed in 2008
		It was formed mainly to resist the setting up of hotels in the area by investors with the aim of turning the area into a tourist stop point. Villagers believe that this would degrade their natural resources
2	Membership of the club	In total there are 13 members of the club
		1 woman and 12 men in the club
		Joining the club is voluntary but one has to be from the village with interest in conserving the natural resources in the village
		Youth are particularly encouraged to join the club
		Every member pays annual subscription of 100 baht.
3	Activities of the club	Preserving natural resources through sensitizing and training of the villagers
		Providing guided tours to tourists in the sanctuary and the water fall. They also link them to other villages with features of interest to tourist. All these are done at a fee.
		Encouraging villagers to grow their own trees, by getting seedlings from the forest in order to reduce pressure and their dependency on the forest resources
		Provide training to youth on natural resource preservation
		Participate in garbage collection and events like mother and father days
	Involvement of the club in the management of sanctuary	Sensitizing villagers on the importance of preserving the sanctuary
		Reporting illegal activities
		In case of fire outbreak, members of the club help in putting it off
4	Condition of the sanctuary in term	There is no sign of degradation of sanctuary. Instead the biodiversity richness in sanctuary has increased over the

	of biodiversity richness	years.
5	Measures taken by the club to protect the sanctuary	Sensitization of community. Reporting illegal activities. Fire control in case of out break
6	Access rights	Villagers have access to the forest to harvest NTFPs only

Interview with the Wildlife sanctuary chief.

Table 4. Condensation and Compilation of Forest Management issues

	Focus point	Responses from Respondent
1	Establishment of the sanctuary	The sanctuary was established in 1982
		Villagers did not resist the establishment as population was low and other forests were available for them to depend on
		Some of the lands for the establishment of the sanctuary were given by villagers
2	Ownership and management of the sanctuary	The sanctuary is owned by the Government of Thailand
		However the management is under the National park department
		The sanctuary is managed by 8 members of staff headed by the sanctuary chief.
		Due to limited number of staff and good relationship with villagers, they help in the activities of the sanctuary.
		Government soldiers help in providing protection to all forests including the sanctuary
3	Management objectives of the sanctuary	The objective of the sanctuary is basically to protect wildlife species from extinction or reduction
		These include both animals and plants species
		Limited number of tourists mostly under the guidance of Niyom Pari Club is allowed upon filling a form
		Provide training to youth on natural resource preservation
	Official rules that guide their activities	National Park and wildlife act,
4	Relationship between the authorities and the villagers	There is good relationship between the office and the villagers. The officers help the villagers in organizing social functions like wedding. The villagers on the other hand voluntarily participate in the activities of the sanctuary
5	Involvement of the Villagers in the management of the sanctuary	There is no official involvement of the villagers in the management of the forest
		However they report illegal activities in the sanctuary and

		control fire in case of out break
		Niyom Pari Club is involved in sensitizing the public on the importance of preserving the sanctuary as well as in eco-tourism activities.
6	Agreement with villagers concerning harvest of NTFPs	There is no formal agreement with the villagers concerning harvest of NTFPs. However informally they are allowed to harvest the NTFPs for own consumption
9	Adherence to the rules by the villagers	All the villagers are aware that the law does not allow them to log, establish plantation or hunt in the sanctuary and most of them do follow the law
		However a few of them still encroach particularly to log and hunt wild animals
10	Action taken to the offenders	Through the village headman they are warned and educated on the consequences of encroaching the wildlife sanctuary
		If the same persons continue encroaching for more than three times, they are then arrested and prosecuted in the court of law
11	Overlapping areas	26 household have their land located in the sanctuary. These households are from village 1 and 2
		They are allowed to establish rubber and palm oil plantation in the land they claim are theirs.
		For such a land to be valid as belonging to them, they must have been holding such land three years before 1998. This applies to all lands in Thailand

Interview with the herbalists

Table 5. Condensation and Compilation of Forest dependency issues

	Focus point	Responses from Respondent
1	Frequency of harvest	2 to 3 time a year.
		They collect enough and preserve them by drying. This then reduces the frequency of harvest
2	Uses of the herbal plants	Medicine- for treating human diseases
		Pesticide -for pest control
3	Places where the herbal plants are harvested	Sanctuary
		Forest
		However more is harvested from the sanctuary due to its richness in plant biodiversity.
		Own gardens
	How many people are involved in harvest of herbs	There are few herbalists in the village who collect the herbs from the forest. However, people from other villages come to collect them mainly for sale
4	Are the young	The young generation are not involved in the harvest of

	ones involved in harvesting herbs	herbal plants since they prefer modern medicine
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Interview with a villager who live very close to the sanctuary

Table 6. Condensation and Compilation of Forest dependency issues

	Focus point	Responses from Respondent
1	Access to the forest	Harvests NTFPs mainly from the forest next to his home
		He harvests seedlings of Pak leang and Pak naam for planting in his garden
		He also collects small building poles from the sanctuary without the permission of the authorities
2	Other sources of NTFPs	From his own garden.
		The sanctuary (seedlings)
2	Uses of the NTFPs	For his own consumption
		He sells the NTFPs (mainly pak leang) because it is a very popular vegetable in the village.
		Sell 3 bunches for 5bahts to middlemen who sell for 25 bahts in Krabi market and for 15bahts in the local market
3	Tree bank program	He has not joined the tree bank program
		Intend to join it in the near future as there is no cost involved
		The trees that he will plant through the program will help his children in future.
	Overlapped areas	The village is overlapped by two areas; the Forest reserve and the wildlife Sanctuary
		He has overlapped area in the forest reserve and the problem is that he has no certificate for the land
		Villagers are willing to claim the land that are overlapped by the forest and the sanctuary
		The forest department allows them to use the overlapped land for establishing plantation but one cannot sell it.
4	Community forestry Establishment	Villagers are willing to establish community forest in the forest reserve
		They want community forest for the provision of timber
5	Agricultural activities	The major crops are palm oil, para rubber, and coconut
		He earn approximately 30,000 bahts from his plantation adjacent to his home measuring 15 Rai and about 100,000 bahts from his rubber plantation which measure 9 Rai
		Other crops are vegetables and fruits
6	Relationship with the authorities	Relationship is good mainly because of regular communication, and flexibility in the law
	Credit facilities in the village	Para Rubber fund- provides credits to those who have old para rubber plantation for the purpose of replanting. However if your plantation is in the forest reserve, then you do not qualify for the loan

		Tree bank fund
		Village revolving fund

Interview with the middleman

Table 6. Condensation and Compilation of Forest dependency issues

	Focus point	Responses from Respondent
1	NTFPS she sells	Pak leang Pak waan Mushroom
2	Sources of NTFPS	From the wildlife sanctuary and forest reserve From her own garden Buys from other villagers
2	Where does she sell	In Kabi markets located in another province In the local markets
3	Quantity sold and the amount of money she gets	Between 200 to 300 bunches weekly She earns approximately between 2,000 to 3,000 bahts per weeks from the sale of NTFPS
4	The quantity she is allowed to collect from the sanctuary and the forest reserve	There is no restriction on the quantity she collects. They allows her to collect as much as she wishes as long as she does not cut the trees
	Availability of NTFPS	There is no decrease in the availability of the NTFPS in both the sanctuary and the forest. This is because people only collect leaves and fruits.
5	Overlap issues	Her land also overlap in the forest Most villagers have their lands inside the forest and the sanctuary
6	Tree bank	She is not yet a member of the tree bank program because she wants to learn the benefits from those who have so far joined the program Approximately ½ of the villagers have joined the program

Appendix D: Seasonal calendar NTFPs

[illegible]

Ma Dou	<i>Ficus sp.</i>	MORACEAE																
Ta Kob Pa	<i>Flacourtia indica</i> (Burm.f.) Merr.	FLACOURTIACEAE																
Luk wai	<i>Calamus godefroyi</i> Becc.	PALME																
Ma Phai	<i>Baccaurea ramiflora</i> Lour.	EUPHORBIACEAE																
Honey																		
Puk Gum	<i>Crateva trifoliata</i> (Roxb.) Jacobs	EUPHORBIACEAE																
Puk Kood	<i>Asystasiella neesisna</i> Lindau	ACANTHACEAE																
Puk Nam	<i>Asparagus racemosus</i> Willd.	ASPERACEAE																
Harvest																		
Sporatic harvest																		

Appendix E: Seasonal calendar crops

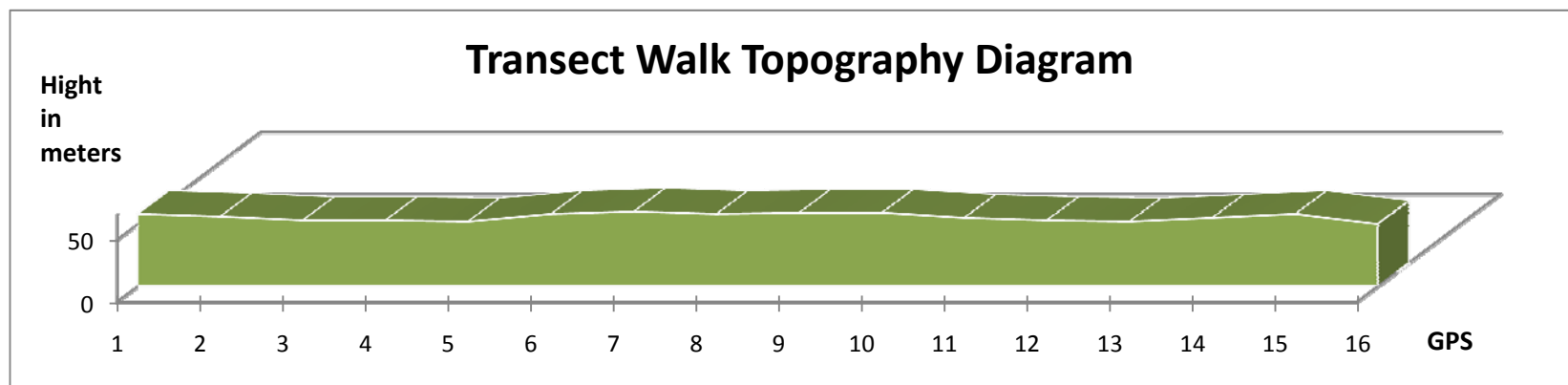
Name	Scientific name	Family	Jan	Feb	Mar	Apr	Maj	Jun	Jul	Aug	Sep	Okt	Nov	Dec
Rubber	<i>Hevea brasiliensis</i> (Wild. Ex A.Juss) Mull. Arg.	EUPHORBIACEAE												
Oil Palm	<i>Elaeis guineensis</i> Jacq.	PALMAE												
Mangostean	<i>Garcinia mangostana</i> L.	GUTTIFEREAE												
Jum Pa Da														
Jack fruit	<i>Artocarpus heterophyllus</i>	MORACEAE												
Ra Gum														
Sa La														
Longong														
Rambuttan	<i>Nephelium lappaceum</i> L.	SAPINDACEAE												
Durian	<i>Durio zibethinus</i> Merr.	BOMBACACEAE												
Banana	<i>Musa sapientum</i> L.	MUSACEAE												
Mark	<i>Araca sp.</i>	PALMAE												
Black pebber	<i>Piper nigrum</i> L.	PIPERACEAE												
Plu	<i>Piper betle</i> L.	PIPERACEAE												
Growing														
Harvest														
Harvest less intensive														

Appendix F: GPS results

A village map has been made to show the location of the wildlife sanctuary in comparison to the village. On the simple map version it is possible to see the borders of the sanctuary and the village. Also other places of interest made by GPS measuring and plotted into the map. The version with the colored GIS map in the background also shows the topography and location of the village forest and the wildlife sanctuary forest. There you can see that the village actually continues a bit onto the sanctuary. GPS marks from the transect walk has been plotted in as well. you can see that the transect walk cover a good range of the village, almost from one end to the other.

The information from the transect walk help us to give us a better understanding the area. The transect walk shows the various types of agricultural activities in the ages of the different plantations. On the table from the transect walk we can see that the main agricultural products are oil palm and rubber plantations. Corresponding well to the information we got from our village map and seasonal calendar, which both are made by the villagers. We see that the level of cultivated area is high and the plantations are intense and well maintained. Weed control is practised in more or less all plantations shows that the amount of work that they put into the plantations is high. The plantations we went through are relatively young, 10 years or less. This shows that plantations like rubber are renewed regularly to keep up the high production. Soils along the transect walk all seemed to be red and loamy soils without any bigger rocks, a typical tropical soil.

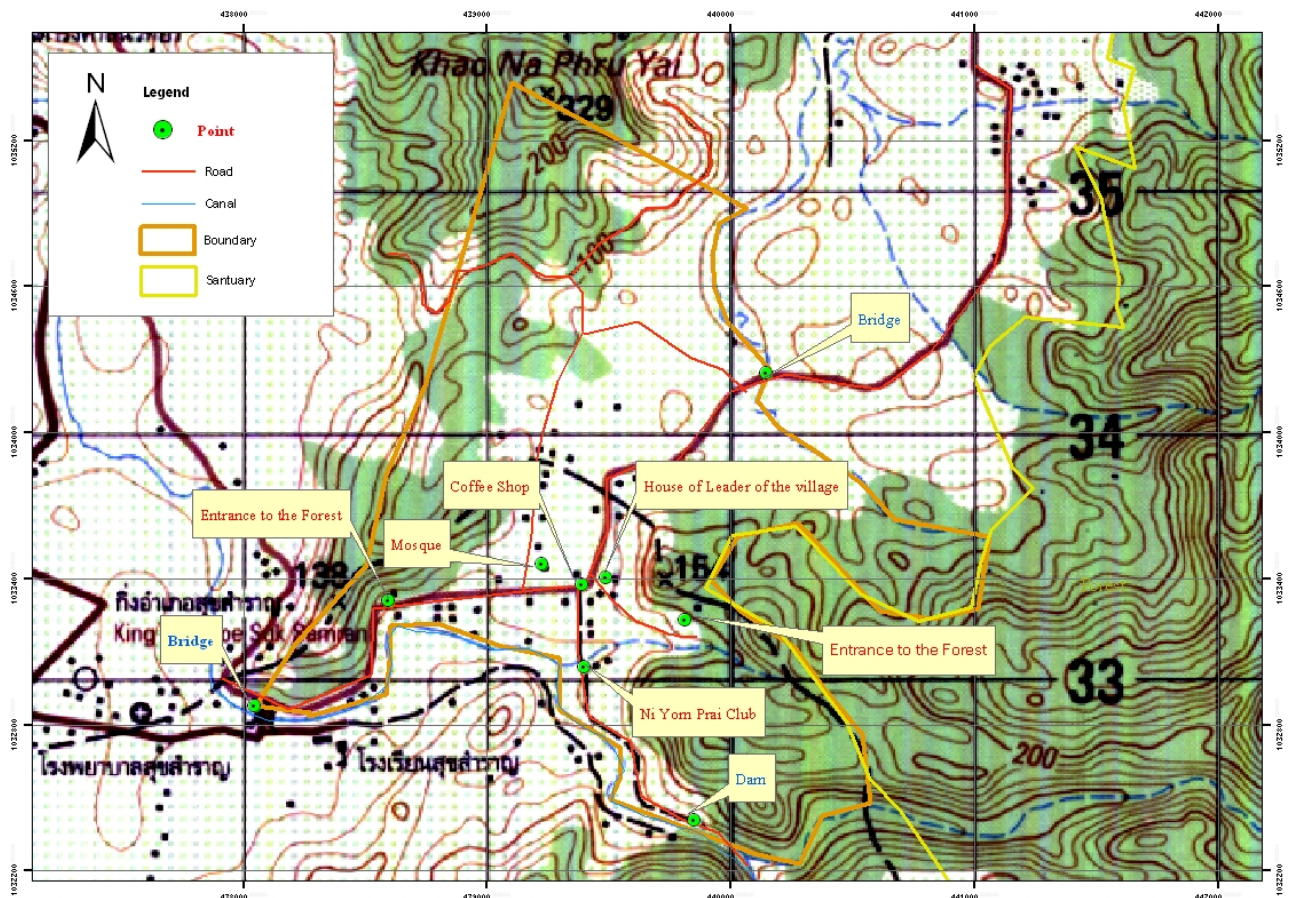
About the typography we can see that the area is very flat in easy to cultivate. At one place only we saw a slope with erosion control with strips of grass along the contour lines.



GPS #	Land use	Soil	Vegetation	Age	Topography	Comments
1	Free area	Gravel red soil	Short scattered grass		Flat	Villagers want to make it to a sports area
2	Oil palm		Thick grass cover	1 to 2	Flat	Producing fruits. Between oil and rubber there was a seasonal creek, with bamboo vegetation
3	Rubber	Red loamy soil	Short grass, well maintained	3,5	Slope	used to be fruit farm, but changed because of unsuitable weather with too much rain
4	Mangosteen			-		Few trees between the rubber plantations
5	Mixed garden		Pepper, banana, mango- steen, rambutan...	-	Flat	Well for underground water for HH consumption
6	Rubber	Red loamy soil	Short grass, well maintained	6	Flat	Bacterial control with natural pesticides from beetle shell
7	Mixed garden		Rambutan	-		
8	Forest	Red loamy		-	Flat	Bamboo, rubber and mushroom beds, less

soil		intensive			
9	oil palm	Tall grass	3	flat	
10	Mixed garden	sparse grass vegetation	-		Bamboo and mushroom beds
11	Rubber	sparse grass vegetation	10	Slope	Closed tree canopy
12	Oil palm	Red loamy soil	tall grass	2 to 3	Slope
13	Mixed Oil palm and rubber	Short grass / thick vegetation	>1 and older		Oil palm plantation on both sides of the road. Thick vegetation in the first part, short grass on the second one. Rubber trees scattered around.
14	Rubber	Short grass	4	Slope	Strip grass along the contour lines for erosion control
15	Oil palm	Red loamy soil	Cleared for vegetation	3	slope
16	Rubber	Short grass		Slope	walking along the street

GPS map of the Ban Tone Kloy including marks of places of interest



GIS map with village forest and sanctuary.

Appendix G: Key points from the village meeting

As a part of our research we attended the village meeting, that are held every other Saturday. On the village meeting we got important information about what is going on in the village and what kind of current problems they have.

Problem	Solution
Shortage of drinking water	Restrictions on the use of water. Fine up to 300 baht for letting the water run when they are not using it. Every household pays 20 baht for water pipe repair.
Foreign labor from Myanmar causing problems	<p>Thai people that use foreign labor have to stick to the restrictions and precautions made for Burmese people, such as:</p> <ul style="list-style-type: none"> • <i>They can't go out after 7 pm</i> • <i>They don't have right to a cell phone</i> • <i>They can't drink alcohol</i> • <i>They can't drive a motorbike</i>
Increasing use of drugs	Parents should take more care of their children
Illegal tree logging causing problems in the sanctuary	A reminder that tree logging will be punished with jail
Poverty	A new information project concerning crops and income is on the way for inspiration
Natural disasters <ul style="list-style-type: none"> • <i>Quakes</i> • <i>Tsunami</i> • <i>Wild fires</i> 	The village leader refers to the information center in the district, to gain knowledge of how to deal with these situations. He also made it clear that forest clearing by fire is not legal in case of forest clearing, other methods has to be used.

Appendix H: Final Synopsis

Exploring the Sustainability of the Current Level of harvest of NTFPs by the Villagers in Klong Naka Wildlife Sanctuary



Final synopsis of SLUSE field course,
Interdisciplinary Land Use and Natural Resources Management
Faculty of Life Sciences, University of Copenhagen
24.02.2010

Alex Oloya Otenya, Allan Højgaard Jensen, Gertrude Badaru and Cecile Gallet

The purpose of this course is to improve the student's skills in interdisciplinary field work, learn and use methods for data collecting in real life situations. Groups of students with different backgrounds are mixed together and are given one village or study area each.

Study area

Our case study will take place in the village called Ban Tone Kloy in the Ranong province, Thailand. It is approx. 10 degrees north of the Equator in the tropical part of Southeast Asia. It is close to the coast which means that the climate is tropical coastal climate. Because of that, temperatures are warm and pretty stable throughout the year. There are two main seasons consisting of a dry and a wet season. The wet season starts in May and lasts until November. Temperatures are usually a bit higher during the dry season. Precipitations are very high and exceed 4000 mm/y. Soils in the area and surroundings are likely to be oxisols or ultisols, poor in nutrients, with content of iron and aluminum which give tropical soils their typical red colour (FAO, 2010). Due to the nearby mountains and slopes in the area there is a higher risk of soil erosion. The soil erosion will depend on the vegetation cover e.g. forest, crops or no vegetation.

It is a small village with only 284 inhabitants placed in 65 households. It is spread out over an area of 6710 acres (Basic Information Report, Ranong, 2009). The common practiced religion in Thailand is Buddhism, though some parts in the South are Muslim as well. There are several groups in the village, serving different purposes. Some examples are groups that are organizing selling of products to the market, and a weaving group. Also initiatives for forest protection have been established, and the group Niyom Prai works for the protection of the forest and ecotourism (Basic Information Report, Ranong, 2009).

An important income for the village is agriculture. The majority of the villagers are involved in the rubber industry. Cassava is also an important crop for the village. Cassava is possibly both for own consumption as well as for exporting. A number of houses support their income with mixed household farming which typically consist of a big variety of crops for own consumption. Yet another important part to support income is the harvest of natural resources, which can be found in the surrounding land area. A great deal of these resources comes from the forest in the wildlife sanctuary located nearby the village. The wildlife sanctuary is a protected area, where there are rules against removal of the resources from the area. These rules count for normal timber as well as non timber forest products (Basic Information Report, Ranong, 2009).

The wildlife sanctuary was established in 1972, even before the village founded. At the moment of writing there is no information about where the villagers lived before the establishment of the sanctuary. Ten villagers are now directly or indirectly connected to the sanctuary as staff members or similar, which is one of the possible reasons for the apparent good collaboration between those two groups (Basic Information Report, 2009).

According to our given information, the official sanctuary rules are not followed in common practice. Some of the villagers, perhaps on the basis of an agreement between them and the sanctuary authority, are collecting resources which under normal circumstances should be left in the sanctuary. It seems that a group of villagers, the Niyom Prai Club, are trying to

protect the forest, but nobody has made any research in this area. Information is needed to see if this way of using the forest is sustainable (Basic Information Report, Ranong, 2009).

Problem definition

Forests in Thailand are highly diverse and can provide a whole range of resources for the local people (Fisher et al., 1997). The harvest of non timber forest product is a traditional activity for local Thai people and in Northern Thailand is carried out by up to 80% of households (Boonchote and Pasandhanatorn, 1998). Generally, the uses of NTFPs vary a lot, going from medicinal purpose to source of energy. The reliance on these products is well known, as it can reduce their expenses on food for example and provide an alternative source of income if the NTFP is sold (Fisher et al., 1997).

Related to land use, the harvest of NTFPs is being considered more sustainable than logging, as the forest-like structure is maintained (Michael Arnold and Ruiz Pérez, 2001). Also, in comparison to other land uses, forests managed for NTFPs harvesting can maintain a large biodiversity of both plants and animals (Michael Arnold and Ruiz Pérez, 2001).

However, even though NTFPs can be considered renewable resources, the amount and frequency at which they are extracted can exhaust them and thus have an impact on their long term availability and on the area where they are harvested (Hall and Bawa, 1993). The factors which can influence the quantity and frequency of the harvest of NTFPs are for example their economic value, the access to market, the size and closeness of the village harvesting in the forest (Karanth et al., 2006). The decrease in yields of NTFPs has been observed in different studies (Hall and Bawa, 1993; Michael Arnold and Ruiz Pérez, 2001) and different explanations have been pointed out, notably the impoverishment of the genetic diversity, the competition between humans and animals on the forest resources which puts pressure on the forest and the prevailing presence of plants and animals with high regeneration abilities (Boot and Gullison, 1995; Hall and Bawa, 1993; Peters, 1994).

It is thus important that the harvest of NTFPs be done in a sustainable way so that the local people do not have to face the depletion of these resources and to minimize the impacts of the environment.

This issue of sustainability is especially relevant in regions where the harvest is done in protected areas, which main goals are to preserve the biodiversity and ecosystem. Nowadays, almost 25% of the Thai territory is under protected territories (Trisurat, 2007). Unfortunately, the matter of the people living in the forest before the creation of the protected areas has not been considered as a top priority and most of them have been displaced and relocated elsewhere (Ghimire, 1994). Furthermore in Thailand, where the government is centralized, the management of protected areas is exclusionary and takes little into account the needs and knowledge of the villagers living around it (Nepal, 2002). The rules and access rights are often strict, so as the regulations about the harvest of NTFPs. In Ban Tone Kloy however, the relation between the sanctuary authority and the villagers seems to be good, and the sanctuary authority lets the villagers harvest NTFPs for their own consumption.

The following question then arises: to which extent is the harvest of NTFPs from the wildlife sanctuary by the villagers from Ban Tone Kloy sustainable?

By sustainable harvest we mean:

The harvest of NTFPs from the wildlife sanctuary in such ways that it will not decrease the base of these NTFPs itself so as to meet the current and long term needs of the villagers and that it will not compromise the forest ecology in the areas where the NTFPs are harvested.

Objective

1. To establish how the sanctuary is managed
2. To assess the ecological impacts of the harvest of NTFPs from the sanctuary
3. To determine the level of dependency of the villagers on NTFPs

To narrow down our focus, we will investigate only on five NTFPs, which will be determined through a ranking exercise done with the villagers.

Definitions of Terms

Non Timber Forest Product (NTFPs):

It encompasses all forest species other than tree parts used for timber, e.g. rattan, mushrooms, medicinal plants. Its potential is to support not only the subsistence need of the community but also to offer commercial opportunities which will provide reliable source of income (FAO, 2004).

Wildlife Sanctuary:

It is an area specially designated to preserve wildlife. There it is illegal to interfere in anyway with the natural life i.e. hunting, shooting, and fishing is prohibited.

Methodologies

Different methods will be applied to the research question in order to generate relevant data. The study will use both quantitative and qualitative data collection methods according to the suitability of each and taking into consideration time limitations. Specifically, the following methods will be used during data collection process.

4.1. Semi structured interview with key informants.

Semi-structured interview will be conducted to generate mainly qualitative data to support and enhance the quantitative data expected to be generated through questionnaires. Due to time limitation, only four semi structured interviews will be done with persons having different responsibilities in the village: the wildlife sanctuary administrator, a park ranger, the local leader and the group leader of the Niyom Prai Club.

The semi structured interview will mainly be to generate information on:

- Institutional arrangements such as the sanctuary ownership, the regulations on how the sanctuary resources are managed, the collaboration between the sanctuary authority and the villagers, and access and user rights
- Measures taken both by the sanctuary authority and the villagers to protect the sanctuary
- Characteristics of the harvest of NTFPs
- Changes in the forest's structure and ecology

4.2. Questionnaire:

The largest data set will be gathered through the use of a structured questionnaire. The questionnaire will be devised to provide a mixture of both quantitative and qualitative data. The questionnaires will be administered to 16 households involved in the harvest of NTFPs. The questionnaire will be used to generate information on household characteristics, livelihood sources, NTFPs and parts being harvested, intensity of the harvest, reasons for harvesting and methods of harvest.

4.3. Participatory Rural Appraisal

4.3.1. Transect Walk

Transect walks through the wildlife sanctuary will be conducted to get information on; the general condition of the sanctuary, the different ecological niches within the sanctuary, the dominant non-timber forest product species, location within the sanctuary where harvest of the NTFPs is being carried, methods of harvesting NTFPs, parts of trees being harvested, why do they harvest and illegal activities in the sanctuary. The transect walk will be organized to include the participation of selected villagers who are involved in the harvest of NTFPs in the sanctuary, sanctuary field workers and individuals knowledgeable about the activities in the sanctuary. During the walk three to four persons will be requested to take note which shall be used during the drawing of transect diagram and the discussion sessions. During the transect walk, areas in the forest where NTFPs are being harvested are will be located using GPS.

4.3.2. Focus Group Discussion

Semi-structured discussion group will be facilitated with 8 villagers knowledgeable about the socio-economic and environmental situations in village and are actively participating in the harvest of NTFPs. The purpose of the focused group discussion will be mainly to identify the different species of NTFPs being harvested and to prioritize about five major ones for this study. A ranking exercise will be done with the 8 villagers in order to prioritize the 5 major NTFPs. During the FGD, we will also ask some of the elderly villagers about the changes which might have occurred in the sanctuary over time.

4.3.3. Seasonal Calendar

Additional information will be generated through a PRA tool called seasonal calendar. Different groups of 8 villagers will be mobilized for the exercise. They will be requested to

describe primary activities in the different seasons or months of the year. Seasonal calendar is expected to generate information on livelihood tasks and to categorize responsibility by season, gender, age and the intensity of the activity. It is expected to specifically generate information on which months or season of the year harvest of NTFPs is highest and why.

4.3.4. Participatory resource mapping:

Participatory resource mapping will be conducted basically to gain an understanding of the resource availability in the village and their location. The mapping will be done with the villagers present during the seasonal calendar activity. The location of the sanctuary relative to the village will also be mapped.

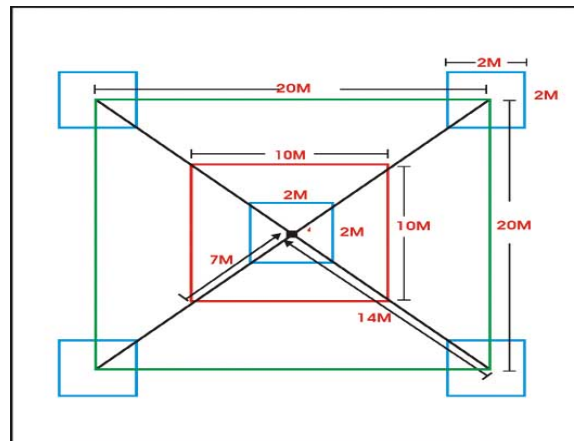
4.4. Rapid Forest Assessment (RFA)

During the forest assessment, locally important plant species will be identified with the help of local knowledgeable persons (villagers and the forest rangers or forest guards). Given the mobility of the animals within the sanctuary, a listing of these will not be possible to generate. We will then limit ourselves to record the wildlife activity we will observe while working on the RFA. Due to limited time, 6 plots in the area under consideration will be selected and in each of the selected plots, a quadrat of 20m x 20m will be laid out in the centre and in this quadrat all tree species above 20cm DBH will be enumerated. Within the 20m x 20m quadrat another 10m x 10m nested quadrat will be laid out and tree species of less than 20cm DBH will be enumerated. Finally in the center of 20m x 20m quadrat and at its four corners small quadrates of 2m x 2m will be laid out and ground vegetation recorded. On the basis of the above exercise the following parameters will be developed using standard formulae; (Assessment of NTFPs in People's protected areas by Khane el at, 2003)

- density of trees, saplings/shrubs and ground flora
- frequency of trees, saplings/shrubs and ground flora
- basal area of tree species,
- abundance of ground flora
- list of plant species and their common uses

Since the objective of the assessment is to find out the effects of the harvest of NTFPs on ecological sustainability of the forest system, three plots will be selected from harvested parts of the forest and three from non-harvested system and comparison of the results will be made based on the above parameters.

Laying of Quadrates (not to scale)



(Source: Khane el at, 2003)

4.5. Nutrient flow estimation in harvested and non-harvested parts of the forest

From the four plots identified for the RFA, (2 plots from harvested parts of the forest and 2 from areas which are not being exploited) soil samples will be taken using random sampling method to determine pH, organic matter content (OM) and nutrient status NPK. Information from the random sampling method will be used to generate data which will be used to compare the differences of nutrient and organic matter variation in the two zones (harvest and non-harvested parts of the forest). Description of each identified plots in regard to human activities will be noted.

4.6. Secondary data

The study will involve review and analysis of secondary information from wildlife sanctuary offices and information posted in Absalon by the study supervisors and many searches from internet.

4.7. Trip to the Market.

We are going to look at the availability of the NTFPs and assess their economic value. The trip will help to find out how far the market is from the village.

Coding, data entry and analysis

Data coding will be done for questions that are not pre-coded and data will be entered, cleaned and analyzed using excel sheet. Percentages and means will be generated for the key variables and cross tabulations will be done for the purpose of comparison of Data. Texts recorded during the interviews will be discussed, condensed and compiled into short forms and categorized in different themes by research team.

Proposed Schedule:

Date Activities	10.0 3	11.0 3	12.0 3	13.0 3	14.0 3	15.0 3	16.0 3	17.0 3	18.0 3	19.0 3	20.0 3	21.0 3
Introduction to Thai group												
Introduce ourselves and project to local leaders and forest authorities												
Conduct pilot test of the questionnaire												
Focus group discussion and ranking												
Semi structured interview with sanctuary administrator												
Semi structured interviews with forest ranger												
Semi structured interviews with local leaders												
Semi structured interview with Niyom Prai group leader												
Seasonal calendar and village mapping												
Questionnaires with the villagers												
Transect walk												
GPS site location												
Rapid forest Assessment (2 plots per day)												
Soil sampling												
Visit to the local market												
Debriefing with the villagers												

The group will meet every evening to discuss the daily activities and appoint the each member to a task.

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Appendix A. Matrix of methods

Objective	Question	Method	Purpose	Limitations
To establish how the sanctuary is managed	What are the management objectives?	Semi structured interview with the park administrator	To find out if the sanctuary is managed only for conservation purposes	Park management plan may be written in Thai. The responses from the administrator might be bias.
	What are the official rules that guide the staff's activities?		To get an overview of the rules	
	Is there any agreement between the villagers and the sanctuary staff concerning the harvest of NTFPs from the sanctuary?		To find out if harvesting NTFPs is legal or not. Find out if they have any agreement and if yes, specify the rules of that agreement.	
	How are the relations between the sanctuary staff and the villagers?		To see if there are any problems between park staff and villagers, and if the villagers are involved in the management.	
	What measures does the sanctuary staff has in place to protect the wildlife sanctuary?	Semi structured interview with the park ranger	To find out what measures the park staff has to enforce the rules, and if they can control any illegal activities	
	Do the villagers have any role in the management of the sanctuary?	Semi structured interview with the village leader	To see if the villagers' inputs and knowledge are taken into account.	
	What are the activities of the group in regard to the protection of the sanctuary?	Semi structured interview with the Niyon Prai group leader	To know if they are involved in the protection of the sanctuary and to which extent.	

Assess the impacts of the harvest of NTFPs	Are there any signs of forest degradation?	Semi structured interview with the park ranger	To see if the extraction of NTFP is degrading the forest	There might not be a significant difference. Identification of species We might not find untouched forest. Villagers don't want to reveal or don't know the amount and how often they harvest.
	Are there any signs of forest degradation?	Semi structured interview with the group leaders	To see if the harvest of NTFP is degrading the forest	
	What, where and how are the NTFPs harvested from the sanctuary?	Questionnaires for the villagers	To get an overview of the harvested products	
	How much and how often do the villagers harvest of these NTFPs as compared to 5 years ago?		To see the availability and intensity of NTFPs over time	
	Where and how is the harvest done?	Transect walk	To locate harvested areas, and set GPS marks points at them to generate a GPS map. To see how the harvest is done and by whom. Locate our plots for RFA. Take soil samples at the plots for RFA. To find illegal activities	
	Are there any signs of forest degradation?	Rapid forest assessment	To compare plots from harvested and non-harvested sites, in terms of structure.	
	Are there any signs of soil degradation?	Soil sampling	To compare plots from harvested and non-harvested sites in terms of NPK, pH & OM depletion	
Level of	What are the most	Focus group	To identify and rank the	The focus group might

dependency of the villager on NTFPs	important NTFPs harvested from the sanctuary?	discussion	major NTFPs harvested by the villagers	not be representative of the entire village.
	Why do villagers harvest?	Questionnaires for the villagers	To get an overview of the villagers' dependency on NTFPs	
	Are the products the villagers harvest in the sanctuary available elsewhere?			
	Who depends most on the NTFPs?	Semi structured interview with the local leaders	To know how the needs are related to income status, gender and age	
	Are there any conflicts related to limitations of NTFPS from the sanctuary?		To see if there is any competition between the villagers	
	How do the activity, availability and harvest differ throughout the year?	Seasonal calendar	To find out the intensity of activity in different seasons and by who	
	Where are the resources located within the village?	Village mapping	To location of the village boundaries relative to the forest and resources.	
	What kind of NTFPs are to be found at the market, and what are the prises?	Visit to the market	To estimate the economic value and availability of the NTFPs.	

Appendix B. Guidelines for Semi Structured interviews

B. 1. Semi structured interview with the village leader:

1. What is your role in the village?
2. Who owns the sanctuary?
3. What do you know about the management of the sanctuary?
4. Do the villagers have any role in the management of the sanctuary?
5. Do the villagers aspire to participate in the management of the sanctuary?
 - If yes, in what ways?
6. How are the relations between the villagers and the park authorities?
7. Is there an agreement between the villagers and the park authorities concerning the harvest of NTFPs in the sanctuary?
 - If yes, what kind of agreement?
 - Is there a cost associated with the agreement?
 - If no, do villagers seek permission from the park authorities to go harvest?
8. What proportion of the villagers harvest NTFPs from the sanctuary?
9. Who depends most of NTFPs harvested from the sanctuary?
(socio economic status, gender, age)
10. Why do they depend on it?
11. Who collects most?
12. How often do villagers go harvest in the forest?
13. How much do they harvest?
14. Where else than in the sanctuary can they get the NTFPs?
15. Are there any conflicts between the villagers related to the harvest of the NTFPs?

B. 2. Semi structured interview with the park administrator:

1. When was the park established?
2. Who owns the park?
3. What are the management objectives?
 - *We will request for the management plan*
4. What are the official rules that guide your activities?
5. How are your relations with the villagers?
6. Are the villagers involved in the management of the sanctuary?
 - If yes, in what way?
 - Is there a cost associated with the agreement?
 - If no, do you plan to involve them?
7. Do you have an agreement with the villagers concerning the harvest of NTFPs from the sanctuary?
 - If yes, what kind of agreement? How do you control the harvest?
 - If no, do villagers seek your permission to go harvest NTFPs in the sanctuary?
8. Do villagers follow the rules from the agreement?
 - If not, what actions do you take?

Are you aware that villagers are harvesting NTFPs in the sanctuary?

B.3. Semi structured interview with the park ranger:

1. What are your weekly activities in the sanctuary?
2. What are your responsibilities?
3. What are the dominant species (plants and animals) in the sanctuary?
4. Are there any species that are less present or extinct compared to 10 years ago?
5. Do villagers harvest NTFPs in this forest?
6. If yes
 - i. Is it legal or illegal?
 - ii. Has the number of harvesters increased as compared to 10 years ago?
 - iii. How often do they come to harvest?
 - iv. How much do you allow them to harvest? Give an approx. number
7. What measures do you have in place to prevent illegal activities?
8. What do you do when you encounter encroachers?
9. Are there any signs of forest degradation?
 - If yes, what are they?

B.4. Semi structured interview with the group leader:

1. How long ago was the group formed?
2. How many members does the group include? (gender, age...)
3. What are the activities of the group?
4. Is the group involved in the management of the sanctuary?
 - If yes, in what ways?
 - If not, do you aspire to participate in its management? In what ways?
5. Are there any signs of forest degradation?
 - If yes, what are they?
6. Are there any species that are less present or extinct compared to 10 years ago?
7. What measures do you take as a group to protect the sanctuary?

Appendix C. Questionnaire for villagers of Ban Tone Kloy:

Questionnaire number: _____

Date: _____

Name of group members: _____

Name of translator: _____

We kindly ask you to help us answering this questionnaire. Your answers will give us a big help in our further work, and will only be used in our research and. Your respond will not be given to any third part. We are all students from different Universities in Denmark, France, Uganda and Thailand within the field of development. We really appreciate your help.

1. Name (optional): _____

2. Occupation: _____

Male

Female

3. Sex: ☐ ☐ 4. Age: _____

5. Level of education: _____

4. Number of people in the household: _____

5. Average land size belonging to the household: _____

6. What is your average income level per month?

1,001-5,000 baht	
5,001-10,000 baht	
10,001-15,000 baht	
over 15,000 baht	

7. Please rank from 1 to 6 which of these activities contribute most to your household income (1 being the largest contributor and 6 the lowest)

Agriculture	
Fishing	
Sale of NTFPs	
Handcraft	
Remittance	
Others	

8. How many different NTFPs do you collect from Klong Naka wildlife sanctuary:

9. Of these, which are the 5 ones that you harvest most?

- 1) _____
- 2) _____
- 3) _____
- 4) _____
- 5) _____

10. How much of these do you harvest per year? Approx. amount

- 1) _____
- 2) _____
- 3) _____
- 4) _____
- 5) _____

11. What are the uses of the collected NTFPs?

Product Uses	1	2	3	4	5
Energy					
Human consumption					
Medicinal					
Building material					
Handcraft					
Furniture					
Religious use					
Animal fodder					
Other					

12. What is the purpose of the harvest?

Product Purpose	1	2	3	4	5
For own consumption					
To sell					
Both					

13. Who collects NTFPs in this household: _____

14. At which stage of growth do you harvest these NTFPs?

Product Stage	1	2	3	4	5
Seedling					
Sapling					
Fully grown					
Dead plant					

15. What part of the plant do you harvest?

Product Plant part	1	2	3	4	5
Whole plant					
Root					
Stem					
Leaves					
Flower					
Bark					
Sap					
Fruits					
Other					

16. How much do you harvest of these NTFPs compared to 10 years ago?

Product Amount	1	2	3	4	5
Much more					
More					
The same					
Less					
Much less					

17. How is the availability of NTFPs compared to 10 years ago?

Product Availability	1	2	3	4	5
Much better					
Better					
The same					
Worse					
Much worse					

18. How far in the forest do you need to go to find these NTFPs as compared to 10 years ago?

Product \ Distance	1	2	3	4	5
Much further					
Further					
No change					
Closer					
Much closer					

19. How many times do you go harvesting each of these products per month?

1	2	3	4	5

20. Has the number of villagers that harvest in the sanctuary changed, compared to 10 years ago?

Increased ☐

No change ☐

Decrease ☐

-Are any of the products you harvest in the sanctuary available elsewhere: _____

Market ☐

Own garden ☐

Other forests ☐

Other villages ☐

Other: _____

Product \ Location	1	2	3	4	5
Market					
Own Garden					
Other forest					
Other village					
Other					

Appendix D. Guidelines for PRA:

D.1. Focus Group Discussion and ranking

Time: Two hours

Purpose:

To generate list of NTFPs harvested by the villagers, rank 5 most harvested and get an overview of the harvest.

Process:

Ask the following questions before ranking;

1. What are the different NTFPs that you harvest in the sanctuary?
2. Why do you harvest them?
3. Who harvest these NTFPs?
4. Are these NTFPs found elsewhere other than the sanctuary? If yes, where?

We will then ask them to rank 5 NTFPs they considered most harvested by the villagers.

Questions for informal talk with elderly people during FDG

What major changes in forest conditions have occurred over the years?

Ranking exercise

Purpose:

It will help to identify the most collected NTFPs for different groups of people in Ban Tony Kloy village according to income status, gender, age and employment. A quick overview of who depends more on NTFPs, and see which purposes the products are most used for.

D.2. Seasonal Calendar

Time: Three hours

Purpose:

To find out the major activities relating to harvest of NTFPs in the different seasons/months and categorise roles according to gender and age.

Material:

We will need flip chart and markers for drawing the calendar

Process:

1. Ask participants to describe the primary activities from harvest of NTFPs to final use in each season/month
2. Ask one participants to record the identified activities on the flip chart
3. Ask for the intensity of the harvest (heaviest or sporadic).
4. Ask who is responsible for each activity
5. Repeat this process for all the 5 ranked NTFPs and the ask volunteers to present the information for discussion using the following question

- Who have your activities changed over time? Why?
- How has participation of women/men changed over time? Why?
- Has the availability of NTFP in the sanctuary increased or decreased? Why do you think the availability has changed

Example of Seasonal Calendar indicating activities from harvest up the final use

Activities	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec
Harvest												
Processing												
Selling												
...												

Heavy
 Sporadic

Men
 Women

Boys
 Girls

D.3. Participatory Resource Mapping

Time: Two hours

Purpose:

Depict the village with its resources and assets as well as their location (Natural resources like Sanctuary, any other forests, water sources, Mountain, Lakes and rivers; assets like, roads, schools health centre, market, recreational and community facilities). Location of the sanctuary and its relative distance from the village will be included in the village map.

By water sources we mean, boreholes, protected springs/wells, shallow well where villagers fetch their drinking water

Material:

Flip chart and marker pens

Process:

- Ask women and men to draw the village map separately either on the ground or on a flip chart, indicating location of all the resources and assets available in the village. The map should include the wildlife sanctuary and its relative distance from the village.
- Ask the groups to present their maps to plenary
- Allow the two groups to discuss and agree on point of departure and eventually draw a final village map and the chart.

D.4. Transect walk

Purpose:

Identify and analyses the different characteristics of the village and the wildlife sanctuary.

Persons needed:

For the transect walk and diagram drawing we need at least two knowledgeable persons : 1-2 person(s) harvesters that knows the forest well and a forest ranger which works in the forest and knows about the activities within it.

Tool and materials:

- GPS
- Compass
- Plastic bags with labels
- Soil urger
- pH equipment
- Camera
- Hoes
- Machete
- Notebooks/textbooks
- Flip chart

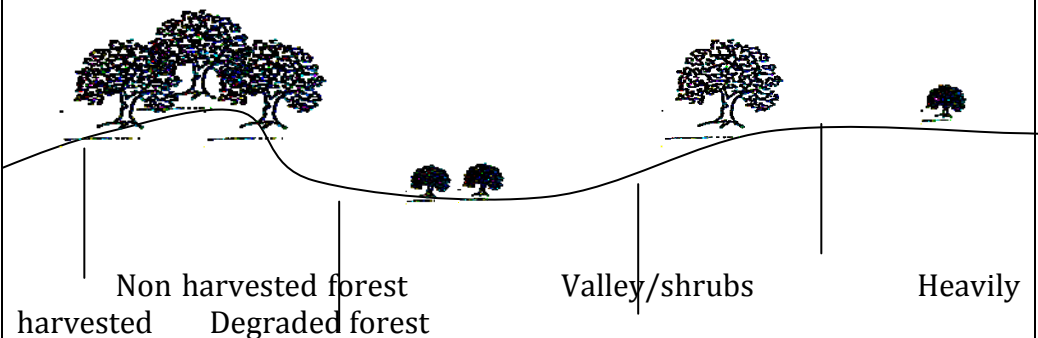
Working guide

The distance should be long enough to get a good overview of the area investigated. This means we will need 3-4 hours to get a fair idea of the sanctuary. The route can be decided on the basis of the community map and in cooperation with locals. When planning the route, it is essential to include the biggest ecological variety as possible.

It is important not hurry but to observe along the way and pay maximum attention to what the locals point out and comment. The transect walk should end up with a transect diagram, based on what we remember and the notes taken.

Transect diagram

In case more details is needed, more than one transect diagram will be made.

Transect diagram							
Terrain of the route							
Identification of harvest areas (RFA & SS)							
Identification of non harvested areas (RFA & SS)							
Identification of NTFPs being harvested							
Methods of harvest							
Parts being harvested							
Illegal activities							
Infrastructure							
Problems							
opportunities							
Potential solutions							

Appendix E. Inventory sheet for RFA:

Inventory sheet for trees

Plot type.....		No		
Tree No.	Species Name	DBH1	DBH2	Uses of the tree
Total No.....				

1. Description of the quardrat:
2. Location:
3. Terrain condition
4. Animal activities
5. Illegal activities noted

Inventory sheet for sapling/shrubs

Plot type.....		No		
sapling no.	Species Name	DBH1	DBH2	Uses of the sapling
Total No.....				

Inventory sheet for ground vegetations

Plot type.....		No
Name of the species	Frequency	Uses

Appendix F. Worksheet for soil sampling:**Soil sampling**

Soil sampling will be done from 4 of the 6 selected forest plots for RFA. The methods used for the soil sampling will be random sampling from the 4 sites.

The procedure in test 1 is to take five samples from each of the four plots. The five samples are then mixed together and one test is done for each of the plots, see illustration below.

Test 1						
Location	Depth	pH	Organic matter	Nitrogen	Phosphorous	Potassium
NHF*1	0-20 cm					
NHF2	0-20 cm					
HF*1	0-20 cm					
HF 2	0-20 cm					

Test 2, each of the five samples for each plot will be analyzed separately.

Test 2							
Location	Sample	Depth	pH	OM	Nitrogen	Phosphorus	Potassium
NHF*1	1	0-20 cm					
	2	0-20 cm					
	3	0-20 cm					
	4	0-20 cm					
	5	0-20 cm					
HF*1	1	0-20 cm					
	2	0-20 cm					
	3	0-20 cm					
	4	0-20 cm					
	5	0-20 cm					

NHF: Non harvest forest

HF: Harvest forest

Example of soil sampling plot

Site samples

