

# Will Nonthaburi National Park have an impact on the villagers' livelihoods of Ban Mai Nai Fan?



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## **Abstract**

Interdisciplinary field work took place in Ban Mai Nai Fan to determine what impact Nonthaburi National Park would have on the villagers' livelihoods. Natural and social science methods were used to collect data about their livelihood activities and assess the importance of agriculture in the village. Their livelihoods mostly consisted of agricultural practises and external activities outside the village. The agricultural practises and other factors such as land tenure have had negative impacts on soil fertility and lower crop yield. Nonthaburi National Park is expected to increase the number of people earning cash income from external village activities as non timber forest products will no longer be allowed to be collected. However, the villagers of Ban Mai Nai Fan may also persist to supplement this external income with their farming activities in order to keep the land and to continue their lives as they were found at present.

## **Acknowledgements**

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The villagers of Ban Mai Nai Fan were very hospitable to us while we worked in their village. They were quite willing to open up their village to us and share their knowledge. Thank you so much for your participation and sharing your information with us, it is greatly appreciated.

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We want to thank our two interpreters - Miss Somporn Wonvilai and Miss Wararat Kaewkeeyoon - who did a fantastic job in acting as our translators. They established an important link between the Thai and Danish students and translated a lot of information that we needed in order for our fieldwork to be complete. This we acknowledge and appreciate.

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## Introduction

This is an interdisciplinary report written by a social scientist and a natural scientist who worked with Thai students with similar academic backgrounds to investigate what impact a national park will have on the livelihoods<sup>1</sup> of villagers living in a rural village in northern Thailand. The fieldwork took place between January 12<sup>th</sup> and 28<sup>th</sup>, 2004 in the rural village of Ban Mai Nai Fan, Nan Province, Thailand (Figure 1).

## Thailand National Parks

The forest area in Thailand was approximately 274,000 km<sup>2</sup> in 1961 representing 53% of the country's total land area (Amaornsanguansin and Routray, 1998). There has been an approximate decline in forest area of 4500 km<sup>2</sup> year<sup>-1</sup> on average from 1961 to 1993. In 1993, the total land area covered by forest in Thailand was 133,500 km<sup>2</sup>, which is 26% of the country's total land area (Amaornsanguansin and Routray, 1998).

To conserve biodiversity and prevent deforestation, the Thai Government started creating national parks in 1962 and increased the strength of forestry laws through amendments and creating new forest legislation such as the Nation Reserve Forest Act and the National Park Act (Ajarn Pat pers. comm., 2004). When the first national parks were created, the National Forest Reserve (NFR) boundaries were re-declared as national park land. The government rushed into the process of declaring national parks without considering the people who were living there before the national parks were established in the NFR. The people living in the area were seen as a nuisance by the national park authorities (Ajarn Pat pers. comm., 2004; Chief of the Sanian Watershed Management Unit pers. comm., 2004).

The government soon realized that they needed to cooperate with the people who were living in areas where national parks were to be created to avoid conflicts. In 1992, the Thai Government enacted the National Economic Social Plan legislation, which now allowed villagers affected by national parks to have more input regarding the park boundary location and exclude their land and villages from the parks (Ajarn Pat pers. comm., 2004). In areas where the government wants to create national parks, the local sub-district office of the Tambon Administrative Organization (TAO) must be involved directly with the negotiating process and act as the representatives for the villages affected by the national park boundaries (Superintendent of Nonthaburi National Park pers. comm., 2004).

In 1995, the government decided to create Nonthaburi National Park (NNP) in three districts (Muang, Tawang Pha and Ban Luang) located in Nan province. A boundary was drawn in 1997 and the TAO sub-districts were informed that a national park was being planned in their area. As of January 2004, the area of NNP was 877 km<sup>2</sup>

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<sup>1</sup> The word 'livelihood' in the context of this report refers to aspects and actions leading to sufficient income or in other ways having resources enough to uphold a decent living for the villagers in Ban Mai Nai Fan.



(547,125 rai). At this time an inventory had not been taken of the land that is to be included in NNP to determine what resources, agricultural land and villages are present. After the inventory has been completed, the size of NNP will decrease to avoid conflict with the affected village people (Superintendent of Nonthaburi National Park pers. comm., 2004).

### **Establishment of Ban Mai Nai Fan**

The villagers currently living in Ban Mai Nai Fan are Tin people who originally lived in Huay Pan village, Tambon Boh Klua Tai, Nan Province. During the late 1960s a war broke out between communists living in Tambon Boh Klua Tai, Boh Klua District, Nan, Thailand and the Thai Government. Due to this war the villagers living in the Tambon Boh Klua fled the area. Most of the Tin people built temporary huts secluded from one another, while others migrated to Ban Na Pa Klang village, Tambon Sila Lang, Pua District, Nan where they lived for approximately 10 years.

In 1979, six of the original Tin households moved to Ban Mai Nai Fan and in 1981 they were reunited with most of the remaining Tin households from their original village Huai Pan. Between 1982 and 1983, the Internal Security Protection Administration moved 100 former communist Lua and Hmong people to Ban Mai Nai Fan for one year. By this time the war had ended and the Lua and Homong people returned to their original villages in Tambon Boh Klua Tai.

During 1982 to 1994, Ban Mai Nai Fan village was under the control of Song Kwa village, Mu 5 Tambon Sanian, Muang district, Nan. The village was separated from Song Kwa village in 1995 and has been placed under the control of Tambon Sanian since then. Currently there are 65 households in Ban Mai Nai Fan and they are of Tin origin. The population is 335 people which include people who live outside of the village during the dry season. Most of the villagers are related and there are 5 family names.

### **Research Question**

All students participating in the Thailand field course was given the same research question:

*How are the villagers' livelihoods being affected by the proposed Nonthaburi National Park?*

The two main issues in this research question are the *villagers' livelihood* and the proposed *Nonthaburi National Park* and the link between them is how NNP will *affect* the livelihoods of villagers living in Ban Mai Nai Fan. We used this research question as the starting point to develop our own specific questions and focus areas that would provide us with the information needed to help answer this question.



### Specific Research Questions:

*What do the villagers' livelihoods consist of at present?*  
*How dependent are the villagers on the proposed Nonthaburi National Park area for their livelihoods?*

### Focus Areas:

1. Village Organizations (livelihoods)
2. Occupations and Economics (changing land use characteristics)
3. Natural Resources (soil, water, forest)

The project was divided into three focus areas based on our combined disciplines and educational backgrounds. There were only two Danish students in our group, thus we were only able to be directly involved in areas (1) and (3) and the Thai students covered the second area themselves.

Before we arrived in Thailand, we had an expectation that the villagers livelihoods would be severely affected by NNP and this impact would increase once the park was created. After our community meeting with the villagers, it became clear the impact of NNP would not be as drastic as we had expected. From this point, we focused more on the situation at present and the villagers' expectations for the future.

As a group we developed a working hypothesis to further investigate the focus area Occupation and Economics. The hypothesis that we developed from the community meeting was: The villagers would rely more on external village income than they had in the past.

## Methodology

The purpose of carrying out the fieldwork with both social and natural scientists was to use the information gained from both disciplines to better explain what impacts the villagers livelihood decisions, and how their choice of livelihood strategies could be influenced in the future by NNP. During the fieldwork, we used as many natural and social science methods as possible given the time we were permitted to obtain a comprehensive picture of the livelihoods in Ban Mai Nai Fan.

### ***Qualitative Methods***

#### **The different methods used during the community meeting**

We decided to use a community meeting as the opening activity to introduce ourselves to the village and use the session to gain more information about the villagers through PRA (participatory rural appraisal) techniques such as crop calendars, village maps and

timelines non timber forest products (NTFP) collection (Mikkelsen, 2002). PRA techniques are a good way to gather information when working in rural areas. This technique was developed from the earlier foundations of Rural Appraisals developed by Robert Chambers (Chambers, 1997).

We asked the villagers to divide into the following groups: village elders, housewives, farmers, children, and other groups they were involved with. The groups were provided with blank paper, markers and pencils and everyone was asked to participate by drawing maps of the village, identifying the village boundaries, where households were, fields, the school, community forest and other important places. Group members drew trend lines for their activities identifying major events since they were relocated and settled in the village in 1982. This included a history of the land use. The farmer group drew a crop calendar indicating when crops were planted and harvested, and an activity calendar outlining high and low times for agricultural work. The farmers also provided us with a crop rotation calendar. The housewives drew calendars depicting what types of NTFP they collected and when they were collected. They also provided a calendar of their daily activities. Groups that were present at the village meeting and identified by the village headman included the housewives group, cow group, savings group, handicraft group, funding group, former headmen, and spiritual leaders.

We chose to use PRA techniques so everyone who attended the community meeting could participate actively in the empiric production. This method is also supposed to help turn the role of the researcher into more of an observing and 'wait-and-see' participant, and make the role of the interviewees more facilitating (Mikkelsen, 2002). We thought the PRA techniques were a good way to allow even the less dominant villagers in the community to actively participate. However it turned out to be quite difficult to apply techniques to encourage everyone to participate. Unfortunately we ended up with a situation where some villagers participated while others took a more observing and reserved position in the exercises we had planned.

During the community meeting we experienced some difficulties in having a participatory session. For example there was one small group which consisted of six people including the headman in which we encouraged the villagers to draw the area within the village boundary on a blank piece of paper. However, during the process only the headman seemed to draw and explain where households and other buildings were located while the other participants were quiet and did not help the headman make the map. This might have been due to the fact that they felt the headman was more qualified to do the exercise or they might have felt intimidated by the headman and did not want to participate. It is difficult to identify exactly why this situation occurred, and we definitely learned that using PRA and making it work is more difficult than it seems.

### **Selecting informants for the interviews**

After our first visit to Ban Mai Nai Fan we made arrangements with the village headman for an interview. We asked him to provide us with the groups that were active in the

village and would be relevant for our project. As well as providing us with the village groups, he gave us the names of the group leaders and where they lived in the village.

Villagers who attended our first community meeting were asked if they would be interested in participating in interviews regarding their group activities. Those who were interested provided us with their contact details and when the most appropriate time would be to interview them.

A ‘snowballing effect’ was used during the fieldwork for selecting our informants, in which we contacted the people who the headman directed us to, and these people in turn provided us with more people to contact. We contacted the people who we felt would provide us with information that was relevant to the focus areas. We interviewed village group leaders for the livelihood section regarding organisations and beliefs in the village, who also provided us with their village history. We soon discovered we had to find different people to interview when it became clear that most of the people we were interviewing were leaders of most of the groups in the village, and these people were closely related to one another.

## **The interview process**

The interviews conducted during the field trip were carried out as informative semi-structured interviews. We contacted a wide range of people living in Ban Mai Nai Fan to learn more about the history of the village and the villagers’ present livelihoods. We used interview guides for this purpose.

With semi-structured interviews it is possible to have more of a conversation with the interviewee, and this we found to be a good starting point for us to get information about the villagers’ livelihoods. It also provided the interviewees and interviewer with a more relaxed atmosphere for the interviewees, which was essential because we were aware that we might have to re-interview them to clarify information to ensure we had the correct information.

Transect walks around the village to special places for example where they held religious ceremonies, or drawing maps during the interview to indicate where a certain location was where activities in which the interviewees could participate actively and not just answer our questions.

The occupation and economics group interviewed 15 households in the village based on an income stratification of poor-middle-rich they developed. During the interviews, the interviewees were asked to provide information about household incomes, whether or not the household was involved in agriculture, and what NTFP the household collected. We are not entirely sure how they determined what constituted the differences between the poor-middle-rich categories, and how they selected their interviewees.

A semi-structured interview took place with the Chief of the Sanian Watershed Management Unit from the Royal Forestry Department (RFD) in Nan. Although the

official was mostly involved with the natural resource management issues in the region, he did have some relevant information regarding the Nonthaburi National Park boundary and how the process was taking place. An official of the district TAO office was interviewed and provided us with books of statistics for Ban Mai Nai Fan. The TAO official also outlined its responsibilities in the region and its action plan for the next few years. A semi-structured interview took place with the Superintendent of Nonthaburi National Park who provided information about the current Nonthaburi National Park border, what stage the national park was at, and information pertaining to the negotiations with Ban Mai Nai Fan.

### **The 'treatment' and use of the interviews**

In this report, we chose to summarize the interviews by including the information that was most relevant to our fieldwork in the appendices. Every interview we attended was conducted in Thai, and the interpreter did not always have time to translate the entire response given to the interviewee and the information we gained had been interpreted to some extent. In some cases when the Thai students were leading the interviews the translation was usually condensed into the main points due to time constraints. The way we use the interviews in this report will be to refer to them and use the knowledge we have obtained from them in contrast to referring directly to the respondents and using quotes.

### ***Quantitative Methods***

Seven of the households that were interviewed and farmed agricultural land in the village gave us permission to take soil samples from their fields. In addition, two of the households allowed us to take samples from two fields they actively farmed. Fifteen to twenty soil samples were randomly taken from each field by walking 20 paces in a zigzag pattern and then collecting the soil sample. An auger was used to extract the soil sample to a depth of 15 cm. A GPS unit was used to map which fields we had taken soil samples from and the points were later entered into a GIS database. The slope was taken using a clinometer at different points of the fields where we had taken the soil samples on the first day of soil sampling, however we forgot to take the clinometer with us the second day thus we estimated the slopes for these fields based on the measurements taken in the other fields.

To determine the impacts of the farmers' management practices, the soil samples were taken to the base camp where they were air dried for two days and were later passed through a 2 mm sieve to analyze the sand, silt and clay portions. The following parameters were measured using the Thai soil analysis kit: pH, nitrate, ammonium, phosphate, and potassium. Soil texture was determined by weighing 10 g of soil and adding it to a 5% salt solution. Each soil sample was then shaken for half an hour to allow the soil particles to separate into the sand, silt and clay fractions. The soil samples were sent to a lab in Chiang Mai for further in depth analysis for the same parameters mentioned above as well as organic matter.

It was initially planned that leaf samples would be taken from fields where soil samples had been taken to analyze the leaf tissue for the presence of nitrogen, phosphorous, potassium and magnesium. Unfortunately, it was not possible to collect leaf samples from the maize and rice fields because these crops had already been harvest and the next crop had not been planted yet, and due to time constraints for leaf tissue analysis, it was decided not to collect leaf samples from lychee trees.

Water samples were taken from different points of the Salai River which runs through Ban Mai Nai Fan, and the wells in the village and the reservoir for the mountainous pipeline. Electroconductivity, pH, salinity, temperature, dissolved oxygen, total dissolved solids and flow rate were measured directly at the source. Water samples were collected in water bottles and taken back to the base camp where they were analyzed for phosphate. Fishing nets and sieves were used to collect and determine what aquatic species were present in the river. The species were identified by using a Thai guide book of fish and other aquatic species. It was originally planned the water would be tested for contaminants such as pesticides and *E. coli*, however the growth medium to test the presence of *E. coli* was spoiled and consequently unreliable, and attempts made to modify the soil pesticide analysis kit were not successful.

We conducted a forest inventory in the community forest. Since the community forest was predominantly bamboo, we did one 40 m x 40 m forest inventory that was further divided into sixteen 10 m x 10 m subplots. The non-bamboo tree species that were above waist height were counted. We randomly selected trees we thought might have a breast height diameter of 10 cm, however only one of the trees had a breast height diameter greater than 10 cm, hence we did not measure anymore breast height diameters. The villagers who were with us in the community forest helped us identify the non-bamboo species and a Thai forest guide (Gardner *et al.*, 2000) was used to identify the trees with their scientific genus and species, as well as their family name. Soil samples were also taken at each intersection of the 10 m x 10 m plots using a soil auger to a depth of 15 cm. The combined soil sample underwent the same process of drying, sieving, and analysis as those collected from the farmers' fields. This soil sample was also sent to Chiang Mai for further analysis of the same nutrient characteristics.

In addition to marking where we had taken the soil samples in the community forest and agricultural fields with a GPS unit, we also mapped the community forest, the outer boundaries of the village, and points of interest in the village. The data points entered in the GPS were downloaded into a GIS database to make a map of the village. We did not walk and map the entire perimeter of the village with a GPS unit because of time limitations and the Thai student who knew the most about GPS and GIS left during the field course for one week to attend his university graduation. We know that this a limitation to our report and we decided against using the village map that we made in the GIS database because it was of poor quality, we are not entirely sure what the different images are since we did not sit together when the map was being made in the GIS database during the field course.

## **Miscellaneous**

Notebooks were kept to keep track of our daily fieldwork and note observations in the village. Each evening everyone in the group would present what they had done for the day and what they planned to do the following day. We also took several photographs of the village, forest and surrounding area that were significant to the project.

## **The limitations of our project design**

There were many methods we could have used during our field work but due to time constraints and not having access to the appropriate equipment they were not included. We will address the influence of our chosen methods in the discussion section, and instead concentrate on the methods we did not choose to use during, but which might have provided us with useful information.

From the very beginning we decided a questionnaire-survey would not provide us with sufficient useful information for this report because it is a time consuming activity especially since we would need to have everything translated into English. Our Thai colleagues also felt the same way about this method and it would be more appropriate to gather more specific information about the livelihood activities in Ban Mai Nai Fan by using interviews instead.

Attempts were made to organize a meeting with an environmental NGO working in Nan to find out what the key environmental issues were in the area, and what significance the proposed national park would have on the surrounding area and Ban Mai Nai Fan. Unfortunately, the NGO that was contacted was unavailable to meet with us while we were conducting our fieldwork. It was originally planned that an official from the Agricultural Department would be interviewed, however as we progressed with our fieldwork it was felt that an official from this department could not tell us more than what we already knew from our interviews with the farmers. There were also time limitations, thus the idea was abandoned.

Our group was divided into three focus areas. At the time this seemed like an excellent plan, but towards the end of the fieldwork, we realized we did not have a lot of input in the occupations and economic group about the information we would like to know about the villagers' sources of income and their agricultural practices. We also did not get all of the relevant information from this group, especially how they selected the households they interviewed and how accurate the values were for the incomes and expenses, thus it is difficult to make strong conclusions based on their findings. We were only able to cover one part of the actual livelihood study which was a more socio-anthropological study about what the villagers do in terms of work, and what they used to do in the past.

Working through interpreters to cooperate with our Thai colleagues had its limitations. It was the first time we really had to sit down with an interpreter to know what someone we are working with is trying to tell us. We had some problems with this since it is a very time consuming process and the time we were allotted to spend in the field was quite limited. It also took longer than usual to reach solutions and common agreements that would make both sides happy, but we remained patient throughout the process because we knew how important it was to have good communication with the interpreters and the Thai students. However, when everything has to go through a third party the original or intended meaning might be distorted (Neumann, 2000). In order to combat this difficulty we sought to ensure that everybody in the group was clear about the issues being debated and that everybody had a chance to state their suggestions before moving on to other issues.

During the fieldwork the interpreters were a very integral part of the interviews since all questions and replies had to be translated into English. This affected how we had to prepare ourselves during the interviews and discussing the results with our Thai colleagues. When the questions we asked were not given an answer that corresponded, we simply rephrased the question and made another attempt. This happened a few times but it might also have been because the question was not suitable to ask and needed to be modified by the interpreter.

## Results

### Summary from Economics Group

Appendices H and I contain the cash incomes and expenses of 15 households that the economics group interviewed. Table H clearly shows that these households rely significantly more on external village activities rather than agriculture for their cash income, which is also portrayed in Figure 2.

- Of the 15 households interviewed, 14 households practiced agriculture in Ban Mai Nai Fan;
  - The one household that did not practice agriculture was in the rich category
- Six of the 15 households did not earn any cash income from their agricultural activities, thus there are households in Ban Mai Nai Fan that cultivate agricultural land for primarily household consumption
- Once expenses are subtracted from total income, it is difficult to keep the designations classifications rich-middle-poor
  - Four of the five poor households could be classified in the middle class while one of the middle class households should be classified as poor

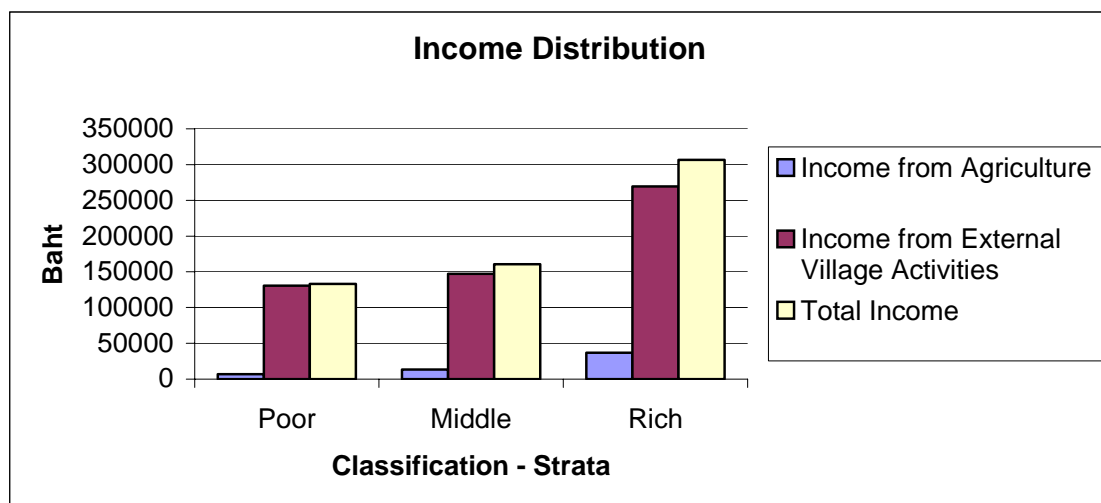


Figure 2. Income distribution between the agriculture and external village activities (Source Appendix H).

### Summary of Soil Results:

- Nitrate and phosphorous were found to be relatively low in all of the 10 soil samples from the agricultural fields and community forest
- Ammonium was generally found to be low; however in two out of ten instances (location 1 and location 3) the colour change was not present on the colour indicator charts: a second test was carried out to determine if something had gone



wrong during the first analysis but the colour remained the same as what was found in the first test:

- the soil science professor was consulted and she stated the presence of ammonium was likely to be quite high at these two locations
- Potassium was high to moderate for all of the soils analyzed: this may be a result of their agricultural practices of burning the land to release nutrients; ash remaining on the agricultural land is high in potassium
- pH: was for most cases 6.0 to 6.5 while the pH of the community forest was slightly less (5.0 to 5.5)
- Texture of the soil was predominately clay with some silt present; no sand was detected in any of the soil samples based on the methods used to determine the soil texture

### **Summary of Water Quality**

The hydrology professor provided us with a translated copy of acceptable levels for surface water in Thailand, and a guide book of aquatic species that are commonly found in Thailand's streams and rivers. Refer to Appendices D, E and F for all of the water data collected.

- The pH ranged between 7.917 to 8.298 for all of the sites (wells, pipeline and stream)
- Water temperatures measured throughout the village stream ranged between 17.4 to 18.4°C
- The south well water temperature was rather high (24.5°C) but this could have been due to the well location (it was in direct contact with the sun) and the time of day when the temperature was taken
- Electroconductivity for the north well and mountainous pipeline was very high, 378 and 370  $\mu\text{S}/\text{cm}$  respectively
- Inlet to village, intersection of Salai and Chompoo, Salai outlet and middle of village were just under the maximum acceptable limit 200  $\mu\text{S}/\text{cm}$
- TDS for north well and mountainous pipeline were over the recommended limit of 180 mg/L; they were 188.8 and 185.1 mg/L
- Insects, fish and other aquatic species predominantly found in the stream were indicators of good water quality; there were a couple of species indicating excellent water quality and a couple of species indicating poor water quality; overall the presence of these species indicates that the water in the stream is of good quality

### **Summary of Forest Inventory in Community Forest:**

- Community forest is predominantly bamboo
- 19 non-bamboo species were identified, and were mostly saplings
- Tree breast height diameter was less than 10 cm except for one tree

- Four people each took four subplots to count the number of non-bamboo trees; the person who counted the far left subplots was inexperienced in counting trees, and may have accidentally counted the same trees more than once and may have counted trees that were less than waist height

Table 1. Crop calendar used by most farmers in Ban Mai Nai Fan

Month		January	February	March	April	May	June	July	August	September	October	November	December
Crop	Upland Rice					Plant Up land Rice				Harvest Upland Rice			
	Low-land Rice				Prepare land and seed-lings					Harvest Lowland Rice			
	Soy-bean		Harvest Soybean							Plant soybean			
	Black Bean		Harvest Black Bean							Plant Black Bean			
	Maize (1)		Harvest Dry Season Maize							Plant Maize in dry season rotation			
	Maize (2)					Plant Maize				Harvest Maize			
	Lychee	Burn and apply fertilizer	Pesticide Application			Harvest lychee fruit							

Table 2. NTFP calendar for NTFP commonly collected by villagers in Ban Mai Nai Fan

Table 2: NTFP Calendar for NTFP commonly collected by villagers in Dan Mai Nui Pan													
Month		January	February	March	April	May	June	July	August	September	October	November	December
NTFP	Bamboo Shoots				Bamboo shoots from different species are collected during this period								
	Candied Palm	Collect Candied Palm in NFR									Collect Candied Palm in NFR		
	Rattan	Collect Rattan in NFR									Collect Rattan in NFR		
	Mushrooms				Different mushroom species are collected during this period								
	Others: Fire wood, Herbs, Wild animals, Wild vegetables	Collected throughout the year depending on availability and how much available time the villagers have to find these NTFP											

## Discussion of Results

### Land Tenure

Ban Mai Nai Fan has an area of approximately 2000 rai (approximately 330 ha). It is surrounded by NFR and consequently it is not possible to legally extend the boundary of the village. The Chief of the Sanian Watershed Management Unit stated the government owns the land upon which the villagers use and live on. There is an agreement that this land can be passed on to their children. This is an indication that they have SPK certificates, which is the lowest form of recognition that individuals are using a specific piece of land. Farmers also pay a PBT5 tax for the land they use. During an interview, a housewife stated that no one in the village had NS3 and NS4 land certificates.

The Chief of the Sanian Watershed Management Unit also stated that the government does not want to give land certificates to the villagers because it is concerned that once the villagers obtain official recognition they have rights to the land, they will sell it to capitalists. The government fears that the villagers will not save the money earned from the sale of the land, rather that they will spend it and be caught in a poverty trap since they will no longer have land to grow crops on. During a transect walk with the headman, he mentioned that less than 20 villagers living outside of Ban Mai Nai Fan “owned” land in the village. This could be due to a number of factors:

1. When the Hmong and Lua people lived in Ban Mai Nai Fan between 1982 and 1983, they may have been given entitlement to some of the land they had used while they lived here
2. Up until 1994, Tambon Song Kwaie had jurisdiction over Ban Mai Nai Fan. During this time people within this tambon may have been permitted to use land in Ban Mai Nai Fan and the agreement continued when the jurisdiction changed to Tambon Sanian
3. Ban Mai Nai Fan may have sold their SPK certificates to villagers living outside of Ban Mai Nai Fan or transferred these certificates because they owed them money and could not repay in cash
4. Former villagers may have inherited the land and continued to use the land

Since the village was established in 1982, the population has grown, limiting the amount of land to live on and agricultural production to sustain them. More people have had to find work outside of the village to provide food for their families and other necessities.

During transect walks, farmers pointed out where the RFD has begun planting trees in farmers’ fields. Consequently, this has created conflicts between the farmers and RFD. Farmers are worried about losing more of their land through reforestation by the RFD, so they have shortened the fallow period, and have begun planting new crops once the previous crop has been harvested. This reduces the amount of time the land is given to replenish itself. Other farmers have started to demarcate their fields with trees such as

teak to indicate where their fields are and to prevent the RFD from planting trees within this area.

From our observations in the village, many households have planted lychee orchards. Lychee is a cash crop, but it also may be used for land tenure security. It indicates the particular land will be used over a longer time period compared to an annual crop such as rice or maize. Some households indicated that the lychee was not always harvested because there was not enough labour. This raises the question why are they growing lychee if there is not always enough labour to collect the fruit, did they plant the trees because they yield cash incomes or did they do it to secure their land tenure?

### **Agricultural Practices**

When the villagers arrived in Ban Mai Nai Fan, some of the forest had been cleared, which enabled them to plant crops soon after they arrived. More forest was cleared at this time to help support all of the households that had moved to the village. Since this time, shifting cultivation has traditionally been practiced in the village. Once their crops have grown in a certain field for two or three cropping seasons, they will abandon the land so it can undergo a fallow period to replenish the nutrients that were used by the previous crops. However, this practice has been limited since they moved to the village because most farmers own 2 to 5 rai (less than 1 ha) which is divided into two plots (Khunarak *et al.*, 2003). This limits the amount of land they are able to cultivate. The farmer then moves to another plot of land that he or she clears by slash and burn to remove any vegetation. The process of slash and burn releases nutrients which are now available for plant uptake.

Ban Mai Nai Fan is located in a rainfall zone that receives one lengthy rain period from April to October, which divides the year into the dry season and rainy season. There is not enough water to provide fields with water during the dry season, thus planting agricultural crops is limited to the rainy season, although some crops with lower water requirements are grown during the dry season. If additional water is required for their fields it is taken from the Salai Stream. None of the farmers in the village utilize irrigation which limits their possibilities of growing crops with higher water requirements during the dry season. Irrigation may not be practiced because the cost of implementing it would not warrant the income earned from the additional crops grown. The external village income they earn during the dry season could be higher than what they would earn from the extra crops. In some cases, no cash income is earned, either the expenses equal the income earned or the expenses are greater than the income earned.

### **Soil Fertility**

The soil analysis revealed ammonium, nitrate and phosphate levels were quite low to moderate when the soil samples were taken in January, the dry season. This is an indication the nutrient supply and fertility of the soil is rather low. Many farmers stated in interviews that their crop yields were declining and they believed this was due to decreasing soil fertility. Some people mentioned that the land productivity has declined over the past 10 years because the same land is being continually used. As fertility

decreases, more inputs are required to improve the crop yield. However, these inputs are expensive and may not be affordable since some of the households operate under subsistence agriculture. The economic tables show that in some cases the expenses for agriculture are greater than the income earned or the value of the crop. Most of the agricultural land is located on hilly terrain with slopes ranging from 25 to 90°. Although there was no evidence of rill or gully erosion in January, a few farmers stated erosion was a minor problem, but not as significant as their shortened fallow period, which has increased because they fear the RFD will plant trees in their fields if they abandon them.

## **Livelihoods and Economy**

As described in the previous sections the villagers' livelihoods within the village mostly consist of agricultural practises. During interviews with the households we learned that the villagers are also very dependent on activities we have chosen to classify as *external village activities* for sources of cash income. These activities consist mainly of hired labour on sugar cane farms, construction work, and working in factories in Bangkok. During the course of our fieldwork, many villagers were working in Sukothai harvesting sugar cane. The housewives informed us most villagers, especially the men, work outside of the village for approximately 8 to 9 months of the year and the wages they earn vary between 100 and 200 Baht per day. We worked with the hypothesis that the external village activities had increased over the past decade and will eventually surpass the agricultural activities in Ban Mai Nai Fan. External village activities would in time become the most important source of income to the villagers which already seems to be the case.

Our economic tables for household income (refer to Appendices H and I) indicate what we determined to be the division between the two main income sources and also how the village is divided into three different groups according to their level of cash income. Most of the villagers earn their income from both agriculture and external village incomes. Rich households make profits from their farming activities while the middle and poor households make little or no profit and might lose money by choosing to farm their land. In this report we will only refer to these findings as indicators of the cash income of the villagers. Nevertheless, we chose to discuss the household economics as it has relevancy to the understanding of how the natural and social sciences link each other and they can provide us with further information about the declining soil fertility.

The numbers we obtained from the household economies indicate how much the rich, middle and poor households earn from agriculture and external village activities. It can be clearly seen that the largest proportion of the households' cash income comes from the external village activities compared to that earned from their own agricultural production. Unfortunately it is difficult for us to determine how important agriculture production within the village is to each household, however it may be important for the villagers to be self sufficient in food production to some extent. Another reason may be that by continuing to use their land for agricultural production, they are increasing their land tenure security. The value of subsistence agriculture may be more important than earning cash income from their agricultural production.

The people in the village we interviewed also shared our hypothesis. In recent years, the trend for most villagers has been to seek work in external village activities rather than relying on producing enough food to produce and possibly sell depending on yields. A villager said during an interview that the soil fertility had decreased during the twenty years he had been farming in Ban Mai Nai Fan and this had in turn led him to pass on his land to his son but instead his son had chosen to seek another livelihood strategy. According to this interviewee the soil fertility has been decreasing due to the scarcity of land, and the amount of fallow time has decreased. After handing the land over to his son, he was able to open a small shop in the village. This however, will not be a possible solution for all the villagers in need of a different livelihood strategy and therefore we hypothesize that more villagers will leave Ban Mai Nai Fan to find work elsewhere.

As a result of the changes in livelihood activities, environment, and way of life in the village we have described, it is most likely more people will migrate from the village in the future. During the community meeting, one woman felt in the future more children would receive a higher education than previous generations by leaving the village for larger cities where a higher level of education may be achieved. Since the demand for workers in the village agricultural sector can be seen as static or even decreasing people will have to search for other sources of cash income. The likelihood of the village boundary expanding in the future is limited because it is surrounded by NFR and eventually Nonthaburi National Park.

## **The population growth and environment**

The population of Ban Mai Nai Fan village has been increasing since it was established in 1982. This tendency is likely to continue which may create additional pressure on the village, agricultural land and surrounding area.

The population growth can be viewed differently by several authors. Ester Boserup was one of the main authors who described the area and the consequences of the increasing population of the world. In contrast to Malthus the population growth is seen as a positive development. Emphasis in this theory is placed on the positive effects of an increasing population. Boserup believed there would also be an increase in the number of 'hands' to perform the work needed to supply the extra number of people. Combining this point of view to our research the increasing number of people in Ban Mai Nai Fan could also be viewed as positive for the economy of the households. However, with the restrictions on the land use and the restrictions on the expansion of the village area the increasing number of villagers in Ban Mai Nai Fan may have negative effect on the surrounding environment and thereby also on their ability to sustain livelihoods in the area. This may also put more pressure on the urban areas since the villagers will have to find work outside of the village.



## **Community Forest**

The village community forest was established in 1982. Soon after the villagers settled in Ban Mai Nai Fan, they began to cut down trees to build houses to live in. Villagers with few resources were also permitted to use the community forest more extensively by allotting them small tracts of land. The forest inventory of the community forest clearly indicated it was predominantly bamboo, although some new species were beginning to emerge due to gaps in the forest canopy. A very poor effort has been made by the villagers to manage the forest to increase the diversity of trees, plants and other species. The Chief of the Sanian Watershed Management Unit stated that many villages did not have funding for their community forests, thus it was not a priority for them to replace trees that they had cut. The village has established some rules for using the community forest. Villagers are allowed to collect and use NTFP so long as it is not for sale. Villagers now have to ask permission if they want to cut down trees for building purposes. An internal village committee will decide whether or not the individual is allowed to do this, and villagers are able to vote on the decision made.

## **Nonthaburi National Park Boundary**

The border for NNP which is present in Figure 1 has been changed since 1997. This figure clearly shows that Ban Mai Nai Fan is inside the park, however, when the boundary surrounding Ban Mai Nai Fan was being negotiated, the village protested with two other villages affected by the boundary and were successful in having it changed. The headman and TAO representatives signed an agreement in December 2003 with the National Park stating that they agreed with the new boundary located near Ban Mai Nai Fan. Unfortunately, they did not have the papers they signed or the map with the new national park boundary that now excludes Ban Mai Nai Fan. They made it clear to us that when the National Park officials came to the village to do a transect walk, no Ban Mai Nai Fan land had been included in NNP. It is difficult to say whether any farm land undergoing fallow right now, may have accidentally been excluded from the village boundaries.

According to the most recent map which the Superintendent of Nonthaburi National Park official brought with him for his presentation, the boundary does not envelop Ban Mai Nai Fan, however it is rather close to the official boundaries of the village (approximately 1 km away). The Superintendent of Nonthaburi National Park and the Chief of the Sanian Watershed Management Unit stated that Ban Mai Nai Fan was not included in NNP.

Although Ban Mai Nai Fan is not located in NNP, the boundary is quite close to the official village boundaries. People that are utilizing the land and forest in the NFR that surrounds Ban Mai Nai Fan could be directly impacted when NNP is officially declared. People that gather NTFP from this area will no longer be able to do so because it is forbidden to remove anything from any national park in Thailand. The Superintendent of Nonthaburi National Park did admit that people are collecting NTFP from national parks. The people who are collecting small quantities of NTFP are

declaring them to National Park officials as they leave the park and the officials allow them to continue.

The main purpose for having the national parks is to protect the forest and conserve the biodiversity. When national parks are placed close to village boundaries, as is the case in Ban Mai Nai Fan, the NFR between the village and park acts as a buffer zone. The villagers have lost access to the resources that are now inside the national park and they may increase their reliance on the NFR buffer zone and their own community forests for these NTFP. It is expected that the village population will probably continue to increase to some extent. This would also place pressure on the NFR zone if more people need to collect NTFP for their own consumption or to earn cash incomes. As a result, the NFR area and community forests may become degraded and national park officials could decide to include parts of the degraded NFR buffer zone inside the national park. This could have serious impacts on the villagers who rely on collecting NTFP for their livelihood. National Park officials will have to work closely with villagers living in Ban Mai Nai Fan to ensure that they do not overuse the NFR buffer zone.

## **Discussion of Fieldwork**

### **Problems with Data Collection**

Our fieldwork took place in January which is the dry season in northern Thailand. As a result, we did not have full access to all of the villagers that live in Ban Mai Nai Fan. Many had left the village for the season to work elsewhere, while others returned late at night and left early in the morning. We were limited to speaking with and interviewing mostly housewives, the headman, a few farmers, and other people who did not work outside of the village. If we had interviewed people who worked outside of the village, we may have gotten a better perspective of their livelihood strategies, their income levels, village history, reliance on agriculture, and what impact the proposed NNP will have on the village. Another issue found during the collection of the data was that the headman directed us to people who seemed to be closely associated to him, primarily through family relations. These people may not have been telling us the whole story, and we made every attempt to interview people who had less association to the headman and the people he guided us to.

The use of PRA techniques has proven to be a good way to learn more about the villagers and their perception of their own situation. However, we also faced some problems when we used these methods. For instance we found that it was difficult to facilitate the session in order to make everybody participate. Given more training in using PRA we believe that the results would have been clearer and maybe we would have known more about reading the specific situation. Despite these difficulties we learned a lot both about the village and the relations between the villagers and also how to use PRA techniques.

Another observation we made during the fieldwork was that for the most part the villagers seemed more enthusiastic when talking to the Thai students. The villagers we interviewed in some cases seemed more open and confident to talk with the Thai students than when talking to the Danish students. This is understandable since we had a barrier of language between us, and it might have been prevented given that we could have had more time in the village than the two weeks we collected the data.

### **The main findings from the different sub topics analysed**

The soil fertility was found to be quite low due to many compounding factors. The lack of land has great impacts on the agricultural practises and the status of the soil along with the lack of resources to invest in techniques that could improve farm management practices. Without land certificates, it is difficult for people to obtain credit from lending institutions to invest in the land and improve their agricultural management practices.

The livelihoods investigated in the village consisted of a combination of agricultural activities in the village area and external activities. It was found that the villagers to a considerable degree depend on the income earned from their external

income activities. Nevertheless, even though we might put strong emphasis on the income that is earned compared to farming in the village, we are aware of the fact that however low the villagers' yields are it does not mean or even indicate that the farmers should abandon their agricultural practises. The value of the work in their fields has to be measured against the amount they would be able to earn if they worked in different areas for the whole year including the period they farm their lands and added to the value the land has to them. This is not a possible calculation for us to do. What we can deduce is more people work outside the village and this trend is likely to increase within the near future where they earn more money.

## ***Validity and reliability***

### **The data collected and the analysis performed**

The interviews are seen to provide us with a large amount of information. They were used to obtain knowledge from different stakeholders at different levels of the society in Ban Mai Nai Fan. By analyzing soil from different villagers' fields, we attempted to triangulate the data to verify the results with the interviews. The use of triangulation can be a means of improving the validity because the different data can be viewed and tested from more than one perspective. This approach can be seen as a useful method to get a broader and more in depth view of the truth and the situation we want to investigate. The way we used it was to obtain data from both the people of the village through interviews and the testing of their soils we performed during our fieldwork.

Due to the division of work between the Danish and the Thai student groups we have no insight into how the farmers who were interviewed were selected. This sampling strategy was not discussed and is therefore not clear to us. Because of this we have difficulties validating this material. However, we can say that the soil testing corresponds well with the information we obtained during the first community meeting.

The other interviews on livelihood and the village itself can also be said to have some flaws that we are aware of. Previously we stressed the fact that many of the interviewees were related and that we have tried to overcome this bias by simply choosing other respondents to the extent this was possible. Furthermore this whole issue on interviewees being related can be seen as a minor issue when looking at the broader perspective. The fact of the matter is that we had already decided upon different aspects we wanted to have information about, and given that this information would be best to get from the people who had the most knowledge about these aspects, we had to choose the leaders or at least the members of the groups to interview. In using the interviews in the analysis and combining them with the data from the soil sampling we can say that we measured what we set out to do.

Another question which can be interesting to address is, whether the strategy we used for collecting our data and investigating our research question was clear and adequate enough. Can our data be reproduced in different times or by other researchers? We made sure that all the methods used were firmly noted and discussed within the

group. This was done in order to ensure that we used the most suitable methods within their context. This was done in collaboration with the Thai students who had some experiences with fieldwork especially PRA methods and also a deeper knowledge about the current situation in the area. Through this method our fieldwork can be said to be reliable and valid.

## **The results**

What can we actually say from our findings? Through our findings we have the possibility of answering our research question but can these findings be seen as valid? The validity depends on the way we actually performed the methods we chose and to what extent we decide to use the results in our conclusion. We are able to conclude different things in relation to our research questions. However, we have some problems concluding on the focus area concerning the economic and occupational patterns. This was the section that the Thai students were responsible for and this is also the reason why we only have indicators about this section instead of an actual conclusion. These indicators are seen to be quite relevant though and we do use them in the analysis of the future expectations seen by the villagers. This is one way we can use the information, because we try to apply the information carefully and also in combination with what we found through working with the two other focus areas that we were both directly involved with as described above.

## Conclusion

Land tenure is a significant issue in the village of Ban Mai Nai Fan. Although the government officially owns the land in the village, villagers have SPK certificates stating they use the land according to our interviewees. Many people stated during interviews that the soil fertility was declining in the village and that it was difficult to earn an income from agriculture. This was supported by the information obtained by the occupation and economics group, and the soil analysis which indicates most of the nutrients in the soil are quite low. This may also be an indication that land tenure is quite important because they continue to use their land even though the soil fertility is low and the harvest is primarily for household consumption. Farmers have reduced their fallow periods to grow their next crop to prevent the RFD from planting trees in their fields. Other farmers have started to plant lychee orchards, which may be to increase their cash income, increase their land security because the orchards are an indication that this land is being used for the long term, or both.

Now that a national park, Nonthaburi, will be declared approximately 1 km away from their village, this may heighten the need for farmers to prove that they are actively using the land. In the future they may be concerned the National Park Department will try to increase the area of NNP and expand it into Ban Mai Nai Fan and the NFR buffer zone.

Why are the farmers continuing to cultivate the agricultural land if they can earn more income from external village activities? We hypothesize that the villagers believe that some day they may obtain a higher level of recognition from the government that they utilize the land. If they achieve a higher recognition, this may encourage them to invest more in the land and improve their agricultural practices to increase agricultural productivity. Depending on what level of recognition they receive from the government, they might be able to sell their land.

In January 2004, the villagers did not appear to be concerned about Nonthaburi National Park being declared close to their village boundary. If the situation remains as it is now that most people earn cash incomes from external village activities for up to 9 months of the year, their livelihood strategies may not be highly reliable on collecting NTFP. However, for households that do rely on NTFP collection for consumption or sale, they may be more severely impacted by Nonthaburi National Park.

## Changes for the Future

For future investigation of this area, it would seem relevant to have a broader combination of the different sciences throughout the fieldwork in order to clarify some of the questions directly involving the natural resources.

Also more investigations of the soil and the water would be preferable. This could help indicate the status more clearly and if performed at different periods of time to provide more insight into the actual conditions of the given location. Testing for *E. coli* and pesticide contaminants, and erosion would be relevant analyses to make if we were to stay in the area longer. This would also require more advanced analytical equipment. Collection of and analysis of lychee leaves could have been done to better understand what quantity of nutrients the trees are taking up from the soil.

More information should have been obtained from, for example, farmers: how much land they own, where their fields are located, how much land they plant, what crops are grown and the rotations used, what crop amendments are applied and their quantities, the crop yields, what quantity is kept for the household, what quantity is sold, prices received for the produce, how much is harvested, how many animals and poultry are owned? These would have given a broader overview of the actual situation and we might have linked the results even further.

If given more time in the area or if performing the fieldwork again we would want to interview NGOs working in the area particularly those with campaigns or movements concerning national parks. NGOs would have provided another view point regarding national parks compared to the government officials.

Mapping the village might also have come in handy to give the reader a clearer overview of the area we worked in and identify land use in the village. We sought to do GPS and GIS mapping but unfortunately we did not have the extended knowledge and the data or programs that would enable us to use this mapping technique. Along with mapping the village we would have liked to have had an actual map of the official boundary of NNP. This would have clarified further how close it is to Ban Mai Nai Fan.

More contact with the Thai students might have provided us with more knowledge about the area and eased the working conditions in the group. Also, more contact with the village prior to our arrival for example through a Thai contact in order to prepare the village for our arrival, what we are doing and why we are in their village. This would hopefully improve getting people together for community meetings where they could share information such as their history, crop calendars, daily activities, and other relevant information.

Another important aspect which derives from our research is the question about the future of the environment. Will the environment be conserved in the national park area but deteriorate in the village area? Could this situation be a consequence of the prohibited expansion of the village and agricultural land and the growing population?

Since the agricultural land is not increasing along with the population two situations might occur. One situation is migration – more people will migrate to other areas in order to uphold and sustain livelihoods which we already mentioned. The other aspect is that the soil will become less fertile and deteriorated. If this is the case, the benefits of having national parks and forest reserves at the cost of the surrounding environment and the inhabitants of these areas can be disputed. It would be beneficial to find out in more detail what factors are involved in declaring a national park. Most importantly, is it possible to protect the environment and allow villagers' livelihoods to coexist in a sustainable manner?



## References

Amornsanguansin, J. and J.K. Routray. 1998. Planning and development strategy for effective management of community forestry: lessons from the Thai experience. *Natural Resources Forum*. 22: 279-292.

Chambers, R. 1997. *Whose reality counts? putting the first last*. Intermediate Technology Publications, London.

Gardner, S., P. Sidisunthorn, and V. Anusarnsunthorn. 2000. *Forest trees of northern Thailand: a field guide to forest trees of northern Thailand*. Kobfai Publishing Project, Bangkok

Khunarak, R, O. Mingtipol, S. Prabudhanitisarn, P. Oksen, and T. Treue. 2003. Basic information for the SLUSE field course 2003-4 Piang Pao Watershed, Nan Province. Maejo University, Kasetsart University, Chiang Mai University, Royal Forest Department, University of Copenhagen, Roskilde University Centre, The Royal Veterinary and Agricultural University.

Mikkelsen, B. 2002. *Methods for development work and research – a guide for practitioners*. Sage Publications Ltd, London.

Neumann, W.L. 2000. *Social research methods – qualitative and quantitative approaches*. Allyn & Bacon, New York.

Personal Communication:

Ajarn Pat. 2004 (January). Ban Mai Nai Fan group advisor. Lecture on creation of National Parks in Thailand. Piang Pao Watershed Base Camp Nan Province.

Chief of the Watershed Management Sanian Unit. 2004 (January). Nan Royal Forestry Department.

Superintendent of Nonthaburi National Park. Presentation on Nonthaburi National Park. Piang Pao Watershed Base Camp Nan Province.

## Appendices

### Appendix A

#### Summary of Soil Results

Location	Ammonium	Nitrate	Phosphorous	Potassium	pH	Texture	Slope
L1 rice (moderate farmer)	Orange	VL	VL	M to H	6.0 to 6.5	Silty clay	Flat
L1 rice, lychee, maize (moderate farmer)	L to M	VL to L	VL to L	M	6.0 to 6.5	Clay	20°, 45°, 80°
L2 lychee (moderate farmer)	L to M	VL	VL > L	M	6.0 to 6.5	Silt clay loam	37.5°, 90°
L2 maize (moderate farmer)	L	L	VL > L	M	6.0 to 6.5	Silty clay	40°, 50°
L3 lowland rice (moderate farmer)	Orange	0 to VL	L	M to H	6.0 to 6.5	Silt clay loam	flat
L4 lychee (rich farmer)	VL to L	VL	VL > L	M	5.0 to 5.5	Clay	35 to 70°
L5 lychee (moderate farmer)	VL to L	VL	VL > L	M	6.0 to 6.5	Clay	40 to 80°
L6 lychee (poor farmer)	VL	VL	VL > L	M	5.5 to 6.0	Clay	45 to 90°
L7 lychee (rich farmer)	L	VL	VL > L	M	6.0 to 6.5	Clay	30 to 60°
Community Forest	VL to L	VL	VL to L	M to H	5.0 to 5.5	Clay	~35 to 50°

P: low = < 10 ppm; medium = 10 to 25 ppm; high = > 25 ppm

K: low = < 60 ppm; medium = 60 to 90 ppm; high = > 90 ppm

## Appendix B

Summary of Forest Inventory of Non-Bamboo Species

Far Left	Left	Right	Far Right
71	41	25	35
102	59	39	33
162	72	42	56
76	63	63	53

## Appendix C

Table of Scientific names of Non-Bamboo Species identified

Identification Number	Scientific Name	Family
1	<i>Alstonia scholaris</i>	<i>Apocynaceae</i>
2	<i>Aporosa villosa</i>	<i>Euphorbiaceae</i>
3	<i>Dalbergia oliveri</i>	<i>Leguminosae</i>
4	<i>Garuga pinnata</i>	<i>Burseraceae</i>
5	<i>Ailanthus triphysa</i>	<i>Simaroubaceae</i>
6	<i>Baccaura</i> spp	<i>Euphorbiaceae</i>
7	<i>Antidesma</i> spp	<i>Euphorbiaceae</i>
8	<i>Ardisia</i> spp	<i>Myrsinaceae</i>
9	<i>Stereospermum fimbriatum</i>	<i>Bignoniaceae</i>
10	<i>Cratoxylum cochinchinensis</i>	<i>Guttiferae</i>
11	<i>Castanopsis</i> spp	<i>Fagaceae</i>
12	<i>Salix</i> spp	<i>Salicaceae</i>
13	<i>Delinia parviflora</i>	<i>Dilleniaceae</i>
14	<i>Michelia</i> spp	<i>Magnoliaceae</i>
15-19	Unknown	

## Appendix D

Summary of Measured Water Parameters

Location	DO (mg/L)	Temperature (°C)	pH	Salinity (%)	EC (µS/cm)	TDS (mg/L)	Flow rate (m/min)	Volume (m <sup>3</sup> /min)
Inlet to BMNF	10.78	17.4	8.125	0.1	192.8	96.9	5.603	0.684
Intersection: Huai Chompoo and Salai	10.78	17.9	8.079	0.1	198.9	99.2	4.26	1.214

Inlet Huai Chompoo	10.78	18.2	7.917	0.1	164.0	82.0	1.983	0.242
South Well	4.80	24.5	7.917	0.0	93.2	46.6	NC	NC
Salai Outlet	8.65	17.9	7.917	0.1	193.2	96.6	3.093	5.104
North Well	4.65	17.4	7.917	0.2	378.0*	188.8*	NC	NC
Middle of Village	9.58	18.4	8.220	0.1	192.2	96.1	7.56	2.996
Mountainous Pipeline	7.13	20.7	8.298	0.1	370.0*	185.1*	NC	NC

NC: not calculated (unable to measure water flow)

## Appendix E

Aquatic Species found in stream running through BMNF

Location 1: Watershed inlet to BMNF

Organism	Quantity	Indicator	Comments
Long horned case maker	1	Good	Require good water quality, moderate to high oxygen
Pagoda snail	5 small	Good	Require good water quality, moderate to high oxygen
Waterfall crab	2 small	Unknown	
Tadpoles	5 medium	Unknown	
Stocky dragonfly	3	Good	Require good water quality, moderate to high oxygen
Common demoiselle	1	Good	Require good water quality, moderate to high oxygen
Freshwater Shrimp	2 small, 1 large	Poor	Require average water quality, moderate to low oxygen
Long-headed caddisfly	1 large, 2 medium, 1 small	Excellent	Require excellent water quality, high oxygen
Hillstream loach (fish)	1 large, 2 medium	Excellent	Found in streams and waterfalls where physical conditions and water quality are good to excellent
Freshwater snails	13 small	Poor	Require average water quality, moderate to low oxygen
Waterstriders	11 small	Unknown	

Location 2: Intersection: Huai Chompoo and Salai

Organism	Quantity	Indicator	Comments
Freshwater prawn	2 medium, 1 large	Good	Require good water quality, moderate to high oxygen
Freshwater shrimp	1 large, 2 medium, 1	Poor	Require average water quality,

	small		moderate to low oxygen
Freshwater snails	one very large snail	Poor	Require average water quality, moderate to low oxygen
Crab	1	Unknown	
Tadpole	1 large	Unknown	
Red tailed snakehead (fish)	1 medium	Unknown	Can tolerate polluted water courses
Striped minnow	1 small	Unknown	Can tolerate streams whose physical condition and water quality are beginning to decline
Stocky dragonfly	1	Good	Require good water quality, moderate to high oxygen
Two tailed demoiselle	4	Good	Require good water quality, moderate to high oxygen

#### Location 3 Inlet Huai Chompoo

Organism	Quantity	Indicator	Comments
Stocky dragonfly	1 large and 1 medium	Good	Require good water quality, moderate to high oxygen
Freshwater snail	1 very large	Poor	Require average water quality, moderate to low oxygen
Whirligig beetle	1	Unknown	
Freshwater shrimp	2 large, 2 medium	Poor	Require average water quality, moderate to low oxygen
Freshwater prawn	1 large, 1 medium	Good	Require good water quality, moderate to high oxygen
Tadpoles	2	Unknown	
Red tailed snakehead (fish)	1	Unknown	Can tolerate polluted water courses

#### Location 5: Salai Outlet

Organism	Quantity	Indicator	Comments
Freshwater shrimp	1 large, 1 small	Poor	Require average water quality, moderate to low oxygen
Freshwater prawn	1 medium	Good	Require good water quality, moderate to high oxygen
Red tailed snakehead (fish)	1 small	Unknown	Can tolerate polluted water courses
Trapdoor snail	2 small	Unknown	
Long headed caddisfly	3 large, 2 medium, 3 small	Excellent	Require excellent water quality, high oxygen
Tadpole	1 medium	Unknown	

River barb fish	1 small	Unknown	Lives in deep parts of rivers and streams where physical condition and water quality are good to excellent
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#### Location 7: Middle of Village

Organism	Quantity	Indicator	Comments
Freshwater prawn	1 large	Good	Require good water quality, moderate to high oxygen
Freshwater shrimp	2 medium	Poor	Require average water quality, moderate to low oxygen
Water stick insects	2 large	Unknown	
Water scorpion	1	Unknown	
Red tailed snakehead (fish)	1 medium, 2 small	Unknown	Can tolerate polluted water courses
Stocky dragonfly	3 large	Good	Require good water quality, moderate to high oxygen
Common dragonfly	1 medium	Good	Require good water quality, moderate to high oxygen
Common demoiselle	1 large, 1 medium	Good	Require good water quality, moderate to high oxygen
Saucer bugs	2	Unknown	
Freshwater snail	8 small	Poor	Require average water quality, moderate to low oxygen
Longheaded caddisfly	1 large	Excellent	Require excellent water quality, high oxygen
Greater water boatman	1	Unknown	

## Appendix F

#### Phosphate present in Water samples

Location	Phosphate (mg/L)
Watershed Inlet to BMNF	0.25
Inlet Salai	0.25 to 0.50
Intersection Salai and Chompoo	0.25 to 0.50
Middle of Village	0.25 to 0.50
Outlet	0.25 to 0.50
North Well	0.25 to 0.50
South Well	0.25 to 0.50
Mountainous Pipeline	0.25 to 0.50

## Appendix G

Calendar of Project Activities for January 2004

Date	Natural Science Group	Social Science Group	Agriculture Group
Tuesday January 13	Danish and Thai Students introduced and begin to work together on their working plan in Ban Mai Nai Fan including the working question, sub-questions, hypothesis, data needed for each section, methods to be used		
Wednesday January 14	Continue to work on data needed section, and timeline	Continue to work on data needed section and methods to be used	Continue to work on data needed section and methods to be used
Thursday January 15	Representative from each group attends official community meeting in BMNF; remaining group members work on presentation depicting what we will do in the village		
Friday January 16	Representative from each group go to village to make observations, take GPS measurements and get a tour of the village; remaining group members work on making outlines of calendars, timelines and village map for the community meeting		
Saturday January 17	Representative from each group go to village to make observations, take GPS measurements and get a tour of the village; remaining group members work on making outlines of calendars, timelines and village map for the community meeting; in the evening all group members attend the community meeting where PRA techniques are carried out		
Sunday January 18	Carry out forest inventory	Conduct interviews	Conduct interviews
Monday January 19	Soil Sampling	Conduct Interviews	Soil Sampling
Tuesday January 20	Water Survey	Conduct Interviews	Conduct Interviews
Wednesday January 21	All members prepare for the midterm evaluation		
Thursday January 22	All members enjoy their day off!		
Friday January 23	Attend RFD meeting in Nan	Make interview guides	Attend RFD meeting in Nan
Saturday January 24	Begin soil analysis; evening carry out interview with TAO village rep	Continue making interview guides; evening carry out interviews	Continue making interview guides; evening carry out interviews
Sunday January 25	Take more GPS points, take soil samples, continue soil analysis	Continue making interview guides; evening carry out interviews	Interviews with households
Monday January 26	Continue soil analysis	Summarize information, carry	Interviews during day and evening

		out interviews in evening	
Tuesday January 27	NR group: finishes soil analysis; all groups continue to summarize information and begin initial data analysis; Evening: all group members attend village meeting and thank villagers for participating in project		
Wednesday January 28	All groups continue to summarize information and data collected and carry out preliminary analysis; work on debriefing note and final powerpoint presentation		
Thursday January 29	All group members participate in final presentation		

## Appendix H

Occupation of selected households and their income per year

Number	Occupation Type		Income/year (Baht)		
	Agriculture	Non Agriculture	Agriculture	Non Agriculture	Total
Poor					
1	√	√		25,000	25,000
2	√	√		25,000	25,000
3	√	√	2000	24,500	26,500
4	√	√		28,000	28,000
5	√	√	500	28,000	28,500
Middle					
1	√	√		30,000	30,000
2	√	√	5000	25,000	30,000
3	√	√	500	32,000	32,500
4	√	√		33,600	33,600
5	√	√	8000	26,400	34,400
Rich					
1	√	√	7000	30,000	37,000
2	√	√		40,800	40,800
3	√	√	13,000	38,000	51,000
4	√	√	17,000	40,500	57,500
5		√	NA	120,000	120,000

NA = Not Applicable

## Appendix I

Income level of villagers and expenses for agriculture and non-agriculture

Number	Income (Baht)	Expenses (Baht)			Balance (Baht)
		Agriculture	Non-Agriculture	Total	



Poor					
1	25,000	1200	18,000	19,200	5800
2	25,000	1000	14,400	15,400	9600
3	26,500	1600	16,500	18,100	8400
4	28,000	1000	18,000	19,000	9000
5	28,500	1200	20,000	21,200	7300
Middle					
1	30,000	1000	22,000	23,000	7000
2	30,000	3000	19,600	22,600	7400
3	32,500	1200	28,800	30,000	2500
4	33,600	1200	22,000	23,200	10,400
5	34,400	1500	25,200	26,700	7700
Rich					
1	37,000	790	24,000	24,790	12,210
2	40,800	2000	30,000	32,000	8800
3	51,000	13,000	24,000	37,000	14,000
4	57,500	12,000	19,250	31,250	26,250
5	120,000	NA	90,000	90,000	30,000

NA = not applicable

## Appendix J

### Summarized RFD Interview

#### *RFD Mandate*

The jurisdiction of the RFD is divided into two parts: laws, acts and regulations legislated by the government and state, and community participation. Community regulations include: culture and tradition, sacred forests, cemeteries, and community participation

In the past, there was limited community participation, however now the RFD realizes cooperation with villagers is advantageous and reduces conflicts. There is limited land for people to use due to the increasing population. The RFD is encouraging villagers to grow new crops such as fruit trees and also encourages reforestation. Unfortunately the RFD has a small budget for reforestation as the government has no reforestation policy. The Prime Minister is advocating rubber plantations, he sees that there will be an increase demand for rubber in the future especially from China.

There is an RFD officer in each village to hold meetings with the villagers and communicate with the villagers. This officer acts as a link between the RFD and villagers.

It is difficult to enforce forestry laws because most villagers are breaking the laws. The RFD realizes it is better to work with the villagers and focus on the long term goals rather than carrying out strict enforcement.

#### *Working with the villagers*

When the RFD works with villages, it must deal with problems that occur within the village. There are four key factors that are usually involved.

1. Culture/livelihood of the community
2. Individual villager's needs: their level of education, economic status
3. Economics: income and occupation of the villagers
4. Ecosystem: how they utilize the land and the CF

When they know these factors, the RFD can analyze them and solve the resulting problems. They also look at the needs of the villagers and deal with the most basic needs first. The RFD looks at their income needs which differ among villagers, areas, agricultural practices, cultures, and spiritual beliefs.

The RFD would like to limit the amount of shifting cultivation taking place and convert part of the cultivated land into forest and the other part would remain as permanent agricultural land. The RFD acknowledges this is a difficult change to make and people don't want to lose one of their sources of food.

#### *Land Certificates & Rights*

Thai people have the initial rights to the land they are using. For the people who are not Thai citizens, the government has to consider who was there first: the people or the National Forest Reserve when making decisions on forest and land tenure issues. The practices of the people have to be taken into consideration whether they use pesticides and fertilizers, or cut down trees illegally for example.

All villagers would like to have land certificates because they can be used as collateral to obtain credit, or the villagers are now able to sell the land. The land is owned by the government and it is afraid that if they issue land titles to villagers, the villagers would then sell the land to capitalists. The government expects that the villagers would spend the money earned from the sale of land rather than saving it, and eventually the villagers would be poor with no land to cultivate. The government believes the main reason why people want the land certificates is to sell it. There is an agreement with the government allowing the villagers to pass the land on to their children.

#### *Community Forest*

Community forests are not officially recognized or established by the government. Most of the regulations concerning the CF and its use are created by the villagers. Although, the government is concerned that everyone in the village has equal rights and that the headman and other high ranking village people are not abusing their powers of authority to control the community forest. The government also has concerns that capitalists are attempting to buy CF.

The RFD acknowledges that the CF are predominantly bamboo. They believe this is a result of villages not having enough money in their budgets to manage the CF properly which has resulted in their degradation. Also there is a higher priority for agricultural cultivation than forest conservation. The RFD encourages the villagers to manage their CF themselves.

In BMNF, land use management has changed from the past and there isn't as much agricultural land as there was in the past.

### *National Park Boundaries*

Once a NP is declared, regulations in the area will be much stricter.

The theoretical criteria for declaring a NP is the environment. The primary reason for having forest in Thailand is to conserve the forest area. The government passed a law stating Thailand must have 40% forest cover. In addition, this will improve water management especially during the dry season.

The government has to recognize the land that the villagers are using, however, the villagers are concerned they will lose their land when a NP is declared. Each village has a TAO representative who works with RFD officers on the specifics of the NP boundary that will affect the particular village. In the past the RFD officers decided where the park boundary would be and this created conflicts.

With regards to NNP, details concerning individual communities are still being worked out. The length of time it takes to create a NP is quite long from the beginning to official declaration. One NP took 10 years to declare.

## **Appendix K**

### Summarized interview with village Headman

The name of the headman is Surasuk Pitsachan. He is the leader of several of the groups in the village.

During the interview with the headman we received information on the savings group, the funding group and the cow group since the headman was the leader of all three groups. We began the interview at around 10 and ended with having some lunch together. After this interview we talked with his wife and 4 other women who were present during the whole interview. The wife of the headman is the leader of the housewife group. All of this took place at the porch at his house.

#### *Some general information:*

We started out talking about the different groups in the village. Every group has to follow the different rules set up by each group and every project has to go through the TAO.

#### *The first topic was the Cow Group:*

The cow group started in 2000 (2543). The funding came from the government – Japanese supported – and through the TAO Sanian. The village received 100.000 Baht. They spend 30.000 Baht to buy 11 cows. These are being kept at the Watershed Management, since the villagers do not know how to take care of the baby cows and they do not have the time either.

#### *The next topic discussed was the Savings Group:*

The savings group was started in March 2000 (2543). To become a member, you have to pay 20 Baht and next you can ‘buy’ shares for 10 Baht each. The group is being

supported by the Rural Development Department. This organisation is interested in having the village saving money. The members have to put in money at their account once every month. The members each have a *bank account book*, in which every deposit is listed monthly. It is possible to lend money if needed, and for every 100 Baht you have to 1 Baht in interest fee. There are no limits for paying back the money the interest is the same whether you lend money for one month or for ten months, but the loan must be paid back one time – not split up in sections or tariffs.

If the member wishes to lend more money than is in the account, friends or family have to provide the security (guarantee). This means that a person is able to lend money according to how many 'shares' the person has in the savings group account.

It is only possible to lend money once a year but it is decided upon by the committee. They will look at the loaners' needs and situation.

Fee for not paying back in time is 1 per cent of the total amount borrowed per day overdue. The group has meetings every month and any problem there might be is discussed at these monthly meetings.

The Ban Mai Nai Fan village has almost 100.000 Baht on their account.

The next topic was *the Funding Group*:

The village received 1.000.000 Baht through the government, and therefore they have to inform the government if any problems occur. The purpose of this funding group is to help people/lend money for agricultural purposes.

Earlier there were 15 members of this committee, but now the number has been reduced to 9 and it is supposed to decrease again. To be member of this group, you also have to be a registered member in the savings group.

The cost for joining this group is 20 Baht and 100 Baht for opening an individual account. In order to get the million from the government every village has to have its own account with a certain amount of money in it.

The loans obtain through the funding group is primarily for doing agriculture, but if the loan taker can pay back, it is possible to lend for other purposes as well. This is for the committee to decide.

The money borrowed should be returned within a year. There are no problems with paying back the money in this village – yet. It has not occurred yet that is. (For supporting information see interview with Secretary 24<sup>th</sup> og January 2004, Mette/Pat)

The way the village decide upon a group leader is by having an election.

## **Appendix L**

Summarised interview with village TAO representative

### Information regarding the Cow-group

*Founding of the group:*

The Cow group was first set up in 2543 (2000). The money for setting up the group came from the province development fund – GO. The villagers received 100.000 Baht from the government in order to develop the occupation in the village to get a better life. After the crisis in 1997-98 the Thai government got money from Japan in order to get the economy going again.

The village spend 30.000 to buy 11 cows (calf). There were 53 households interested in taking care of the cows so the village ‘trækker lod’.

All cows are being kept in the same place they put them at the Watershed Management the year they got them, for nobody knew how to take care of the small calves. The village has an agreement with the Watershed Management for 5 years – meaning that this agreement runs until next year 2548/2005.

There are no costs for the village for keeping the cows at the Watershed, but they agreed that the watershed would get the offspring from 2001. Unfortunately all the baby cows died from diarrhoea in 2002 so the village still just have 11 cows.

The purpose of having the cows is for selling. If anybody wants to take of the cows they get to keep the offspring but the 11 cows belong to the whole village. The sale of a full grown cow is about 9-10.000 Baht.

#### *The activities of the Cow group:*

The group gets visit from a veterinary for free. They have 10 cows and 1 bull. All the calves died from diarrhoea so now they might get vaccines to prevent this from happening again.

They also visit the cows to see if they are doing all right – apparently nobody is really looking out for the cows at the moment so they might move them to the TAO Sanian. If nobody has the time to take care of the cows, they might even hire some from one of the other villages to take care of them and then pay the person with the offspring. The villagers in Ban Mai Nai Fan are not able to take care of the small cows them selves. (see interview with headman Mette/Pat)

For feeding the cows, they just get to wander around an area and eat the grass. There are no special fodder arrangements, so there are no costs related to having the cows. The only cost is when some of the cows have eaten from other villages’ fields. That happened one time and the cost was 5 Baht per eaten plant – in total that was 650 Baht. This happened before the cows came to the Watershed. For paying this fee, they took the money from the cow group fund.

#### TAO information – second interview with TAO officer from the village:

The boundary was set in December 2546/2003 (last year).

The Park people had come to the village with a proposal on the National Park boundary. This however included Ban Mai Nai Fan in the park area, and the villagers objected.

They negotiated some time last year, and in December they signed another contract that excluded three villages from the National Park including Ban Mai Nai Fan. The park boundary is at present approx. 10 km from our village, since the village is to the left of the Sanian Stream.

According to the TAO the creation of this National Park will not have any great influence on the village. They hardly use the area at all, only for collecting some mushrooms once a year – this activity will eventually end, but at the moment they are still able to collect these mushrooms (for consumption).

#### *The village boundaries:*

There is at present no exact boundary for doing agriculture/for living. Everything is in the national forest reserve area, meaning that the village can only expand to land to the ‘old’ and ‘degraded’ forest area. Here the RFD do not seem interested in planting anything so the village can expand their village or farming area there if they want to. The only expansion comes from the growing of the village and the growing number of households. Every year approx. 2 more houses are built. For doing this the villagers have to ask the TAO Sanian for permission and then the TAO will provide the address.

#### *The agriculture/community forest:*

They use the shifting cultivation in order to keep the land. They do not use fallow periods for then the RFD is able to take over the land and plant trees.

They have the bamboo forest – which is not a community forest (in Danish terms of community forest). The villagers have made their own rules for using this forest, and it is not recognised as a community forest with the RFD.

## **Appendix M**

Summarized TAO Interview: attended by Mette & Jeanine

#### *TAO Responsibilities*

We interviewed one of the two TAO representatives in Ban Mai Nai Fan. The individual we interviewed has been serving in this capacity for 6 years and is in his second term. Each term lasts for 4 years and people are nominated and elected into the positions.

The main duties of the TAO representatives are: to maintain and preserve the forest and environment in the village; provide village with electricity, roads and tap water. The representatives also lead campaigns in the villager to encourage the villagers to maintain the forest and make fire breaks. There have been good results from these campaigns, villagers have participated and helped out.

The TAO is responsible for the provision of tap water, electricity and road. It has asked the government to provide a budget for these resources, which takes some time. The TAO has to ask the government to provide a budget every year.

#### *Village Income & Taxes*

Most of the income earned by villagers living in Ban Mai Nai Fan comes from labour outside of the village. Since they earn a low income, they do not pay income taxes. The government used to collect tax in the past, but they stopped collecting it in 2002 because the village is located within the NFR, and in this particular watershed, villagers do not pay taxes. Although, agriculture and shops are taxed based on the following scheme:

- Horticulture/Agricultural Group is taxed:
- 20 Baht/rai paid for long living trees i.e. lychee
- 5 Baht/rai paid for upland rice and maize
- Shops: commercial tax based on the size of the store

#### *Nonthaburi National Park*

The TAO representatives and committees in the village have participated in the boundary of Nonthaburi National Park. The interviewee stated that Ban Mai Nai Fan had a good relationship with the RFD. According to this TAO representative, the boundary will be about 40 km away from the village. There will be no changes with the boundary near Ban Mai Nai Fan. It has already been negotiated and drawn and a contract has been signed.

Villagers collect NTFP in the National Forest Reserve, but once Nonthaburi National Park is declared, they will not be able to collect any NTFP in the park. Currently, they collect rattan and candied palm from the National Forest Reserve, whereas bamboo shoots and mushroom are collected in the community forest.

When Nonthaburi National Park is officially declared, there will be few impacts on the village because few villagers from Ban Mai Nai Fan collect NTFP from the National Forest Reserve. In order to reach the area where the NTFP are collected, they need to use animals such as horses or vehicles because the location is far away. Capitalists hire the villagers to collect these products and they go to the area by car.

#### *Village Rules*

Rules for the natural resources in the village have been created by committees and are voted on by the villagers. There are no rules for the land and soil.

Rules for water include: people are not permitted to throw garbage into the stream. Pesticides can not be used near the stream and pesticides that are applied must be prevented from entering the stream. There are no restrictions on how much water can be used for household consumption including during the dry season. If there is a day when there is no water, the committee will lock the pipeline until enough water accumulates in the storage tanks. There are action plans in place when water shortage becomes a problem. When the water line is being fixed, the pipeline is locked. The mountainous pipeline is used for household activities, while the stream is used for agricultural purposes.

There are no rules for the NFR, however the community forest does have rules. Villagers are allowed to cut down trees for household use i.e. fences, building houses, construction material. They have to obtain permission from a committee before they may cut the trees. It is prohibited to sell timber from the community forest. Villagers do not replant trees to replace the ones that they cut down. The committee decides when they should replant trees. Trees such as teak, ormosia, *Grudia chrysanthia* are replanted in the cemetery forest. The village has been divided into different areas i.e. location of permanent houses, agricultural land and forest. Trees are not replanted in agricultural land to replace trees that have been cut in forest areas.

#### *Environment*

In 1979, the RFD planted trees such as teak, *Grudia chrysanthia*, and eucalyptus in Ban Mai Nai Fan. Soon after Ban Mai Nai Fan had been established by the Tin people, the village headman at that time asked the Nan RFD to plan trees in the village. In the past, there were not many RFD officers involved in the community forest.

When the first villagers arrived in Ban Mai Nai Fan, there were elephants and other wild animals in the area. Unfortunately they have now left the area. During the early years when the village was beginning to establish the soil fertility was high, there were many trees and the natural resources were quite rich.

## **Appendix N**

### Summary of interview with village shop owner

Som Boon is the owner of a store in the village, farmer, former village TAO, and the local ‘garbage guy’.

He came to the village in 1987 (2530) because of the communism in his own province, Boh Klua District.

#### *Farming:*

When he first came to farm in the area, there were no problems with the soil. It was rather good soil and he was at that time growing upland rice. Later he had to use pesticides due to the decreasing soil fertility. The villagers are not allowed to expand the lands they farm and therefore the soil does not get enough rest. He still has the same 10 Rai as when he migrated in 1987. If they want to try to expand their lands, they have to go to the RFD and ask.

There are no certificates to the land because the RFD owns the land, and the villagers only “borrow” it. But he stressed that there had never been any problems between the villagers of Ban Mai Nai Fan and the RFD. As long as the villagers do not expand into the forested areas and as long as they do not leave their land uncultivated for longer periods there are no problems with the RFD.



*Shop owning:*

After a while (unknown) he built the house, where he lives and has a store. There is a tax for having this store and it is 10 Baht per squared meter a year, which in this case is 60 Baht. In the cities there is also a tax on the amount of net income.

In order to build the store/his house, the shop owner got the money from farming, selling his water buffalos and lending money from the funding group (40.000 Baht).

*Garbage collecting:*

As a third occupation the interviewee has a job as garbage collector in the village. Every household pays 20 Baht to get their garbage removed. The garbage is then droved to the city by interviewee.

It has now been two months since this garbage arrangement started.

*Other information about interviewees' livelihood regarding rituals:*

During this interview we got around two other subjects which were the rituals and the Buddhism day.

*Buddhism Day:*

This day is in April, Full Moon.

During this time villagers have to stay in their house and no go to the city. In a way it can be seen as some sort of religious holiday. It is however allowed to collect NTFP's for consumption. This is an old tradition passed on by fathers to sons etc.

It is believed that if the villagers go to work on Buddhism day they will get ill and besides that lots of bad things will happen in your life. This is also believed by the younger generation.

Furthermore the villagers have to pay a fee for 50 Baht if it is found that you have been working this day. The money will be used by the village committee to buy whisky and chicken to give to the spirit house.

*Rituals:*

In the village there are two older persons performing the rituals; Mr. Wan Dee Pitsachan and Mr. Geaw Suriya.

There is a ritual against illness, where you offer 1 whisky, flowers and incense.

Another ritual is related to the natural resources, here flowers, incense and candles are offered to please the spirit (worship). These offerings are put on the ground in order to ask the 'motherland' for permission to use the soil and as a plea to make the soil fertile.

A little hut is then built for the spirit to stay and take care of the farmers and the lands they use. This is an agricultural ritual for farming land and not keeping livestock.

The animals stay in the village with the villagers and the village has its own spirit and ritual.

The villagers also have to worship the 'motherland', when the forest are cleared – then pray for rain and good outcome. The land has its own spirit and the village has its spirit.

Along with these there is (of course) also a ritual for using the water resources. Small spirit houses are built and people, who do not participate in this, will have to pay money. The two people performing the rituals ask the spirits for sufficient water supply for use in both the village and in the farming section.

Even if things does not o their way, the villagers will still offer chicks and whisky.

These described rituals show the relationship between Man – Resources – Spirits.

## **Appendix O**

### Informal interview with Housewife

#### *General Information*

Housewives in the village do not have special jobs. Their daily activities include cooking, working in the field or collecting plants to make roof material. They receive 10 Baht for every 4 lines the make. They collect bamboo from the NFR and take care of their children. All women who are married are members of the housewives group. One of their activities is to help at village events, for example school ceremonies. Most families in Ban Mai Nai Fan have 2 or 3 children. Most women breastfeed their babies because it is less expensive than buying baby formula.

If the women want to go to the city and they do not have a car, they have to wait for the grocer mobile to come to the village to buy vegetables and other food items. Many of the villagers buy vegetables because the soil is not fertile enough to provide adequate yields for household consumption. The village is quite far from the city and it is very rare that a bus will come to this particular area.

The villagers in Ban Mai Nai Fan get along quite well together, especially since most people are related. The villagers help each other out for example with the agricultural crops or with the construction. The villagers who have lived in Ban Mai Nai Fan the longest are mostly the children.

The housewife interviewed said the main problem in the village is poverty. Some people have to borrow land. The government provides some assistance to Ban Mai Fan to do agriculture nearby because the village is in a C zone area and the villagers do not have land certificates. Each year the government sends 10 blankets for 10 households because it is very cold during the winter months

This particular housewife is a member of the savings group. Anyone living in the village can become a member. One share equals 10 Baht. At the end of each month all members have to contribute money to the group. The savings group acts as a bank. Members are able to withdraw money.

After Ban Mai Nai Fan had been settled by the Tin people they lived in huts but then they were able to cut down trees in their community forest to build houses. They also collect NTFP from the community forest. Paved roads and electricity have also been added to the village. Electricity expanded in the village since the New Year.

The forest was divided to give some people who land that did not have any. The land in the community forest is used for rice. If the people have money then they will

grow ginger or groundnut. Recently the RFD has been planting trees and taking land the villagers use for agriculture out of production.

#### *Education*

Most children finish their education when they complete grade 6 or 9. The majority of children finish at grade 6 because their parents can not afford to provide them with further education, it is too expensive. If families have enough money, they will send their children to school until grade 9 or 12. The school in Ban Mai Nai Fan only goes to the fourth grade. The children learn art, math and Thai in school. Up until now, once the children finish grade 4 in Ban Mai Nai Fan, they must go to another village to continue their education. When children attend school outside of Ban Mai Nai Fan, they need money to pay for their books, clothing, food and a place to stay. The tuition is free. During the weekends, they will return to the village by walking through the hills. Each child receives 1 Baht per day to go to school from the government.

After the children have finished their education, they will either stay at home and work or go to Bangkok and work in the factories. They send some money home, but not a lot because it is expensive to live in Bangkok. During special holidays i.e. New Years and the Water Festival, the people who have left the village will return to celebrate with their family. Once some children have left the village to work elsewhere, they will not return. Instead they will stay in the city to work and eventually start a family.

Most of the people, especially the elderly, can not read and write. This contributes to their low level of income because it is easier to find work if they can read and write. Most of the children who continue their education can read and write at a high level by their teenage years.

#### *Employment outside of village*

Most housewives stay at home while their husbands work mostly outside of the village and earn money for the family. Many villagers leave the village for 4 to 5 months of the year to cut sugar cane. The woman interviewed stated her husband leaves at 8 o'clock in the morning and arrives home at midnight or 12 o'clock in the morning. He earns 200 Baht per day.

## **Appendix P**

Presentation by Superintendent for Nonthaburi National Park

#### *Nonthaburi National Park*

The idea to create a new national park, Nonthaburi National Park, began in 1995 and the original boundary was declared in 1997. It is a brand new park it is not an expansion of a current national park boundary. At the time of the interview, the area of NNP was 877 km<sup>2</sup> (547,125 rai). NNP includes three districts (Muang, Tawang Pha and Ban Luang) and in the upper area of the park, there is no forest. A lot of land has been excluded from the original boundary to avoid conflict. The inventory had not begun for the land that is

planned to be included in NNP. After the inventory has been completed, the size of the park will likely decrease again. A survey of the agricultural and forest land has been carried out, and the inventory needs to be done again. Once the negotiation process has finished for NNP, National Park officials will make a request to have an inventory done and once it is finalized, the formal demarcation will occur. The negotiation and inventory will take approximately 30 days for each district, for a total of approximately 90 days. They use GPS to map the boundary for NNP. It will take approximately 30 days to demarcate the boundary of NNP.

During the process of negotiating NNP boundaries, there is frustration amongst the villagers who will be affected by the park. There is a continuous process of changing the boundary to accommodate the villages affected until the negotiation process finishes. The villagers need to have faith in their TAO representatives and village headman that they are negotiating the location of a national park boundary in good faith with the best intentions of everyone in the village. The Hmong people were not happy with the boundary around their villages. They were successful in having the boundary changed. The land that has been excluded from NNP has been predominantly bamboo. The forest that will be included in NNP will contain many species, not just bamboo. This land is considered to be quite fertile. Communists used to live in the north central section of NNP. There were many conflicts in this area and it was bombed. There was a Royal Project in this area to help the forest rejuvenate, and it is not as fertile as other areas in NNP.

At the time of the interview there were villages within the boundaries of NNP, however people living in these villages will be negotiating with national park officials to have buffer zones placed between the village and NNP. They will be essentially surrounded by NNP, but they will not be included in the park. On December 16<sup>th</sup> and 17<sup>th</sup> 2003, the headmen of the villages witnessed the demarcation of NNP. Ban Mai Nai Fan has not been included in Nonthaburi National Park. The villagers have participated in the inventory. According to the map of NNP that the National Park official had, Ban Mai Nai Fan will be surrounded on the east, south and west sides by the boundary, however the boundary for the north is further away.

### *National Park*

The main purpose of having a national park is to preserve nature, protect and rehabilitate the environment, and to educate people. When a national park boundary is being negotiated with the villagers, the main objective of the national park officials is not to cause problems with the villagers involved. A village that will be surrounded by a national park will have a buffer zone around it to offset the effects of having a park near its boundaries. The buffer zone will be classified as NFR.

National Park officials have to verify what practices are actually taking place in each village and to ensure that these activities really exist. The villagers may claim many activities take place not only to keep their village boundaries out of the national park, but may also try to increase the size of their village. The national park officers need to determine how much land the villagers need. One family should not require more than 15 rai of land. Whether fallow land is included in a national park depends on if the

villagers have registered their land to the RFD. According to the constitution they are required to inform the authorities how much land they own, cultivate, etc.

Compared to other countries, it is difficult to manage a national park in Thailand. People do not respect the laws. Some people do not know the laws because they speak a different language and they do not understand the laws.

The national park has accepted some of the local people to work in the national parks. One example of a wage received is 130 Baht/day, which may be higher than what they ordinarily would earn.

#### *National Park Enforcement & Laws*

The Cabinet Resolution from June 30, 1998 clearly states that people who cultivate land in the C zone are doing so illegally and it is illegal to live in the NFR. If forestry officials find people living in the NFR illegally or if farmers encroach their agricultural land into the C zone, this is illegal and the officer can jail these people. Some people do not understand they are breaking the law when they encroach on NFR or NP land.

People living in the NFR illegally should not be compensated if they have to be moved for example a national park will be declared on the land where they are living. It should be the other way around, these people should be compensating the government. In the past, Thailand was not very technologically advanced. The people in charge of the NFR may not have thoroughly checked to see if people were living in the NFR. The officials would just draw the map for a national park.

The National Park Act states that no one is allowed to remove anything from any national park, but in reality people are still collecting NTFP for their own consumption and other purposes. There are check points throughout national parks, just within the boundaries. People who collect small amounts of NTFP from national parks and if the officers are aware that they have allow them to keep what they have collected and pass through the check point. People who collect large amounts of NTFP usually do not pass through the check points. There are National Park Officers patrolling inside the parks to ensure that people are not cutting down the trees or villagers are not trying to expand their land into the park. National park stations have already been built inside Nonthaburi National Park.

National Park officials have developed strategies to inform people the national parks belong to them and they are not to be destroyed. Other departments at the local level i.e. the watershed unit are working together with the people to prevent problems from occurring.

Once a national park has been officially declared and gazetted by the King, the boundary can not be renegotiated with the NP and RFD officials. The people who want the boundary changed would have to negotiate with the government directly because this is not a national park responsibility.

#### *Miscellaneous*

Community forests are the responsibilities of the villagers. They manage the forests, and make decisions about reforestation and other practices.

Villagers are not allowed to cut down trees outside of the village boundaries to increase their land base.

Villagers may lose some other resources such as access to water once a national park is declared.

## **Appendix Q**

### **National Park Lecture: Ajarn Pat**

#### *Importance of National Parks*

The purpose of having National Parks in Thailand is for conservation, recreation and education. In 1962, 50% of Thailand's land base consisted of forest. This declined to 28% in 1988 and 25% in 1998. The first NP was established in 1962 based on the model of Yellow Stone Park in the US. When the Government originally set out to establish NPs, they rushed into the process without taking people into consideration. This national park was declared without considering the people living in the park. The National Forest Reserve boundary was simply re-declared as a National Park. There was no National Park Act at the time and the NFR Act was used for enforcement, however this Act was not very strong consequently the government was not able to remove the people and they continued to live in the National Park. People continued to collect NTFP and cut down trees after the National Park had been declared. The National Park Act that has been legislated prevents anyone from removing anything from National Parks, not even a rock, stone, leaf or twig.

In 1992, the Thai Government declared new constitution that the country would have a forest cover of 40%: 15% from economic forests such as plantations, and the remaining 25% from conservation areas such as National Parks. Economic forests are recognized as forest cover because the government wants to recognize the private sectors initiatives to plant trees. This was known as the National Economic Social Plan. This new constitution stated local people must be involved directly to conserve and manage forests, as well as local organizations i.e. the TAO would be directly involved with the surrounding environment. In 1997, the government legislated new constitution, followed in 1998 with the Decentralization Act which gave the local level (TAO) more power, effectively a veto right, and more involvement with affairs that effected villages such as National Parks.

Currently there are 102 National Parks in Thailand which account for 10% (46,000 km<sup>2</sup>) of the land base. In addition, there are 55 protected wildlife sanctuaries which account for an additional 7% of the country's land base.

#### *National Park Process*

National parks are created in pre-existing NFR. The E and A zones in the NFR are usually excluded from the national park because there are many people living in the surrounding area and the land is no longer pristine. Officials try to create national parks in C zones. There is no clear policy on what would happen if people live in a C zone that could become part of a national park. Once the National Park is declared, all land within the park is now under National Park laws which are much stricter than NFR laws.

Once the government decides it wants to create a national park, it must inform the TAO offices that fall within the jurisdiction of its intentions. Villages that are located close to the proposed national park boundary will be visited by national park officers who will walk with the village headman or TAO representatives around the village so they know where the village boundaries are and where agricultural land is located. This area will usually be excluded from the national park boundary. Bargaining may occur for land that undergoes shifting cultivation. It is difficult to protect fallow land from becoming part of a national park because it may not be evident that the land is involved in agricultural production. It may be seen as being abandoned rather than under active agricultural production. The park officer has to let the TAO or villagers accept the NP boundary. National Park officials do not want to have conflicts with the TAO. Even if just one TAO says they don't want the NP, then the NP won't be established.

#### NP Establishment Process

1. An officer reports the potential of a NFR to become a NP: rough boundary is made; preliminary survey
2. NP designates an officer to do a preliminary survey including community participation; TAO acknowledgement and co-operate with the demarcation and boundary inventory as a result of the Constitution in 1997 and the Demarcation Act of 1999
3. NP committee looks at the proposed NP boundary from the NP Act 1961
4. New Cabinet Resolution on draft NP: parliament approval
5. Legal consideration by the Office of the Council of the State
6. Field demarcation: confirmation from the NP Department
7. Gazetted NP with the King's approval

Nonthaburi National Park is in the early stages. It is either at step 1 or 2.

If a farmer is using land in the C zone for agricultural production, it could be included in a National Park. However, the TAO representative and village headman may be able to negotiate with the TAO to not include this land in the National Park. If the National Park officials agree, then the farmer receives official recognition that he/she is using land in the C zone.

#### *Changing Attitudes of National Park Officials*

In 1998, 6 villages took part in a pilot project to encourage cooperation between villages and national park officials. The idea was to help the villagers minimize their impacts on the land and help them to improve their agricultural practices. They also provided these villages with other economic options such as tourism for generating cash incomes. The pilot project was also used to improve the attitudes of national park officials and dispel any old biases that it is better to have parks without people. The villagers are not their enemies, they are their friends.

## **Appendix R**

### Community Forest Lecture: Summarized

#### *Legislation*

After the government had enacted The Forestry Act in 1964 it realized the forests required further protection. A cabinet resolution was written creating conservation, economic and agricultural zones which over ride previous laws. Also, National Forest Reserves were created. The NFR where the field work was taking place was created in 1976.

There have been 6 versions of a CF bill, which were merged into one bill 5 years ago. The bill is still in Parliament. The bill includes: CF can not be in a C zone, but can be placed in an E zone and maybe an A zone. The bill, if passed, would give forest officials the right to hand over land to villagers.

The government has made changes in the Ministry of Forestry. There are now three departments: RFD, NP, and Conservation & Resources.

#### *Cooperation Between RFD & Villages*

The structure and management of the CF is decided upon by the village and forestry officials. The benefits gained from the CF are to be derived by the villagers. It is possible to divide the CF into different sections i.e. conservation, development, NTFP collection. Villagers feel they have ownership to their CF therefore they want it to thrive and prevent degradation. Although problems with ownership and participation do occur. When the NP boundary is declared, it won't take over forest designated as CF.

People do illegally enter the NFR if they require NTFP.

## **Appendix S**

### Summary of interview with village handicraft group – three different people

#### The Handicraft group:

The handicraft group are at present not very active. The group used to get orders from the Thai payap organisation, but for past two years there have not been any orders made. When these orders came in, some of the villagers shared the work and contacted the organisation when the work was done.

There are about 8 people in the village who are able to make the handicraft which is mainly baskets, bottle 'wrapping' and other smaller items with the different colourful patterns. When the villagers making the handicraft are not doing this, they make other bamboo handicrafts such as kitchen utensils, fishing nets and baskets and rice baskets for selling in the village.

#### The products and the resources:



The woods used for this handicraft are primarily bamboo which are collected in the nearby community forest. For the colourful patterns another bamboo sort is used. This is a darker shade, and it is collected in the national forest reserve area approximately 40km. away from the village. This means that the handicraft does not cost anything to produce, but the time the person making it spends. It takes about two days to make one set of baskets. There are five different baskets in one set; one large and four smaller baskets. These basket sets sells at around 180 Baht.