

Uncovering factors behind land use decision-making in Ban Dong Long



SLUSE Field Course 2016, Thailand

Interdisciplinary Land Use and Natural Resource Management

Authors:

Barnabas Czomba (zdh774)

Laura Kofod Boss (rtp471)

Monica Rennie (vqk446)

Shannon Dracup (fgn737)

Sumitra Paudel (wdt683)

Supervisors:

Thilde Bech Bruun

Søren Brofeldt

Word count: 11,004

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Authors Framework

| Text | Main author(s) | Contributing author(s) |
|--------------------------|-------------------|---------------------------|
| Introduction | Barni | All |
| Literature Review | Laura and Shannon | All |
| Methodology | Barni | All |
| Results | Monica | Sumitra |
| Analysis - social | Laura | Monica and Shannon |
| Analysis - environmental | Sumitra | Laura and Monica |
| Analysis - economic | Shannon | Laura, Monica and Sumitra |
| Discussion | All | |
| Conclusion | All | |

Preface

This study is a part of field-based course, *Sustainable Land Use and Natural Resource Management*, which was carried out in collaboration with University of Copenhagen, Denmark and Kasetsart University, Thailand. This report is an outcome of nine weeks of intensive coursework, including two weeks of fieldwork in Phetchabun Province in Northern Thailand. This study has allowed us to gain an insight into the different social, environmental and economic factors influencing farmers' land use decision-making in Ban Dong Long.

This course has given us a wonderful learning opportunity, during which we have worked in a group of students with interdisciplinary backgrounds. We learned about applying different research methods in a completely new environment that has broadened our horizon of knowledge and has allowed us to recognize our strengths and weaknesses. We believe that this coursework has also prepared us to conduct research in different settings in the future.

Abstract

The main goal of this study is to examine the agricultural practises in Ban Dong Long, Thailand, and to analyse the social, environmental and economic factors affecting farmers' land use decision-making. Discussions in Thailand regarding farming practises are primarily concerned with whether monocrop or crop diversification strategies are employed. In Ban Dong Long, most farmers produce cash crops, most commonly maize, taro and ginger in monocrop systems or in rotation with another crop. Due to severe water shortages in the dry season, many farmers are restricted to growing crops only during the wet months, and therefore it is common for villagers to rely on off-farm income. The appearance of a number of resorts over the last couple of decades has increased the opportunity to earn extra income. Despite this, the idea of being self-sufficient has been promoted by the headman. The village received its status as a self-sufficient village this year, however we did not find that there was a high level of interest among farmers. We found that economic factors are most influential in farmers' decision making, namely market price and farming expenses. Following these, social factors such as knowledge of farming and age also influence how farmers use the land. We found that water shortage is the most challenging environmental factor.

Acknowledgement

We would like to extend our gratitude to our supervisors Thilde Bech Bruun and Søren Brofeldt for their constant support and guidance throughout the SLUSE field course. We would like to express our utmost appreciation for their endless assistance and the motivation they provided us with, from the beginning until the end of our project. We would also like to extend our thanks to Simon Mundus and Daniel Ortiz Gonzalo who helped us during our soil laboratory analysis by providing necessary materials and guidance.

We would also like to thank our Thai counterparts: Thitima Ketkaew, Nattinee Munchaona, Nuttakit Lamsomboon and Suchada Yang-En, our interpreters: Kaew Chonlada and Prinn Hemapanpairo, and our supervisors in the field: Racha Chaichana, Kelvin Egay and Wannana Soontornnaruerangsee and the entire SLUSE team from Thailand who accompanied us in the field trip. It was such a rewarding experience to meet so many wonderful and insightful people.

Lastly, we would like to thank the staff at Thung Salaeng Luang National Park for their accommodation. Our experience in Thailand would not have been the same without their comforting hospitality and delicious meals.

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Abbreviations

C - Carbon

CL - Clay Loam

KII - Key Informant Interviews

N - Nitrogen

NTPP - Non-Timber Forest Products

POXC - Permanganate Oxidizable Carbon

PRA - Participatory Rural Appraisal

SD - Standard Deviation

SE - Sufficiency Economy

SI - Silt

SSI - Semi Structured Interview

SOM - Soil Organic Matter

1. INTRODUCTION

This study is about rural farmers' land use decisions in northern Thailand and the factors that influence them. We will describe the field site, provide history of the village, and discuss the motivation behind our research as well as our main research question and sub-questions.

1.1 Field description

Our focus area for this study is the village Ban Dong Long (Moo 6), located in the Camp Son sub-district of Khao Kho district in Phetchabun province (SLUSE, 2016). Khao Kho is situated in the Phetchabun Mountains, where the highest elevation is 1174 meters above sea level. The area has two distinct seasons: the rainy season starts in late March and lasts until the end of October, followed by the dry season. The average yearly precipitation is around 1100 mm and the average yearly mean temperature is around 27 degrees Celsius, which is nearly the same all year long (Thai Meteorological Department). We carried out our field research in early March, at the end of the dry season.

1.2 Village History

Moo 6 was first mentioned in 1957, when people emigrated from Lomsak district to grow maize and raise livestock on unoccupied land. In 1962 the population rose to about 100 households. During this period the first local tax was initiated due to population growth. For many years maize was the main crop grown but from 1981, taro cultivation started. In 1997, the current headman, Charn Thavornwong, was elected. In 2013, three community forests were registered.

Nowadays, the village is divided into six areas called Khums, each containing approximately 10-12 houses and a village committee officer. In 1999, the land in Moo 6 was divided into plots and allocated to villagers via a lottery system. Some areas were agreed to remain public. The picture below shows the map of these plots, which are still mostly the same today.

1.3 Motivation and research question

Before we arrived in Moo 6, we heard that the headman promotes self-sufficiency so we considered focusing our research on the theory of a sufficient economy and how that impacts farmers in the village (SLUSE 2016). However, we decided to broaden our research question to focus on the factors

behind why farmers make certain land use decisions. This approach could include farming decisions that fall under SE as well as other types of factors, rather than focusing only on SE.

For these reasons, our research question is:

How are social, environmental and economic factors related to farmers' decisions regarding land use?

To answer our research question, we created four sub-questions:

1. Which farming strategies are used in Moo 6?
2. To what extent are social factors related to the farmers' land use decisions?
3. To what extent are environmental factors related to the farmers' land use decisions?
4. To what extent are economic factors related to the farmers' land use decisions?

2. LITERATURE REVIEW

Mertz et al. (2008) show that rural farmers' land use decision making process is complex, which is why it is necessary to look at a multitude of different kind of factors if you want to avoid making simplistic conclusions while uncovering the drivers behind the farmers' decisions. We want a more holistic understanding of the farmers land use decisions, and this is why we focus on the three big factor groups: social, environmental and economic.

Social factors: It is relevant to look at social factors in relation to farmer's land use decision for several reasons. According to Chainuvati and Athipanan (2001), social factors like education and government incentives matter. Education is important in the way that the higher education the farmers have, the better they will be at adapting to the different farming-related challenges that they face. If they have a lower education, it will be harder for them to make use of the new technology and thereby also to change their practices accordingly. Government incentives are also likely to influence farmers' decisions (Duangjai et al. 2015; Chainuvati & Athipanan 2001). As Chainuvati and Athipanan say, the government believes that Thailand needs agricultural development to work towards a sufficiency economy. Parnwell (2005) says that power structures might also influence land use decisions, since power can be used in an empowering way: to enable and to encourage people to adopt specific practices.

Environmental factors: Several environmental factors are likely to affect the farmers' decisions as well. Salam et al. (2006) talk about the importance of community forests for Thai villagers; they say that forest resources are critical for the survival of rural people traditionally relying on these products. Water is also likely to be an influencing factor, since water shortage is a major challenge to the farmers because they rely on rainfall (Chainuvati & Athipanan 2001). It is also interesting to explore the indigenous knowledge of soils, since it is seen as essential in understanding the local realities of farmer and may explain farmers land use decisions (Saito et al. 2006).

Economic factors: Economic restrictions are arguably the most influential factors that determine farmers' land use decisions. According to a study in northern Thailand, market forces were responsible for driving change in land use patterns from food crop cultivation to fruit orchards (Duangjai et al. 2015). Farmers may change their farming practices based upon fluctuating market prices or general shifts in demand. According to the Department of International Development, "those with more assets tend to have a greater range of options and an ability to switch between multiple strategies to secure their livelihoods" - one of those assets being financial capital (DFID 2000).

For the above mentioned reasons, we will look into the different social, environmental and economic factors that influence farmers' land use decisions in Moo 6. We will not limit our study to look only at the factors mentioned above, though, but rather we will learn which factors are most important to the farmers in Moo 6.

3. METHODOLOGY

To gather all of the necessary data related to our research questions both qualitative and quantitative methods were used, with more focus on qualitative methods. These methods are key informant interviews, household questionnaires, semi-structured interviews (SSIs), participatory rural appraisal (PRA) and soil sampling. This section will describe and justify our choice of methods. All of the methods were conducted with the Thai counterparts, except for the SSIs, soil sampling and one key informant interview.

3.1 Key Informant Interviews

Soon after arriving in the village, an informal interview was conducted with the headman, Charn, at his home to introduce ourselves and build rapport with him. We took this opportunity to ask general questions about the village and the farmers' agricultural practises. Charn took us on a brief tour of the

village so that we could get an idea of the size and important landmarks. We had a spontaneous second interview with Charn, where he told us of land division amongst other things, and a third, more formal interview, to uncover the power structures and their influence, as well as to clarify certain questions about the learning center and his opinion on self-sufficiency economy.

Another key informant was the hydroponic owner, Kastana. We wanted to interview him because of his unique status as a hydroponic farmer, as he is the only one in Moo 6. We thought we could get some interesting insights from him regarding land use decisions.

We also interviewed two out of the headman's three assistants to get more information about the village's power structure, the assistant's' responsibilities within their position and the benefits they receive.

3.2 Household Questionnaires

Before the fieldwork, we designed a tentative questionnaire, with an aim to gain information regarding the households' land use choices and also about households dependency on community forest, reliance on off-farm income etc. The questionnaire changed quite significantly after discussing it with the Thai counterparts, though, since their focus was more on tourism. However, we managed to create a questionnaire that satisfied the research needs of both groups.

After pre-testing the questionnaire at one household, with a farmer called Kong Kan, to ensure clarity and comprehensiveness, another 23 questionnaires were collected with an adjusted questionnaire. We aimed to represent each khum in our questionnaire survey, and choose households using a convenience sampling strategy based on whom we could find at home. To carry out the questionnaires, we split into four groups, each with one Thai student and one Danish student. The Thai counterparts conducted the questionnaire while we observed. On the last day of gathering the questionnaires, only the Thai counterparts conducted questionnaires while we held interviews.

We examined the information in the questionnaires to select five households for semi-structured interviews. We based our decision on the number of crops they grow, if they sell or consume their crops, level of off-farm income, and if they collect NTFPs or not, so that we could see if these factors would affect their land use decisions.

3.3 Semi-structured Interviews

The purpose of these was to get more in depth answers regarding farming choices and challenges faced by farmers. We asked farmers to take us to their fields after each interview to perform transect walks. This allowed us to get a visual overview of their land and so ask them about their perceptions of their soil.



3.4 Participatory Rural Appraisal (PRA)

On our second day in Moo 6, we designed a map of the village with one of the headman's assistants, Chok. This gave us a clear visual of Moo 6, including location of households, farming land, water sources, and more.

Towards the end of our study, we organised a community meeting during which we asked villagers to participate in a number of PRA exercises: focus group discussions, community mapping, crop ranking, ranking of land use decision-making factors, and construction of seasonal calendars for crops and collection of NTFPs and a timeline of village history and development.

Initially, we asked participants to list the three cash and subsistence crops that were most important to them individually. Eight farmers took part in this exercise, including the headman. We used the results of this exercise to construct a crop calendar for the top six of these crops. The size of the group fluctuated during this activity, between three and eight villagers. Four people actively participated but most information came from Khomin, an assistant of the headman. Two villagers provided information for the NTFP calendar, while another two observed. Despite low levels of participation, we collected comprehensive information about crop growing seasons and NTFP collection throughout the year.

Finally, five farmers used the village map from Chok to indicate the areas of different soil types in Moo 6. We asked them to do this, so we could see the location of the different soil types as well as see how they characterize them.

3.5 Soil sampling

The main purpose of soil analysis was to understand farmers' perception of soil quality and to see whether it matches scientific measurements. For this, we asked each of the five SSI informants to

describe their soil types, which enabled us to grasp their perception regarding soil quality. From these five, we identified three households for taking soil samples as these farmers were clear about having good or bad soils in their field. For soil sampling, we selected two pairs of comparable plots, each pair consisting of both fertile and infertile plots. At each plot, we made three soil profiles (holes) and collected soil samples at the depths of 0-5 cm and 15-20 cm. We took a total of 24 samples (4 plots*3 replicates*2 depths) using volumetric soil sampling method with a soil core (100 cm³). We assumed that the topographic and climatic variables were similar in these comparable plots.

Then, we prepared samples by air drying, crushing and sieving the soils through a 2 mm sieve for the analysis of the following parameters: pH (1:2.5 soil:water), soil texture, bulk density, Permanganate Oxidisable Carbon, Total Carbon and Total Nitrogen. Laboratory analyses were carried out in the University of Copenhagen laboratory using standard methods (Mundus 2016).

4. RESULTS

4.1 Agriculture in Moo 6

In this section we will present some of the most relevant findings related to agricultural practises in Moo 6. Using information from the questionnaire, semi-structured interviews and crop-ranking exercise, we will describe the importance of different crops and the range of farming strategies in the village.

| Subsistence | Votes | Rank | Cash | Votes | Rank |
|---------------|-------|------|------------|-------|------|
| Rice | 7 | 1 | Taro | 5 | 1 |
| Banana | 4 | 2 | Ginger | 4 | 2 |
| Taro | 3 | 3 | Maize | 4 | 2 |
| Chili | 2 | | Cabbage | 3 | 3 |
| Lettuce | 2 | | Rice | 2 | |
| Morning glory | 2 | | Tamarind | 2 | |
| Mango | 1 | | Tobacco | 2 | |
| Papaya | 1 | | Vegetables | 1 | |
| Vegetables | 1 | | Parsley | 1 | |

Figure 1 This table shows the results from a crop ranking exercise with farmers. We asked each participant to vote for the three most important subsistence and cash crops to them.

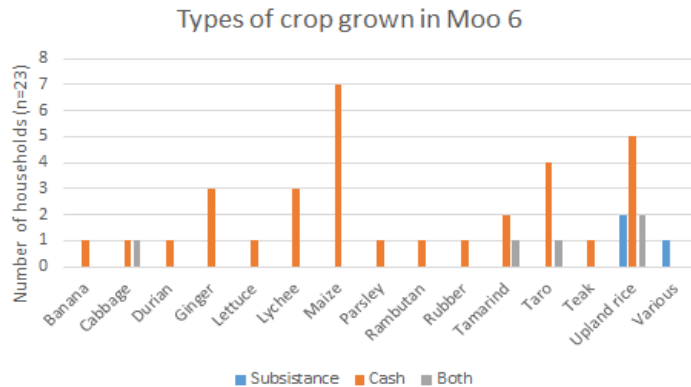


Figure 2 This graph shows the number of households growing certain crops for consumption or sale.

The average age of the farmers in Moo 6 is 49 (n=38), the youngest being 26 and the oldest 81. The size of land farmed by each household ranges from 0.5 rai to 332 rai, with an average of 35 rai. According to the headman, and also true in the crop ranking results, maize and taro are the most important cash crops, while upland rice is the most important crop for consumption and only the leftovers are sold (HM1). Our questionnaire confirmed this remark, although we found that five out of 23 households were also growing rice solely as a cash crop.

Black, white and sticky rice are the three types of rice that farmers grow in Moo 6. All maize farmers included in our survey sell their entire harvest, for the purpose of human consumption or animal feed depending on the variety. Taro is sold to household groups in the district for processing and then sold onto local shops or elsewhere in the country (HMAC).

We also learnt of the importance of several other crops. Ginger is another important cash crop in Moo 6, featuring high up in the crop ranking alongside maize. However, farmers must let the land rest for 5 years between crops or move to new usable land (HM1, SSI1) to grow ginger. This year farmers are preparing their land to grow ginger, which involves burning the fields. The Phetchabun province is well-known for its tamarind (Phetchabun.go.th), and we often enjoyed receiving large bags of the fruit from villagers, both sweet and sour varieties. The harvest season is very short, just one month in the dry season, but farmers can earn a little extra money (up to 400 baht per day) by helping to pick the fruit (KK). We also observed many banana trees on the edges of fields or next

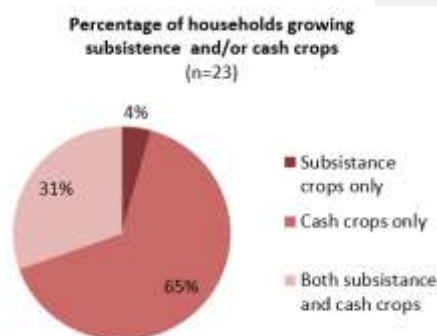


Figure 3

to houses, and although it is not well represented in our survey results, bananas are another important crop for household consumption, as confirmed in the crop ranking.

| | SSI1 (Q5) | SSI2 (Q9) | SSI3 (Q11) | SSI4 (Q14) | SSI5 (Q24) |
|--|---|--|---------------------------------|---|--|
| Name, gender, age of informant | Sonrawee Chuenchom, female, 44 | Suriya Henla, male, 58 | Wuttiya Senanut, female, 42 | Sanguan Wongsee, female, 60 | Uncle Long, male, 81 |
| Education level | Grade 4 | Bachelor | Grade 6 | Grade 4 | - |
| Number of household members | 2 | 3 | 3 | 5 | 4 |
| Size of land (rai) | 34 | 46.5 | 6 | 0.5 | 30 |
| Crops grown (subsistence /cash/both) (total) | Eg. <i>Maize, ginger, banana, upland rice</i> (4) | <i>Tamarind, rubber, macadamia, pine, teak, banana, lychee, bergamot, lime, langan, ginger, finger root, taro, rice</i> (12) | <i>Taro, maize, parsley</i> (3) | Lemon-grass, papaya, tomato, banana, egg-plant, parsley, pumpkin, julian, bean, lime, lettuce, morning glory, mint, cucumber, mango, onion, garlic, salad, ginger, maize (20) | Morning glory, teak, mango, coconut, papaya, banana, bamboo, <i>rambutan, tamarind, durian, lychee</i> (5) |
| Principle cropping system | Crop rotation | Agroforestry | Monocrop | Home garden | |
| NTFPs | None | None | Mushrooms and bamboo | Mushrooms and bamboo | None |

| Water source | Rain | Rain, pond, shower water | Rain | Village supply | Rain |
|---|-------|--------------------------|---|---|--------|
| Household expenditure on food (baht/year) | 36000 | 72000 | 0 | 20000 | 60000 |
| Off-farm income (baht/year) | 12000 | 56000 | 300baht/day (labour, dependent on employer) | 300baht/day (labour, dependent on employer) | 360000 |
| Debt (baht) | 50000 | 400000 | 53000 | 0 | 30000 |

Figure 4 Relevant background information about the households where we conducted SSIs.

4.2 Farming strategies

This section will look at the main farming strategies that we observed in Moo 6.

4.2.1 Monocropping

Almost half of the households surveyed grow one crop only, the most common being taro and maize. Unfavorable environmental conditions, such as unstable rainfall and poor soil quality, can limit the opportunities for farmers to grow more than one crop (Pandey & Bandari, 2007). All of the monocrops presented in Figure 5 are cash crops.

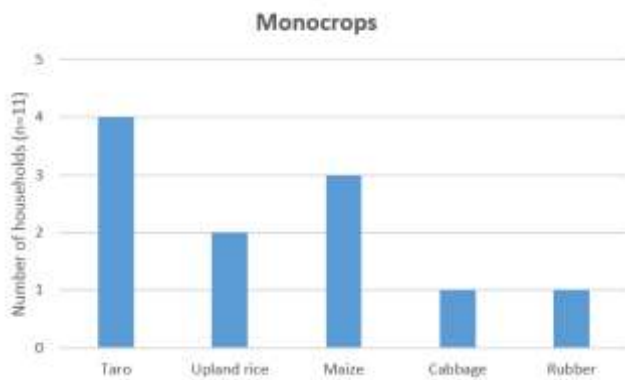


Figure 5 This graph presents the monocrops mentioned in the questionnaire

4.2.2 Crop diversification

52% of the households surveyed were growing more than one crop. Growing several crops which might be more or less favourable to different environmental conditions can help to stabilize farm output and reduce risk (Pandey & Bandari 2007). We observed that farmers in Moo 6 would divide their land to grow several crops, or rotate several crops on the same piece of land. For example, Q8¹ grows taro, maize and parsley simultaneously in separate areas. Sonrawee rotates maize, rice and ginger. She grows maize for 1-2 years followed by upland rice, telling us that upland rice grows better after rotating with maize, and vice versa. Additionally, employing this farming strategy allows farmers in Moo 6 to stagger labour demand, exploit environmental niches, and supply a wider range of outputs (Pandey & Bandari 2007).

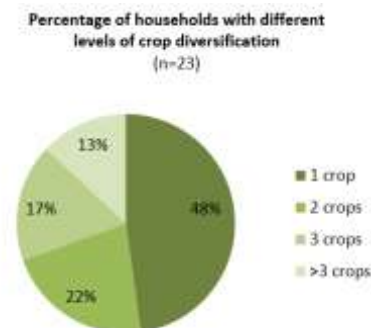


Figure 6

The informant for the pilot questionnaire, Kong Kan, told us that he had recently increased the number of crops on his farm. He used to only grow maize on his 30 rai field but then it became unproductive because of excessive use of herbicide. Now, he grows taro and ginger and rotates it with rice (KK).

4.2.3 Intercropping/agroforestry

We found two farmers who grew their crops in an agroforestry system (SSI2, SSI5); that is to say, they were growing multiple crops of different heights on the same plot of land. This is another type of crop diversification. Suriya practices a 5-level planting system over 26 rai of his farmland, and also in the garden next to his house. Suriya's crops range from standing trees (teak and rubber) to root crops (ginger and taro), with a number of types of fruit tree in between. According to Suriya, this method of planting provides several benefits: 1) Standing trees provide shade to shorter plants, and protect soil from direct sunlight, increasing moisture retention. 2) Growing plants with different nutrient requirements makes use of fertiliser and soil nutrients to the fullest. 3) Growing different types of crops can increase the level of natural push-pull pest control. Suriya has also introduced pine trees, the leaves of which he claims provide a good mulch layer, encouraging the growth of mushrooms.

¹ Questionnaire number eight

4.2.4 New technology

In our first meeting with the Headman, he talked to us a lot about the hydroponics farm that was set up in Moo 6 two years ago. Kastana Chavasirikul Tol started this hydroponic farm after being inspired by the many hydroponics farms in Khao Kor sub-district. The land used for his hydroponic farm is owned by his mother, and was previously used to grow maize for animal feed. Now Kastana grows 5 types of lettuce, which he sells outside the village, mostly to hotels and restaurants. Kastana's hydroponic farm is the only one in the village, however the headman told us he would like to see every farmer with their own hydroponic farm in the future, if Kastana's farm becomes a success.



4.2.5 Fruit trees

This was not captured by the questionnaire, however from general observation around the village and transect walks during the semi-structured interviews, we understand that many villagers grow fruit trees around their houses which they use for their own consumption. In most cases we observed only a small number or small patch of trees. The most commonly observed were banana, papaya and coconut. We believe that villagers may not consider these trees to be part of their farming practices, which is why we did not learn about it from carrying out the questionnaire survey.

4.2.6 Home gardens

As in the case of Suriya and Sanguan, a small number of villagers were growing more than just fruit trees around their houses. In fact, these villagers grew a wide variety of vegetables and herbs in their gardens, and used organic fertiliser (chicken manure). Kastana's mother started growing limes in her garden this year (KCT). She mentioned that limes have a good market price and therefore can be economically profitable.

4.3 Factor Ranking

The table below was created based on results from a PRA session in which we asked farmers to rank a list of ten factors that influence their farming decisions.

| Rank | Factor | |
|------|-----------------------|--------------------|
| 1 | Market price | |
| 2 | Farming expenses | |
| 3 | Soil quality | Water availability |
| 5 | Knowledge about crops | |
| 6 | Access to land | |
| 7 | Off-farm income | |
| 8 | Land size | |
| 9 | Access to loans | |
| 10 | Government incentives | |

Figure 7

5. ANALYSIS

5.1 Social Factors

This part of the paper will look at which social factors influence the land use decisions of the farmers in Moo 6. These factors consist of access to knowledge, social connections, education, health, age and sufficiency economy.

5.1.1 Access to knowledge

In general, social factors do not seem to be of great influence, but there are some that play at least a small role. The first factor is access to knowledge of farming practices, which is related to how the farmers gained their knowledge of farming and whether they have access to gain more.

Two of the farmers, Sonrawee and Wuttiya, said that their parents had taught them how to farm (SSI1, SSI3). They both farm in a conventional way, but had their parents taught them differently, it is likely that their farming practices would have been different from what they are today. Wuttiya actually has changed her farming practices a little, though, after her husband attended a class at the learning center on how to use wooden fuel instead of pesticides (SSI3). Sanguan's knowledge of farming was limited to onions until she attended a conference about SE-farming held by government officials,

which is why she grows so many different vegetables in her garden today (SSI4). Suriya originally learned about farming from Kasetsart University, but started doing agroforestry also after attending a conference about it, which took place outside of the village (SSI2). He learned about the conference through a friend, the news and the Internet. Kastana also has farming knowledge from Kasetsart, but started his hydroponic farm after researching “different”² farming practices and visiting other hydroponic farmers in the Khao Kor district to gain knowledge about the hydroponic structure and the farming process (KCT). The third farmer with a university degree is Somrudee Teiprateep, who is the granddaughter of uncle Long. She is now working on starting her own hydroponic farm outside the village (Q24). There is therefore a correlation between having a university degree and farming in an unconventional way. This might be because their educational backgrounds have given them a deeper understanding of agriculture, which is why it is easier for them to understand why alternative ways of farming can be more beneficial.

For all the farmers, time is a factor that affects their access to gain further knowledge of farming practices. Sonrawee told that she never used the learning center because she was always working and therefore did not have the time to go there (SSI1). It is therefore likely that Wuttiya would not have started using the wooden fuel if her husband had not had time to go to the learning center. The same goes for the rest: Sanguan and Suriya both had time to attend a conference, and Kastana had time to research and meet with hydroponic farmers.

5.1.2 Social connections

Social connections can also be somewhat influential. As mentioned, Suriya heard about the conference on agroforestry from a friend (SSI2). He also said that he has friends who inform him of market prices, and that he sometimes considers these when deciding what to grow. Kastana’s brother is his middleman, and Kastana says that which types of lettuce he grows depends on what his brother tells him (KCT).

Whether a farmer is a member of an organization has no effect on the farmer’s land use decisions according to our study. We found that 14 out of 23 were members of an organization, but there was no relationship between the membership and what they grow or how they grow it.

² Kastana said that he did not know that he was going to start a hydroponic farm, when he moved to Moo 6, he just wanted to do something “different” (KCT).

5.1.3 Health

Two farmers, Suriya and Kastana, reported not using chemicals on their crops because they are concerned about how it will affect the health of those who consume their products (SSI2, KCT). For Suriya, this means that he uses chicken manure as fertilisers for his trees, and for Kastana, that he uses bacteria as organic pest control.

5.1.4 Age

Age is an obvious factor but one that we had not thought of. Several people reported stopping farming or only growing fruit and standing trees since they need less water and care because they were getting too old to do hard physical work (SSI5, Q19). Six out of 23 households grow trees, and each of these six farmers was well above the average age of 49³. Uncle Long (81) stopped growing parsley, cabbage and ginger three to four years ago, since they were becoming too difficult to grow (SSI5). He now rents out the land that he no longer uses to Hmong farmers. Even the onion merchant, Sanguan, probably would not have started to grow all the different vegetables in her garden if it had not been because of her old age. We believe her retirement enabled her to have time to both attend the conference and to now tend to her garden.

³ N = 38. The age range of the six farmers was between 58 and 81.

5.1.5 Sufficiency Economy

After analyzing the power structures of the village and how different actors define and promote SE, we believe that SE does have a small influence on the farmers' land use decisions. We did not find any examples of true SE-farming, which means following the King's 30-30-30-10 guideline (see Box 1), but we did find evidence of SE-related farming practices. These consisted of using wooden fuel as pesticides, farming to be self-reliant on vegetables, and farming without the use of chemicals.

We analyzed different actors, including the headman, the SE learning center and government programs. We also looked at the village committee and the headman's assistants, but these did not advise people on how to farm - neither did they seem interested in doing so (HMA, HM3). We found that the learning center and government programs were more influential than the headman himself.

Firstly, Charn is not influential because he does not actually encourage people to do SE-farming (SSI1, SSI2), and secondly because he does not do it himself. Whether we quote Suriya or John Kotter's (1996) theory on how to be a successful leader of change, the conclusion is the same: you cannot be influential if you do not practice what you preach.

The learning center is influential in the way that some of the farmers, including Wuttiya and uncle Long, have implemented smaller SE-related practices that they learned through the center. For example, they learned how to use the vapor from wooden fuels in such a way that it serves as a pesticide alternative (SSI2, SSI3, SSI5). Suriya told us that there have been check-ups of the learning center's attendees to see if they have changed any of their practices, and probably 10% did (SSI2). 10% is not that much, especially when considering the lack of interest the villagers have in the center. Uncle Long said he had no interest in attending its activities (SSI5), Sonrawee that she probably would not attend (SSI1), and Wuttiya that she might go, if she will have the time (SSI3).

Box 1: Sufficiency Economy

The Thai king, Bhumibol Adulyadej, introduced the concept of sufficiency economy philosophy back in 1974 (Pibool). According to the literature (Piboolsravut 2004, Naipinit et al. 2014, Khamman 2013), the sufficiency economy is a philosophy that can be applied to several aspects of life and improve the development of the country. The components of SE are moderation, reasonableness and self-immunity, and in order to encompass these, one also has to be knowledgeable moral (ibid.) In relation to farming, the purpose of SE is to make farmers "more self-reliant through a holistic management of their land, while living harmoniously with nature and within society" (Piboolsravut 2004). The King's suggestion is that farmers do this through employing the 30-30-30-10 guideline. This is done through using 30% of your land for rice, another 30% for vegetables, 30% for a pond and the last 10% for the household and livestock (ibid.). Another part of SE is that the produce should be chemical free, since the development should be towards a green society (Khamman 2013).

Lastly, government programs are evaluated to be the most influential in regard to the farmers' land use decisions. Suriya and Sanguan, who both attended conferences, have changed their practices most drastically (SSI2, SSI4): Suriya went on to do agroforestry and Sanguan to cover her garden with different fruits and vegetables. Neither of them use chemicals for their farming. The point that government programs are the most influential of the three actors is also supported by the fact that 30 households now grow mushrooms that they can sell because they attended a conference about it (SSI2). The conferences are thereby very effective in affecting farmers' practices in Moo 6.



Suriya showing us his 5-level farm

5.2 Environmental Factors

This section will focus on environmental factors such as water and soil quality which were ranked as third important factors by farmers after farming expense and market price to influence their land use decisions in Moo 6 (Figure 5.1.2). Since there are three community forest with total area of 115 rai in Moo 6 (HM1), this section will also talk briefly about use of forest resources and people's dependency on NTFP to see whether this influences land use decisions.

5.2.1 Water Shortage

Most of the farmers (four out of five SSI) in Moo 6, including the headman, mentioned scarcity of water as a constraint to agricultural production. Drought was mentioned as a challenging environmental factor (SSI1 and SSI2). 78% (n=23) of households rely entirely on rainwater for growing their crops. There are three wells in Moo 6 from which water can be used at the rate of 8 baht/m³ (HM1). We found only three households (n=23) used this water for agricultural purposes. The headman told us that there are two waterfalls, both located on a very steep slope (one waterfall was 35m high), making it almost impossible for the villagers to use the water for farming - the headman even advised against it for safety reasons.

We found that water influences land use decisions in Moo 6. SSI5 said that he only grows fruit trees because they do not require much water to remain productive. Wuttiya (SSI13) was not growing any crops this year because of lack of water. Suriya and uncle Long also mentioned that in the future they would like to grow plants with less water demand, SSI2 also talked about saving shower water for

crops. We noticed that three out of five SSI households had ponds in their field. As the ponds were very small, we do not exactly know the scale of its impact. Sonrawee finds it useful to have a pond during the wet season but it does not extend the growing season as the water level falls very low during the dry season. However, one household (Q1) mentioned that she can grow lettuce all year round using water from the pond. Tamarind is harvested in the dry season, so villagers can use it as a source of food and income at a time when many other crops are not available due to lack of water (KK).

From all these observations, we found that water is an important factor which influences land use decisions in Moo 6. It was only for Kastana that water was not a hindrance (though his opinion was water availability is an issue in Moo 6), as he was using water from the well for growing lettuce. We think this is because Kastana is relatively wealthier than the other villagers and could therefore afford to use the village supply as much as needed.

5.2.2 Forest Resources (NTFP)

To find out if the dependency on forest resources affect the farmers land use decisions, we conducted questionnaires with 23 households and 61% of household said that they use community forest for NTFP collection - mostly for self consumption. In a study in Chang Tok Tay Community forest in Northern Thailand, people revealed that NTFPs such as mushrooms, bamboo, herbs, and small animals play an important role in sustaining local economies and forest resources are considered to have a significant role in sustaining rural livelihoods for neighbouring communities who traditionally rely on these resources (Salam et al., 2005). However, although there are three smaller community forests in Moo 6, and that we got a long list of all the different NTFPs that the villagers collect (see Box 2), we did not find that the villagers rely heavily on the NTFPs. Firstly, because some villagers reported not using the forest because they are afraid of dangerous animals (SSI1, Q6) and are not sure which NTFPs are safe to eat (SSI1, KK). Secondly, because most villagers reported using the forest only one or two months a year. NTFPs only seem to be important to one household (Q18), since they collect the products from April to October, eight times a month. Furthermore, the opportunity for villagers to earn off-farm income

Box 2: Collected NTFPs

The products that the villagers of Moo 6 actually collect are the following:

Plants:

Bamboo
Mushrooms
Melientha suavis
Wild yam
Stemona tuberosa
Stephania pierrei
die
Pueraria

Animals:

Birds
Moles
Palm civets
Fish
Crabs
Mice
Cicadas
Bamboo worms
Dung beetles

Based on the information gathered from the questionnaires and the NTFP seasonal calendar.

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means that they do not desperately need to collect forest products. Also, we found no relation between forest usage and types of crops grown or if they grow to sell or consume.

5.2.3 Soil

Farmers' Perception on Soil quality

Farmers' knowledge of soil quality can influence land use decision. Murage et al. (2000) documented that farmers grew different crops in fields that were perceived productive and unproductive. Therefore, we thought it would be interesting to see whether the farmers' perception matches scientific measurement and how it influences land use decision in Moo 6.

| Plots | Coding description | Owner | Perceived quality by farmer | Reasoning |
|-------|--------------------|--------------------|-----------------------------|---|
| C1 | Clay Soil-1 | Suriya (SSI2) | Infertile (I) | Clay soil; acidic soil |
| C2 | Clay Soil-2 | Sonrawee (SSI1) | Infertile (I) | Clay soil; difficult to apply fertiliser, low water retention |
| L1 | Loose Soil-1 | Uncle long (SSI 5) | Fertile (F) | Loose soil layer at top which is good in water retention followed by clay layer; no acidic soil |
| L2 | Loose Soil-2 | Sonrawee (SSI1) | Fertile (F) | Loose Soil, easy tillage; easy to apply fertiliser, high water retention |

Figure 8 Plot description (Soil Sampling)

We found that farmers use certain parameters to describe good and bad soils (Figure 5.4.1). We will use the terms “fertile” and “infertile” for “good” and “bad” soils mentioned by farmers.

Farmers mentioned about having three types of soil in the village: loose (red and black colored), clay (orange colored which turns black in rainy season) and combination of both (PRA). We found that they use soil type, drainage and workability of soils to distinguish between good and bad soils, and that they perceive loose soils as good and clay soils as bad.

We found that some farmers in Moo 6 perceive that chemical fertilizers degrade soil quality (Suriya and Sanguan). Suriya mentioned that because of the excessive fertilizers by farmers in the past, the whole village had acidic soils. He also explained the need for farmers to start using natural fertilisers (he hasn’t used chemicals for 15 years); but as most of them grow for commercial purposes, he said it is hard to reduce the amount of chemical fertilisers used, and also difficult to change attitudes. We found that some farmers try to combat low soil fertility by intercropping plants with different nutrient requirements or rotating crops (Suriya and Sonrawee). The headman mentioned that growing beans would be good for soil fertility (HM1), but we found no evidence of anyone doing that.



Despite the fact that farmers (PRA) mentioned soil quality as a factor that influence land use decisions, we found that for most it does not really matter. Sonrawee (SSI1) has both loose and clay soil and although she perceives loose soil to be more fertile due to its ease of tillage and water retention, she does not specifically allocate crops to either soil type. However, she grows a small patch of banana trees at the top of her field in order to prevent soil erosion and landslides (SSI1). Wuttiya (SSI3) also made a similar statement saying loose, black soil is better as it is easy to plough; clay soils are red and are not good for growing crops. However, she also said that soil types do not influence what she grows; her most recently used plot of land was a patchwork of both soil types but she planted taro all over it. Soil quality, or at least soil color, is the determining factor for her though, when she decides which

fields to rent - the darker the soil, the better. According to Ettema (1994), dark soils are considered to be more fertile as they have high organic matter content.

This section of the soil will talk about the result obtained from laboratory analysis of some soil quality parameters.

Soil Color and Texture

We did not observe any difference in soil color between soil horizons (0-30cm) when soil was analyzed using Munsell soil color chart (see Appendix: A.9.4.1, A.9.4.2, A.9.4.3). Most of the soils were found to be clay loam.

The results of soil physico-chemical analysis is shown in Figure 9

| Plots (Top layer soil, 0-5 cm) | | |
|------------------------------------|-------------|---------------|
| Plots | C | L |
| | I | F |
| pH | 6.27±0.02 | 5.49±0.4 |
| Bulk density (gm/cm ³) | 1.07*±0.01 | 1.16*±0.16 |
| PoxC (mg/kg) | 657.5*±49.9 | 232.25*±47.07 |
| Total N (%) | 0.16±0.03 | 0.08±0.014 |
| Total C (%) | 1.9±0.49 | 0.68±0.0 |
| SOM (%) | 1.1±0.86 | 0.39±0.0 |
| C/N | 11.60*±0.24 | 9.44*±0.24 |
| n | 6 | 6 |

Figure 9 Soil properties of fertile (F) and infertile (I) fields, combined (Mean±SD)

Note: * statistically significant at $p < 0.05$; n: number of replicates

We did a t-test to see whether there was a significant difference between perceived fertile and infertile soil for the topsoil.

Soil pH

The soils that were considered to be fertile had strongly acidic soil, pH 5.49. Soils with pH<7 is considered to be acidic and acidic soils may result in iron, aluminium, manganese toxicities and phosphorus unavailability (FAO 1987). Soils with a pH between 5.5-7 is considered good (Defoer 2000). One farmer (SSI2; C1) mentioned that the whole village has acidic soils and this was found to be valid. However, another farmer (SSI5) who said he didn't have acidic soil, had strongly acidic soil (see Appendix A.9.4.7). His argument was that if his soil were acidic, his sweet tamarind would turn sour. This just shows that he has no idea of his soils acidity.

Bulk Density

Soil bulk density is used as an indicator of soil compaction (Schoenholtz et al. 2000). The average bulk density of the perceived fertile soil was found to be 1.16 gm/cm³, which was higher than the values for perceived infertile soil (1.06 gm/cm³), and a t-test conducted showed statistically significant difference ($P < 0.05$) between these two plots.

Permanganate Oxidizable Carbon (POXC)

The average bulk density of perceived fertile soil was found to be 232.25 mg/kg whereas for infertile soil, it was 657.5 mg/kg. A t-test showed a significant difference ($P < 0.05$) in POXC values between these plots. POXC is directly related to the amount of active carbon in the soil which is an indicator of biological soil quality (Weil et al. 2003).

Total Nitrogen (%)

Nitrogen is an important nutrient for plant growth and Total Nitrogen > 0.1% in the rooting zone is considered to be good (Defoer 2000). The perceived fertile soil had <0.1% Total Nitrogen whereas infertile soil had >0.1 % Nitrogen.

Soil Organic Matter (SOM %)

SOM is an important indicator of nutrient availability, water holding capacity and soil structure (Barrios et al, 2006). Low organic matter content indicates weaker soil structure and increased risk of soil erosion. Soils with SOM greater than 1.7% are considered good (Defoer 2000). The perceived infertile soil had higher SOM than the perceived fertile soil however, SOM content in all plots were below 1.7%.

C/N

The C/N values were lower for perceived fertile soil and higher for perceived infertile soil (statistically significant at $P < 0.05$). The high C:N ratio of soil indicates that the organic material are more resilient to decomposition (FAO 2005).

We found that farmers have their own soil classification to define soil quality based on their observation and experience. The indicators that farmers mentioned to judge good and bad soils were soil type, acidity, drainage and workability. However, this study found that the farmer's perception regarding their soil quality mostly does not match the scientific measurement. Loose soils that were mentioned fertile, because of easy workability and drainage by farmers was found to be more acidic and had higher values of bulk density, lower POXC, lower Total Nitrogen, lower Total C, lower SOM and lower values of C/N whereas clay soils that were mentioned infertile had opposite values. Based on our study, we can conclude that soil quality is not a big influencing factor on farmers' land use decisions as we found even though most of farmers are aware of soil quality, it does not mostly influence what they grow.

5.3 Economic Factors

This part of the paper will look at the economic factors that are most influential in farmers' land use decisions, more specifically market price and demand, farming expenses, off-farm income, debt, land ownership and the introduction of resorts.

5.3.1 Market Price and Demand

Knowledge and understanding of market price is important for households who rely heavily on selling their products for profit. Some farmers in Moo 6, like Kastana and Suriya, tend to learn of market prices through friends or media sources such as TV and radio. However, farmers without connections to the market or those who don't utilize media sources must rely on a middleman to learn of market prices. 60% of farmers in Moo 6 sell their products through a middleman, and the rest sell it themselves or through a cooperative. One of the headman's assistants said that the farmer is always the poorest in the system. Kastana also said that farmers are the poorest, and those who sell the crops are richer. This is because farmers that use a middleman and don't know the true market price have the risk of being manipulated by the middleman and earning less for their products, as Suriya mentioned (SSI2). Suriya has friends in Bangkok who regularly update him on market prices, which allows him to make informed decisions on which crops to grow. This insight also prevents him from

being tricked by a middleman. Suriya often has several middlemen contact him, and he decides which crops to grow and which one to use based on the price they give him.

Almost all the farmers said that they initially chose to grow the crops they grow based on their market prices (SSI1, SS2). However, we found that some farmers do not change the crops they grow regardless of fluctuating market prices. Uncle Long as well as Sonrawee still grow the same crops even if the market price falls (SSI5, SSI1). In uncle Long's case, this may have to do with varying dependence on off-farm income, as his household receives income from their shop, so they don't need to maximize farming profit as other households might. Sonrawee's reason for always growing the same crops is that the prices change so little that the overall change does not affect her much.

Many of the farmers in Moo 6 grow crops to sell in the market and resorts, therefore it is important that there is demand for the crops. There were only two farmers, though, who mentioned that the demand affect their crop decisions. Suriya chooses to grow sour tamarind because most farmers grow sweet tamarind, so he has less competition when selling his products in the market. Selling sour tamarind gives him a better market price than selling sweet tamarind, because the demand is there. Kastana also mentioned that which new crops he will grow at the hydroponic farm depends on the market; there must be a market before he starts growing anything new.

The headman and his assistant, Chok, both mentioned in separate interviews that many farmers are preparing to grow ginger this year. A high yield of ginger may lower its market price, however, this doesn't seem to stop farmers from planning to grow it. Based on our questionnaires and SSIs, we noticed a pattern that most farmers tend to stick with their initial crops, so demand is not an obvious factor influencing farmers' decisions.

5.3.2 Farming Expenses

Another important factor that influences farmers' decisions is farming expenses: in particular, high investment costs. Kastana built his hydroponic farm himself to save costs, but it still cost him 300-400,000 baht. The construction of a hydroponic farm can reach up to one million baht if you have it built for you. Kastana mentioned that other farmers in Moo 6 show little interest in hydroponic farming due to the costly investment in the structure. He even invited villagers to teach them how to do hydroponic farming, but none of the villagers seemed to be interested as few people have the money to invest in hydroponic farming. During our first interview with the headman, he said that if this hydroponic farm is successful, he wants it to spread to other households in Moo 6. However, when

we interviewed Kastana, he said that he was unaware of the headman's opinion and has received no help from the headman.

Farming expenses are less of an issue to farmers in Moo 6 who have more assets such as education and financial stability. Kastana, for example, has many assets that make hydroponic farming easier for him than other farmers in the village. He is well-educated, with a marketing degree from Kasetsart University. He comes from a wealthy family and does well for himself financially, with a carpenter business in Bangkok and his brother, a middleman, to sell his crops in Bangkok. His ability to start a hydroponic farm in Moo 6 can be accredited to these things. Kastana told us that he doesn't actually need the money from his farming, rather that he thought it would be "fun to try something new".

Another farming expense is cost of seeds. Suriya, like Kastana, is well educated with a background in agriculture. His wife works as a teacher and he receives retirement money from the government. Similarly to hydroponic farming, 5-level planting requires a high initial investment cost to purchase the seeds, with some seeds costing up to 200 baht. Suriya only needed to buy the seeds once, as he is able to use seeds from the previous year, so now his farming expenses are much lower. One farmer mentioned that she chooses to grow maize and upland rice because of the low seed cost and because they are both easy to maintain and profitable (SSI1). Other farmers choose to grow taro because they can save it after harvest and replant it without buying seeds (Q7, Q8, and Q11).

We were not able to obtain as much quantitative data as we hoped regarding expenses that are related to the commonly grown crops, such as upland rice. In our discussion section, we will expand on how missing answers in our questionnaires led to this lack of quantitative data.

5.3.3 Off-farm Income

We could not find a correlation between off-farm income and land use decisions due to incomplete answers in the questionnaires. We did find that off-farm income in itself is important: 86% of villagers in Moo 6 have an off-farm income, particularly during the dry season when farming conditions are poor. Since the headman tries to promote SE in the village, he believes that farming is better than relying on off-farm income. He wants the villagers to consume the products they grow and sell what is left over. His dream is for villagers to have enough food and to stay in the village.

Sanguan has a small home garden in which she grows many different crops solely for consumption (SSI4). Her household relies on the income from her son's labor work outside of the village to cover

expenses. However, she only started her home garden two months ago, so it is hard to make a connection between her farming and her reliance on off-farm income.

Off-farm income is sometimes invested in farming activities. Wuttiya invests some money from her son's labour work into her farming (SSI3). Sonrawee cuts trees from areas that are not being used and sells them as wooden fuel after the rainy season (SSI1). Half of this money is used for household expenses, and the other half is invested in her farming, for example on gasoline, labour, and land preparation.

To help relieve the farmers during the dry months, the government introduced a mushroom project in which 30 of the households received mushrooms to grow. The headman prefers that villagers grow and sell these mushrooms during the dry season rather than leaving Moo 6 for work elsewhere. This project's goal is to increase the number of households who follow the SE. Despite what he wants for the villagers, the headman himself owns a restaurant and car wash outside of the village, so he is not exactly following his own expectations for the villagers.

5.3.4 Debt

While many farmers in Moo 6 have debt, it does not seem to hinder their livelihoods and farming practices. In fact, most of the households with debt have seasonal farming debt where they loan money from the bank and then pay it back after the harvest. Sonrawee mentioned that the maximum loan she can take from the agricultural bank is 50,000 baht (SSI1). This limitation could prevent farmers from transitioning their farming practices to 5-level planting or hydroponic farming, if they wish to, because they lack funds to cover the high investment costs.

Wuttiya takes an annual loan of 30,000 baht from a community fund. She mentioned that she has only grown maize and parsley one or two times, but is considering growing them again as it can help her gain enough income to pay back her debt. Wuttiya's income is enough for living but not for repaying her debt (SSI3).

5.3.5 Land ownership

More than half of the plots of land included in the questionnaire survey were owned by the farmers (53%, n=42), while the remaining plots were either rented or borrowed. The average price of rent within Moo 6 is 500baht/rai (n=8), while land rented from outside the village is more expensive (Q1 pays 1000baht/rai, and Q3 pays 1500 baht/rai). Only two plots of land are rented to outsiders. From

our findings, it is not possible to draw any clear connection between land ownership and land use decisions, except that farmers who rent land are not able to plant perennial crops or standing trees (Suriya).

5.3.6 Introduction of Resorts

According to the headman, in the past Moo 6 was entirely made up of farmland and now only 80% of the village is farmland. The first resort came to the village 21 years ago, and since then around 2000 rai has been converted from farmland to resort areas. Last year, Moo 6 became an official tourist attraction. Another 100 rai which used to be farmland is now being prepared to sell for building resorts. The headman believes that an increase in tourism does not affect the land use much. He thinks that it is good for the villagers' income because farmers will grow more crops to sell to the resorts. However, we did not meet any villagers who actually did this.

5.4 Sub-conclusion

Based on the analysis, this is how we rank the top seven factors that influence the farmers' land use decisions: We found that two economic factors, market price and farming expenses, are the most important in farmers' land use decisions. Almost all the farmers state that they initially chose to grow the crops they grow based on their market prices. Among the farming expenses, it seems that the price of seeds influence which crops are grown. Farmers with large sums of debt tend to grow maize, upland rice or ginger, which could be because of their cheap cost of seeds. We believe that the third and fourth most important factors are to be found among the social factors. The third most important is access to knowledge. From whom the farmers learned how to farm and whether they have access to gain further knowledge greatly influences the way the villagers farm. The fourth factor is age, since age affects how hard farmers are able to work in the field. We were told that trees are easy to grow since they do not need a lot of care taking, and we did find a connection between age and growing trees: All the tree farmers are well above the average age of the farmers, ranging from 58-81 years old. Water is the fifth most important factor that influence land use decisions. Some farmers said that in the future, they wanted to grow crops that are less water-reliant, since water shortage is a big problem in Moo 6. The sixth most influential factor is government programs. This is because they are able to change the practices of the farmers most drastically. Although the changes are drastic, not that many villagers attend the conferences held by the government, which is why this factor is only ranked as number six. Soil quality was not influential for many farmers, which is why we ranked soil quality as the seventh important factor. It only seems to be of importance to those farmers who rent new

fields frequently, since then the quality of the soil affects which fields they pick. Some farmers said that they combat low soil fertility by intercropping with other crops.

6. DISCUSSION

In this part of the paper we will evaluate how useful our study is in answering our research question by discussing how the methods we used affected our results.

6.1 Key Informant Interviews

None of the interviews with our key informants happened in the way we imagined them to. The main interview that we had with the headman took place by the security checkpoint at the entrance to the village (due to last minute rescheduling). The headman, his assistants and other committee members were greeting cars and waving them into the village⁴, while enjoying some beers around a small fire at the side of the road. Since Charn had all his fellow committee members around, it might have affected the answers he gave us. The headman also seemed less willing to talk about SE, which in previous, private meetings he had talked about without us even asking. We had to ask him directly about SE before he said anything about it, and then what he said was limited. We were surprised when Charn told us that he thinks it is most important for villagers to farm to sell their products rather than to consume, since growing everything to consume would be impossible, as it goes against the teachings of SE. This could be his honest opinion, or it could be that since most of the villagers, including the committee members, only grow one crop, he did not want to offend or upset them. This seems plausible especially because he said that one of the things he enjoys most about being the headman is the love and respect he gets from the villagers. On the other hand, Charn seemed pretty relaxed and not that different from the other times we met with him - and since he does not follow SE himself, it would be strange if he would say that farming to consume is better than to sell.

We wanted to talk to Charn's assistants to find out if they got special benefits as assistants or if they were helping the headman in promoting SE. Our Thai counterparts arranged a joint interview, which added some bias to the answers we got. Khomin was louder and way more talkative than Chok, which meant that it was mostly Khomin's opinions that came across. Also, the fact that the interview took place at Khomin's house probably did not make it easier for Chok to speak up. We took it in turns with the Thai counterparts to ask questions to keep Chok and Khomin busy while the interpreters translated

⁴ The headman told us that they need to monitor who comes into the village in order to prevent drugs and weapons being brought in.

for us, but it disrupted the flow of related questions, making follow-up questions harder. Overall, the biases of this joint interview will not interfere with the results of our study, as we concluded that Chok and Khomin's position as Charn's assistants did not affect their farming practices, or influence the farming practices of others.

The interview with Kastana did not go uninterrupted either. After 10-15 minutes, his mother came and joined us at the table, and she was very eager to talk about her own history, the wealth and philanthropy of the people she knows, and why she moved to Moo 6. We did get all the answers that we wanted about him and his hydroponic farm, though, so her presence did not interfere with the information we were looking for. Actually, we believe that her "interruptions" only added an extra depth to the interview, since it helped us understand him and his background even better.

6.2 Household Questionnaires

Although our research topics had a different focus, we managed to work with the Thai counterparts to combine our questionnaire with theirs so that both groups would obtain the relevant information. However, because the Thai students conducted the last questionnaires by themselves, we were not able to notice if they missed out a piece of valuable information or if something was not written down, which has resulted in a number of gaps in the data.

In the crop table section, we asked farmers for specific quantities and prices of fertiliser, herbicide, pesticide and seeds, which resulted in almost unusable data due to multiple units (e.g. price of seed: per kg, per bag, per 10 trees, etc.) and huge differences between answers (e.g. price of maize seed for Q16, Q20 and Q21 was 9000baht/[no unit], 1700baht/kg and 170baht/kg respectively). We were aware that asking for specific numbers in the questionnaire would not yield very reliable answers, and although we were wary about including it, the Thai counterparts insisted that they needed this information. It is not essential information for our report and so the lack of reliable results doesn't affect our write-up so much, however there was a lot of time wasted in asking these questions and translating them.

After carrying out the SSIs and transect walks, we realised that the informants grew more crops than they stated in the questionnaire. For example, while walking in Sonrawee's fields we spotted a patch of banana trees that belong to her, which had not been mentioned previously. Also we only discovered uncle Long's papaya, coconut, mango, banana and morning glory after the SSI. Therefore, the questionnaires could under-represent the true number of crops grown by each farmer. Indeed, they may not think that fruit trees around the house or edges of fields were necessarily crops that they

actively farm. Had we known this before carrying out the questionnaire, we could have made an effort to make sure all fruit trees etc. were included.

In general, we should have been more direct with our questions. We designed our questionnaire with the idea that we would ask questions about smaller details in order to deduct the most important factors ourselves, and also to be able to choose households for the SSIs. However, it would have been very helpful to ask more direct questions about decision making (e.g. 'why do you grow these crops and not others?') to contribute to our final conclusion. If we had asked these direct questions, we could have gathered more quantitative data about the farming expenses related to the most commonly grown crops, for example. Leaving out the big questions made it harder to use the questionnaire results to understand the decision-making process in Moo 6.

6.3 Semi-structured Interviews with households

After conducting our questionnaires we chose five households to question further in SSIs. In general, all of the households were welcoming and willing to sit down with us and have a more in depth interview, and we did not experience any major constraints.

At SSI5, we had expected to talk to the 26 year old, female farmer (Somrudee Teiprateep, who had been the informant in the questionnaire. We had chosen this household for the SSI due to her young age and also her hydroponics work outside of Moo 6. However, she was busy preparing for her wedding so we spoke to her grandfather. While we were unable to talk about Somrudee's hydroponic farm outside the village, we still gained relevant information from him as he farms within the village.

We consider the SSIs a successful part of our research because we were able to obtain more detailed information from the selected households.

6.4 Participatory Rural Appraisal

Towards the end of our time in Moo 6, we held a PRA session in the community center in the village. When we told the headman of the idea, he invited himself and village committee, and they spread the word to other villagers. We had a great turn out, with around 25 farmers in attendance. This was our first PRA, so of course there were mistakes made along the way.

We split into two groups to conduct the PRA: Thai students and Danish students. We felt that this separation created a tense atmosphere because the Thai group was laughing and having fun, and we

were a bit more stressed. We could have gone over to observe the Thai students' exercises to show the villagers that we were interested in what they were doing and to create a more comfortable atmosphere. We could also have copied the participants (e.g. standing and sitting when they did) to make it feel more like a discussion than a Q&A session.

Our main constraint was only having two interpreters, as it was difficult to communicate with farmers when both interpreters were busy. A lot of time was spent listening and waiting for translations. There were a few times when the interpreters did not completely understand what we wanted the farmers to do, and often they only addressed the person talking rather than the whole group. This could have been avoided if we had properly briefed interpreters on the activities and how we wanted them to interact with participants.



The headman and his assistants dominated many of the exercises that we conducted, like the crop calendar and factor ranking. Whenever they were present they did all of the talking and everyone else listened. Many of the villagers were very shy and it took a lot of encouragement to make them speak. We tried to hear from more farmers by directly asking them or bringing them closer into the circle, but many just stood and observed.

We put the crop calendar on the chalkboard but should have placed it directly on the table so that multiple farmers could fill it in rather than just us. We quickly realized that when the headman or his assistants were present, no one else would speak. We were able to hear from other farmers only when the headman and his assistants had left or when we directly asked farmers what they thought, for example we asked a woman who farms ginger to explain the process to us.

For the factor ranking exercise, we had a good idea of the main influencing factors based on our questionnaire and SSI results, so we provided the factors for them to arrange in a list. It would have been interesting to know why the farmers placed the factors where they did; this exercise had little discussion - and also to see factors they would have mentioned themselves, if we had not provided them with a list.

Overall, the PRA was a positive experience. We created a formal setting where the villagers signed in and we greeted them and gave them snacks and drinks. We had presents on display that we gifted to them at the close of the evening. This formality is common in Thai culture and it seemed to work well. We realized that there was not much we could do to avoid the dominance of the headman and his assistants' as long as they were present. Nevertheless, we gained a lot of useful information about farming strategies and decision-making factors in Moo 6.

6.5 Soil Sampling

Our soil sampling was based on the perception of soil fertility of three SSI farmers who had clear opinions of having fertile or infertile fields. Therefore, the result may not be representative of the whole village. However, since we managed to sample both loose and clay soils, which farmers in general perceived as fertile and infertile (PRA) based on their visual observation and experience (soil type, drainage and workability), it still gives a general overview about farmers' perceptions regarding soil quality and how it differs or matches scientific measurements.

It was challenging to take soil samples from steep plots (C2 and L2). These plots were deeply ploughed and at times, we had to hammer the corer multiple times. We are aware that this might have created some sampling biases as we were sampling top and subsoil. But, we were careful not to mix the samples together.

We also think that we could have done soil sampling differently. Based on literatures, we could have asked farmers to rank or list important soil quality indicators that they use to define soil quality in the questionnaire in order to grasp the soil perception of the whole village. After analysing the most common indicators from the questionnaires, then we could have sampled soil based on these indicators, for eg. soil color, soil type and drainage. This would have also allowed us to explore more soil quality indicators (e.g. weed abundance) which have not been mentioned by farmers in our study.

6.6 Sub-conclusion

All the methods that we used were relevant to answer our research questions. Among all qualitative methods, we can say that key informant interviews and SSIs were the most successful because we got a lot of useful information from them. We found that the questionnaires and PRA activities were the most challenging methods. There were some difficulties working with our Thai counterparts to conduct the questionnaires which meant that the information we gained from this method was not as useful

as we had expected. We encountered some problems while doing the PRA, mainly due to the language barriers and certain dominating participants, but we managed to address situations as they arose and were successful in getting the information we wanted. So, despite these shortcomings, we have still been able to use the results to answer our research questions (and we know which aspects we would change if we had the opportunity to repeat these methods in a similar study).

7. CONCLUSION

The purpose of this study was to reveal which factors lie behind the land use decisions made by farmers in Moo 6. Our study showed us that the most influential factors were 1) market prices, 2) farming expenses, 3) access to knowledge of farming, 4) age, 5) water shortage, 6) government programs and 7) soil quality. Although we found all of these factors to be influential, not all households are influenced by them in the same way. In many cases, the extent to which farmers changed their land use strategies in response to these factors was minor. It seemed that once the farmers had decided on which crops to grow and their overall farming strategy, they stuck with them and only made smaller changes such as introducing organic fertilisers. The only examples of households who incorporated the philosophy of SE, were those that were less reliant on their farming.

The implications of our findings are that poorer and less educated farmers are less resilient to shocks and stresses, such as fluctuating market prices and water shortage. To help the farmers increase their resiliency, the government arranges conferences based on the Sufficiency Economy Philosophy to teach the farmers how to become self-sufficient while at the same time being able to sell their excess produce. However, farmers recognise the risk involved in making drastic changes to the conventional farming practices on which their livelihoods rely. Many farmers therefore show little interest in introducing novel farming practices to their land, even if such a change would make them more resilient and better their livelihoods.

8. REFERENCES

8.1 Villagers

HM1 - First interview with the headman

HM2 - Second interview with the headman

HM3 - Third interview with the headman

HMA - Interview with the headman's assistants: Chok (HMAC) and Khomin (HMAK)

KCT - Interview with Kastana Chavasirikul Tol

KK - Interview with Kong Kan⁵

SSI1 - Interview with Sonrawee Chuenchom

SSI2 - Interview with Suriya Henla

SSI3 - Interview with Wuttiya Senanut

SSI4 - Interview with Sanguan Wongsee

SSI5 - Interview with Uncle Long

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9. APPENDICES

9.1 Questionnaire

No.

Questionnaire

The Effect of Tourism Promotion on the Change of Land Use and Livelihood in Donglong Village, Campson Sub-district, Khao Kho District , Petchaboon *****

Area of study: Moo 6, Donglong Village, Campson Sub-district, Khao Kho District , Petchaboon

Address..... (please give the exact number)

Name of Respondent:

Tel:

General Information in Society Aspect

General information about members in the family

1. Total members in the family

Total..... Male: Female :

Family details

| Relation | Age | Gender | Education | Occupation |
|----------|-----|--------|-----------|------------|
| | | | | |
| | | | | |
| | | | | |

| | | | | |
|--|--|--|--|--|
| | | | | |
| | | | | |
| | | | | |

2. You have been here for..... year

3. Were you born here or elsewhere?

☐ 1. You were born here, including your parents

☐ 2. Born here, but parents moved here from

☐ 3. Moved here, from: village.....

sub-district.....district.....province.....

4. The reason you or your parents moved in

☐ 1. marriage ☐ 2. New workplace ☐ 3.Others

5. Are they any member in your family who moves out of the village? (Excluding studying aboard)

☐ 1. Yes (specify)

☐ 2. No

6. The reason for moving out of the village

☐ 1.No workplace ☐ 2. Unemployed ☐ 3.Others

7. Are you a member in any organization?

☐ 1. Yes

☐ 2. No (skip to question 12)

8. What organization are you in? (multiple answer are available)

☐ 1.Farmers' wives club

☐ 2. Village committee

☐ 3. Funeral support group

☐ 4. Saving group

☐ 5. Village water supply group

☐ 6. Agricultural financial support

☐ 7.Cooperation for agriculture

☐ 8. Others

(specify).....

9. Benefits from group membership

☐ 1.Withdraw without financial support ☐ 2. Dividends

☐ 3.Power to negotiate prices of product ☐ 4. Market to sell products

☐ 5.Low interest loans ☐ 6. Others

(specify).....

10. What do you do in the group?

☐ 1. Sharing opinion

☐ 2.Attend/Participate

☐ 3.Committee

☐ 4. Socializing

☐ 5.. Others (specify).....

11. How often do you participate in group activities?

.....

12. Land use

| No. of plots | Size(Rai) | Land Characteristics (A) | Plot location | | Land (Code B) | Land ownership (Code C) | Documentation (Code D) | Rental fee(Baht) |
|--------------|-----------|--------------------------|----------------|--------------------|---------------|-------------------------|------------------------|------------------|
| | | | In the village | Out of the village | | | | |
| 1 | | | | | | | | |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |

| Code A | Code B | Code C | Code D |
|-----------------------------|--|--|--|
| 1=Flat 2=Slope 3=Both | 0=Abandoned 1=Resident 2=Taro 3=Ginger 4=Upland Rice 5=Maize 6=Other (specify) | 1.1=Owner inherited 1.2=Owner bought 2=Rented out to someone else 3=Rented from others 4=Borrow land for free 5=Hired to farm | 0=No deed 1=Deed 2=Rights, but can be taken by land dept 3=Rights, but can be taken by forest dept 4=Other (specify) 5= Rights, but can b taken by municipality |

13. Crop table

| Crops | | | | | | | |
|---|-----------------------|--|--|--|--|--|--|
| Details | | | | | | | |
| 1.Area (rai) | | | | | | | |
| 2.How long have you been growing crop? | | | | | | | |
| 3.How long to grow crop(duration)? | | | | | | | |
| 4.How often /year crops grown | | | | | | | |
| 5.What species of crops? | | | | | | | |
| 6.Seed price | | | | | | | |
| 7.How many time you plough before sowing? | | | | | | | |
| 8.Expense for land preparation (baht/rai) | | | | | | | |
| 9..Expense for herbicide | When do you apply? | | | | | | |
| | Quantity (littre/rai) | | | | | | |
| | Baht/littre | | | | | | |
| 10.Expense for pesticide | When do you apply? | | | | | | |
| | Quantity (littre/rai) | | | | | | |
| | Baht/littre | | | | | | |
| 11.Expense for fertilizer | When do you apply? | | | | | | |
| | Quantity (kg/rai) | | | | | | |
| | Baht/kg | | | | | | |
| 12.Transportation cost (baht) | | | | | | | |
| 13.Who participate in planting? | | | | | | | |
| 14. Planting fee (baht) | | | | | | | |
| 15. Who participate in harvesting | | | | | | | |
| 16. Water source | | | | | | | |
| 17. Harvesting fee(baht) | | | | | | | |
| 18.Rental fee for machines (baht/day) | | | | | | | |
| 19.Do you sell it directly or store it? | | | | | | | |
| 20.Amount | Consume (kg) | | | | | | |
| | Sell (kg) | | | | | | |
| 21.Selling price in baht | | | | | | | |

| | | | | | | | |
|----------------------|--------------------|--|--|--|--|--|--|
| 22.How do they sell? | Sell themselves | | | | | | |
| | Middle man | | | | | | |
| | Group/Co-operative | | | | | | |
| | Relatives | | | | | | |

Off-farm occupation income

14. What are other income sources besides farming?

- ☐ 1. Resort ☐ 2. Labor
☐ 3. Homestay/Motel ☐ 4. Other (specify).....

15. What is your yearly off-farm income?

| HH Member | Off farm occupation | Duration | Income (yearly) |
|-----------|---------------------|----------|-----------------|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Total: _____

16. Savings?

1. Yes
 2. No

17. Where is the money saved ?

1. Agricultural Bank
 2. Agricultural Co-operative
 3. Community saving
 4. Commercial Bank
 5. Other (specify).....

18. Other household expense excluding agriculture

| Types of expense | Monetary value (Baht/year) |
|------------------|----------------------------|
| 1. Food | |
| 2. Education | |
| 3. Debt | |
| 4. Other | |

19. What kind of debt?

1. Seasonal Debt (farming purposes)
 2. Chronic Debt (loaning and repaying)
 3. Other (specify).....

20. Where is the money borrowed from ?

| Source of borrowed money | Amount of money | Interest(Baht/year) | Period(year) |
|---------------------------------------|-----------------|---------------------|--------------|
| Official debt | | | |
| 1.Bank of agriculture and cooperation | | | |
| 2.Agriculture cooperation | | | |
| 3.Female Club | | | |
| 4.Savings Club | | | |
| 5.Community fund | | | |
| 6.Bank | | | |

| Source of borrowed money | Amount of money | Interest(Baht/year) | Period(year) |
|--------------------------|-----------------|---------------------|--------------|
| Unofficial | | | |
| 1.Merchants | | | |
| 2.Relatives | | | |
| 3.Others (specify) | | | |

21.Do you collect forest resource?
☐Yes Where?

- ☐ National Park
☐ Community Forest

☐No

22. What kind of forest product?

- ☐ 1. Mushroom ☐ 2. Bamboo
- ☐ Consume ☐ Consume
☐ Sell ☐ Sell
- ☐ 3. Other, specify..... ☐ 4. Other, specify.....
- ☐ Consume ☐ Consume
☐ Sell ☐ Sell

23. Which month? How often/month?

9.2 Interview guides

9.2.1 Headman Interview guide

| Research questions | Asked questions | | Purpose of questions |
|---|-----------------|--|---|
| 1) Introduction/about the headman | a. | What is your full name? | Easy questions to get him "warm" - so other Qs will be easier to answer |
| | b. | What is your age? | |
| | c. | For how long have you been living in Moo 6? - Did you grow up here? If not, why did you move here and from where? | |
| | d. | What is your educational background? | |
| | e. | How many people are in your household? - What do they do for a living? | Does the headman and his family have special benefits? |
| | f. | What do you do besides your headman responsibilities? How long have you had the restaurant and carwash? | |
| | g. | Do you have your own farm? If yes: - How much land? - Do you own your land? - How many livestock? | |
| 2) How is the land used in Moo 6? | a. | What would you consider to be the primary source of income in Moo 6? | Which farming strategy do the farmers use? |
| | b. | Which crops do you think are most commonly produced? | |
| | c. | What kind of agricultural practices is the most common? (Subsistence/ Cash crops/ Others) | |
| | d. | What are some challenges that farmers have? | |
| 3) Who is the headman, what does he do? | a. | When did you become the headman? | To figure out his function + get him talking about SSP |
| | | How did you become headman? | |
| | b. | What is your job as the headman? | |
| | c. | What is the best part about having your job? | |

| | | | |
|--|-----------|---|---|
| | d. | Which farming strategies do you think are the best for the farmers of Moo 6? And why? | ← ONLY ask this if he doesn't start talking about SSP on his own word for farming strategies in thai word.. |
| | | When did you learn about SSP? | |
| | | Can you tell us about the time you met the King? (Why did you receive an award?) | |
| 4) Power structure - who is influencing the headman and his decisions? | a. | Do you have a vision for Moo 6/something you want to accomplish as the headman? | Who influences headman + get him to talk about the king? |
| | | Why do you think that this vision/accomplishment is important for Moo 6? | |
| | b. | Who do you get inspiration from regarding your visions for Moo 6? - any people from the village? | |
| | c. | Who has the right to vote? | |
| | d. | Are there re-elections to the position of village headman, or is it a position for life? | |
| | | How are your assistants elected? | |
| | | How did you know them? | |
| | | What do the assistants do? | |
| 5) Power structure - who influences Moo 6's village committee? | a. | What is the purpose of the village committee? | Purpose of learning center + who influences its activities |
| | b. | How often are meetings held at the center? | |
| | c. | What do you discuss at the meetings? | |
| | | Who decides the topics? | |
| | | What is the average attendance at the meetings? | |
| | | How often do you attend? | |
| | | Are the Khums represented? | |
| | | Who is part of the village committee? | |

| | | | |
|--|----|---|--------------------------|
| | | What is the hierarchy within the committee? | |
| 6) Power structure - who makes the decisions regarding community forest usage? | a. | How many villagers (in percentage) do you think make use of the community forest? - Is it the same all year round? | His assessment of usage |
| | b. | What is the purpose of the forest committee? | Who makes the decisions? |
| | c. | Who makes up the committee? - How did they get the job? | |
| | d. | What happens if someone uses the forest in an incorrect manner? | Any punishment? |
| | | How do you know if someone is overusing it? | |
| | | How often do you have to report farmers to the forest dept.? | |

9.2.2 Headman Assistant's interview guide

General:

- Name
- Age
- Occupation other than HMA?
- When did you become assistant?
- What are your main responsibilities?
- How many members do you have in your family?
- How long have you been in Moo 6?
- What are the benefits-do you get paid?
- What do you enjoy the most as being a HMA?
- What is the most challenging task?
- Are you appointed for a fix term?
- What do you think are the most important values to promote in the village?
- What are the biggest problems in the village?

Land:

- How many plots do you own or rent?
- What crops do you grow?
- Are they mainly for your own consumption or market?

Chok:

- What agricultural issues do you deal with? And How?

9.2.3 Hydroponics Interview guide

General info:

- Full name
- Age
- Education
- Where are you from?
- Where do you live?
- o If not in M6: How often do you come to M6?
- o If in M6: how long in M6?
- o If in M6: Why did you move to M6?

Job and more:

- What jobs do you have besides HP?
- How did you learn about HP? (Inspiration from other village?)
- For how long have you been doing it (in M6)
- How many crops can you grow using the HP system?
- What was on the land before you used it for HP?
- How many employees do you have here? How did they get the job?
- When do you expect to see a return on your investment? – If it already happened – when?
- When would you consider your project a success – what criteria?
- What are your future plans with the HP? Will you introduce more crops?
- Where do you sell your produce?
- How much of your produce is sold outside the village and how much is sold to villagers?
- Does the headman support your project? How?
- Do other farmers approach you for advice on this method of farming?
- Do you think many people are interested in doing it themselves?
- Do you think it's a good idea if more farmers set up hydroponics systems in Moo 6? Would you like to see it spread in the village?

9.2.4 Household Interview Guide

-Ask them to draw map of plots and include details about land ownership, crops grown, use of fertilizers, etc

What did you grow in the past?

Have there been any changes in types of crops you grow then and now? (in the past 10 years) If yes, why?

-Which crops would you like to grow in the future? Why?

-Do you consider market price before growing?

-Do you process any of your products before selling?

-How did you get knowledge about farming? (family, friends, education)

-What is your biggest challenge as a farmer?

-Who do you ask for help if/when you have farming-related problems? (why)

If they rent land – how easy or difficult is it for you to find land to rent? Do you rent for a fixed term?

(Farmers' perception of soil quality)

-Which of your plots have the most fertile soil?

-How do you measure soil fertility?

-Where your plots are located?

Economic:

-Have you expanded or reduced farming area (number of plots) in the past 10 years? If so, why?

How expensive is it to farm? (pesticides, fertilizers, seeds, etc)

Do you have to take loans to farm?

If off-farm income includes resorts: why do you only work in specific months?

9.3.1 NFTP

[illegible]

9.3.2 Crop Calendar

| | Jan uar y | Feb rua ry | Mar ch | Apri l | May | June | July | Augu st | Septe mber | Octo ber | Nove mber | Dece mber |
|------------------|-----------------|------------------|-----------|----------------------------|--|---|-----------------------------------|------------|-------------------------|---------------------------------|--------------|--------------|
| rice | | | | Prep are the land | 1.)Mi x seed with fertil izer 2.)Pl antin g 3.)O ne week after plant ing use pesti cide | 1.) In the end of the mont h use pesti cide again 2.) use Fertil izer (15:1 5:15) | Pick weed by hand and tools | | Start harves ting | End of harv estin g | | |
| Ta mar ind | | | | | | 1.) Make holes 2.) Put fertili zer 3.) Plant | | | | Harvest (October- January) | | |

| | | | | | | | | | | | | |
|------------|--|--|--|--|---|------------------------------|--|----------------------------|---|--|--|--|
| | | | | | | ing 4.) Let it grow | | | | | | |
| Mai ze | | | | Prep are the land | Plant ing | | 1.) Put ferti zer 2.) Plow | | Harvest | | Middl e man come and buy crops | |
| Tar o | | | 1.)P rep are the lan d 2.) Pic k wee d | 1.) Prep are to plan t 2.) Put taro in the soil spac ing 50 cm. | 1.) Put herbicide 2.) When taro grow and have 3 leaves put fertilizer (46:0:0) (21:0:0) | | 1.) Pick weed 2.) Put ferti zer (13:1 3:21) 3.) Plow | Take care of taro | Harvest (September-February) | | | |
| Ban ana | | | | Dig a hole and plan t | | | | | Dig a hole and planti ng banan | | | |

| | | | | | | | | | | | | |
|----------------------------------|---|--|--|--|------------------------|--|---|--|--|---|---|--|
| | | | | ban na bud for 1 year | | | | | a bud for 1 year after rainy season | | | |
| Gin ger (Rai n) | | | 1.) Pre par e the lan d (plo w,ti llag e) 2.) Dig hol es | 1.) Put ferti lizer (15: 15:1 5) 2.) Put chic ken man ure 3.) Cove r the soil 4.) Put herb icide | | | 1.) Put Fertilizer (13:13:21) 2.) Plow | | | Have st ginge r for seling l and planti ng next year | | |
| Gin ger (Wa teri ng) | 1.) Put gin ger ingr oun | | | Plo w | Harvest (May-November) | | | | | Harve st ginge r for planti ng | 1.) Cut ginger into pieces 2.) Water | |

| | | | | | | | |
|--|---|--|--|--|--|--------------|--|
| | d 2.) Cov er gro und 3.) Spri nkl e wat er | | | | | next year | ing 3.) Dig up ditch for planti ng 4.) Put chick manur e |
|--|---|--|--|--|--|--------------|--|

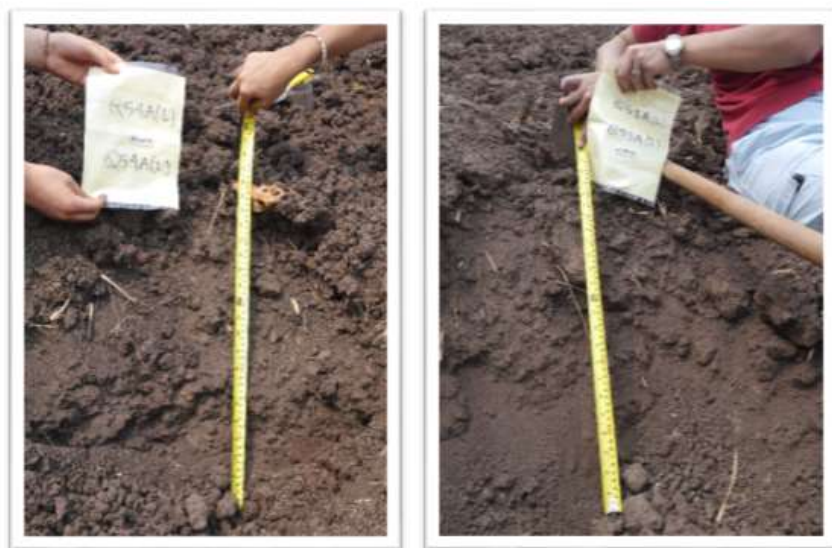
9.3.3 Soil Map



9.4 Soil sampling



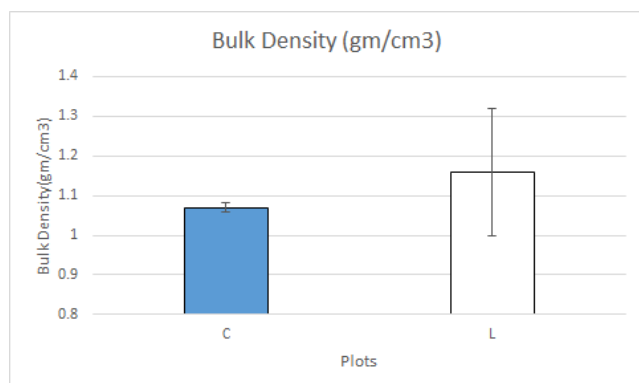
A.9.4.1. Soil profile (Plot C1 and L1, left to right)



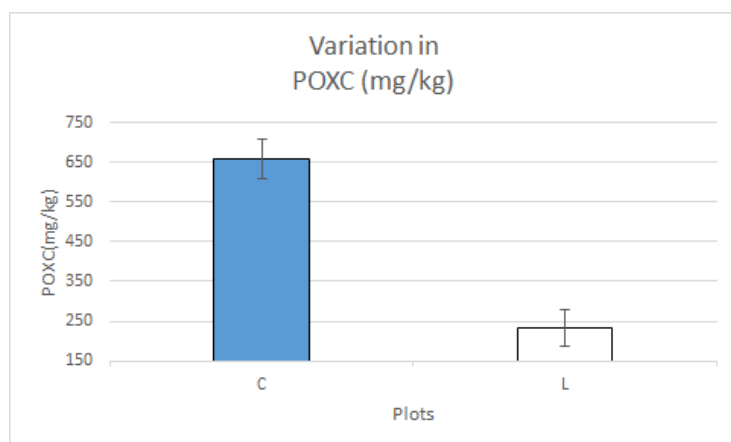
A.9.4.2 Soil Profile (C2 and L2, left to right)

| Plots | Profile | Texture | Munsell soil Color |
|-------|---------|---------|--------------------|
| C1 | Topsoil | CL | 10 YR 5/3 |
| | Subsoil | CL | 10 YR 5/3 |
| L1 | Topsoil | SI | 7.5 YR 5/4 |
| | Subsoil | CL | 7.5 YR 5/4 |
| C2 | Topsoil | CL | 10YR 3/2 |
| | Subsoil | CL | 10YR 3/2 |
| L2 | Topsoil | CL | 10 YR 3/2 |
| | Subsoil | CL | 10 YR 3/2 |

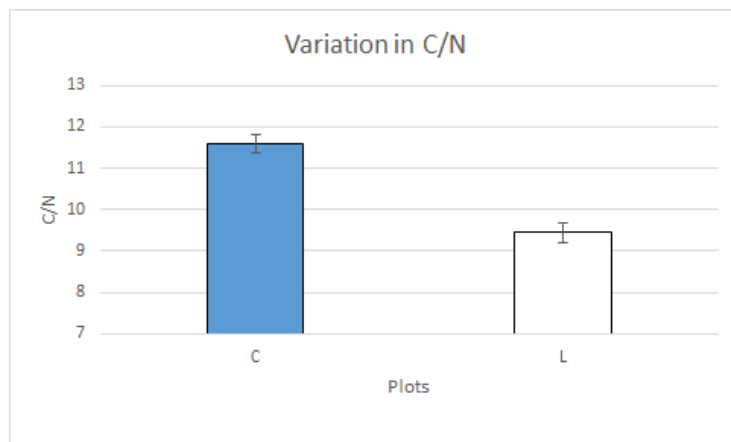
A.9.4.3 Soil Color and Texture description; CL:Clay Loam; SI: Silt



A.9.4.4 Bar graph showing bulk density between C (Infertile) and L(fertile) soil



9.4.5.Bargraph showing POXC between C (Infertile) and L(fertile) soil



A. 9.4.6 Bargraph showing C/N between C (Infertile) and L (fertile) soil

| Plots (Top layer soil, 0-5 cm) | | | | |
|------------------------------------|------------|------------|-------------|-----------|
| Plots | C1 | L1 | C2 | L2 |
| | I | F | I | F |
| pH | 6.3±0.14 | 5.2±0.09 | 6.3±0.15 | 5.8±0.21 |
| Bulk density (gm/cm ³) | 1.1±0.09 | 1.2±0.02 | 1.1±0.05 | 1.2±0.13 |
| PoxC (mg/kg) | 692.8±72.9 | 265.5±6.06 | 622.2±103.8 | 199±69.7 |
| Total N (%) | 0.14±0.023 | 0.07±0.025 | 0.19±0.015 | 0.09±0.0 |
| Total C (%) | 1.55±0.37 | 0.69±0.28 | 2.25±0.24 | 0.68±0.28 |
| SOM (%) | 0.9±0.01 | 0.4±0.16 | 1.3±0.14 | 0.39±0.14 |
| C/N | 11.44±1.33 | 9.62±1.77 | 11.75±1.08 | 9.27±1.06 |
| n | 3 | 3 | 3 | 3 |

A. 9.4.7 Soil physico-chemical properties between four fertile and infertile plots.

9.5 Synopsis

Land Use Decision-making in Moo 6

Synopsis - Final version



Photo taken by Thilde Bech Bruun

SLUSE Field Course 2016, Thailand Interdisciplinary Land Use and Natural Resource Management

Students:

Barnabas Czomba (zdh774)
Laura Kofod Boss (rtp471)
Monica Rennie (vqk446)
Shannon Dracup (fgn737)
Sumitra Paudel (wdt683)

Supervisors:

Thilde Bech Bruun & Søren Brofeldt

Word count: 2472

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1. Introduction

In most of the Western world, the main discussions regarding farming strategies revolve around whether or not the farming is organic. In Thailand, however, this is not the primary concern. Instead, the discussions are about whether the farmer employs a mono-crop or a crop diversification strategy (Buch-Hansen, 2003; Kasem & Thapa, 2011).

The strategy that focuses on crop diversification is also known as the self-sufficiency philosophy, which has been promoted by the Thai king, Bhumibol Adulyadej as well as shifting governments since the mid 1990s (Buch-Hansen, 2003). The idea behind the philosophy is that as long as farmers grow different kinds of crops, food crops as well as cash crops, they will be better off. This is because employing a crop diversification strategy will strengthen farmers' resilience to shocks, so that even if unpredicted challenges occur, the farmers and their households will be food secure (Chainuvati & Athipanan, 2001). The king has promoted self-sufficiency through his "New Theory", which he came up with as a response to the economic crisis of the mid 1990s. It contains guidelines based on an average household of 4-5 people, which holds an area of 15 *rai* (24,000 square meters). According to the theory, such households should divide their land into four parts: 30% should be turned into a pond so the collected water can be used for cultivation during the dry season, 30% should be set aside for rice cultivation for home consumption, another 30% is to be used for crop diversification and fruits, and the remaining 10% is for housing and livestock enclosures (Royal Thai Embassy, 2015). The shifting governments have tried to promote self-sufficiency through several laws and development plans such as the 8th Economic and Social Development Plan (1997-2002),

where 25% of cultivated land was set aside for sustainable agriculture, which means that on this land mostly food crops would be grown for self-sufficiency (Buch-Hansen, 2003).

Prior to the recent focus on crop diversification, Thailand was one of the world's biggest exporters of rice and other agricultural commodities (Buch-Hansen, 2003). This positively impacted the national economy and the development of Thailand, but while it benefitted the business sector and Bangkok, it impoverished the rural areas (Buch-Hansen, 2003). Although self-sufficiency was introduced to overcome this problem, many farmers still follow a mono-cropping strategy since switching from one farming strategy to another involves risks and insecurities (Kasem & Thapa, 2011). It is therefore interesting to investigate why some farmers choose to follow the highly respected king's and the government's advice and diversify their production, while others continue to mono-crop.

1.1 Study Site

The focus of this research will be on how the farmers in Ban Dong Long (Moo 6) make their decisions regarding land use and farming strategies. Moo 6 is a rural village of around 466 inhabitants, which are divided into 225 households. The village is located between two national parks, Thung Salaeng Luang and Phu Hin Rong Kla, in northern Thailand's Phetchabun province. The village was established in 1962 and initially grew maize as the main crop, but now crops as upland rice, taro and short rotation vegetables such as coriander is grown as well.

The elected headman of Moo 6, Charn Thavornwong, is a big promoter of self-sufficiency and therefore urges people to convert to crop diversification strategies. Because of this, a learning center has been set up where the farmers can go to get educated on how to spend money wisely and how to produce subsistence crops. In Moo 6 you also find a forest committee, who is in charge of managing the two community forests where the villagers can go to gather non-timber products such as bamboo and mushrooms for household consumption. In addition to that, villagers can also provide for themselves and their households through an off-farm income. They can either work in one of the six resorts that are located within the village area, or sell their labour force to other farmers, local construction or fruit processing businesses.

1.2 Land use constraints

Engagement in agriculture exposes farmers in Moo 6 to challenging conditions, such as natural disasters and market uncertainties, resulting in uneven income distribution, which is why poverty in Thailand is considered to be highest among rural farming communities. Farmers in these areas suffer from low agricultural production efficiency due to the dependency on rainfall, which limits the applicability of technology for increasing production, and which is why the farmers' income decreases during the dry season. Farming on unsuitable land also causes problems associated with low production, including soil erosion and infertility. Pests and diseases have also been identified as key issues for Thai farmers.

Additionally, Thai farmers struggle with limited access to land and natural resources and competition from other production services, and many are at risk of losing land ownership in the future. Small farm holding size and their situation in non-irrigated areas results in unstable and low crop supplies, which increases the risk involved in market dependency.

Other constraints include labour availability, access to credit and materials, farmers' low levels of education, and information flow to farmers, which hinder adoption of new land use strategies (Chainuvati & Athipanan, 2001).

1.3 Decision-making

Decisions about access to land and natural resource use are controlled by various actors from the local to the global level (Buch-Hansen, 2003). Ultimately, the adoption of alternative land use proposals from government agencies or local initiatives relies on the understanding and acceptance of the target farmers. Farmers will consider a number of economic, environmental and social factors when deciding if an alternative plan is suitable for their household or not (Chainuvati & Athipanan, 2001). Some of these key factors are as follows: *Economic factors*: access to capital and land tenure, market opportunities, off-farm income, labour availability. *Environmental factors*: access to land, soil quality, access to forest resources, availability of water resources. *Social factors*: influence of the village headman and community committees, knowledge flow.

2. Objectives and Research Questions

The objective of our research is to assess households' land use decisions in Moo 6, which includes both farming strategies and community forest usage.

Our research question is:

How are social, environmental and economic factors related to farmers' decisions regarding land use?

In order to answer our research question, we have broken it down into the following four sub-questions, including seven sub-sub-questions:

1. Which farming strategies are used in Moo 6?
2. To what extent are social factors related to the farmers' land use decisions?
 - a. What are the power structures in the village? (headman, forest committee, learning center, wealthy villagers/who does one go to with troubles/problems?)
 - b. How do the farmers gain knowledge of farming practices and market prices of agricultural products?
2. To what extent are environmental factors related to the farmers' land use decisions?
 - a. How do environmental factors impact the choice of crops grown?
 - b. What kind of households utilize the community forest for non-timber forest products (NTFP) and to what extent?
2. To what extent are economic factors related to the farmers' land use decisions?

- a. How does access to land impact farmers' land use decisions?
- b. How do the various sources of income impact these decisions?
- c. How does household spending impact decisions?

3. Methods

In this study, we will use both qualitative and quantitative methods to address our research questions. As per need and circumstances, we will combine different methods in order to triangulate the information that we obtain. The purpose of the study will be well explained to all the people that will be involved before conducting the study. The different methods that will be used in our study are explained in this section.

3.1 Key Informant Interviews

Within the first few days of arriving in the village, we will conduct casual or informal interviews with key informants (KIs) to build rapport with each other. This will allow us to work well together throughout our study and have efficient dialogue. KIs will include the headman, members of the village learning center, members of the forest committee, agricultural extension officers, and others who will be determined once we have arrived in the village.

Following our introductions and casual conversations, we will conduct semi-structured interviews with these key informants. This will happen soon after we arrive at the field site. Questions will be prepared beforehand, but we will plan to ask further questions as needed. Translators will be present to assist when necessary. The goal of these interviews is to gain a general overview of the village regarding agricultural practices, land ownership and power structures.

3.2 Household Questionnaires

We will survey around 20-30 households in the village out of the total 225, due to time constraints. We will conduct a random sample of households once we have arrived in the village based on information we receive from the headman. Households may be selected based on convenience due to limited time. We will prepare questions beforehand, but we will plan to ask further questions and adapt to responses as needed. We will pre-test our questionnaire with the translator and 2-3 villagers to ensure clarity, comprehensiveness and acceptability by the respondents.

The goal of the questionnaire is to gain information regarding the households' land use choices and general ways of life. Information gathered from the questionnaires will be used to stratify households based on certain parameters such as dependency on community forest, reliance on off-farm income, subsistence farming and cash crop farming for conducting a more in-depth study.

3.3 Semi-structured Interviews

Semi-structured interviews (SSIs) will be conducted with the key informants as previously stated, along with some selected households. The purpose of this is first and foremost to get more in depth answers regarding farming choices and power structures, so that we will get a better understanding of the factors that lie behind the choices the farmers make, but also to figure out whose fields we want to use for soil sampling (the chosen farmers' land use decisions should ideally be as different from each other as possible).

3.4 Focus Group Discussion

Focus Group Discussion (FGD) will be carried out with 5-6 participants taking in account of power relation when forming groups. The topic will be explained before the discussion and the moderator will guide the conversation. The aim of conducting FDG is to gather people together from similar backgrounds or experiences so that we obtain informations that could help to address our research questions. The discussion will allow participants to agree or disagree about certain topic and we can gather insight about what the group thinks about an issue. Also, it will help to explore the meanings of survey findings which cannot be explained statistically. The plan is to conduct FGD with the community forest user committee, farmers going to the learning center and farmers not going to the learning center.

3.5 Participatory Rural Appraisal

Participatory Rural Appraisal (PRA) involves participation of local people therefore we will use this method to answer our research question as the validity and reliability of information gathered through PRA is usually high. Therefore, we plan to incorporate various PRA methods in our study, such as transect walks, community mapping and the making of a seasonal calendar.

An informal village tour will be done with key informant(s) at the beginning of our study to gather general information regarding the village and community structure, the farming system and agricultural practices; and to get ourselves familiarize with our study area. Later, we will do a proper *transect walk* with farmers when we conduct the in-depth studies with particular farmers. It will also be considered as one of the ways to triangulate the information gathered through other methods that will be employed in our study. A GPS will be used to measure track and waypoints.

A *seasonal calendar* will be developed to get an overview of different crops grown in different seasons. This exercise will be carried out by engaging 4-5 farmers in a group. Also, we plan to make seasonal calendar to gather information regarding collection of NTFP to understand if the dependency is seasonal and the types and amount of product that each household collects.

A *mapping exercise* will be conducted by involving 4-5 farmers in group to define village boundaries and to collect information regarding different farming practices and land use types.

3.6 Participatory Observation

We will take part in some activities in the village as a way to collect data in an unstructured manner but in a naturalistic setting. For this, if feasible, we plan to stay at least a night in the village so that we can build rapport with local people and at the same time also get familiarized with the village structure and local people. As participant observation is both a data collection and analysis tool, all the information that we gather from observation, conversation and informal interview will be recorded in our field notes to avoid the loss of gathered information.

3.7 Soil Sampling

The main purpose of soil analysis will be to understand farmers' perception regarding soil quality and crop productivity and triangulate it with scientific measurements. Soil profile description and color determination will be done on the site. For measuring soil color, the Munsell color chart will be used. Both, the core and loose samples with replicates will be taken from each site. Core samples will be taken with a core metal ring of 100 m³ volume (volumetric soil sampling). Then, the samples will be transferred to polythene bag and will be labelled with a code. Soil samples will be air-dried, crushed using mortar and pestle and sieved through 2 mm. Finally, the prepared samples will be used for the analysis of the following physical and chemical parameters: pH, soil texture, bulk density, soil organic matter, permanganate oxidizable carbon and soil total Nitrogen. Core samples will be used to determine soil organic matter and bulk density. Laboratory analyses will be carried out using standard methods in the Copenhagen University laboratory.

The site selection for soil sampling and the sampling strategy will be based on our judgemental analysis after gathering relevant information from farmers regarding land use and soil quality using various methods (key informants interview, observation, questionnaire and participatory mapping). Permission for soil sampling will be sought and sampling site will be georeferenced using GPS.

4. Collaboration with counterparts in Thailand

We have exchanged ideas for the study with our counterparts in Thailand. After we arrive at the study site, we will sit down with the Thai students and get to know one another. We will share our timeline for activities in the field and lay out a more detailed plan together. We will also discuss our overall objectives and expectations of one another to ensure efficient and positive communication. We hope that we will be able to work in collaboration with the Thai students to perform all of our methods and gather interesting data.

5. References

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6. Appendix

6.1 Data Matrix

| Research Question | Sub-questions | Sub-sub questions | Methods | Equipment | Output | Important and critical assumptions |
|--|---|--|---|---|---|---|
| How do social, environmental and economic factors relate to farmer's decision-making regarding land use? | 1. Which farming strategies are used in Moo 6? | | Key informant interview (Headman, agricultural extension officer, farmers), Questionnaires, SI, PRA | Paper, Pen, GPS, Camera | Land ownership, farming strategies, general overview | Time will be a crucial factor as we have only 30 days to work in the field. Engagement of local people and willingness of people to provide information. |
| | 2. To what extent are social factors related to the farmers' land use decisions? | What are the power structures in the village? (headman, forest committee, learning center, wealthy villagers/who does one go to with troubles/problems?) | Key informant interview (specifically with the headman), interview with agricultural office or other organization officials that could be helpful | GPS, Dictaphone, Paper, Pen, Camera | Influence of headman (self-sufficiency promotion), List of organizations that are working in the area and what they are doing, Activities that these organization are doing/ promoting and its influence on local people - Gain information about the learning center, promotion of self-sufficiency from headman, education of farming practices | It may not be feasible to visit some of the organization if present (Eg. Agricultural Extension office). It may have biased view of power structure in the village. |
| | | How do the farmers gain knowledge of farming practices and market prices of agricultural products? | Questionnaires, FGD in village learning center | Paper, Pen | | It may be difficult to determine how the farmers gain knowledge; information could be simply passed on from older family members, years of observation, etc. |
| | 3. To what extent are environmental factors related to the farmers' land use decisions? | How do environmental factors impact the choice of crops grown? | Questionnaires, Soil type mapping and sampling, Timeline of farming practices, Community mapping | Paper, Pen (Colored), GPS, Soil sampling equipments (Corer, hammer, wooden block, gloves, Remount marker, Plastic bags, Camera) | Factors influencing farmer's choices regarding crops choice (access to resources such as water, topography, inputs i.e seed, fertilizers (not necessarily only environmental)), Constraints to agricultural production and resource use, Farmers plan to introduce or grow other crops in the future (what and why) - List of NTFP (mushrooms/bamboo) and amount they collect, Types of household that depend more on these resources (or is the NTFP only seasonal), Results of soil physico-chemical Analysis | Sampling strategy is to be designed on field based on judgemental analysis of field scenario and information obtained for soil sampling from questionnaire. |
| | | What kind of households utilize the community forest for non-timber forest products (NTFP) and to what extent? | Questionnaires, join household(s) when they go to collect resources from the forest, Focus group with forest committee, PRA | | | |
| | 4. To what extent are economic factors related to the farmers' land use decisions? | How does access to land impact farmers' land use decisions? | Questionnaires, SI | Dictaphone, Paper, Pen, GPS, Camera | Demographic information, Land ownership, Farming practices, Agriculture products (Sale/Substance), Off-farm income details (Other jobs/Remittance/economic activities) and Expenses overview | It may be difficult to qualify the results from these income-related questions. |
| | | How do the various sources of income impact these decisions? | | | | |
| | | How does household spending impact decisions? | | | | |

6.2 Timeline

| Activity | Wed 02/02 | Thur 03/02 | Fri 04/02 | Sat 05/02 | Sun 06/02 | Mon 07/02 | Tue 08/02 | Wed 09/02 | Thur 10/02 | Fri 11/02 | Sat 12/02 | Sun 13/02 | Mon 14/02 |
|---|-----------|------------|-----------|-----------|-----------|-----------|-----------|-----------|------------|-----------|-----------|-----------|-----------|
| Meet supervisors and Thai counterparts in Bangkok | | | | | | | | | | | | | |
| Travel to study site | | | | | | | | | | | | | |
| Arrive at TSLNP Visitor Centre and settle in | | | | | | | | | | | | | |
| Make a group work contract | | | | | | | | | | | | | |
| Identify and meet key informants | | | | | | | | | | | | | |
| Village tour | | | | | | | | | | | | | |
| 1st semi-structured interview with village headman | | | | | | | | | | | | | |
| Prepare and test questionnaire | | | | | | | | | | | | | |
| Arrange overnight stay - for the 8th? | | | | | | | | | | | | | |
| Carry out questionnaires | | | | | | | | | | | | | |
| Questionnaire analysis/categorise households | | | | | | | | | | | | | |
| Semi-structured interviews with selected households | | | | | | | | | | | | | |
| Transect-walks/walk through forest (where is the non-forest?) | | | | | | | | | | | | | |
| Soil-sampling | | | | | | | | | | | | | |
| Focus group discussion with farmers | | | | | | | | | | | | | |
| Construct seasonal calendar with farmers | | | | | | | | | | | | | |
| Community mapping | | | | | | | | | | | | | |
| Spend the night in the village | | | | | | | | | | | | | |
| Observation of village committee meetings | | | | | | | | | | | | | |
| Focus group with village committee | | | | | | | | | | | | | |
| Observation of teaching sessions at learning centre | | | | | | | | | | | | | |
| Focus group with farmers at the learning centre | | | | | | | | | | | | | |
| Construct seasonal calendar with farmers at the learning centre | | | | | | | | | | | | | |
| Semi-structured interview with teaching assistant | | | | | | | | | | | | | |
| Semi-structured interview with aquaponics farmer | | | | | | | | | | | | | |
| 2nd semi-structured interview with headman (if new Qs) | | | | | | | | | | | | | |
| Hand out farewell/thank you presents to key informants | | | | | | | | | | | | | |
| Return to Bangkok | | | | | | | | | | | | | |

6.3. Questionnaire

Date/ Time:

Location/GPS:

Picture:

Interviewer:

Translator:

Note-Taker:

We are students from Copenhagen University, Denmark and Kasetsart University, Thailand. We are doing a course called Sustainable Land Use and Natural Resource Management. As part of it, we are here to do a field work. This questionnaire will take only 20-30 minutes and will be only used as part of our study. Your name will not be disclosed. The result of our study will be shared with everybody at the end of our study. You may wish not to answer any questions you do not like to answer.

Household characteristics

Name (Interviewee):

Family details

| Family Members' Name | Gender | Age | Level of Education |
|----------------------|--------|-----|--------------------|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Ethnicity: Thai/Hmong/ (No idea of relevancy of asking this question, will figure out after collecting baseline information at the beginning)

How long have you been living here?

Income

| Source of income | Amount (Range) | Remarks (Seasonal difference or any other relevant information) |
|--|----------------|---|
| Agriculture | | |
| Off-farm (More detail splitting later) | | |

Expenses

| Type of expense | Amount (Range) | Remarks |
|-----------------------------|----------------|---------|
| (Child's) education | | |
| Debt/mortgage | | |
| Seeds/agricultural purposes | | |

Farm characteristics

Farm size: _____ (in rai). Numbers of sites: _____

Note: Will try to get overview of land first (If 5 fields then we may get general idea at the beginning and will proceed accordingly)

Ask farmer to draw a map over their fields/plots on a piece of paper

- Ask farmer to mark what kind of crops are grown on the different fields
- And to mark how the farmer obtained the land (inherited, bought, rented, communal share)
- And to mark if the plots are within a 15 minute walking distance from the farmer's house or not
- Mark which plots are connected in clusters and which are separate

Who makes decisions regarding land use practices?

Who participates in farming?

- family members
- friends
- Do you hire labour?
 - How expensive is it to hire?
 - Does it influence your farming decision and agricultural practices?

Crops, soil fertility and management

What did you grow in the past? Has there been any changes in the types of crops that you grow in past 10 years? (If yes, reasons for so and ask to add on to map)

Which crops would you like to grow in the future? (Reasons)

NOTE: In order to fill out the below table, someone has to number the plots on the map that the farmer drew, and add the same numbers to the table, so that the interviewee doesn't have to repeat him-/herself.

Table questions:

- How fertile is your soil? or How good or bad is your soil?
- How do you grow this? Can you explain something about it? (Will start by throwing some general question then accordingly fill the table)
- What do you do to your soils to improve yields/conserve the soils?

| Plot # | Crops grown | Fertility (perception) | Harvest (Amount) | Use of pesticides/herbicide/fertilizers | Amount of P/H/F(if they know) |
|--------|-------------|------------------------|------------------|---|-------------------------------|
| | | | | | |
| | | | | | |

| | | | | | |
|--|--|--|--|--|--|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Do you sell your agricultural products? If yes:

- What kind of crops do you sell?
- How much of earning do you have from it (% or in any comparable form?)
- Where do you sell your crops?
- Do you consider market price of crops before growing them?
- Do you process any of your products/get any of your products processed before you sell them?

How do you get knowledge about farming? (family, friends, learning center, other education)

What is your biggest challenge as a farmer? / Do you have any problems? (Water, topography, access to loans (capital limitation), market and price of agricultural products)

Who do you ask for help if/when you have farming-related problems? (why?)

Community forest

Are you one of the user of community forest? *(If no, the interview is over)*

How often do you gather non-timber forest products for consumption in a month?

- Does your usage of the NTFP change with the seasons? (why)

Who goes into the forest from your household?

What kind of forest product do you collect?

Do you use it only for home consumption or do you also sell them?

(If sold) How much do you earn from selling them?

Who makes decision regarding when and how much of forest product shall be collected?

Is there any strict rule regarding the collection of forest products (Types of punishment for violation of rules)?

NOTE: REMEMBER to be polite and thank them for the interview!

6.4 PRA

PRA Exercise 1

Date:

Location:

Facilitator:

Note-taker:

Translator:

Total Number of Participants: Male: Female:

Time: 2 hrs (Tentative)

Activities:

(The facilitator will introduce PRA tools to the group, explain our purpose of study, act as an catalyst and make sure the group does not go off-topic, supports note-taker, makes an explanation of information gathered at the end to confirm the mutual understanding)

Materials Required:

Paper, Pens and different colored pencils, Camera (permission shall be seeked)

Mapping

Mapping of the village and land-use

(Village resource map and social map can be a good start to begin with, the participants will be asked to draw boundaries of village), different soil types (ways to identify them),

- Mapping of types of crops grown, cropping system, crops grown according to soil types, areas with good and bad soils, Trendline (Changes in types of crops grown as compared to past)
- Stakeholders mapping

Seasonal Calendar for crops

| Crops/Months | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|--------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | | | | | | | | | | | |

PRA Exercise 2

Date:

Location:

Facilitator:

Note-taker:

Translator:

Total Number of Participants: Male: Female:

Time: 2 hrs (Tentative)

Activities:

(The facilitator will introduce PRA tools to the group, explain our purpose of study, act as an catalyst and make sure the group does not go off-topic, supports note-taker, makes an explanation of information gathered at the end to confirm the mutual understanding)

Materials Required:

Paper, Pens and different colored pencils, GPS, Camera (Permission shall be seeked)

1. Transect walk in the forest with key informant
2. Mapping of the forest and location of sites for NTFP
 - Forest resource map
1. Seasonal Calendar

Seasonal Calendar for Non-Timber Forest Product (NTFP)

| NTFP/Months | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Bamboo | | | | | | | | | | | | |
| Mushroom | | | | | | | | | | | | |
| Others | | | | | | | | | | | | |

(For the amount of each NTFP collection, a symbol to quantify the amount shall be developed discussing with the people involved in the exercise, if it seems possible to quantify the amount)

6.5 Interview guides

A. Interview guide for Community forest Committee

| Research Questions | Asked Questions | | Purpose |
|--|-----------------|---|--|
| 1) Introduction | a . | What's your full name? | General introduction to get a start |
| | b . | What's your age? | |
| | c . | How long have you been living in Moo 6? | |
| | d . | What is your educational background? | Role, qualifications and possible benefits of interviewee |
| | e . | For how long have you been part of the committee? | |
| | f . | What is your role in the committee? • How did you become part of it? | |
| | g . | What is the best thing about being part of the forest committee? | |
| 2) Committee characteristics | a . | When was this community forest committee formed? | |
| | b . | How many members does the committee have? | |
| | c . | What is the purpose of the committee? | |
| 3) What kind of household depend on community forest and to what extent? | a . | When was the forest established as a community forest? | General forest characteristics |
| | b . | How much area does it cover? | |
| | c . | How is the forest managed? | |
| | d . | Who uses it? What kind of service does it provide to local people? (products) | To understand the dependency on NTFP (in terms of product types and extent); in general to |

| | | | |
|---|---------------|---|--|
| | e . | What kind of forest products do people collect from the forest? | understand how the use of the forest influence land use decisions |
| | f. | Are there specific areas from where people collect forest products? | |
| | g . | Do people collect more in a particular season? | |
| | h . | Are people charged fees for collecting forest products or for going into the forest? | Forest access |
| | i. | Who benefit most from the forest? What kind of people come to collect forest products? (In terms of household, gender, age) | |
| 4) What are power structures like in the committee? | a . | Do you have a separate user committee? | To understand power structures and how social factors influence land use decisions |
| | b . | Do you have some rules regarding the access into forest and use of forest products? • If yes, which? | |
| | c . | Do you know how these rules are made? | |
| | d . | What kind of punishments provision are there? (Any examples from past, if any) | |
| | e . | How do you get financial support for the forest management? | |
| | f. | What are your future plans regarding management? | |
| | g . | Would you like to share something more that you think would we should know? | |

B. Interview guide for Agricultural Extension Officer

| Research questions | Asked questions | | Purpose |
|---|-----------------|--|--------------------------------------|
| 1) Introduction | a . | What is your full name? | General introduction to get a start |
| | b . | What is your age? | |
| | c . | How long have you been living in Moo 6? | |
| | d . | What is your educational background? | Qualifications |
| | e . | How long have you been working in the office? | |
| | f. | How did you get your job | |
| | g . | What is the best part about having your job? | Any special benefits? |
| 2) Purpose and power structures of office | a . | When was the office established? | Characteristics |
| | b . | What is the purpose of the office? • And does it provide seeds, fertilizers, pesticides etc? | |
| | c . | How often the staffs get training in disseminating knowledge to farmers? | |
| | d . | How is the office managed? • and who gives the orders? | Power structures |
| 3) Does the office train farmers? | a . | What kind of agricultural practices do the farmers of Moo 6 follow? | Characteristics of training (if any) |
| | b . | Do the office also provide training for the farmers? (if no, jump to Q4) • What kind? • How often are activities held? | |
| | c . | How do you decide how to train the farmers? • How do you identify training needs and how? | |
| | d . | Do you charge fee for that? • If yes, how much? | |

| | | | |
|--------------------|-----|--|---------------------------------|
| | e . | What is the rate of adoption of provided training? How do you monitor? | What effect do the office have? |
| 4) Problems/vision | a . | Do you like to share any issues if you have? <ul style="list-style-type: none"> What are your future plans? | |

C. Interview guide for the SSI with the learning Center

NOTE: Identify the head of the center prior to the interview - figure out if it makes more sense to interview him/her or a random employee (or both)

| Research questions | Asked questions | | Purpose of questions |
|---|-----------------|---|---|
| 1) Introduction/about interviewee | a . | What is your full name? | Easy questions to get the interviewee talking |
| | b . | What is your age? | |
| | c . | How many people do you have in your household? | |
| | d . | For how long have you been living in Moo 6? | |
| | e . | What is your educational background? | |
| | f . | For how long have you been working in the center? | Establish role/influence of interviewee in center |
| | g . | What is your role/position in the center? <ul style="list-style-type: none"> What do you do? | |
| | h . | How did you get this job? | |
| | i . | What is the best part about having your job? | |
| 2) Does the interviewee follow the instructions from the learning center? | a . | Does your household have a farm? (if no, skip to RQ 3) <ul style="list-style-type: none"> Which crops do you grow? | What's the interviewee's farming strategy? |
| | b . | How would you describe the way you farm? <ul style="list-style-type: none"> Do you grow crops mainly for your own consumption or for selling them? | |

| | | | |
|---|-----|---|--|
| | c . | Why do you farm the way you do? | |
| 3) Characteristics of the learning center | a . | When was the learning center established? | |
| | b . | What is the purpose of the village's learning center? | Power structure/dynamics ← Obviously you shouldn't ask this if you're talking to the boss/if repetition |
| | c . | Who decides what goes on in the center? | |
| | d . | Who runs the learning center? • Who chose him for the job? | |
| | e . | Do the employees have to pass some kind of test/training before they can start teaching? | How qualified is the education given at the center? |
| | f . | What kind of education is provided at the center? • Do you have a certain way of giving the education or is it different from teacher to teacher? | |
| | g . | Does it cost anything for the farmers to attend the courses? | Can the poorest farmers afford to attend the activities? |
| 4) Does the farmers use the center? | a . | What type of people use the learning center? | Who uses the center and how much? |
| | b . | How many activities/events do you have per month? | |
| | c . | How many people/farmers attend the activities at the learning center?/How many attendees per event/activity? | |
| | d . | Does men and women participate equally - or do you have more men than women attending? | |
| | e . | How do people use what they learn at the center? • Is there a difference in the farming choiced between the farmers who have attended activities at the center and those who have not? | Does the learning center have an effect? |

D. Interview guide for the headman

NOTE: Ask Thai replacement word for farming strategies or any other ways to ask question about farming strategies - this might have been solved, but we can still ask.

| Research questions | Asked questions | | Purpose of questions |
|---|-----------------|--|---|
| 1) Introduction/about the headman | a . | What is your full name? | Easy questions to get him "warm" - so other Qs will be easier to answer |
| | b . | What is your age? | |
| | c . | For how long have you been living in Moo 6? <ul style="list-style-type: none"> Did you grow up here? If not, why did you move here and from where? | |
| | d . | What is your educational background? | |
| | e . | How many people are in your household? <ul style="list-style-type: none"> What do they do for a living? | Does the headman and his family have special benefits? |
| | f . | Is being a headman your "only" occupation? Other responsibilities? | |
| | g . | Do you have your own farm? If yes: <ul style="list-style-type: none"> How much land? Do you own your land? How many livestock? | |
| 2) How is the land used in Moo 6? | a . | What would you consider to be the primary source of income in Moo 6? | Which farming strategy do the farmers use? |
| | b . | Which crops do you think are most commonly produced? | |
| | c . | What kind of agricultural practices is the most common? (Subsistence/ Cash crops/ Others) | |
| | d . | What are some challenges that farmers have? | |
| | e . | Does the farmers own their land? <ul style="list-style-type: none"> If not, who does? And how do the farmers get access to land they don't own? | Land accessibility |
| 3) Who is the headman, what does he do? | a . | When did you become the headman? | |

| | | | |
|---|---------------|---|---|
| | b . | What is the best part about having your job? | To figure out his function + get him talking about SSP |
| | c . | What is your job as the headman? • Do you have a vision for Moo 6/something you want to accomplish as the headman? | |
| | d . | Which farming strategies do you think are the best for the farmers of Moo 6? And why? | ← ONLY ask this if he doesn't start talking about SSP on his own word for farming strategies in thai word.. |
| 4) Power structure - who is influencing the headman and his decisions? | a . | Why do you think that this vision/accomplishment is important for Moo 6? | Who influences headman + get him to talk about the king? |
| | b . | Who do you get inspiration from regarding your visions for Moo 6? • any people from the village? | |
| | c . | How did you become the headman? | How democratic is the election of a headman? |
| | d . | Who has the right to vote? | |
| | e . | Are there re-elections to the position of village headman, or is it a position for life? | |
| 5) Power structure - who influences Moo 6's learning center and the things that it teaches? | a . | What is the purpose of the village's learning center? | Purpose of learning center + who influences its activities |
| | b . | How often are activities held at the center? | |
| | c . | Who decides what goes on in the center? | |
| | d . | Who runs the learning center? • How did they get that job? | |
| | e . | How many people/farmers attend the activities at the learning center?/How many attendees per event/activity? | |
| 6) Power structure - who makes the decisions regarding community forest usage? | a . | How many villagers (in percentage) do you think make use of the community forest? • Is it the same all year round? | His assessment of usage |
| | b . | What is the purpose of the forest committee? | Who makes the decisions? |

| | | | |
|--|---------------|---|-----------------|
| | c . | Who makes up the committee? <ul style="list-style-type: none">• How did they get the job? | |
| | d . | What restrictions are there on the use of the forest? | |
| | e . | What happens if someone uses the forest in an incorrect manner? | Any punishment? |