Thailand

Location 5

Ban Huai Hua

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"Land use intensification in Ban Huai Hua"

Abstract

The fieldwork for this report was conducted in Northern Thailand during October 2001. The methodology used to enlighten the community was semi-structured interviews, group interviews, in-depth interviews and observations, soil sampling and participatory sequences. The focus was on the agricultural intensification and livelihood strategies in the village Ban Huai Hua.

1. Introduction

Our focus area during the SLUSE/TUCED Field Trip 2001 was the village Ban Huai Hua. Ban Huai Hua is the village that is located furthest up in Khun Samun Watershed from the city of Nan. It is a fairly new settlement, where the first settlers arrived 32 years ago, and the only access to Ban Huai Hua is a nine-kilometre dirt road starting in the village Ban La Bao Ya down stream.

We, three Danish and four Thai students stayed together with three interpreters and three teachers at the new-built school in the village for 10 days with the main purpose of proving our hypothesis and collecting data. This was to be achieved through the use of different methodologies and techniques learnt during the preparatory phase of the field course, as well as we had the possibility to draw on our experiences from other courses and activities endured during our studies at our respective universities.

1.2 Objectives and research questions

Our objective was to study the environmental conditions, socio-economic characteristics, land use management and livelihood strategies in and around Ban Huai Hua. The village is situated in conservation zone[1], set by the Royal Forest Department (which we call RFD below), which obligates the inhabitants to follow certain restrictions concerning their land use. Due to these restrictions, the farmers do not have the permission to expand to new and unutilised areas. This could be a problem if the old fields are depleted or if they, due to population expansion, need a higher

[1] Conserved zone, C-zone: forest areas conserved by the Royal Forest Department.

food production. The restrictions on cutting down the conserved forested areas may also be a problem in relation to construction of new buildings.

Furthermore the lack of tarmac roads between Ban Huai Hua and Ban La Bao Ya may influence the marketing possibilities and access to hospitals and agricultural inputs. Our thoughts are that if expansion is not possible, then fertilisers, knowledge, pesticides etc are essential inputs in order to intensify the fields in their possession.

Our hypothesis was that the farmers have had to intensify because of the restrictions on expansion, but that there might be problems intensifying because of the village's remote location and thereby difficult access to inputs.

Combined with the fact that we had to answer the common hypothesis about the intensification up through the watershed, our group found it interesting to do research on the following main problem:

Main question: How does the RFD restrictions affect the land use practices (hereunder intensification) and livelihood strategies of Ban Huai Hua?

Sub questions / fields of study:

A. How do the conserved zones affect the agricultural management and the villagers' use of the forest?
B. How is the tenure ship in the village and how has the land use changed over time and why?
C. How does the village's remote location and local culture affect the livelihood strategies according to access to markets, income generating activities and inputs to the systems?

1.3 Group formation and interdisciplinarity

To start out with, we had to all agree on the research questions and then divide into the three sub groups (A, B and C) between the three Danish students and the four Thai students. We chose groups according to our interests and major field of study and adjusted the sub questions and fields of study to these groups. The groups ended up looking like this:

A. One agronomist and one horticulturer (one Dane and one Thai)
B. One geographer and one environmental pollution'er (one Dane and one Thai)
C. Three geographers (one Dane and two Thais)

This was quite a time consuming task, but then, the interdisciplinarity is quite a big part of the course. It was difficult to choose sub questions before starting out the fieldwork, so this resulted in, that in the beginning of the fieldwork we all worked on the same topics, as will be described below, and then we split into to the sub groups to go into further detail. Knowing that we were all working to answer a common main question, the keywords for the three groups were:

A. Agriculture, degree of intensification, soil analysis
B. Land tenure ship, RFD restrictions, community forestry
C. Migration and labour

A positive thing about working interdisciplinary is the different views upon topics that will naturally occur. We got chances to work on our majors and at the same time hear and experience others' views upon the same and different sides of the topic. There were good chances for having suggestions from others and for seeking advice. But there are certainly also bad sides concerning compromising, lots of time consuming discussions and the biases that occurs in connection to the different perceptions of methods and theory. This will be discussed further in part 2. In addition to this, the cultural differences among the group members were an extra hurdle and also a good experience for life.

In the following report, we will first present our theoretical considerations concerning how the conditions in the village were supposed to be in relation to its remote location and the poor access. To test our theoretical considerations, we have determined what kind of data that needed to be collected, and in order to collect the data needed, we jointly determined different methodologies and techniques that could be used to achieve our goals. The chosen methodologies and techniques will be presented and discussed for their goal-achieving abilities. Finally, the information and data obtained during the field trip will be presented and conclusions concerning the land use intensity in the village of Ban Huai Hua and an answer to our main question will be given.

1.4 Theoretical considerations / data required

The following were the tools we decided on before going to the village. We did not stick one hundred percent to these because of changes in the work division between the groups during the fieldwork. After trying out the group work and by suggestions

from our ajarns we decided on the topics that were listed above as keywords for each group, and the actual used methodologies will be described in part 2

Data in general 1: General geographical information that we are going to get from literature, GIS and GPS. Such as physical data: topography, soils, climate, and hydrology. This is important in order to fully understand the environmental conditions and possibilities the villagers have.

Data in general 2: Information about regulations and restrictions set by the RFD and other GOs (governmental organisations). Here we were going to use literature and hopefully make an interview with a resource person, with relevant knowledge, on RFD and their restrictions and administrations. A semi-structured interview is useful in this situation because it can supply us with a deeper knowledge

Data for sub question A: Information about intensification, which will be collected by semi-structured interviews with a group of farmers from the village. The group will be chosen with awareness of the differences between the villagers in order to get a picture of the whole village.

Data for sub question B: Information about the land tenure ship, locations of fields, present and past forest and agricultural practices if possible. Source: Observations during forest- and field walks including informal semi structured interviews, according to the description above.

Data for sub question C: Cropping calendar. We would like to make two cropping calendars. We will also register other income generating activities, cultural history, demography, and infrastructure by semi-structured interviews with the householders and simple observations.

2. Methodology

2.1 Methods and working processes

After thorough discussions among the group members we decided on what kind of scientific data collecting tools to use. The decisions were based on the aims and objectives of the course, the facts that we had a limited time for the fieldwork, that we had to get to know the villagers before we could start asking personal questions and the group members' different wishes and interests.

The first data to be collected was the general information about the village. Through literature studies we got to know as much as we could about the village's history, the administration and political background and the physical facts of the area. Combined with our courses at home and by writing a synopsis this was the first part of the course – the preliminary work.

The second part of the course included the fieldwork at the study site. The program for the first days was to get to know the village and its inhabitants and to carry out semi-structured interviews with a sample of the families in order to get a general knowledge about the village.

To get a sampling that covered the whole village (concerning income), we made an income map of the village where the households' average incomes were divided into five groups. The information on the households' income was collected on a village walk with the TAO[2]. He explained for each household who were living there, how much they earned and he commented on any special information about the families. Hereafter we made a random sampling and chose every third house from the five income groups. The number of households selected from each income group was calculated, so that we had approximately the same percentage of each income group represented in the sample, though we chose a few more of the richest and the poorest group in order to get more details about the extremes.

2.2 Group interviews

To do the formal introduction of ourselves to Ban Huai Hua and to get a basic knowledge on the village we planned to have a meeting with the Head of the village. Unfortunately he was absent (and actually did not return to the village while we where there) so instead we planned a meeting with the TAO, who we also found to be an important informant. Another meeting with the principal of the school and the teachers was also planned and finally we planned a meeting with the Spiritual Leader.

[2] TAO: Tambon Agricultural Organisation. The term "TAO" was used for the officer in the village.

These three interviews were all held as group interviews. We had two reasons for doing that. One was that it was important that we all met and greeted key informants and furthermore that we found that the information we could obtain from these interviews was of relevance for all of the three subgroups. We had planned short interview guides, which made it possible for everyone to ask additional questions (see Annexes B, C and D). We had to limit the subjects for each interview but it was a good way to hear everyone. In general we got a lot of useful information, though the organizing sometimes went a bit wrong. Because of lack of organization one informant was interviewed, about the RFD restrictions, only by one student. This might have happened because we were not well enough prepared for the interview and aware that the informant was coming. The interview with the Spiritual Leaders became unorganized also because of too many participants. This problem could perhaps have been solved if the interview had taken place somewhere else than at the community house in the village (a public building with chairs and a roof). Furthermore the Thais and especially the interpreters became so eager that they took over the leading role of the interview and forgot to translate to the Danish students. This made it impossible for the Danes to ask questions and we were also physically pushed away from the mapping as so many people wanted to participate in the drawing of a map. We think these circumstances occurred because of some rushing due to of lack of time, and also because of language and understanding problems amongst the group members.

2.3 Semi-structured interviews

We chose to use semi-structured interviews on our randomised sample to get a general picture of the village. This would be very useful for our further study. The aim was to get a broad knowledge on the village and its inhabitants, to know what to look more into the following days, who could be useful informants, etc. All together 19 households were selected.

As written above, the information on the households' income was collected on a village walk with the TAO. He explained for each household who were living there, how much they earned and commented on any special information about the families. The interview guide included 54 questions concerning land tenure, land use, forestry and socio-economic aspects (see Annex A). It included more questions and more detailed questions than what the norm is for this kind of interview (Andersen, 1999). This was necessary in order to agree and to get a common understanding of

the questions between the Thai and the Danish students. Normally the guide would only include key words of the main subjects to be asked about - a kind of a checklist - but that was not possible in our case. Therefore it was decided that all groups should do the same interview with the chosen families.

During the interview, the questions were mainly asked by one of the Thai students and then translated into English for the Danish students by the interpreters. The 54 questions were supplemented by additional in-depth questions during the interview. Before the first real interview was performed, one of the groups made a test with a family that did not belong to the selected group of households. The test-interview reveeled a need for adjustment, so the semi-structured interview guide was revised. As we found out after the first real interviews there were still some important questions missing. We therefore had a meeting after every interview session during the first 2-3 days where we revised the interview guide according to our experiences and after this the interviews worked fine.

Points of critique are that some of us (the Danish students) felt that we missed some useful information due to the many translations and the fact that we were not able to ask the supplementary questions at the "right" time. It also took some time to get used to the working processes, translations and co-operation with each other, so in the beginning the interviews were carried out more like a questionnaire than like a semi-structured interview. This can have to do with our different cultures and the Thais' and the Danes' different perception of a semi-structured interview. Furthermore, the village walk, and hereby the information on household incomes, was done with only one person's knowledge (the TAO's) and biases therefore occurred. The information on income that we got from the families during the interviews differed from the TAO's information, so this bias related to the sample should be kept in mind when comparisons are made. We also experienced that we should be aware of imprecise information from the single families, because in some cases "possible incorrect" answers were possible. E.g. some families gave an annual income of about 1000 Baht[3] per year and they owned cars.

[3] Exchange rate, 100 Thai Baht to DKK: 19,11 (11.12.01).

2.4 In-depth semi-structured interviews

After finishing the general interviews with the 19 households we split into the three subgroups that were now ready to continue with more specialized work that we found interesting after discussing the first interviews. We then concentrated on the above described keywords. New interview guides were made and the interviews carried out according to such an interview. As there were not as many questions as on the general guide, the possibility of getting deeper into the subjects was greater.

Group A:

One of the most classical ways of intensifying agricultural production is to apply fertiliser, both organic and inorganic, to the fields. Through our semi-structured interviews we learnt that in Ban Huai Hua, most farmers apply fertiliser to their fields, but some years the farmers do not have the money to buy the fertiliser and therefore they apply less than recommended or none at all. We had, as explained below, chosen to take soil samples from different fields with different characteristics, so it was of profound interest for us to get hold of all the background information on the fields in question. To get the information, we prepared a semi-structured in-depth interview for each field, with 27 points to be answered (see Annex M). All in all we made in-depth interviews on six fields, belonging to 3 different farmers. These interviews gave us information on the history of the field, on the cultural management in terms of the use of fertiliser and pesticides and on the output from the field.

This information could then be compared with the results from the soil analysis, and concluding assumptions, concerning whether the use of fertiliser has any visual effect on the output or not, could be made.

Our main idea with analysing the nutrient content of the soils from various locations, was to compare the nutrient status in-between fields that had received fertiliser and fields that had received none.

Group B:

In Group B we chose to concentrate on the land tenure of the village. We found this interesting because of the village's remote location and the location in the conserved forest zone including the fact that the villagers did not have title deeds. This might have an influence on the agriculture and the livelihood. We made an interview guide, which contained 14 questions about the tenure ship, presence of title deeds, amount of land, location of fields, neighbouring village's fields in the area, the community

forest, the C-zone and the restrictions from the RFD (see Annex E). On the first hand we chose to interview the TAO, he advised us also to interview the ex-TAO and on our request he then advised us to interview the ex-ex-TAO. We could have interviewed a large sample of the families again, but chose the other way because of lack of time. These interviews worked very well. Because we only had 14 questions it was possible to carry out the interview more semi-structured and more like an informal conversation. We had more time for each question, which also made it easier for the Dane to follow the Thai who was in charge of the direct talking to the informant. Of course this has also to do with the fact that we got to know each other better at this point. This meant that we got plenty of useful information. Here we got to the interesting points and had time to listen to long explanations and ask further, not directly related, questions if it sounded interesting. This kind of interview was better than the general semi-structured interview, but the other one was necessary in the beginning when we were strangers in the village and when we did not know each other and our perceptions well enough in the group. It also seemed like the informants felt more secure now that they knew us, and now that we didn't have so many questions.

Group C:

From the general semi-structured interviews it was found that one of the biggest problems in the agricultural development of Ban Huai Hua was the lack of labour often caused by migrated family members. In order to find out how big a problem this was for the different households and why this problem had occurred, we made a semi-structured interview guide focusing on these topics (see Annex F). The selected households were all families with relatives living elsewhere. All together 9 households were interviewed. We are aware that excluding the households without migrated relatives meant that we lost information on the labour force or the lack of labour in about 50 % of the village's households, but we felt that these questions were answered during the general semi-structured interviews. Furthermore we found it interesting to elaborate the effect that migration has on the households - the lack of labour but addition of remittances. We later realized that it could have been gainful also to interview families who did not have relatives working outside the area in order to compare answers regarding migration and remittances. This comparison would have made it possible for us to see whether there is a pattern in the households where young people either choose to migrate or to stay in the area.

To interview all the selected households, within the limited time, we had to divide into two smaller groups. Splitting up into two groups was a bias as one of the two groups seemed to ask more in-depth questions than the other group and cross checking was done to a greater extend in one group. Therefore half of the in-depth interviews have more detailed answers than the other half. For the more quantitative answers (such as income from migrated relatives, dependency on other income generating activities than agriculture and profiles of the household members) the two groups' answers should be comparable. To get more equal in-depth interviews we should have spend more time discussing the aim of the interviews to get a common understanding of what data were relevant and why they were needed.

2.5 Participatory land use mapping

Our perception of this was the making of a map of a two dimensional area together with a group of people. We made an appointment with the TAO, the ex-TAO and a few villagers on the third day of fieldwork (13th) for participatory land use mapping. Group A and B were in charge of this task, which is a useful tool for getting to know the area better. We did not have a detailed map of the village nor the surroundings, so a land use map made by a local person would be useful. Learning the local names would also be very useful for our further communication with the villagers. We met them at the community house and we had prepared a map, which showed the main roads, the main rivers and the school all in a big size. Then we asked them to draw where their fields were mainly located, the different forest types (C-zone, RFD plantations, community forest and NTFP[4] collecting places), upland/lowland areas, ridges, main paths, water pumps, water reservoirs and to add local names on as much as they could. In addition the TAO had prepared a map with all the side streams to the main river with names and locations. This mapping was interesting and a good and fun way to get to know some of the villagers. The information we ended up with gave us a good overall picture of the village, the land use types and the area in general even though a detailed map of the area would have been good to have.

2.6 Cultural calendar and group interview with Spiritual Leader

In order to understand the local culture and belief and its eventual influence on the agriculture, we wanted to have a cultural calendar. On Monday the 15th we had an appointment with one of the spiritual leaders in the community house. A semi-structured questionnaire was prepared. Half way through the interview we started to

[4] NTFP: Non Timber Forest Product

make a cultural calendar. This calendar gave us an insight into the Mien culture and how they use their spiritual belief during the agricultural year. As the interview was held in the community house, many other villagers stopped by to join the interview. This resulted in a very unstructured interview, but we gained useful information about the months and the different task according to each month in Mien culture (see Annex H). The methodological problems at this interview were mainly that too many people were present; villagers as well as students, interpreters and teachers. Another problem concerning the interview was that the interpreters got so eager during the cultural calendar mapping, that they took over the leading role of the meeting. The intense discussions about the mapping caused that we did not have the time to get answers on the last questions of our questionnaire.

2.7 Field and forest walks

On the 9th day of fieldwork we had an appointment with two guides, one for a forest walk and one for a field walk.

From the in-depth interview Group C had found out that NTFPs plays an important role in the household economy. To study how the collection was done, which NTFPs were used and for what, how time consuming it was and where the NTFPs were collected we planned a forest walk. It was our wish to find a guide with knowledge on the NTFPs and one who collected them himself. It was first suggested that we asked a man who worked with RFD but in order to get a discussion and answers about 'reality' and not 'how-it-was-supposed-to-be' we decided to ask a man in the village whom we were told knew about the NTFPs. The Group C went on a long forest walk with this guide. It was our plan to have an informal discussion with him during the forest walk, so that we could get information on who collected where, for what reason, when and how. This information was needed in order to find out not only how the NTFPs influenced the household's economy but also on the preservation of the NTFPs in the forest surrounding Ban Huai Hua.

A bias for the chosen route might be that we on our forest walk had planned to get GPS marks from the evergreen forest as well as soil samples from the forest. The route was therefore not the one usually selected by the villagers though NTFPs are found here.

To catch up on information that was lost, for example knowledge on where in the area different types of NTFPs are collected, we planned a meeting with the guide after the forest walk. At this meeting the guide, curious family members and

neighbours made a NTFP-collection map. Furthermore we discussed the various types of NTFPs with starting point in a book with photos of important NTFPs in Northern Thailand. This way of discussing the plants and herbs turned out to be very useful as many new species were pointed out and everyone could join the discussion when they recognised a type of NTFP.

The field walk took the participators to different types of land use and types of crops, and during the field walk, the participants collected soil samples, which were analysed and compared. At the field walk we also brought a GPS to collect measures of the different land use types and soil sampling spots.

2.8 Soil sampling and –analysis

During the late 1960's, early 1970's the Green Revolution took place in many Asian countries. The main goal of the Green Revolution was to intensify the agricultural production to be able to feed the growing population of the world (Borlaug, 2000). The yield from a given crop depends on, according to N. E. Nielsen (pers. comm.), the genetic properties of the crop, as well as the abiotic- and the biotic environment. Human interference may alter all three properties, and the tools to alter them are, according to Parks (2001):

- New crop varieties
- Irrigation
- Fertilisers
- Pesticides
- Mechanisation

The use of new crop varieties and irrigation was tried investigated through the semi-structured interviews.

The use of fertilisers was also investigated through our semi-structured interviews, but here we learned that some farmers used chemical fertilisers, while others did not. The explanations for not using fertiliser was either that the farmer did not have the necessary funds to buy the fertiliser, or he did not grow rice, which, to our knowledge, was the only crop that was fertilised with chemical fertilisers.

It was interesting to investigate whether the soils that did not receive any fertiliser was less fertile than the soils that received some kind of chemical fertiliser. The best way to investigate this is to take soil samples and analyse the soils for their content

of N (Ammonium and Nitrate), P (phosphorus), K (potassium), as well as the acidity of the soil.

In order to investigate whether it had an effect or not to apply a chemical fertiliser to the steep-sloped fields of Ban Huai Hua, we identified three monocropped fields with different crops where only rice had received fertiliser and made comparisons.

The farmers of Ban Huai Hua have the possibility of influencing the availability of nutrients in another way than applying a chemical fertiliser. The alternative is to plant a leguminous cover crop. In maize fields, which occasionally were intercropped with lynchee, it was found that some farmers planted a cover crop called *Calapogonium*, probably *Calapogonium mucunoides*. *Calapogonium* is a perennial legume and, according to Giller and Wilson (1993), it improves the nutrient availability in the soil, mainly through the legume's ability to fix N_2. This N is released when the legume residues are decomposed. Besides fixing N_2, the legume also conserves nutrients that are prone to loss (especially nitrate) when there are no crops on the field. Reduction of soil erosion, reduction of soil temperature and reduction of weed problems are some of the other potential benefits that intercropping with a leguminous cover crop can have on the agricultural production (Giller and Wilson, 1993).

The ability of the cover crop to enrich the soil with nutrients, especially N, as well as its ability to reduce erosion was investigated through soil samples, where fields with and without cover crop were compared.

Besides investigating the nutrient status in the soil, group A also investigated the soil acidity in all soil samples. The reason why the pH of the soil is interesting is that the availability of nutrients (especially P) is greatly affected by the acidity of the soil. The microbial community, as well as the physical properties of the soil are also affected by the acidity (Lægreid *et al.*, 1999).

The last two sets of soil samples were taken from a field that was left fallow for 7 years (field no. 7. See Annex K) and from a forest area with evergreen forest (field no. 8. Ibid.). The main purpose of including these soil samples in the analysis is to have them as a kind of control sample - to have an idea about how the soil conditions were in Ban Huai Hua 30 years ago, before the village was established.

The fields from which we got our soil samples were all, except one, placed on slopes. Therefore we took three soil samples from each field, one from the upper part, one from the middle and one from the lower part. The actual taking of a soil sample was

done with an auger, which was drilled 20 cm down in the topsoil. For each soil sample three soil samples were taken and mixed. The soil was later dried, and when dry, the soil was tested with a soil test kit.

2.9 Community meeting

Our perception of a community meeting in this case, and our possibilities, was to invite a group of villagers to the school and combine festivitas with informal interviews. So on the last evening we held a community meeting where we invited the TAOs, the officers from The Watershed Management Office (we met them the day before at an informal visit at their office) and a representative from each of the interviewed households. About 30 people showed up and joined the meeting. We held an introduction explaining about our work in the village and presented the informative maps and posters we had made. After this session we played some games with the villagers and divided them into three groups: Group C met with all the young and unmarried people (the ones who considered themselves young) and the rest were divided between Group A and B.

At the community meeting group A made a ranking of the grown crops (a matrix scoring, see Annex I) to find out which crops were the most important for consumption and for selling. This was done participatory and we went through all the crops one by one - or rather two by two. The map we used was made in a simple way and was easy to understand, so it was a good working process. The villagers were very eager to participate and we had good talks about the different crops and problems related to the crops.

Group B had a brainstorm with the villagers about good and bad things about Ban Huai Hua, the main problems according to the villagers and a general talk about differences between Denmark and the village. This gave good insight to the villagers' perception of livelihood in a place like Ban Huai Hua.

Finally group C chose to have a discussion with some young people. This was done because the group found it interesting to get the young peoples point of view concerning migration versus agriculture in the village. A 'group discussion' was done with ten young people on the community meeting. It turned out to be very difficult to make the young people discuss as few said a lot and most said nothing. Therefore the group discussion ended up being more a group interview than a general discussion as we were interested in every ones history, wishes and thoughts about the future. A bias in this meeting could be the selection of the young people participating

in the meeting. We had not chosen any sampling method but just spread the message that we would like to see some of the young people. This of course can influence on the group that was present at the meeting though we had representatives from both sexes and different ages with different points of view on migration and farming.

The community meeting was generally a success. We had the possibility to show our appreciation to the villagers and the villagers seemed to enjoy all the activities, smiled and laughed. Furthermore we got some useful information during the informal talks and discussions.

3. Results

3.1 Presentation and analysis of general data according to observations and general interviews

Ban Huai Hua lies in the conservation zone as it is set by the Royal Forest Department (RFD). Therefore we have found it very important from the beginning to concentrate on the RFD restrictions and how these restrictions have an effect on the land use management, agricultural intensification and livelihood strategies of the villagers in Ban Huai Hua. The village is located in a valley surrounded by mountain ridges, about 300 - 500 meters a.s.l. The mountains are covered with primary tropical rainforest mixed with agricultural land, settlements and bamboo dominated secondary forest. To the north the village has its boundary to San Tisuk village, Pra Yao Province, to the south to Ban La Bao Ya, to the east to Baan Song Quare, Moo 5, to the west to Pra Yao Province.

The access to the village is very difficult because the road is a dirt road. The infrastructure consists of a main concrete road (made of bamboo and concrete) and small dirt paths. They have a water pipe from the mountains, wells, electricity telephone, satellite telephone and a school built by the Ministry of Education. The school is well equipped and a new building of classrooms was finished in May, 2001.

The people of Ban Huai Hua are Mien (Yao). The village used to be called Ban Huai La Bao Ya. In 1965 the people migrated from Pa Chang Noi and Pa Chang Doi Ji, Pong District, Prayao Province because of fear of the Chinese communists. The village is now 36 years old and has 47 households and about 60 families (not including Ban Huai Ra Pee, which is another small village close by). Most of the

inhabitants (70%) have been living in the village for more than 20 years. These families do in general have an annual income of 2.000 - 3.000 baht higher than the average income in the village, which is 8.000 baht. The reason why these longterm inhabitants have a higher income could be that they have more land available as they arrived at a time where they could take the land they needed, whereas newcomers are dependent on gifts of land from relatives or friends. According to the answers we got from the general interviews this is not the explanation on the different income levels as the families who stayed longer do not have a higher income from agriculture but in stead from saved money, migrants, embroideries, etc.

According to our interviews one family has about 2 – 3 plots of land and an average of about 10 rai[5] per family with a minimum of 2 rai and a maximum of 50 rai. The total amount of land for agriculture is approximately 5000 rai. We got this information from the TAO, but the different numbers do not fit together. He informed us that one family in average has 15 – 20 rai, so this information should not all be counted on. The reason why the total amount of land is so high can be because of the farmers from Ban La Bao Ya's use of land in the area. It could have been possible, by the use of GPS, to register the actual boundaries of the agricultural land and thereby register whether the farmers expand into the C – zone because of lack of (fertile) land for the Mien hill tribes in Khun Samun Watershed.

All households grow rice and maize. The rice is used for consumption in the family whereas the maize is used to feed pigs. Almost all households have a few pigs and some hens. Except from maize and rice some farmers also grow linchee, cotton or oranges.

The main problem in the agriculture seems in general to be the low output. For almost 40% of the households the yield is not enough to feed the whole family. Only few of these families grow other crops than rice and maize, which means that there are a few households, who do not have enough yield to feed them selves and do not have an income. These families live 'from-day-to-day' with help from relatives and friends. The villagers' explanations on the poor yield in the agriculture are that they have poor soils, fertilisers and pesticides are too expensive and that there is a lack of labour in the village. Approximately half of the villagers do not have enough labour through out the year. This problem is solved by reciprocal labour or by hiring workers in the busy periods in some families. An effect of the lack of labour is that not all fields are grown. This means that they use fallow, though they all responded

[5] 1 Rai = 40 x 40 m

that they do not use fallow. The reason why we had this answer must be that the farmers do not fallow in order to get a better soil but because of lack of labour. Also the expensive fertilisers and pesticides influence on the farmers decisions on which fields to grow. The farmers feel that the labour input on non-fertilised fields is too high compared to the output and choose therefore not to grow these fields. The low output could also, be influenced by the seeds used in the fields. 90% use seeds from last year or from relatives' fields instead of buying new ones at the market.

3.2 Presentation and analysis of data from Group A

The laws against expanding into the forest pose more difficulties to the farmers' use of shifting cultivation as they used to. Before, the farmers took a new area of the forest when the production on the old field got too low. Now they are not allowed to do so, and they have to use the same fields over and over again. Theoretically this is not a problem as most farmers have enough land to sustain themselves. This again means that the fallow period has decreased from 5-10 years in average to one year, which hardly can be called fallow, as the "fallow period" rather is caused by the lack of labour and money, than to regenerate the soil.

At the community meeting we made a comparison between the different crops, both in terms of their importance as food crop as well as cash crops. Here it turned out that rice was the most important food crop, closely followed by maize and vegetables. Meat from pig and chicken was also a very important part of their diet. Oranges was mentioned to be the most important cash crop, but in recent years it has fallen in importance due to the fact that most trees have died from a fungal disease. The cash crop that the farmers put most of their faith into now, according to our matrix, is cotton, although only a few farmers have cotton. Lynchee, which is a fairly new crop, is intercropped with rice and maize. The reason for its low ranking in the matrix might be that most of the trees have not borne fruits yet. Rice and maize are also used to generate income into the households, but only in years where the fields produce more than the family can consume.

Through our in-depth interviews with the farmers, we learnt about the annual cropping cycle, which, for the three main crops, can be seen in Annex G.

During the soil preparation, the farmers apply herbicides to keep the weeds under control. The main herbicide used by the interviewed informants was Gomokzon and Glyphosate. The herbicides are normally applied in May, approximately 10 days before sowing. The volume applied is approximately 1 gallon (~4.5 L) per hectare

and the price per gallon is approximately 750 Baht. The herbicides are, according to our data obtained, only used in rice and cotton and when applied, they are first diluted in water and then applied with either a hand-pumped knapsack sprayer or a motorised fumigator.

The farmers use a no-tillage system. Why the farmers practice this system is difficult to say, but a reason might be that the steep slopes, ranking from 20^0 to over 60^0, makes the use of draught power (cattle and tractors) difficult.

Maize, rice and cotton is sown after the onset of the rainy season, which may come in the end of April or in the beginning of May. As mentioned before, then the majority of the farmers use seeds from last year, or they get them from relatives. This could indicate that the farmers of Ban Huai Hua do not use new crop varieties or hybrids, or if they do, the benefits that the hybrids have, compared to local varieties, would be outbreed within a few seasons.

Most of the farmers in Ban Huai Hua apply, to our knowledge, fertiliser to only rice, and this rarely in the recommended quantities. This is mainly due to lack of money to buy the fertiliser. The fertilisers normally used by the farmers in the rice production are Urea (46:0:0) and CAN (21:0:0), while a few farmers fertilise their fields with NPK complex/compound fertilisers like 15:15:15 and 16:16:8.

The quantum applied is, according to our information, between 0,5 and 4 bags (50 kg) per hectare rice. The price for the fertiliser is between 220 and 300 Baht/50 kg fertiliser.

We wanted to test whether the application of fertiliser had any visible influence on the level of nutrients in the soil and with the results from the soil samples, it seems like there is a small difference. This is based on the data from the soil analysis, Annex K. Here it is seen that the concentrations of nitrate and phosphorus are lower in the monocropped cotton (field no. 2. Ibid.), compared to the concentrations found in the fertilised monocropped rice (field no. 1. Ibid.). If we should draw the monocropped unfertilised maize (field no. 3. Ibid.) into the comparison as well, and only compared the concentrations found at the bottom of the slope, we do not see any visible differences between the three crops. An explanation for this could be that the farmers apply the fertiliser to the rice, but less than the recommended quantities.

The alternative to using chemical fertiliser is, as mentioned before, to plant a cover crop, either together with your crop or separately, in another season. The farmers of Ban Huai Hua occasionally plant the cover crop *Calapogonium* and in theory this

leguminous crop should increase the availability of nutrients. Our data from the soil analysis sustains this theoretical assumption to a certain degree. Here it can be seen, at the cover crop and Maize (field no. 4. Ibid.), that the levels of ammonium and nitrate is higher than the levels were in the neighbouring field, the monocropped maize (field no. 3. Ibid.), as well as in many other fields. The second field with a cover crop, the cover crop + Lynchee + Maize (field no. 5. Ibid.), does not show the same tendency, which may be due to the fact that the farmer here removes the legume from the field every year due to a higher fire hazard. The removed residues are then put under the lynchee trees, but the data does not show any higher levels of neither ammonium nor nitrate under the trees so it seems like the best way to use the cover crop is to keep it for several years and plant the crop in the legume.

One of the other benefits than generating nutrients into the soil and making them more available is that *Calapogonium* helps to reduce soil erosion (Giller and Wilson, 1993). Soil erosion is a severe problem in most of the world, and Ban Huai Hua is no exception. The soil type in Ban Huai Hua is a very erosive type. Combined with the steep slopes, it makes erosion an overhanging risk and through our soil samples we have learned that most fields have erosion to a more or less severe degree. This is based on the fact that most of the tested fields had a higher concentration of phosphorus at bottom of the fields. The theoretical explanation for this is that phosphate binds to clay particles and if surface erosion is taking place, these clay particles may be transported from the upper and middle part of the slopes to the bottom of the slopes by clay dispersion, where the concentration then will be higher (Lægreid *et al.*, 1999). Soil erosion should be minimised by the increased soil cover and the improved soil structure and water infiltration (Giller and Wilson, 1993), but our data does not sustain this as the tendency is the same, with higher P concentrations at the bottom of the slope, on fields where cover crops were cultivated.

The soil acidity was measured to be between 6 and 7 in the soil samples, which is within the optimum range of the crops grown. The soil acidity in the evergreen forest was between 5,5 and 7 and this was to be expected, as forest soils in general are more acid.

The farmers in our study area use pesticides to protect cotton and lynchee against damage from insects and other pathogens. This is done through the application of a pesticide called Monocrotophos.

Maize is the first crop to mature and is harvested in September when the plant is desiccating. Baby corn is also harvested from the maize crop during the growing

period. The quantity of maize harvested is between 500 and 600 kg per hectare. The residues from the maize are normally left on the field.

Rice is the next crop to be harvested, from September to November. The quantity of rice harvested is between 1000 and 2600 kg per hectare.

Cotton is harvested from November to January. Harvesting cotton is also a very labour intensive process, but since it is a cash crop most producers employ people to come and harvest the cotton. The salary paid is 1 Baht/kg. The yield from the cotton fields have been impossible to estimate as the farmers do not know how much they harvest per year – the harvest period is too long.

3.3 Presentation and analysis of data from Group B

As written above the villagers have about 15 rai of land per family (leaving the biases out of account). Most of them got the land by cutting down forest when they settled in the area. If they arrived later than the first settlers, they have bought or had land from others or shared with their relatives. 15 – 20 rai is said to be enough to feed a family and most of them only cultivate 10 rai because of lack of labour. They pay tax every year according to the amount of land and types of crops[6]. There is some confusion about this, but we were told that the village pays about 2000 Bath in total every year and the tax is collected by the Head of the village's assistant and is sent to the sub district. They make a survey every third year to register the crops grown. If the village desperately needs money for e.g. road constructions, reparations after floods, etc they can apply for donations from the sub district. This was the case last year when there was a flood in the village.

According to our in-depth interviews most of the farmers' fields are placed on slopes and very far away from their house. The average distance to the fields is 3 – 5 km, which causes problems especially in the rainy season because the physical access is difficult. This has become better during the last years because RFD has constructed roads to their plantations in the area, so the farmers can use these roads, according to the TAO.

No one in the village has title deeds and it does not seem to be a direct problem, but it is the villagers' opinion that the situation would be better if they had land certificates. So they have expressed during the interviews. Most of them are worried

[6] Rice, maize and cotton fields cost 5,- Baht per rai and orchards costs 20,- Baht per rai

that someone will come and take their land. About 75 % say that they would have a better feeling about the future if they had certificates and actually owned their land. For many years they have tried to apply for certificates, but they have now given up because nothing happened. When the children in the families grow up they are going to get land from the parents if they choose to stay in the village.

About 100 families from La Bao Ya have fields in the area of Ban Huai Hua but the villagers do not mind this because the villagers from that village came first and because they are relatives.

The TAO told us there is about 500 – 600 rai of community forest in the village, but according to our general interviews only 2/3 of the villagers are aware that this community forest exists. Some did not know about it and some use it regularly. They take care of this forest by making firebreaks and they are allowed to collect NTFPs here. NTFPs are also collected in the evergreen forest and in the secondary forest (bamboo forest). The collection of NTFPs seems to be of importance as the products are used not only for selling but also as an important nutrient supplement to the food. 90% of the household use the forest for collection of NTFPs.

As described above, the village is situated in C – zone. Since 1991 the RFD has reclaimed 500 rai of the village's agricultural land to make tropical forest plantations (this is managed by the watershed management office). This was about 20 % of the land, according to the TAOs. This reclamation took place until 1999 where the villagers and the RFD, caused by a demonstration by the villagers, made an agreement which claimed that RFD would not reclaim anymore land from then on, and that the villagers then would not expand into the C-zone. The agreement was supplemented by an old traditional ceremony arranged by the RFD. The ceremony took place in the forest where a monk tied a piece of his orange clothes to a tree as a symbol of conserving the forest and combining this with the villagers' belief. This ceremony seems to have played a big role for the villagers, according to the TAOs.

The villagers use the C-zone for collecting NTFPs but respect the agreement from 1999. They are still worried that RFD will reclaim more of their land, though the main problems identified by the villagers were (in the order they were mentioned at the community meeting):

- drugs
- lack of good roads
- lack of health centre/hospital

- no visits from officers => no help for development
- lack of knowledge on agriculture

3.4 Presentation and analysis of data from Group C

The average annual income per household in Ban Huai Hua is approximately 7,000-8,000 Bath per year. The richest families have an income of more than 20,000 Bath per year while the poorest families do not have an economic income but live from day to day with help from relatives. In general the income mainly comes from selling rattan, mulberry, bamboo shoots and sugar palm either at the market in Nan or to a middleman. Beside these NTFPs most women sell embroideries to a middleman. Only a smaller part of the farmers sell cash crops at the market in Nan, as most crops are needed for consumption in the households and because of the poor access to the market. To survive and to pay for children's school uniforms, health services, tools, fertilizers etc. many farmers also take loans from different donations, which are administrated by the village committee.

Except from the above-mentioned NTFPs the villagers collect many more species of NTFP. These are only used for consumption. The collection of most NTFPs is hard work and it is therefore mainly men who do the collection. They collect it on the way home from their fields or stay in the forest for up to 10 days collecting the NTFP (See appendix for more details on different kinds of NTFP and the villagers' usage of them).

The main problem seems to be the lack of labour in the village. The households do not have enough labour to grow all their fields, which results in a low yield. If more labour was available the yield could also be used for selling and not for consumption only. Some villagers do hire labour during the harvesting season but not many. Another technique used by the farmers to counteract the lack of labour is to use a reciprocal labour system.

The lack of labour is mainly due to the fact that the young people leave the households to find work outside, either for season or permanently. The reason why they choose to migrate is that the families need money and that the young people are not satisfied with their possibilities in making a living out of the agriculture in Ban Huai Hua. We have noticed from an article by Rigg and Nattapoolwat (2001) that the children in Northern Thailand are raised to have the perception that farming is an important issue for the country and therefore it is prestigious to farm the land.

However, according to Rigg the situation is different in real life. This might be an important aspect regarding the use of youths of Ban Huai Hua.

From a discussion with the young people, we had the impression that they are aware that it can be a problem to find a job in Bangkok or Chiang Mai but they expressed that they had to take the chance simply because the family needed the money. In addition to this the young people who had already been to the cities complained that the life there was too busy and noisy and they would prefer to stay in the countryside if it had been possible. All families who had relatives that migrated answered that they were dependent on the money that was send to them. The amounts received were between 400 and 12,000 Bath a year.

4. Conclusion

Our hypothesis was that the main problem in the land use of Ban Huai Hua was the RFD's restrictions that refused the villagers to extent their land into the conserved zone. There is no doubt that the villagers are scared, that RFD will conserve more of the agricultural land, but at the same time they appreciate that they still have land enough for their agriculture. More important issues for the farmers are the remote location, lack of labour, the physical surroundings, drug problems and the lack of knowledge.

The poor soil on the very steep slopes means that the farmers have to invest in fertilizers. Because of lack of knowledge on which type of fertilizer to use on which fields and because of soil erosion on the slopes the farmers have a very low income on crops – if any. It is not a problem for the farmers that RFD has made restrictions on the surrounding land as they do not have enough labor to grow all their fields already. The young people, who are supposed to be the most efficient workers in the field, choose to migrate, as they do not feel that they would be able to make a living out of agriculture in the village or if they do not want to be farmers. The parents support their children in their wish to migrate, as they are dependent on the remittances for inputs.

The remote location has an influence on the villagers' access to the market. There are cash crops like various fruits that cannot be transported the long distance. Beside this they often have to use a middleman to sell their products at the market, which makes the income lower than if they would be able to sell straight at the market in Nan.

4.2 Problem tree

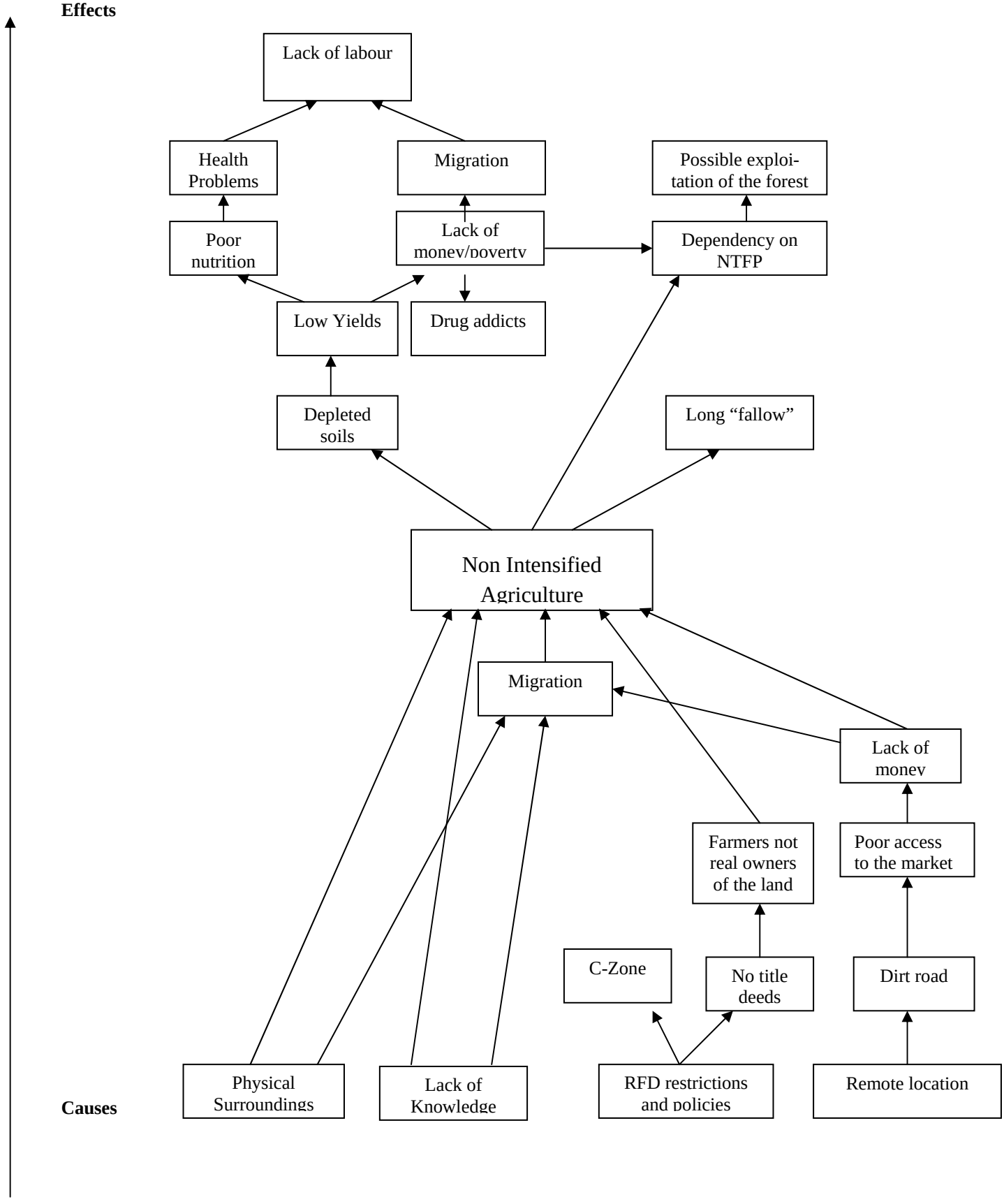
We have tried to illustrate our conclusions through a “problem tree” which is shown below. The problem tree shows the main problem in the village as being the non-intensified agriculture and not the restrictions from the RFD as we presented in our hypothesis. We have pointed out the non-intensified agriculture because it, in our opinion, seems to be connected to all the other problems we have identified in the village to some point. The problem tree shows the causes, which are the physical surroundings, lack of knowledge and so on as described above, and it shows the effects of these causes. The effects are the issues that actually influence the village. The problem tree is created by a combination of our observations and also the problems pointed out by the villagers themselves.

The indicators for intensification we pointed out in our earlier presentations were:

- fertilizer
- pesticides/herbicides
- irrigation systems
- machinery
- draft power
- fallow length
- high yield varieties
- labour input

Concerning the question whether the agricultural production in Ban Huai Hua is intensified or not, we say no or to a very limited extent. We have spotted only two indicators: the fertiliser and the pesticide. There are therefore several ways where the agricultural production can be intensified. One alternative could be to buy seeds of new, high yielding varieties. Another alternative could be to use irrigation where it is possible, taken the physical surroundings into consideration. A third alternative could be to use fertiliser at the recommended quantities, combined with different erosion-preventing measures. Integrated Pest management could be combined with the use of pesticides and finally, some of the agricultural practices could be mechanised, to the extent that the rules set by the RFD allows to.

Fig. 1. Problem Tree
Identifying main problems (causes and effects) in the agriculture of Ban Huai Hua



4.3 Biases and constraints

Drawing conclusions on the background data that we have is of course difficult. We have concentrated our work on few topics because of the time limitation and this is of course a bias to our conclusions. It should be kept in mind that we have to do with a very complex system of livelihood strategies and farming systems, and therefore this report is only a brief description of the areas we chose to work on. It should also be kept in mind that the fieldwork was part of a larger methodology course and therefore the data material may not be as thorough as we could have wished.

An important subject to consider in relation to this kind of fieldwork and conclusions is the reliability and the validity of the data. According to Andersen, 1999, the reliability states to which degree the results are being affected by coincidences or uncertainties in measurements and methodologies. In our case the last point is a very important issue as was described in Part 2. The validity is a matter of relevance – of how relevant the empirical data are in relation to the theoretical background. This should also be considered when drawing conclusion on the basis of empirical material. It is all a part of the working process, which is an important part of a course like this one. It is also important to consider the replicability of the data. We experienced this when working with students from another nationality who sometimes had a different perception of the methodologies. In this case the replicability and agreements were very important in order to get comparable results and it is a clear bias to our conclusions.

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7. Appendices

List of annexes to be found in the appendices:

Annex A	:	General interview guide
Annex B	:	Group interview guide for the TAO
Annex C	:	Group interview guide for school Principal
Annex D	:	Group interview guide for the Spiritual Leaders
Annex E	:	Group B in-depth interview guide
Annex F	:	Group C in-depth interview guide
Annex G	:	Cropping calendar
Annex H	:	Cultural calendar
Annex I	:	Matrix scoring
Annex J	:	NTFP list
Annex K	:	Soil analysis schedule
Annex L	:	Time schedule for fieldwork
Annex M	:	Group B in-depth interview