Livelihood, Land Use, and Environment in Ban Ka Sai

by Carina Mård, Bhim Ghaley and Anne Mette Gruner

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Appendices

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Appendix A: Working Process

The group started the fieldwork the 9th by deciding on the common research question, objectives and working questions. Afterwards we split up into three sub-groups one concerning the physical aspects of land use, the importance of the (community) forest in relation to land use, and one concerning the socioeconomic aspects of land use. We started out by going to the village to introduce ourselves to the headman and make environmental observation. The 10th we came back for an interview with the headman and his assistant. A lot of information was gathered for all subgroups.

The following evening on the 11th we had a community meeting where we introduced ourselves and presented our objectives for our studies in Ban Ka Sai. Here we got some appointment for transects walks the following day the 12th. Some were with key informants as the village headman and the headman assistant, where others were with women farmers. The transect walks included informal interviews with different villagers of Ban Ka Sai. One of the transect walks was mapped my GPS and soil samples from high land and lowland crops were taken. We also ended up by making a participatory seasonal calendar based on what the team had seen on the walk. Afterwards the informal interviews were analyzed for interesting problems to investigate further. On the 13th the different sub-groups started to plan questions for common group questionnaire. Appointments were made for expert interviews with the upper Nan Watershed Management Unit, this process were rather frustrating as the group was sent on to different offices.

The 14th in the evening the first draft for questionnaire was ready for testing and some group members went to the village to test them. This was very informing as we found out that some of the questions had to be changed and the sequence of questions rearranged.

The 15th the group made an expert interview, continued working and correcting the common group questionnaire, and prepared participatory mapping, interviews, and transect walks for the following day.

On the 16th a part of the group continued working on the questionnaire while others went to the village to do participatory (land use) mapping, key informer interview with the leader of the community forest committee, transect walk, and soil sampling. In the evening some went to the village making questionnaires.

We continued making questionnaires on the 19th as well as prepared interview guides for key informant interviews the following day as well as problem tree and trend line, and practical planning of the stay over in the field.

The 20th - 21st the group spent in the field. The girls stayed the night at the head of woman group, while the guys stayed at the headman's house. In the field the group made questionnaires, trend line, problem tree, key informant interviews, participatory mapping of the community forest, participatory NTFP seasonal calendar, informal interviews, as well as environmental observation.

The 22nd the group made an expert interview with AEO and looked through the collected data. A part of the group got inspired and planned an extra day in the field.

The 23rd the group continued looking through the collected data, planned the community meeting in the evening, had a informal expert interview with RFD, and some went to the field

to make transect walk in the conservation zone in order to see whether the area was strictly used for forest.

The following days until the debriefing were used for data analysis.

Appendix B: Division of Work

According to our objectives we formed the following subgroups according to discipline (scientists/ agronomists, geographers/ social scientists, economists):

Group A	*Group B*	*Group C*
Mr. Bhim Bahadur Ghaley	Miss Patcharin Kampang	Miss On-Uma Sanihi
Mr. Jirachi Arkajag	Miss Anne Mette Grüner	Miss Carina Maard
Miss Darunee Punyapitak		
Mr. Direk Kongpae		

Appendix C: Questionnaire

To be filled out by the interviewer – not questions for the respondent

i) Sample number:

ii) Date:_____ Time:_____Interviewer:_____

iii) Sex:

a) Male: □ b)Female: □

iv) Head of household: a) Yes □ b) No □

A. Demography:

1) How old are you?

2) What is your level of education?

a) Illiterate □

b) Primary school grade 1-4 □

c) Grade 5-6 □

d) Above 6^{th} grade □

e) Other level of education: □.

If yes,

f) What level?

3) How many people live in your household?

4) How many people go to work in another province?

B. In-Migration:

5) Were you born in Ban Ka Sai? a) Yes □ b) no □

If no,

5.1) Where are you from?

5.2) How long have you lived in Ban Ka Sai?

C. Religion:

6) What religion do you belong to?

7) Do you perform ceremonies in connection to your farming? a) Yes □ b) No □

If yes,

7.1) What is the ceremony/ritual?

7.2) Why do you have this ceremony/ritual?

E: Land Tenure:

8) Do you own any land? a) Yes □ b) No □

If yes,

8.1) How many plots?…….. and how many rai per plot?

plot 1……Rai

plot 2……Rai

plot 3 ……..Rai

9) Do you rent out any land? a) Yes □ b) No □ If yes haw many Rai?……

10) Do you have a tittle deed? Yes □ No□

If yes,

10.1) What type of tenure do you have?

a) □ Sor Por Kor……. Rai

b) □ Por Bor Tor 5…...Rai

c) □ NS3……..Rai

10.2) When did you get your title deed?

11) Do you think having a certificate is important? a) Yes □ b) No □

If yes,

11.1) Why?

If no,

11.2) Have you applied for one? a) Yes □ b) No □
If yes,
11.3) What kind of certificate?
11.4) Do you know when/if you will get it
12) Where is your land situated? (Point on map)
a) Close to your dwelling? a) Yes □ b) No □
b) Are your plots situated together? a) Yes □ b) No □

E. Land Practise: (if time fill out the table below)

13) What kinds of crops do you have in each plot? Are they rain fed or irrigated?
14) What is the output in kilos?
15) What is the price per kilo?
16) What do you use your output for – for sale, for own use, exchange?

No. of plots	Kind of crop	Rainfed/ irrigated	Number of irrigation	Output (kilo)	Price per kilo	For Sale (kilo)	For own use (kilo)	Exchange	T ar
1									
2									
3									

17) Have you always cultivated the same crops? a) Yes □ b) No □
If no,
17.1) What have you cropped before?
17.2) When?
17.3) Why?
18) What is the sequence of the cultivated crops in a particular field in different seasons? (eg. rice-maize-beans)
19) What is the resting period (fallow) of a piece of land after each crop?
20) Why do the farmers leave the land fallow?
21) Do you practice shifting cultivation?
If yes,
21.1) What is the fallow period?
22) Has the crops grown changed over last 10 years? a) Yes □ b) No □
If yes,
22.1) What crops used to be grown?
22.2) Why have you changed the crop?
23) In your field, do you practice any method for preventing soil erosion or improve the soil productivity/fertility?
If yes,
23.1) What are the different methods followed?
24) Have you observed any soil fertility degradation over the years? a) Yes □ b) No □
If yes,
24.1) Why do you think so?

25) Do agriculture extension office train, provide advice and conduct demonstrations for you to disseminate
improved cropping practices and introduce high yielding varieties? a) Yes □ b) No □
26) Do you think the services have helped them to improve productivity? a) Yes □ b) No □
If yes,
26.1) Please explain how?
If no (to 23),
26.2) Please explain why not?
27) Do you use improved seeds? a) Yes □ b) No □
If yes,
27.1) In which crops?

F. Household expenses:

28) How much input do you use eg. fertilisers, pesticide, herbicides, labour (people to help you farm)?
29) How much do you pay?
30) How much do you pay for machinery?
31) How much do you have to pay for the rent of land?
32) In one crop how many help for weeding, cropping service and harvesting? How long do they spend on each activity?

Input factors	Name of Crop?…….. Amount of Rai?……..		Name of Crop?…….. Amount of Rai?……..		Name of Crop?…….. Amount of Rai?……	
	Amount applied	Real cost	Amount applied	Real cost	Amount applied	Real cost
1. Seeds						
2. Fertilisers						
3. Manure						
4. Herbicides						
5. Pesticides						
6. Labour						
7. Rent of machinery						
8. Rent						

33) How much money do you spend on food or drink or other things for the workers?
Average……baht per day

G. Household expenses:

34) How much money do you spend on food per day?
35) How much do you spend on education per year?
36) How much do you spend on utilities (water supply, electricity, phone)?
37) How much money do you spend on transport (gas, bus, car)?

H. Water supply utilisation

38) Source of water used for household? 1…… 2……
38.1) Is it enough for your demand? a) yes □ b) no □, If no, where do you get water from?…..
38.2) Quality of the water good □ - bad □
39) Source of drinking water? 1…… 2……
39.1) Is it enough? a) yes □ b) no □, If no, where do you get it from?….
39.2) Quality of the water good □ - bad □

40) Source of water for agriculture? 1……. 2……..
40.1) Is it enough? a) yes □ b) no □, If no, where do you get it from?….
41) Do irrigation systems solve this problem?
42) Is there any change in the water quantity comparing now to ten years ago?
43) Change □, no change □, because?
Do you think chemical inputs affect the water quality? a) yes □ b) no □
44) Is there lack of water/rain in the village?
46) Have there been flood problems in your field? a) yes □ b) no □
47) What type of crops do you plan to cultivate in the future?

I. Other Practice: (if time fill out the table below)

48) Do you collect NTFPs? a) Yes □ b) No □
If yes,
48.1) Where do you collect them?
48.2) What do you collect?
48.3) How many kilos/baskets do you collect?
48.4) What is the price per kilo/basket?
48.5) What do you use them for - for sale, for own use, barter?
48.6) Do you collect any NTFPs for ceremonies/ rituals?

NTFP	How much (in kilos /baskets)	Price per kilo	For sale	For own use	Barter system
Mushrooms					
Fire wood					
Bamboo					
Honey					
Other					

J. Income from lifestock

49) Do you have any animals? a) Yes □ b) No □
If yes,
49.1) What type of animals do you have?
49.2) How many of each kind?
49.3) What do you use them for – for sale consumption or exchange?
49.4) What is the price of each animal?
49.5) What are the expenses of having the animals/each animal?

Type	Total amount	For consumption	For sale	Price of each animal	Total income (to be used for analysis after)
Chicken					
Pig					
Duck					
Cow					
Others					

K. Alternative income: (if time fill out the table below)

50) Do you have other work than on the farm?
If yes,
50.1) What kind of job do you have?

L. Wealth Indicators:

51) Do you have any of the following?

Do you have:	Yes	No
a) TV		
b) Radio		
c) Fridge		
d) Car		
e) Motorcycle		

M. Loans:

52) Do you have a loan? a) Yes □ b) No □
If yes,
52.1) From where did you get it?

a) BAAC □ interest rate……..per year

Agricultural Cooperative □ interest rate……..per year

Other □ interest rate……..per year

53) What do you use the loan for? ……..

N. Community organisations/informal groups

54) Are you a member of a community group? a) Yes □ b) No □
If yes,
54.1) Which group?

a) Pig group □
b) Soya group □
c) Maize group □
d) BAAC group □
e) Other □ Specify what group?

55) What benefits does the group give you? (marketing/ investment/ knowledge)

O. Community forest

56) Can you explain what a community forest is?
57) Do you have community forest in Ban Ka Sai?
58) How does the community forest in Ban Ka Sai differ from other forest types?
59) When was the community forest(s) established?
60) What was there before it was established?
61) Why was the community forest established?
62) Do you collect NTFPs in the community forest? a) yes □ b) no □
If yes,
62.1) What do you collect?
62.2) What do you use he collected NTFPs for – sale or consumption?
If sale;
62.3) What do you do with the money, do you give them to the Village Committee?
63) Who manages and preserves the community forest?
63.1) Are you a part of the Community Forest Management?
63.2) How does one become a part of the Community Forest Management?
64) Are there any rules in connection to the use of the community forest?
64.1) Who upholds these rules?
64.2) What is the punishment for not following these rules?
65) Has there been any tree planting in the community forest? a) yes □ b) no □

If yes,
65.1) Who planted the trees?
66) Have you ever received any advice/participated in training on preserving the forest by RFDd/the headman/others?
If yes,
66.1) Do you still get advice/training?
67) Are there any rituals/ceremonies in connection to the community forest?
68) How do you preserve the community forest?

P. Other questions

74) Do you have any other problems besides the ones we have discussed?

Appendix D: Demographic Details of Sample

Introduction to Appendices E – N

All of the interviews started with the following:
Time:
Date:
Place:
Interviewer:
Respondent:
Title of respondent:

Appendix E: Interview Guide for Interview with "Upper Nan Watershed Management Unit"

1) What is your responsible area?
2) What is the Upper Nan Watershed Management Unit project responsible for?
3) How do you define/describe a forest?
4) How do you define/describe a conservation zone?
5) How do you define/describe a community forest?
6) How do you define/describe reforestation?
7) When did the reforestation project or the King's project start? And when is it supposed to end?
8) Who supports this reforestation project financially?
9) Can you explain what the purpose of the project is?
10) Who benefits from this?

If answer includes planting of trees:

11) What are the prospects of the planted trees?
12) Is RFD allowed to cut the trees as they wish or after a couple of years?
13) How much land (rais – any statistics available?) has been given back to the King so far?
14) And what is the goal of amount of that that should be given back and the time limit for the project?
15) What kind of land is included in the project?
16) How does the process of give land back work/can you describe the process of given back land?
17) Are people in general willing to give land to the reforestation project?
18) Have there been any problems involved in this process (enforcement, farmers not wanting to participate in the project of certain reasons or others)?
19) Has the reforestation project been set up in Ban Ka Sai?

If yes,

19.1) When did promotion of reforestation take place in Ban Ka Sai?
20) How did this promotion take place?
21) Do you have a map of the land use in Ban Ka Sai?

If yes (a participatory mapping exercise) (can we get a copy?),

21.1) Can you point out the borders of the conservation forest?
22) Can you point out the borders of the community forest?
23) What is the role of the villagers in the reforestation process?
24) Were they involved in the process?
25) Are the farmers who give up land helped in any way (advice)?
26) What do you think that the environment benefits from the reforestation?
27) What do you think that the farmer benefits form the reforestation?
28) Do you think that there are any negative consequences for the farmers due to reforestation?
29) Are there any rules in connection to use of the conservation zone?
30) Are there any rules in connection to the use of the community forest?
31) What are the farmers allowed to collect in the conservation zone?
32) What are the farmers allowed to collect in the community forest?

If anything about NTFPs,

32.1) How do you distinguish between timber and wood used for fire?

33) Who makes the rules for these areas?
34) Are they written down?
35) Who punishes the one that brakes the rules?
36) Is forest encroachment taking place?
If yes,
36.1) Who are likely strata of farmers encroaching the forest and why?
37) What is the extent of encroachment?
38) What is the general trend observed?
39) How is your organisation cooping with this?

Appendix F: Interview Guide for RFD

1) What is your responsible area within RFD?
2) What does your job in this connection?
3) How do you define/describe a forest?
4) How do you define/describe a conservation zone?
5) How do you define/describe the economic zone?
6) When were these terms established and why?
7) What has RFD's role been in this establishment?
8) What are the rules in connection to the use of the conservation zone and the economic zone?
9) How are these rules communicated to the villagers?
10) Has there been any conflict in the establishment of the conservation zone and the economic zone?
11) What are the farmers allowed and not allowed to collect in the conservation zone?
12) Who punishes the one that brakes the rules?
13) In general, do you know if forest encroachment taking place in the conservation zone?
If yes,
13.1) Who are likely strata of farmers encroaching the forest and why?
13.2) What is the extent of encroachment
13.3) How is RFD cooping with this?
14) How do you define/describe a community forest?
25) When was the idea of community forest established?
16) What is the purpose of establishing community forest?
17) Are there any specific laws on use of community forest?
18) Why are community forest established?
19) Who manages the community forest?
20) What was the land now used for community forest typically used for before?
21) What is the process for establishment of a community forest?
22) Are villagers in any way involved in the establishment process?
23) What is RFD's role in this establishment?
24) Is establishment of community forest a part of the reforestation plan?
25) What are the farmers allowed to collect in the community forest?
25.1) How do you distinguish between timber and wood used for fire?
25.2) Who makes the rules for these areas?
25.3) Are they written down?
25.4) Who punishes the one that brakes the rules?
26) In general, do you know if forest encroachment taking place in the community forest?
If yes,
26.1) Who are likely strata of farmers encroaching the forest and why?
26.2) What is the extent of encroachment
26.3) How is RFD cooping with this?

Appendix G: Interview Guide for AEO

1. What do you call this office?
2. What is the name of the official and his designation?

3. What is the mandate of the office and his tasks in particular? What is the number of field staff in the office ?
4. Do the office generate technologies and train farmers or is it a linkage between the research station and the farmers?
5. How do you decide the training to the farmers? Who decides based on what information?
6. Do you have any contact person or progressive farmer in the village? If yes, what is his role?
7. How do you identify the training needs of the farmers? Who decides and who implements>?
8. Do you evaluate the training after each training session with the farmers? If yes, how do you do that? Has there been any evaluation of the training conducted so far?
9. What is the rate of adoption? What is the reason for more or less adoption?
10. Which technologies have been adopted by the farmers and why?
11. Which technologies have not been adopted by the farmers and why?
12. What is the training methodology followed during farmers training? Is it theoretical lecture to a group of farmers or theoretical classes combined with practical demonstrations in farmers field?
13. How often do you conduct training in a village? Who decides when?
14. What are the main problems of farming in Ban Ka Sai? Eg. Produce marketing, input supply, pest and disease incidence, rat and wild boar crop damage?
15. What attempts have been made by the office to contain the problem?
16. What are the different farming activities practiced by the farmers for income?
17. Which are the improved varieties grown by the farmers in following crops:

- Cotton
- Lowland rice
- Upland rice
- Black bean
- Green bean
- Soyabean

What is the role of extension office in seed procurement for the farmers?
Does the office have a record of number of farmers trained in different technologies?

18. Is shifting cultivation practiced in this region with particular reference to Ban Ka Sai? If so, is there increasing or decreasing trend over the years?
19. What are the different soil conservation methods followed by the farmers in Ban Ka Sai?
20. What is the cropping pattern of a particular plot over different seasons in high land and in lowland?
21. What is the fallow period between each of the crops mentioned above?
22. Is the office involved in training on community forest preservation? If so, how many received the training so far?
23. What are the problems faced by the office in terms of training the farmers? Do they have sufficient time and money (resources)
24. What is the suggestion by the office to improve their services?
25. How often the field staffs get training on updating their knowledge to further disseminate to farmers?
26. Do you have any plan to train the farmers in the near future?
27. How often the staffs get transferred to another office or province
28. Any issues that the office would like to discuss with us?

Appendix H: Interview Guide for Community Forest Committee

1) How will you define/describe conservation zone?
2) How will you define/describe a community forest?
3) When was the community forest established?
4) How was the process?
5) Who promote it?
6) Were the villagers involved?
7) How many rais is the community forest?
8) What kind of land was used for it?
9) Who supports the project financially?
10) Are there any rules for the use of the community forest?
11) Who make them?
12) Who punish if they are not obeyed?
13) What are the people allowed to collect in the community forest?
14) Are they allowed to collect the same in C-Zone?
15) What do you think that the villagers benefit from the community forest?
16) Where do the villagers collect their firewood?
17) How do you distinguish between timber and firewood?
18) Is there any encroachment taking place?
19) Who are the likely farmers for the encroachment in

    A) the community forest ?

    B) C-Zone

20) What is the extent of encroachment?
21) What is the general trend observed?
22) Can you point out on the map? Where the community forest is?

Appendix I: Interview Guide for Head of Woman Group

1) What is the woman group?
2) How many people who participate in the woman group?
3) What is the purpose of the woman group?
4) How does one become a part of the woman group?
5) How long time have you been a member/leader of the woman group?
6) How will you define/describe conservation zone?
7) How will you define/describe a community forest?
8) When was the community forest established?
9) How was the process?
10) Who promote it?
11) Were the villagers involved?
12) How many rais is the community forest?
13) What kind of land was used for it?
14) Who supports the project financially?
15) Are there any rules for the use of the community forest?
16) Who make them?
17) Who punishes if they are not obeyed?
18) What are the people allowed to collect in the community forest?
19) Are they allowed to collect the same in C-Zone?
20) What do you think that the villagers benefit from the community forest?
21) Where do the villagers collect their firewood?

22) How do you distinguish between timber and firewood?
23) Is there any encroachment taking place?
24) Who are the likely farmers for the encroachment in

A) the community forest ?

B) C-Zone

25) Does the woman group get benefits from the Community forest or NTFPs?
26) Is the woman group involved in the Community forest Management/Committee?
27) What do they do in connection to the Community Forest? Preservation?
28) Where is the community forest? (Point out on map)
29) Do you collect NTFPs in the community forest? a) yes b) no
If yes,
29.1) Where do you collect NTFPs? (Point out on map)
29.2) How often that you collect NTFPs?
29.3) Are there any restrictions on what you are allowed to collect or when you can collect it?
29.4) What do you use the NTFPs for? Consumption or sale?
If sale,
29.5) How you make them for sale?
29.6) Do you make them as preservative foods, when you collect the NTFPs in the great amount?
29.7) How much you can earn month?
(Making of seasonal calendar for collecting/selling NFTPs)

Appendix J: Interview Guide for Head of Religious Group

1) What is your role in the village?
2) How long have you had this role?
3) How will you define/describe conservation zone?
4) How will you define/describe a community forest?
5) When was the community forest established?
6) How was the process?
7) Who promote it?
8) Were the villagers involved?
9) How is the community forest managed? Who? How are these people being chosen to manage the community forest?
10) How many rai is the community forest?
11) What kind of land was used for it?
12) Who supports the project financially?
13) Are there any rules for the use of the community forest?
14) Who make them?
15) Who punishes if they are not obeyed?
16) What are the people allowed to collect in the community forest?
17) Are they allowed to collect the same in C-Zone?
18) What do you think that the villagers benefit from the community forest?
19) Where do the villagers collect their firewood?
20) How do you distinguish between timber and firewood?
21) Is there any encroachment taking place?
22) Who are the likely farmers for the encroachment in

A) the community forest ?

B) C-Zone

23) What is the extent of encroachment?

24) What is the general trend observed?
25) Can you point out on the map? Where the community forest is?
26) Are there any rituals/ceremonies in connection to the community forest?
If yes,
26.1) Do the villagers participate in rituals/ceremonies in connection to the community forest? How?
26.2) What are the rituals/ceremonies and what are their purposes?
26.3) What is the process of the rituals/ceremonies?
26.4) How is the villagers belief of spirit in connection to the community forest?
26.5) Does it affect the community forest management? If yes how?
27) Do you use any NTFPs for rituals/ceremonies?
If yes,
27.1) What are they?
27.2) Does each of NTFPs for rituals/ceremonies represent any thing? If yes, what?
27.3) Where do you collect NTFPs you use for rituals/ceremonies? (Point out on map)

Appendix K: Interview Guide for Former Headman

1) How long were you a headman for?
2) When did you stop being a headman?
3) How was it decided who was going to be the new headman?
4) What is the responsibility of a headman?
5) How will you define/describe conservation zone?
6) How will you define/describe a community forest?
7) When was the community forest established?
8) How was the process?
9) Who promote it?
10) Were the villagers involved?
11) How do/did you promote the community forest management to the villagers?
12) Were there any problems about establishing the community forest?
10) How did you solve those problems?
11) What was/is your responsibility to the community forest?
12) How were you involved in community forest?
13) Who support the community forest management?
14) Has there been any training or advises about the community forest from the government/someone else?
15) What do you think that the environment benefits from the community forest management?
16) What do you think that the villagers benefits from the community forest management?
17) How many rais is the community forest?
18) What kind of land was used for it?
19) Who supports the project financially?
20) Are there any rules for the use of the community forest?
21) Who make them?
22) Who punish if they are not obeyed?
23) What are the people allowed to collect in the community forest?
24) Are they allowed to collect the same in C-Zone?
25) What do you think that the villagers benefit from the community forest?
26) Where do the villagers collect their firewood?
27) How do you distinguish between timber and firewood?

28) Is there any encroachment taking place?
29) Who are the likely farmers for the encroachment in

A) the community forest ?

B) C-Zone

30) What is the extent of encroachment?
31) What is the general trend observed?
32) Can you point out on the map? Where the community forest is?

Appendix L: Interview Guide for TAO

1) How long time have you worked for "Or por tor"?
2) How did you get the job?
3) How will you define/describe conservation zone?
4) How will you define/describe a community forest?
5) When was the community forest established?
6) How was the process?
7) Who promoted it?
8) Were the villagers involved?
9) How many rais is the community forest?
10) What kind of land was used for it?
11) Who supports the project financially?
12) What is your involvement with the community forest?
13) What was/is your responsibility to the community forest?
14) How do you support the community forest management?
15) Have there been any problems involved in the community forest management
16) What do you think that the environment benefits from the community forest management?
17) What do you think that the villagers benefits from the community forest management?
18) Are there any adverse impacts because of the community forest management?
19) Are there any rules for the use of the community forest?
20) Who make them?
21) Who punish if they are not obeyed?
22) What are the people allowed to collect in the community forest?
23) Are they allowed to collect the same in C-Zone?
24) What do you think that the villagers benefit from the community forest?
25) Where do the villagers collect their firewood?
26) How do you distinguish between timber and firewood?
27) Is there any encroachment taking place?
28) Who are the likely farmers for the encroachment in

A) the community forest ?

B) C-Zone

29) What is the extent of encroachment?
30) What is the general trend observed?
31) Can you point out on the map, where the community forest is?
32) Do you have any information about title deed distribution in Ban Ka Sai?
33) How much of the land in Ban ka Sai is available for agricultural land use?
34) How many villagers lack land for agriculture?
35) How is it decided who receives a Sor Por Kor certificate?
36) How long do villagers have to wait for their land certificate?
37) Do you know if there are many farmers without any title deed in Ban Ka Sai?

38) If a farmer doesn't have a title deed, but is cultivating land in c-zone anyway, is anything done to prevent him?
39) Is there a lot of forest encroachment going on?
40) Have many farmers had to give up their land for plantations?
41) How many farmers have been hired to work in the plantations established by RFD in Ban Ka Sai?
42) What is the wage for plantation workers and does it compensate for income made from land use.

GROUPS;

43) Do you have any connection to group activity in the village, savings group? Kor Kor chor group?
44) What is the purpose of the different groups? If they give loans what are the loan criteria and interest rates?
45) How long have the different groups existed.

Appendix M: Interview Guide for BAAC Representative in Ban Ka Sai?

1) What is your position and role for BAAC
2) How many people in Ban Ka Sai have a loan with BAAC
3) How many groups have been formed in connection with obtaining a loan?
4) How many members does the agricultural co-operative have in Ban Ka Sai?
5) What is the average amount that households borrow?
6) Do villagers have trouble paying back their loan?
7) Does the BAAC ever provide anything besides money such as fertilisers?
8) What does the BAAC do about this?
9) Does BAAC give any advice on cultivating methods when they give a loan?

Appendix N: Interview Guide for Head of Soybean Group

1) How long you been in this position?
2) How did you get this position?
3) What are the objectives of this group?
4) What benefits does this group give to it's members?
5) How many members are in this group from Ban Ka Sai?
6) How do you become a member? Conditions and rules to become a member?
7) What are the problems that the group face?
8) How do you solve the problems?
9) Are there any market/price benefits from being in this group?
10) Do the members gather in order to sell their products/ bulk marketing?

Appendix O: Community Meeting; Problem Identification

Appendix P: Trend Line

Time span	Events
1960s	Lot of forest, lot of rainfall, lot of shifting cultivation (almost all villagers)
	Fertile soil, good yields without lot of inputs, good soil tilt, only upland rice grown, road condition was bad
1963	Outbreak of rat infestation in crops,
1965	Flood in the village.
1970s	Agriculture Cooperative formed, less forest than in 1960s (slash and burn practice causing forest fire, shifting cultivation) decrease in rainfall,
	Decrease in shifting cultivation (RFD restrictions), no use of fertilizers
1975	Farmers could register as member of BAAC, crops grown were upland rice, cotton, orange, good road, easy to transport produce to market
1980s	Lot of deforestation, decrease in rainfall, decrease in shifting cultivation. No use of fertilizers, started longon cultivation,
1990s	Orange cultivation continued with use of fertilizers, Establishment of AEO, community forest (Wai Paoh) established (1000 rai). Started teak plantation by outsiders by buying up land from the farmers, lowland rice cultivation, stability of forest cover, stable rainfall, further decrease in shifting cultivation, decrease of orange cultivation (high capital investment on inputs, soil degradation, health problems due to excessive chemical use)
1996	TAO established, group formation started, use of pesticides and use of fertilizer in cotton started, flood in the village
1998	Use of fertilizers in maize started, use of herbicides (due to more weeds caused by intensive cropping), some weeds have developed resistance, started litchi cultivation and teak plantation by the farmers (10HH) encouraged by RFD by supplying seedlings, only allowed in SPK and NH3 type land tenure
2000	Community forest (Paa Saa Wanee) established, increasing forest cover (RFD restriction and awareness of farmers to link rainfall and forest), rainfall increased, very few practice shifting cultivation (10 HH), high output due to high dosage of fertilizers and chemicals, advice from AEO started, clod and hard pan formation in soil, decreased fertility,
2001	Started rambuttan cultivation in June (10 HH, 1000 trees) decrease in orange cultivation, orange orchards either converted to rambuttan fields or rambuttan intercropped with orange

Appendix Q: Village Map

Appendix R: Problem Tree

Appendix S: GIS-maps

Appendix T: Hand Made Maps

Appendix U: Soil Tests Results

Appendix V: Income Sources

Appendix W: Farming Expenses Total Income

Abstract

Ban Ka Sai within Khun Samun Watershed, is situated between the E- and C-zone. Agriculture is the backbone of livelihood. The agriculture land use activity includes agro-forestry, horticulture and field crops. Community forests, land tenure systems, loan institutions, farmers' groups and land use intensification play an important role in farmers life. The farm income is low and there is high dependency on off-farm income and NTFP collection. Many of the farms are in restricted conservation zones, posing a dilemma for the local authorities. Land use intensification and crop diversification is taking place to make a living.

In this report, a study and subsequent analysis of the mentioned issues affecting the livelihood of the villagers of Ban Ka Sai was conducted through an interdisciplinary and intercultural approach. The methods applied to get our information will be explained and our results will be presented leading to our conclusion.

Contents

Abbreviations and acronyms

AEO: Agricultural Extension Office
A-zone: Agricultural zone
BAAC: Bank of Agriculture and Co-operatives
C-zone: Conservation zone
E-zone: Economic zone
GO: Governmental Organisation
NGO: Non-Governmental Organisation
NPK: Mineral fertiliser containing nitrogen, phosphorous and potassium
NTFP: Non Timber Forest Product
Pah Chom Chan: Community Forest
Par Sawanee: Queen's Project
PBT-5: Por Bor Tor 5
Rai: Thai measurement of 40 x 40 metres, 1 rai is 6.25 hectares
RFD: Royal Forest Department
NS-3: Nor Sor Sarm land certificate
SPK: Sor Por Kor land certificate
TAO: Tambon Administration Office

1. Introduction

1.1 Problem area

Agricultural development has been the engine of growth for Thailand in the last fifty years. The significant expansion in cultivated area that has sustained growth in crop production has for the most part been possible by a dramatic reduction in forest area. (Buch-Hansen 2000, pp. 3) This process is described below:

"Where in a historical process, a trade-led agricultural boom can be the rationale for opening up forests on new agricultural frontiers, this trade induced wealth later creates basis for sustained population growth (which turns out to be an autonomous driving force behind the elimination of remaining forest fragments) and may provide the funding for road construction (which opens up new frontier areas)." (Wunder 2000, p. 47)

The Thai government encouraged directly and indirectly, up until the late 1970's and 1980's the logging of forestland in a plan to generate foreign exchange, however with the growth of the environmental movement it became more apparent that something was to be done to reverse this trend. In 1989 logging was banned and reforestation and conservation plans were put into effect. Since the 1960's targets have been set for the area to remain as protected national forest using reforestation, conservation and tree plantation schemes, however upholding targets has proven to be a complex task and some of the programs have had adverse effects on the livelihood of farmers. (Rigg 1993, p. 280)

Shortage of legal land available for agriculture and the urgency for accelerating titling and land distribution programs are the main issues requiring attention. The attempts to conserve forestland have had grave implications for small-scale farmers who depended upon previously unclaimed frontier or forestland as a subsistence guarantee and a safety value in times of economic difficulty. (Hirsh 1993, p. 14) In Northern Thailand where a scarcity of forest was perceived, local people developed a communal mechanism to regulate the use of forests to avoid over exploitation or privatisation, such communal forests are to be found in watershed areas. However the government has not always acknowledged indigenous peoples use of the land and these areas have also been submitted to conservation restrictions. (Sato 2000, pp. 155) Much of the land that previously was forested land, and is now used as farmland, faces the dilemma of being officially classed as forest reserve. The farmers who work this land have no legal title to it and thus find themselves in a marginal position economically, ecologically, and also in a political-economic sense. (Hirsh 1993, p. 52) The reduction of available farmland and the importance of land tenure in light of these developments, put pressure on farmers to move away from shifting cultivation towards a more intensified agriculture in order to secure their livelihood. (Boserup 1965, chapter 1 & 9). In most cases intensification is seen as a positive process that agricultural systems should be encouraged

towards however, there are growing concerns that the agricultural intensification process leads to degradation of natural resources. Mismanagement of the intensification process and reliance on inappropriate techniques and technology for intensification are the major source of degradation. (Pindstrup-Andersen & Pandya-Lorch 1994, pp. 9)

1.2 Zooming in on the problem - focusing on Ban Ka Sai

Ban Ka Sai is situated in Khun Samun watershed, Nan province between an E-zone and a C-zone.[1] There are 156 households and a population of around 587. Most of the farmers own approximately 20 rai distributed on 2 plots. They grow both cereal crops for household consumption and cash crops to supplement their rural income. RFD has established many plantations near the village and still encourages the planting of species such as teak. Villagers have also established a community forest for their own use, such as collection of NTFPs and timber for house building.

The geographical position of Ban Ka Sai, being situated between E-zone and C-zone has an impact on land use and livelihood security. Land ownership rights are important in Ban Ka Sai, many have applied for SPK, which gives villagers collateral in their land. There are also many indications implying that farmers practice intensive cultivation, there is a wide spread use of fertilisers and chemicals, and farmers invest a lot of money in their land use. There are however some negative side effects, the need for credit for investment puts farmers in debt and there are indicators of soil degradation as a possible side effect of increased intensification. Low output from agriculture brings farmers in a situation where they have to supplement their income with off-farm activities. The uses of available natural resources such as NFTP from community forest areas are important to uphold a sustainable livelihood.

1.3 Research question

From the overall theme of the field course: "What is determining land use in the villages located up through the watershed and what are the effects of this land use for the livelihood security of the local population and for the environment," we have developed the following research question:

> How does livelihood affect land use
> and thereby livelihood security and the environment of Ban Ka Sai?

[1] E-zone is economic zones and defined as; "(…) areas planned for commercal plantations and reserved areas for landless farmers (for cultivation and settlement)." C-zone is conservation zone and defined as; "(…) restrictedly conserved areas to be forests for environmental reasons (…)." (Traynor & Mingtipol et al. 2001, 10)

The focus of our study is to reach to a conclusion for the case of Ban Ka Sai. This conclusion will contribute to answer the common hypothesis in relation to Khun Samun Watershed, which states; "Land use intensity in the villages in Khun Samun Watershed diminishes the further it is located (diminished accessibility) from the lowland and the city of Nan."

1.4 Definitions of terms

In order to understand how we understand the main terms used in this report they are briefly defined below. How we operationalise the different terms will be explained in 1.5.

Livelihood can be defined as comprising the capabilities, assets and activities required as a means to a living. In developing countries most people earn at least part of their livelihood through work in their own enterprises such as farming. Their consumption is often at least a portion of the output of their productive activities, and household labour is often an important input. Livelihood strategies comprise decisions about production (the level of output, the demand for factors and the choice of technology) and consumption (labour supply and commodity demand). Livelihood security can then be seen as sustaining the above in a way that secures a 'decent' living. (Bardhan & Udry 1999, Chapter 2) During our field course, an attempt to look at the different issues affecting livelihood like land tenure, land availability, community forest, institutions, NTFP collection, on-farm and off-farm income, crop diversification etc. were looked at, which could affect livelihood in one way or the other. In that way, livelihood is one of the main themes during the course of the study.

Land use is to be understood as the utilisation of the rural area covering land used for agriculture as well as different types of forest.

Environment encompasses natural resources such as forests, farmland, fisheries, grassing lands, water sources and so on. The sustainability of these resources is crucial to the livelihood of rural families in developing countries. Soil erosion, decimation of forests and grazing lands, silting and increasing toxicity of rivers and the depletion of aquifers have a negative impact on the sustainability of the environment and thus livelihood.

Intensification of agriculture can be defined as the increased average inputs of capital or labour with the purpose of increasing the value of output per hectare/rai. Agriculture intensification may occur as a combination of different changes such as technical progress that raises land productivity, change towards more valuable outputs, or more output due to more input with no technological change.

1.5 Objectives, working questions, and indicators

To answer the above research question, we have worked in 3 sub-groups (see appendix B) with the following objectives followed by working questions, and indicators. These were developed in cooperation with our fellow Thai students. We took advantage of the interdisciplinary group and were thus able to cover all the below cited areas of study sufficiently.

1. **Objective: To study land use intensification and it's affects on the environment.**

Working questions:

- What land use practices are there in Ban Ka Sai?
- What are the potential and constrains of land use intensification and it's affects on the environment?

Indicators:

- Cropping intensity
- Pesticide/chemical use
- Machinery use
- Contract farming
- Fallow period
- Soil conservation methods
- Irrigation
- Cash -and subsistence crops
- Soil fertility – difference between upland and lowland
- Influence of NGO/GO extension service
- Crop diversification
- Output
- Forest encroachment
- Pattern of rainfall

2. Objective: To look into livelihood strategies and understand the linkages between these and patterns of land use in agriculture.

Working questions:

- Do land ownership rights/tenure influence land use practice?
- What determines access to credit thereby investment possibilities?
- How do "community organisations" influence land use in the village?
- What type of income generating activities are villagers involved in and do they migrate to cities?

Indicators:

- Land tenure (ownership, amount of land)
- Income (on farm and outside own farm, NTFP)
- Input (crops, fertilisers, machinery, labour, food, clothes education)
- Loan institutions (access to credit, types of institution)

3. Objective: To look into how the community forest influences land use and livelihood security in Ban Ka Sai?

Working questions:

- How is the term community forest understood and how does it differ from the conservation zone?
- How has the community forest management influenced land use and livelihood security in Ban Ka Sai?
- Has RFD done anything to train or help the farmers/villagers to conserve the community forest?

Indicators:

- Training and advice from RFD
- NTFP/alternative income
- Position in hierarchy
- Culture/tradition/rituals/ceremonies
- Community participation
- Ownership

Our indicators have changed and developed through out our fieldwork as we acquired more knowledge of the different aspects of our research area, especially after the community meeting and the common identification and discussion of problems in the village. Though we are aware of the fact, that they are influenced by how we look upon the different terms of our research question. This will be discussed further in 2.1

1.6 Change of the research question, objectives and working questions

As it appears from our synopsis we have changed our research question, some of our objectives, and also working questions and indicators. There have been different reasons for the changes. One of them has been to develop a common research question with our Thai colleagues. Another reason is that the group had developed an understanding of certain areas through viewing secondary data as well as during the lectures. Working in the field made us realise that many aspects are different, and looked different upon on site. The changes we have made will be explained in the following.

The research question was changed in discussion with our Thai colleagues during the first day of fieldwork. The reason for this was mostly that the group agreed upon looking at land use in general and not just agricultural land use. The different kinds of land use are all important in looking at the level of intensification.

Two objectives were also changed. In the synopsis submitted one of our objectives were: **To determine the adverse environmental effects as a result of land use intensification.** On discussion with the Thai counterparts, we came to an understanding that the objective laid main emphasis on determination of environmental affects as a result of land use intensification. This means that we already assume that land use intensification exists in Ban Ka Sai and the main study area would be focused on the adverse environmental affects. We agreed that our main intention was to look at land use intensification and then look for any affects on the environment if any. As a result of this change in approach suggested by the group, the objective presented was reformulated as follows, in order to accommodate the changes agreed upon: **To study land use intensification and its affects on the environment. The working questions were changed slightly accordingly.**

The last objective changed in was in the synopsis stated as follows: **How the government's attempt to save the forest with conservation plans and restrictions on land use expansion, along with RFD's reforestation programs had influenced land use and livelihood security in Ban Ka Sai.**

Though one reforestation project was going on in the village there was much confusion about what reforestation actually was among the different respondents. The first days in the field we identified new and different problem areas in connection to forest; the definition of the border between the community forest and the C-zone, the difference between the C-zone and the community forest, and the distinction between Par Sawanee/the Queen's project[2] and the community forest. This resulted in a change of the objective to the following: **To look into livelihood strategies and understand the linkages between these and patterns of land use in agriculture. Naturally working questions were changed.**

Some of the initial working questions in connection to objective 2 were narrowed down. At the community meeting, as well as from informal interviews, we were learned that there was a sufficient supply of labour for agriculture and that there was hardly any unemployment. We therefore chose not to focus on these issues. Despite the growing population of Ban Ka Sai, in-migration did not have any impact on land use. We were of the opinion that with people coming back from cities to Ban Ka Sai there would not be enough land to farm, however this is not the case as families took landholdings into use which previously had been abandoned. Given the complexity of having to get a reliable understanding of how farmers define wealth and as we were not entirely sure of how to use this information we did not pursue this issue. Our decision to cut down on our working questions was also due to time restrictions.

[2] According to Mr. Punsake the Queen's project is, as the King's project, concerning reforestation. The Queen's project is for the people and is establishing community forests. The King's project is for the country and is practically establishing of plantations.

2. Methodologies

2.1 Introduction

As a part of the overall study of the Khun Samun Watershed this group has done an intrinsic case study of Ban Ka Sai as the case itself has been important and especially reaching an understanding of this particular case. (Denzin & Lincoln ed. 1994, pp. 236) To get a broad understanding of our research question and to enable students from different fields to contribute to the gathering of information, we used a variety of different methods.[3] The different methods have all been important in answering our research question, our working questions and fulfilling our objectives. The information from different methods could thus be triangulated in order to obtain an in-depth understanding and to strengthen the validity.

We have used indicators for our objectives as tools in this study to simplify "the real world" in order to be able to "operationalize" our objectives quickly. In general, indicators are not always entirely accurate and meaningful. They are constructed from variables, in this case from the overall agricultural intensification, we have come up with livelihood and land use in order to contribute to the final hypothesis. However, one can question the validity of variables as well as indicators in terms of who defines these? Often as in this case they are defined by the researchers themselves, which might bias the whole research as the measures are created from what the researcher thinks is essential. (Mikkelsen 1995, pp. 87)

2.2 Questionnaire

We made a questionnaire[4] combining a semi-structured interview with a structured survey. Our aim was to gather qualitative data along with quantitative data. The semi-structured questions would enable us to compare information from various respondents to a degree that could determine a simple frequency of responses, however placing the main emphasis on the in-depth understanding provided by respondents (Casley & Kumar 1998, pp. 10). The structured questions would provide us with benchmark data on economic and social variables.

In response to our research question we needed to conduct a simple household survey, where a lot of different information had to be gathered (appendix C). With this information it was our aspiration to have a set of standardised data that could be used and tested for correlations thereby clarifying causality relationships. The combination of the more open questions was very important to get an insight of the respondents view on certain areas.

[3] The order of gathered information can be seen in appendix A.
[4] The respondents of this questionnaire will be referred to as general respondents.

When designing our questionnaire, all of the working groups collaborated in an attempt to ensure a common understanding of the questions formulated. The questionnaire was pre-tested among four households in Ban Ka Sai. Through the pre-test we became aware of the need to rearrange some of the questions. We recognised that some of the questions were not relevant and that some needed to be reformulated.

An important bias in making this questionnaire was that the group members conducting the interviews all had different social, cultural and disciplinary background. The effects of this were that open questions were weighted differently according to interest. Total elimination of this bias was difficult, we acknowledged that the perfect way for us to conduct an interview would be by having one person from each discipline present, however this was simply not possible given time restrictions. The well being of the respondent was also crucial, it was important to create a good atmosphere during the interview, which was easier with few enumerators.

Turning to the more specific problems that we encountered from the questionnaires, we noticed that it was difficult to get precise quantitative data when we wished to calculate on-farm inputs and output. Generally farmers could not remember exact numbers and we were faced with the problem of different units of measurement that we could not always convert precisely. It has left us with some data that is less reliable. The problem of recollection led to a problem of reference periods. It was important to stick to a series of data from one specific time period, which was difficult.

2.2.1 Sampling strategy - simple random sampling

After a discussion about how to sample we chose the random sampling method. Our choice of sample technique used in our survey was based upon a main underlying factor for our research; time limitation. Before applying stratified sampling methods one divides the entire group into a number of non-overlapping subgroups from which random samples are taken proportionally. This implies gathering information about the whole population before actually conducting the main survey. (Furze, De Lacy & Birkhead 1996, 66) We identified many possible indicators to sample from such as: geographical situation, soil type, tenure type, income or situation of field in either c-zone or e-zone. As we anticipated that all these indicators had an impact on our research question we could not focus on one or two to stratify our sample from. Given more time and with the gathering of more information it might have been more apparent how we could have stratified. Random sampling of households in Ban Ka Sai was thus the best way to obtain results that could be used as a representation of the whole population, bearing in mind that with this technique we ran the risk of having a disproportional representation; this sample could then be separated into subgroups to look for causality relationships. The selection of 25 households was done from a list provided by the

headman (appendices D and X). According to the formula of Taro Yamane,[5] 25 households would give us a representative sample size. Our aim of reached 25 random and different households was achieved according to our data.

2.3 Qualitative interviews

To get an in-depth understanding of the different aspects of our research question we also made qualitative interviews, as it was important for the group to be able to triangulate the data collected from different sources. The group did three kinds of qualitative interviews; expert informant interviews, key informant interviews, and informal informant interviews. They were all different, however important in the understanding of the different aspects of the research area, however they were structured differently.

2.3.1 Expert informant interviews

Expert informant interviews were made with Mr. Punsake; the leader of the Upper Nan Watershed Unit, Mr. Konsung; the leader of the Sub-district Agricultural Officer, as well as Mr. Jansek; a representative from the RFD working at the Community Forest Division. An expert informant interview with BAAC in Nan was also conducted in co-operation with location 1. We call these respondents 'experts' as they are working for, in our case, relevant organisations and have expert knowledge of the themes investigated. They were chosen, as they represent the most relevant organizations to triangulate the information given by the key informants and general respondents. In all cases an interview guide approach was chosen, using a semi-structured interview guide with previous formulated questions (appendices E-N).

2.3.2 Key informant interviews

The group did altogether ten key informant interviews. These informants were chosen as they represented different groups in the village. The key informants were; the headman, the headman assistant, the head of the BAAC group, the head of the soy-bean group, the head of the community forest group, the head of the religious ceremonies, the former headman, the head of the woman group, as well as both of the TAO representatives. We aimed to talk to many different key informants to get as wide picture as possible, which we feel that we did. We used the key informants to obtain detailed knowledge about our research area. There are some validity insecurities in the use of this method. The number of key informants sample is rather small and one cannot use these kinds of interviews only. Moreover the choice of the key informants may have

[5] Tara Yamane uses standard error of 0.2 to estimate population size for a sample:

$n = \frac{N}{(1 + N * 0.2^2)}$; N = population, n = sample size (Tara Yamane 1970, pp. 580-581).

been biased as they were chosen based upon information acquired early in our fieldwork by few informants. (Mikkelsen 1995, p. 104) Therefore the purpose of the use of this kind of interview has been to supplement the other methods used and to get an in-depth knowledge. Some of the key informants were interviewed more than once and sometimes in groups e.g. the headman and the headman assistant. This has been positive as many questions were answered through discussion. However, this can be biased as the headman's words might have been given more weight.

The interview guides used in the interviews with key informants vary according to the key informant, however the different interview guides had similar questions (appendices E-N). The interview guides had semi-structured open questions with possibilities of going deeper into an aspect during the interview.

2.3.3 Informal informant interviews

A couple of informal informant interviews were performed as a part of the fieldwork as well. They were informal in a way as there were no interview guides made before hand. The objective was getting inside knowledge of different areas not being controlled by an interview guide, in order to get in-depth understanding of one topic. Some of the informal informant interviews were performed in groups. Through these we gained inspiration for further investigations.

2.4 PRA-methods

The group used a number of different PRA-methods. Most of them are used together to get an understanding of a specific area. In using PRA-methods we got to know the villagers more and tried to create a friendly atmosphere where the villagers felt comfortable sharing their knowledge with us. The purpose of using PRA-methods was to involve the villagers in our work in order for us to get more valid and reliable data by making the villagers address their problems themselves etc.

2.4.1 Community meetings

A community meeting was held in co-operation with the headman. He helped introducing the group to the villagers and the purpose of our studies. These were our main objectives with the meeting as well as creating a friendly atmosphere for our future work. Another objective was to identify main problems that villagers face in Ban Ka Sai, which was done by asking the villagers to write down their problems. This helped us identifying the main problems in the village viewed by the villagers themselves and these were followed-up through the fieldwork.

A community meeting was also held at the end of our fieldwork in order to brief the farmers about our findings, and hand over maps and other materials to the village.

2.4.2 Environmental observation walks and transect walks

Environmental observation walk and transect walks are closely related. We used both of them as walks with relevant key informants with the purpose of creating different maps and transects. They are methods we have used in connection with other methods in order to gather data to create maps and diagrams etc. To make these maps and diagrams the participation of the villagers was very important. We see environmental observation walks as walking in the research area with its own inhabitants. The purpose is to observe the environment and make informal interviews along the way. The information gathered can be used for different purposes. A transect walk is also a variety of an environmental observation walk, however here there are specific purposes of creating transects – cross-sectional maps or diagrams of the area. (Mikkelsen 1995, 76) We used the different walks in understanding the land use of Ban Ka Sai.

2.4.2.1 Environmental observation walks

The first day in the field environmental observation was done. The objectives were to introduce the group and the purpose of our studies to the village headman. Another objective was to make environmental observation with this key informer, by walking to a high point to get an overview of the village. From this point it was our intention to make coarse mapping and getting an overview of the village and the village boundaries. This was to help us in understanding the structure of the village as well as making fine mapping later. This coarse mapping was not fully completed, because we were given specific map of the village the second time in the field as well as we were introduced to an extensive GIS database. However, what we achieved from this walk was general environmental observation as well as informal informant interviews that we could use later in our research.

Other environmental walks were also done; one had the purpose of early in the field study to be shown around the village by some local villagers and observe different sides of life in the village, to talk to different villagers at work and by their houses. Along these walks we were inspired to investigate some aspects further and for questions for our different interviews.

2.4.2.2 Transect walks

To have an overall general idea of resources available and land use types in the village, transect walk was carried out. The group did two different transect walks at different times of the fieldwork with different objectives.

At the outset of the first transect walk, reference points for the transect walk was made from satellite maps. An effort was made to select the most representative area covering all types of landscape features in the village. The transect walk was done with two farmers who were selected

based on information from the headman that they had many years of farming experience, and had knowledge of the land use types in the village. A GPS was used to note waypoints at the beginning and end of the walk as well as at locations with interesting land use types. During the transect walk it was possible to see the different types of crops and fruit plants grown by the farmers. Soil samples from highland and lowland crops were collected for tests. At the end of the day a seasonal calendar was made based on what had been observed in the field see 2.4.4.

The objective with the second transect walk was to understand land use further.[6] The actual transect walk was decided upon after the key informants had mapped the village and the different types of land use in the village. We drove around the village to the areas with different types of land use as well as the areas pointed out as community forests. We mapped the transect walk using a GPS in order to be able to know exactly where the different land use types were and the boundaries of the community forests (appendix S).

2.4.3 Participatory mapping

The group used participatory mapping in several cases with different purposes. The dialogue in connection to the preparation of the maps was as important as the making of the maps itself. The participatory mapping was done with different key informants. It helped us to understand the land use and to see whether the key informants had the same understanding of the community forest. One of the important aspects of community forestry is the relationship between farming and forest management (Jackson et al. 1994, p. 38), and one of the objectives of participatory mapping was to understand this relationship.

2.4.4 Seasonal calendar and NTFP calendar

Our objective of making a seasonal calendar was to have a view of the cropping calendar indicating the time of sowing and harvesting of the different crops grown in the village. From this it was possible to get an idea of the cropping intensity in the village (appendix Q). This information was necessary in order to find out different crops gown and the number of crops grown in a field over different seasons in a year. This could help us probe into land use intensification in Ban Ka Sai. As already described in 2.4.2.2 the seasonal calendar was conducted at the end of the first transect walk with the farmers who were with us during the transect walk. The seasonal calendar was made as a group exercise and as part of many methods used. The participatory part is the strength of the data gathered, however only three farmers were a part of the exercise that could have biased the outcome.

[6] This was done together with; participatory land use mapping, mapping the community forests, making soil samples and test the crops for pesticides.

A NTFP calendar was created in corporation with four random selected villagers in Ban Ka Sai, along a village walk. The purpose was to see when the different NTFPs were collected through out the year. The four villagers were asked individually, and not group-wise (like at the seasonal calendar), about NTFPs collected and at what time of the year. The information they gave was then triangulated. A weakness of the information acquired was that the villagers had to be helped in the process of recalling the many different NTFPs that they collected. This is a weakness of the information acquired in this case.

2.4.5 Trend line

We made a trend line (appendix P) with the objective of acquiring an idea of the history of the village, development patterns and other environmental changes observed by the farmers over the past 40 years. This was done in cooperation with the headman, the headman assistant and one of the TAO representatives in the village. The informants were selected based on their knowledge of the village given their status. This sampling might have been biased as others might have had a different view or remembrance of the history of Ban Ka Sai.

We agreed on focusing on general changes during the last four decades and we tried to keep our focus on the following issues over the past 40 years: rainfall pattern, forest cover, soil fertility, level of crop diversification, inputs, cash crop and subsistence farming, shifting cultivation and cropping intensity.

A bias in this connection was the involvement of the Thai students. They might have had some influence on the discussion as they eventually took part in it. Another bias is the fact that the informants might not have full recollection of the actual events during these four decades.

2.4.6 Problem tree

To get an overview the farming problems and issues in the village and their interrelationship with other socio-economic factors influencing farming opportunities and rural income, a problem tree was made in consultation with three farmers. These informants were selected on the basis that these farmers had been living in the village for the past four decades and had a good idea on the development pattern that had taken place.

To make it participatory and the outcome more valid the informants were asked to come up with a specific core problem and they agreed on “low income”. The farmers discussed the causes and effects and the results of the problem tree can be seen in appendix R.

2.5 Maps – GIS maps, agro ecosystems transect, and handmade maps

The group has used different types of maps and aerial photos in the field study. Some of the maps used were given to us in the village and some were made possible with the use of a GIS database. From this database we also created our own maps of the land use in Ban Ka Sai.[7] We focused on creating three maps using GIS and GPS: 1) The first transect walk; was made with an objective to have a general idea of land use types existing in the village. 2) The second transect walk was also mapped. The objective of this mapping was to show the land use and situation of the community forests in the village. 3) The third environmental walk was mapped and the purpose was to look further into the land use in the c-zone and look into the use of this area. 2) and 3) can be seen in appendix S. A bias using this database is that the information including the aerial photo dates back to 1992. According to the trend line and the questionnaire many changes in farming and land use have happened since.

Another map type created was the agro ecosystems transect (appendix T). The purpose of this was to create a cross-sectional map of the first transect walk (Mikkelsen 1995, 77). Aspects like soil type, crops grown were added under the drawing of the transect see appendix. A number of other maps were created by hand, however we wont mention them here.

2.6 Soil sampling

The reason behind taking soil samples for tests was to determine the amount of organic matter, as the content would give an idea of total nutrient reserve in the soil indicating the capacity of the soil to sustain yield in the long run. It was also to determine the soil pH, as it would give an idea of whether the soil was acidic or alkaline. Last it was to look at the available NPK nutrient in the soil as such tests determines the availability of nitrogen, potassium and phosphate in plant available forms out of the total reserves found in the soil. The details of eight soil-sampling sites along with crop details are given in Table 1 below.

[7] We used the different layers in the database in creating maps and some of the walks we did were marked by GPS. Along the transect walks and other walk, we noted down some way points at places of interest where we either took a soil sample or noted differences in the land use. Later we added this information to ArcView as a themes and different maps with these information were created (appendix S).

Table 1: Soil sampling details.

Sample No.	Marking	Lab code	Date	Crops	Crop stage	Waypoints
1	I	Loc2I	12/10/01	Cotton	Flowering	X = 675770 Y = 2085808
2	II	Loc2II	12/10/01	Maize	Drying	X = 676047 Y = 2085893
3	III	Loc2III	12/10/01	Upland rice	Harvesting	X = 676230 Y = 2086014
4	IV	Loc2IV	12/10/01	Lowland rice	Mature	X = 676717 Y = 2085916
5	V	Loc2V	16/10/01	Orchard (lenchee)	-	X = 0674971 Y = 2088065
6	VI	Loc2VI	16/10/01	Recovery forest	-	X = 0674929 Y = 2088065
7	VII	Loc2VII	16/10/01	Community forest	-	X = 0675075 Y = 2088065
8	VIII	Loc2VIII	16/10/01	Queen's project	-	X = 0674938 Y =2085816

Source: Soil samples from Ban Ka Sai SLUSE 2001

2.7 Pesticide tests

Residual pesticide tests of the commonly grown crops was made to analyse the residual amounts of chemicals present in the crops and its potential adverse affects on human health. Samples of maize cobs, upland and lowland rice, soybean and string bean were collected randomly from farmers field for residual pesticide test.

2.8 Bias

The use of all of the above mentioned methods have resulted in a number of biases. Some of them have already been mentioned under the specific method, and here we will like to discuss the common ones. First of all we have to mention that indicators we have used for agricultural intensification are biased. Most of them were made before hand and are influenced by our way of looking at the world. Making this kind of fieldwork about agricultural intensification we also have to consider the season in which we were there. There were many farming activities at the time we were in the village which would not have been the case in e.g. March, according to the seasonal calendar. The time we spent in the village is also to be considered. Our fieldwork was terminated after three weeks and this time perspective biases the information we gathered. Working with farmers who spent most of their day in their fields also made it difficult for the group to get appointments for interviews and we had to make many of these early in the morning or late at night; times where the farmers were tired or had family obligations.

Some of the sampling of the informants of the different qualitative interviews, as well as the sampling of the informants for the making of the seasonal calendar, have some insecurity. The role of the headman has been significant as he took part in many of the methods we used to gather our data.

Data reliability was another factor that we had to take into consideration. Great variations in data could in some cases lead to conclusions that were not representative of the true scenario. Results should therefore be analysed carefully, and in cases where data is unreliable one should consider excluding it from the analysis or explore the reasons for the variations.

The language barrier also had an impact on the different interviews. The translation was not always precise, which sometimes could lead to misunderstandings. We also worked with 3 different interpreters, who interpreted very differently. Once again this could be eradicated to a certain extent by having a student from each country including a translator at each interview, it was often convenient to be able to compare notes. We therefore tried to conduct our interviews in this manor when it was possible. We were also eight different group members representing different disciplines. This has undoubtedly contributed to the work as well as created bias because of different understandings of specific aspects.

However, to overcome some of these bias it was important for the group to triangulate the data collected. We wanted to check the validity of the data collected in order to clarify and verify the repeatability of an observation or interpretation. As many observations or interpretations are not perfectly repeatable, triangulation has served as identifying different ways of understanding the phenomenon studied. Another important way of trying to overcome bias was e.g. when making the questionnaire we tried to represent more disciplines in case of addressing the questions correctly. We also tried to be at least one Thai speaking and one non-Thai speaking in the working groups in order to meet misunderstandings and discuss impressions. One can however also argue that this has created biases itself, as well as many aspects can have been lost in translation. In order to get more views on the different groups working we tried to discuss the work and the findings at common group meetings to get more input and critics. As we find some of the data gathered too biased or not contributing to answer the research question, we have not included them in chapter 3.

3. Results

3.1 Introduction

Many aspects influence agricultural intensification, and we have chosen to look at land use and livelihood as we see these as crucial influencing factors. In order to look at land use intensification in the village, various indicators as mentioned earlier were identified. Below we would like to present our results.

3.2 Land use

3.2.1 Agriculture

The most common field crops grown in the village with sowing and harvesting months are given below in the seasonal crop calendar:

Table 2: Seasonal crop calendar

Crops\Months	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Mixed/Inter crops
Upland Rice													Squash,Pumpkin, Local bean
Lowland Rice													Variety RD 10
Maize													Squash,Pumpkin, Local bean
Cotton													Squash,Pumpkin, Local bean
Squash													Upland Rice, Maize Corn
Local Bean													Maize
Pumpkin													Cotton, Maize, Corn

Index
Sow
Harvest

Source: Transect walk Ban Ka Sai SLUSE 2001.

An issue of special interest was that the farmers sowing maize in April/May harvested the crop by the month of October. But, one month before the crop was harvested, seeds of beans (all types) are sown (relay cropping) in between the standing maize crop. According to the key informants, this is done to capture the residual moisture left on the field after the maize crop and as a cover/green manure crop to arrest soil degradation due to erosion. Most of the farmers grow 1-3 crops in the same field (table 2). According to the key informants, this was done with an intention to stable the productivity of the land indicating a high cropping intensity in Ban Ka Sai.

According to general respondents, the main **cash crops** grown in the village are maize, cotton, longon, linchee and beans. Lately, farmers have started mulberry and rambuttan cultivation. Of the mentioned cash crops, maize is the most popular cash crop among the farmers with 60% (Table 3) of the sample growing it. Lowland and upland rice, squash, pumpkin, are the main crops grown for consumption. Among the crops grown for consumption, upland rice is the most popular crop with 60% of the sample growing it. According to the Trend line (appendix L) 35 to 40 years ago, only upland rice was grown for consumption. The farmers have been made aware of new economic crops by AEO and this has resulted in **crop diversification** that we see today (Table 2).

Fallow periods are, according to general respondents, are found to be practiced by the farmers depending on the land holding of the farmers. Those farmer having smallholdings are using the same piece of land year after year whereas the farmers having large holdings are practicing long fallow periods ranging from 3 to 4 years. According to general respondents, most of the farmers fallow the land for up to 6 months. Taking fallow period as 6 months and cropping period as 6 months in a year, land use factor (cropping year + fallow years/cropping years) calculates to 2. The system is stable and ecologically sound when the ratio of the length of the fallow period to cultivation phase reached 10 to 1(Agro forestry note, 2001). In comparison to this figure, the land use factor of 2 indicates high land use intensity in Ban Ka Sai.

3.2.1.1. Input and output

More of the sample size use fertilizers and herbicides in maize than in upland rice while more of the sample use pesticides in upland rice (Table 3). Herbicides are used mainly used to get rid of the weeds to prepare the land for sowing. An effort to establish the positive correlation between the inputs (amount per rai) applied and the output (yield per rai) received in both crops proved inconclusive.

Table 3: Input use

Crops	Sample Size	Percent of farmers who use		
		Fertilisers	Pesticides	Herbicides
Maize	60%	93%	7%	80%
Upland Rice	56%	29%	64%	7%

Source: Household survey Ban Ka Sai SLUSE 2001

According to the key informers, in earlier years, the level of output (yield per hectare) was satisfactory/good without using the fertilizers and chemicals in their field. However, farmers commented that the yield has been decreasing over the years due to decrease of soil fertility due to intensive cropping. These days, the farmers have to use lot of fertilizers and chemicals to save the crop in order to get the same or less output from the same piece of land. This has made farming an

expensive enterprise. Moreover, some of the weeds have developed resistance and it is difficult to get rid of them even with use of chemicals.

Pesticide test is important to analyze the amount of residual chemicals on the crop, which might go into food chain and affect human health. The result showed that all the crop samples tested (maize cobs, upland and lowland rice, soybean and string bean) contained only small amount of organophosphate and carbonate which is an indication that the produce can be consumed without any risk to human health. Based on the questionnaire and informal informant interview, no heavy machinery is used except for very few farmers who own large chunk of land. However, simple tools like hand hoe, motor operated sprayer and weeder are used in different agriculture operations. No draught power is used.

Through informal interview, no permanent irrigation infrastructure exists. Most of the crops grown are rain fed except lowland rice where bunds are made to retain the water in the field. Lowland rice is irrigated 5-6 times during the whole growing season. The main irrigation sources are streams, rivers and ponds. Ponds are dug by the farmers to tap the rainwater during the rainy season. Temporary water channels fed by the irrigation sources are the means of channeling the water to the fields whenever required. Farmers have observed that the streams sometimes dry up due to insufficient rainfall causing water shortage for irrigation purposes. That is the reason given as to why the farmers have started digging up ponds to tap rainwater. According to the key informants, the rainfall has direct relationship with the amount of forest cover. This translates to more rainfall with more forest cover and vice versa. However, many studies have been conducted in this arena to study the relationship and the result has been inconclusive till date (Traynor et al. 2001, 46). Given this, we do not rely on the data provided and hence no data presentation on rainfall is made.

3.2.1.2 Soil

As evident from Table 4, it can be seen that the there is a correlation between the farmers who are practicing the soil conservation methods and the observed soil degradation in the field.

Table 4: Soil conservation and observed soil degradation

	Yes	**No**
Do you practise any soil conservation methods?	40%	60%
Have you observed soil degradation over the years?	56%	44%

Source: Household survey, Ban Ka Sai, SLUSE 2001

On walking out into the fields, the soil conservation methods we saw are leaving the crop residues on the field, cropping of beans as cover crop and fallowing. Hence, according to key informants, they are practicing different methods of soil conservation as relevant in their farms.

As evident from the result of the soil test (appendix V), the plant available nitrogen, Phosphorus and Potassium tests were made. **Nitrogen** availability varied from low to very low in the soil. The content of **phosphorus** ranged from low to very high and **Potassium** level is low. In order to produce optimum yield, all the above-mentioned 3 nutrients should be in required quantity as these are the primary nutrient required for plant growth (Fageria 1997, p. 120). However, since the soil samples from the field crops were taken at the end of the harvesting season, the soil sample may not indicate the actual availability of nitrogen because the harvested crop has exhausted the nitrogen in the field. In case of other samples from forests, the deficiency of nitrogen could be due to combined affect of erosion of the topsoil by heavy rain showers and loss of nitrogen through leaching and evaporation. The phosphorus and potassium deficiency could be corrected through use of fertilizers for optimum plant growth. (Fageria 1997, p. 132)

PH[8] is another important factor limiting crop growth. In cotton, maize and upland rice fields, pH is the limiting factor and calcium carbonate can be used to correct acidity whereas the pH in lowland rice, linchee, recovery forest, community forest and forest under Queen's project are within the optimum level. **Organic matter** is a reservoir of nutrients and has a lead role to play in supplying nutrients for crop growth. A good soil should have organic matter at a level of 5% or above based on total soil volume (Gupta 1999, 96). The organic matter content in all of the soils tested has less than 5% of organic matter by volume (appendix V). This indicates the poor quality of the soil to sustain optimum production.

During field visits, large clod formation and soil crusting are visible in the field. This could also be an affect of imbalance fertilization, which could be due to excess fertilization of nitrogen or no application of manure to the soil, which helps to retain the soil structure (Ahn 1992, p. 77). Damage on the soil structure has a devastating affect on the ability of the soil to supply nutrients and support crop growth. As an evidence of soil erosion in one of the fields, an exposed stone was shown which was originally non-existent and farmers believe the stone has been exposed due to rainfall erosion washing down the soil around the stone.

[8] PH level from < 5.5 is considered as acidic and above it up to pH 14 is considered as alkaline/sodic. Both the situations are unwanted in the field. Optimum pH level is between 5.5 to 7.5 (Ahn 1992, p. 75)

3.2.1.3 Agricultural perspectives

In order to tap the potentiality of land use intensification in the village, a lot of intervention activities need to be initiated to address the existing farming constraints. Some suggestions are mentioned in the following: Existing farmer groups should diversify their activities into bulk procurement of inputs and bulk marketing of produce, which would give them more bargaining power in procuring at a lower price as well as selling their produce at a higher price, which would give them more profit. Balanced use of fertilisation regimes combining organic manure, green manure, cover crops and fertiliser may be emphasised to check soil deterioration. Knowledge on soil and rainwater conservation methods may be applied to conserve soil and water to support crop growth. Government intervention to support prices of produce would give farmers stability.

3.2.2 Forest

According to Mr. Jansek from RFD the whole idea of community forest is around 11 years old, and is defined as: "land and or forest that legally allow the community together with forest officers to participate in forest activities. The community can set up their own policies which sometimes are determined by culture, believes and religion. The management of the community forest aims to provide sustainable uses for the community." Mr. Punsake from the Upper Nan Watershed Management Unit[9] supplements; "Community forest means the forest that everyone in the community can participate in protecting, looking after, and setting the rules for within the regulations of the government." One of the general respondents defines a community forest as: "a forest that villagers have together and take care of together in order to preserve the area". The general understanding of what a community forest is and who has the responsibility for keeping it is quite alike among our different respondents. Mr. Punsake emphasised that community forest establishment is a part of the common policies on reforestation in Thailand. The purpose is increasing villagers' awareness of the benefits from preserving and managing natural resources in a sustainable way. RFD's way of supporting this movement is through a participatory approach; villagers are involved in planting of trees for own use financed by RFD.

However our key informants and our general respondents do not agree on how many community forests there are in Ban Ka Sai. According to the 'trend line' and the headman, headman assistant, and the former headman there are two community forests in Ban Ka Sai. One is called Wai Paoh and is situated to the North of the village. It was established around 6 years ago and covers an area of 1.000 rai, which used to belong to the present headman. Hardly anyone but the headman, the former headman and the headman assistant are aware of the existence of this community forest, of

[9] The Upper Nan Watershed Management Unit is a part of the Watershed Management Division, that is a part of the Natural Resource Conservation Office that is a part of the Royal Forest Department that again is a part of the Ministry of Agriculture and Co-operatives. (Traynor et al. 2001, pp. 30)

the general respondents only 24% know of its existence. One can question the rights of the use of exactly this forest, who uses it and who does not, and most interesting, why? The other community forest is referred to as Par Sawanee and is situated on a hill to the south of the village, bordering community forests in nearby villages, covering an area of 3.000 rai. All of the key informants as well as 88% of the general respondents are aware of the existence of this community forest. This can probably be explained by the fact that is situated closer to the village and that more money was spent on establishing it and thereby involving villagers in planting trees. This community forest was according to the trend line as well as some of the key informants established around year 2000. The main reasons for establishing this forest was to increase the forest cover. According to the former headman the budgets for establishing the community forests come from RFD and the Upper Nan Watershed Unit. The villagers were involved in establishing both community forests. It was promoted through the Village Committee. Before villagers with no title deed used the areas for shifting cultivation, but only few were against giving up this land. In the beginning there were also some who did not like the idea of establishing a community forest because they did not understand its concept or the regulations. The rules in Ban Ka Sai seem to be that the villagers are allowed to collect as many NTFP as they wish in the community forest in all times of year. However they cannot cut down timber without permission from the Village Committee. If permission is given you can only cut down ten trees. Cutting down of trees can only be permitted if it has the purpose of construction own houses. Villagers from other villages are not allowed to collect NTFPs from the community forests in Ban Ka Sai. If they are caught doing this they are fined with 500 Baht. Through training and advice provided with by the RFD, villagers have with time understood the uses and benefits of the community forests. However, many villagers are still not aware of the exact borders of the community forest.

The community differs from the conservation zone that is to be understood as restrictedly conserved areas to be forests for environmental reasons. According to Mr. Jansak RFD is controlling the C-zone and in this zone agricultural use, cutting down trees is prohibited. Neither is it allowed to construct roads without the permission from RFD. C-zone areas (along with E- and A-zones) were defined around 10 years ago in order to maintain forest in the future. RFD is aware of the fact that many farmers still cultivate in the C-zone though it according to the law is illegal. It is also not legal to have community forest in the C-zone, however this is according to Mr. Jansak to be changed in the Community Forest Act that is previously being revised. The community forest Wai Paoh situated to the north of Ban Ka Sai is actually situated in the c-zone, while Par Sawanee is in the E-zone (appendix S).

From our key informer interviews and the questionnaire we learned that the position in hierarchy does not determine the access to the community forest. Neither can we conclude that the people in the powerful positions[10] in Ban Ka Sai have a common understanding of how many community forests there are in the village and where they are situated. Many of the villagers in Ban Ka Sai participate in different groups in the village. There also seems to be a quite good relationship between the headman, the Village Committee and the villagers. The villagers with knowledge of the community forest express that they have learned about the community forest from the headman in the village committee. Through the village committee they have got the expression that the community forest is the property of the village and it is their responsibility altogether to preserve and take care of the community forest as well as keeping an eye on it. General knowledge about sustainable management of forests areas has had the effect that encroachment of forest areas (C-zone, community forest) does not seem to be a problem in the village any more. This used to be a serious problem in Ban Ka Sai. Villagers have learned through informal advice and discussion in the village committee that it is their responsibility all together to take care of community forests. If they do not preserve the forests there wont be as many NTFPs and timber for construction in the future as well as there will be problems with the rain during the rainy seasons. Another reason for the villagers feeling that the community forest is theirs is that many of them have participated in planting of trees in the newest community forest "Par Sawanee"

3.2.3 Tradition

Traditions have also been found to be important for land use, 24 out of 25 in our sample are Buddhists.[11] Out of these almost 60% use some kind of ceremonies in connection to farming, however only 16% responded that they use ceremonies in connection to the community forest. However, there has been worship of spirits in the community forests. The reason for that is because the villagers believe that spirit will harm the ones who destroy the forest. Then they are afraid of damaging the forest will cause them problems. There has been described several ceremonies in connection to farming. The general trend is using ceremonies[12] before and after harvesting and before sowing in order to achieve high yields and protect from any failures. It is our impression that the ceremonies play an important role for the villagers, though less practice ceremonies than before; a new temple is subsequently being built.

[10] We define powerful positions as: headman, headman assistant, leader of woman group, leader of the religious group, former headmen, TAO representatives etc.
[11] The last one is Christian. There are only supposed to be two Christian families in ban Ka Sai, the rest are Buddists.
[12] In the ceremony, villagers will worship the spirit with pig head or local whisky with a couple of boiled chicken and practice this once a year. A religious group takes care of the ceremonies. The head of this group knows all the steps in the ceremonies, and according to him he is the one who knows how to establish a good relationship between the villagers and the spirits.

3.2.4 Land tenure

As it is mentioned Ban Ka Sai is situated on the border of the C-zone and the E-zone. This gives a variety of problems in connection to land tenure, as the possibilities for these are restricted in the c-zone. In Ban Ka Sai we identified 3 different types of land documents; PBT-5, SPK and NS-3.[13] The most common land certificate is PBT-5, 84% of our general respondents have this type of certificate covering a substantial part of the land that they cultivate (Table 5.). 76% of the farmers with PBT-5 have applied for SPK but are waiting for their application to be processed by the AEO. There are a series of problems associated with the processing of SPK applications. A mentioned problem is that many farmers have land situated in C-zone an therefore have no right to a title deed, not all farmers were aware of this when they applied. This emphasises the confusion among villagers about the boundaries of C-zone and whether or not they have a right to that land or if they actually are practising forest encroachment. As the farmers have PBT-5 they do not think of farming in the C-zone as illegal, they have no other choice but to farm this land to uphold their livelihood. From informal interviewing with farmers harvesting in the C-zone they all have PBT-5 and most of these hope to get SPK.

Another factor determining right to SPK is the intensity of land use and whether the land has been in use for many years. All of the general respondents stated SPK is important as it provides security in form of collateral. To sell teak, a title deed like SPK is needed, so for a farmer to invest in teak plantations (which the Government supports) they need SPK. Not having an SPK certificate was one of the problems cited by the villagers (appendix O).

[13] PBT-5 is a tax-certificate in order to provide the farmers with the proof that a land tax has been paid. On most occupied land, occupied legally or not, this tax is being collected. SPK is issued by the Agricultural Land Reform Office and is issued in few specific areas. It was introduced in 1975 and SPK land cannot be sold or transferred, however only inherited. It cannot always be used as collateral either. NS-3 is a title deed that gives the farmer right to sell, transfer, or mortage land. It can be used as collateral, and it is also possible to convert it to the title deed Chanod (NS-4). (Traynor et al. 2001, pp. 41)

Table.1 Land Tenure in Ban Ka Sai

Farmland certificate distribution by rai	**Rai**	**Percent**
PBT 5	367	69%
NS 3	30	6%
SPK	132	25%
Total	529	100%
Farmland certificate in each household	**Frequency**	**Percent**
PBT 5	11	44%
NS 3	0	0%
SPK	4	16%
PBT 5 and SPK	9	36%
PBT 5 and NS 3	1	4%
PBT 5/SPK/NS 3	0	0%
Total	25	100%

Source: Household Survey, Ban Ka Sai, SLUSE 2001

3.3 Livelihood

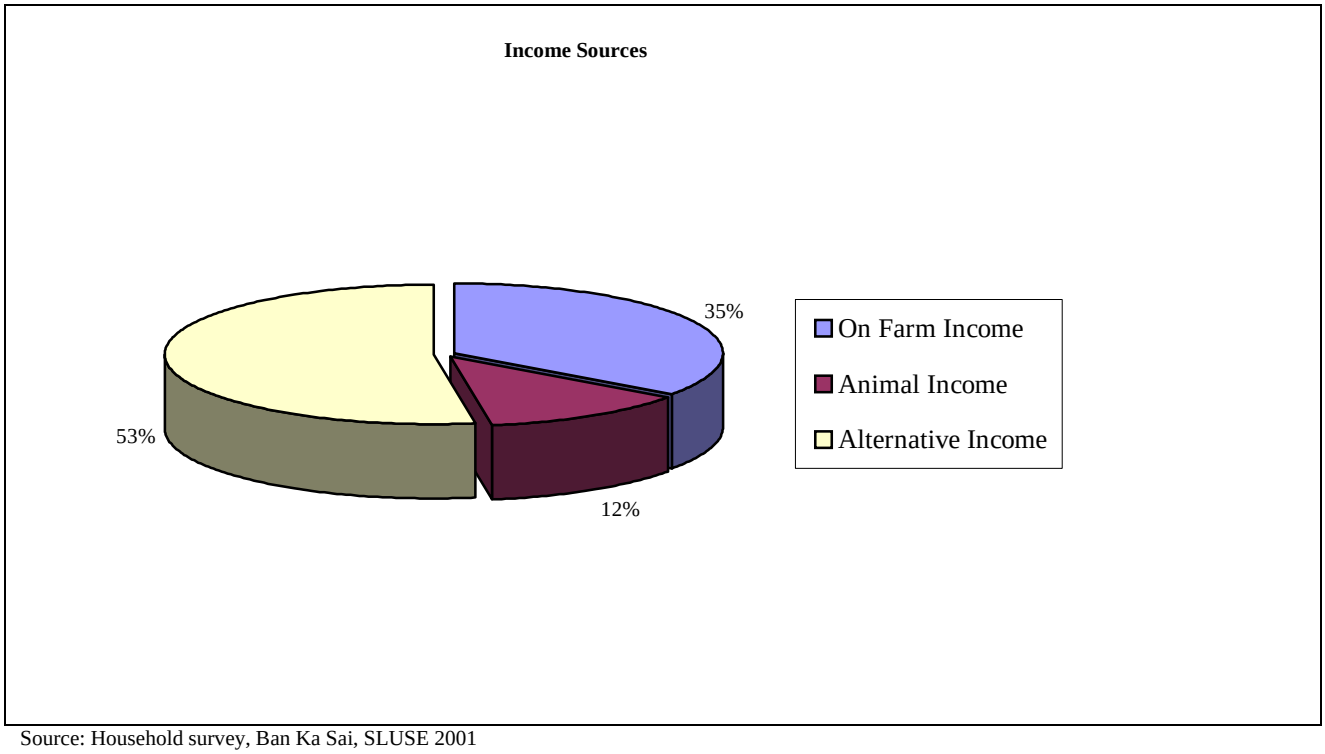
3.3.1 Household economy

All of our general respondents cultivate some land; farming is thus the main enterprise in Ban Ka Sai. According to Community Meeting and the Problem Tree the main problem in Ban Ka Sai is low income (appendix O and R). A substantial part of villagers' income stems from farming activities, however the majority of households are dependent upon alternative income (Figure 1, appendix V). Through our general respondents we discovered that many men are especially involved with construction business, which implies travelling where work is available. In the sample, 40% of the households had family members working in another province. Other activities that are common include farm labourer, plantation work and selling of handicrafts. Working as paid farm labour was a less pronoun activity as most villagers benefit from reciprocal labour commitments.[14] The main handicraft in the village was hat making from bamboo strips, which are one of the main NTFPs collected. Although hat making is a timely activity with little profit (3.000 Baht per year, appendix V) we observed from walks in the village and from interviews, that most households practice this handicraft. This gives us an understanding of the importance of NTFP

[14] Reciprocal labour involve groups of farmers who work on others farms and in return get labour for their own farm.

collection in the village. All of the general respondents are dependent on collecting NTFPs[15] for consumption and 40% use the NTFPs for sale.[16]

Figure 1: Income Sources



Source: Household survey, Ban Ka Sai, SLUSE 2001

3.3.2 Institutions

Access to formal credit institutions play a significant role in the lives of villagers in Ban Ka Sai. The BAAC has a monopoly on the formal loan market; of the households interviewed 92% have a loan, 84% of them have a loan from BAAC, where the loan taker either is a member of an Agricultural co-operative or Agriculture group. The main condition for receiving a loan is the formation of a group as collateral security, 13 of such groups exist in Ban Ka Sai. One of the group members bears the responsibility of administration. The average loan size of the general respondents was 25,000 Baht, the highest loan given was a loan of 70,000 Baht (Table 6.). The proportional size of a loan in comparison to total income is quite large; households take loans that equal 73% of their total income. It is therefore understandable that the problem of debt often was mentioned. It was difficult to establish exact interest rates on the formal and informal market; the

[15] The main NTFPs collected are; bamboo shoots, mushrooms, vegetables and bamboo.

[16] We believe this number should be higher as one of our general respondents answered no to this question while we observed that he was making hats.

answers given where varied, never the less BAAC loans typically had an interest rate of 10-12%. This information coincides with the information gathered from BAAC. Through an interview with one of the heads of a BAAC group, we discovered that BAAC also provide forms of insurance to address the problem of debts. BAAC thus provides the institutional security, which is important for livelihood. In connection to land use the provision of institutional security has facilitated agricultural investment, which has become increasingly important along with growing intensification and sustainable land use. According to the trend line (appendix L) we can see that along with the establishment of BAAC in the late seventies cultivation patterns also changed away from subsistence farming towards cash cropping. This trend continues and farmers are increasingly shifting towards capital-intensive land use such as teak plantations and fruit trees.

Table 6: Loan Size and Income

Economic Indicators

Total income	**Frequency**	**Percent**
< 10,000	3	12,00%
10,001 - 20,000	4	16,00%
20,001 - 30,000	4	16,00%
30,001 - 40,000	5	20,00%
40,001-50,000	2	8,00%
50,001-60,000	2	8,00%
60,001-70,000	2	8,00%
> 70,000	3	12,00%
Total	25	100,00%
Mean		37.372
Minimum		4.800

Loan size	**Frequency**	**Percent**
1 - 10,000	4	17,39%
10,001 - 20,000	6	26,09%
20,001 - 30,000	8	34,78%
30,001 - 40,000	1	4,35%
40,001 - 50,000	1	4,35%
50,001 - 60,000	1	4,35%
60,001 - 70,000	2	8,70%
Total	23	100,00%
Mean		27.239
Minimum		2000
Maximum		70.000

Maximum		104.580	Std		17995
Std		24486			

Source: Household survey, Ban Ka Sai, SLUSE 2001

Other formal institutions that have a significant impact on this are TAO and AEO. They are more recent contributions to Ban Ka Sai, with the main purpose of providing training and support. TAO have had a significant impact on the popularisation of conservation of forest areas more importantly they assist the village with infrastructure and generally all aspects of community development planning. They provide information and advice for villagers about the management of the community forest. The establishment of the TAO has been an important part of governments decentralisation planning.

AEO main functions are to; co-ordinate the linkages and formations of community groups (soybean, maize, women, mulberry, green bean and youth farmer group); provide advice on crop cultivation; help farmers during incidence of pest and disease; and maintain links between university students for research, extension and farmers. The success of AEO's efforts in Ban Ka Sai are varied, many of the general respondents reported that they had received training, however not all agreed that the training was appropriate given their situation. Much of the advice on crop diversification implies investment and many farmers complained that this was a restraint.

Informal institutions and social interactions are very strong in Ban Ka Sai. 96% of the general respondents are members of a group. Gor Kor Kor Chor group is one of the more popular providing small loans to its members and a forum for social interaction, it is described as a group for the poor. Then there are the groups that have been formed in connection to farming activities; pig raising group, soybean group, mulberry group and maize group. The functions of these groups are very similar, consisting of information sharing and more importantly financial support in form of loans. The villagers do not however benefit from groups in terms of increasing their bargaining power. In Ban Ka Sai one of the main problems identified by farmers is low price for produce partly due to middlemen who profit from taking advantage of the farmers. They say they cannot avoid the business/middlemen, as they cannot afford the trucks and machinery that is needed to get their produce on the market. The average price given for 1Kg of maize is 3 Baht, and farmers believe that they could receive up to 1 Baht more for good quality produce.

Generally speaking there is a lot of activity in Ban Ka Sai, the community has institutions and infrastructure that contributes to livelihood, apart from the already mentioned; villagers in Ban Ka Sai have access to electricity and drinking water is supplied from wells, there is one Primary School in Ban Ka Sai and a nursery.

4. Discussion and conclusion

Livelihood strategies in coherence with the changes in land availability due to conservation planning in the sixties are closely linked to agricultural developments/cultivation patterns observed today. Boserup (1965), states that a decrease in land available for cultivation as a cause of population growth leads to changes in land use, cultivation intensity, technology and institutions. Conservation planning schemes developed did not always take local peoples use of the land into consideration, vast areas that previously had been used for cultivation were defined as conservation area. Ban Ka Sai is an example of a village that has had to adapt to these land restrictions; faced with a higher population density on the land that was left as E-zone, a change in cultivation patterns was necessary to uphold and secure livelihood. Farmers have moved away from shifting cultivation and towards intensive cropping practise. In our assessment of the level of intensification we have observed that cultivation patterns include a fallow period from 6 months to 1 year, for the majority it depends on the amount of rainfall received. If the short duration crops are harvested earlier in the season and there is sufficient availability of moisture in the field, a second crop is sown in the harvested field or as mixed crop with other standing crops in the field. Hence, relay cropping is widely practised in the village to optimise the output from the farm. Except with lowland rice, farmers are growing at least 2 to 3 crops simultaneously in the same piece of land. There is a high dependency on chemical fertilisers; the soil quality has deteriorated to a significant level with soil tests indicating low levels of nutrients available for crop growth. This can be associated to a mismanagement of the intensification process. Crop diversification into new economic crops requiring high level of inputs has resulted the farmers to resort to large doses of costly inputs to maintain the yield making farming an expensive enterprise. Intercropping and crop diversification are ways for farmers to generate a secure income, with a variety of crops they spread out risks associated with farming such as crop failures. Those who have not been able to uphold their livelihood through farming have had to supplement their income with other activities, in Ban Ka Sai this is very common and it has become crucial for livelihood security.

Management of the natural resources in Thailand has become crucial due to degradation and deforestation. Community forests are an important aspect of local management of the natural resources. They have an important impact on land use and livelihood; villagers are highly dependent upon natural resources supplied by this common pool. The community forests of Ban Ka Sai were established following C-zone restrictions; there was a need to ensure that villagers still had access to NTFPs, as they constitute a large part of consumption. The sustainable provision of natural resources to all the villagers is enforced through community management; the villagers feel a sense of responsibility towards these forests areas. This is an example of social interaction, which generates positive yields from which all benefit.

Land rights have had an increasing importance along with the intensification process. Without the collateral of their land farmers lack an important part of their livelihood security. Development prospects on land without any title deed are dim; farmers need access to loans and government support, which is not always possible without the minimum of a SPK certificate.

An important factor enabling villagers to uphold livelihood is through the provision of institutional support for investments, necessary infrastructure and land rights. According to the trend line, BAAC reached the village in the late 1970s along with the building of the road straight through Ban Ka Sai. These conditions have had a positive impact on livelihood; access to credit and market along with the establishment of AEO and TAO have had great implications for community development. Ban Ka Sai has electricity, wells, a primary school, a nursery, gas stations and a new temple is being built. Villagers have a large sense of community; there is a high level of social interaction with most villagers being a member of a group and all villagers cooperate in the management of their community forests. Informal institutions also provide financial security, which seems to be incredibly important for their livelihood.

Livelihood strategies have thus had an impact on land use, which has led to intensification. Intensification has been possible through the provision of institutional support, without loans farmers have little investment opportunity. The adverse environmental impacts stemming from the sole use of fertilisers has led to soil deterioration. Soil deterioration has led to lower yields, this along with low market prices and thus low income accruing from farming activities has made farmers dependent upon alternative income sources in order to secure their livelihood. Establishing community forests has contributed to strengthening communal ties and creating environmental awareness while providing villagers with NTFPs. The formation of groups in the village and the support of TAO and AEO provide a foundation for information sharing and spread of knowledge, which leads to positive developments.

All in all livelihood encompasses; land rights, access to institutions and community organisations are important determinants for the use of the land and thereby the security of livelihood and the environment.

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