Characterization of the fishing livelihood in Ban Hadsaikao and the effect of the limitations on the fishermen's livelihood.



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Abstract

Our study was situated in Ban Hadsaikao village, located in the Ranong province on the Andaman sea, Thailand. It focuses on the characteristics of fishing activities and how the main livelihood strategy's limitations affect the livelihoods of fishermen. In the village a high percentage of the householders rely on fishery as main source of income and in most cases the only. The fishing activities are mainly of the artisanal kind, carried out with long tailed boats and using different gears depending on the marine product of interest (e.g. squid *(Sepistenthis sp)., Octupus (Octupus sp.)*). The marine products caught varies between the two main seasons (dry and wet). Furthermore, in the Andaman Coast, also commercial boats coming from other villages fish in the sea, increasing the pressure on the marine resources. Through the implementation of different PRAs, questionnaire, interviews, and observations we found the main limitations which are: decreasing of the marine resources, the high cost to perform fishing activities, sedimentation on the channel, strong winds in the monsoon season, the rising temperature of the sea water and the conflicts between the artisanal and the commercial boats. Due to the limitation the fishermen` livelihood are affected by lower income and high dependency in loans.

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Introduction

History of Ban Hadsaikao

(Main author: Mette)

According to data from the community history made by villagers, people started moving to the area in the beginning of the 1970's. They all engaged in fishing activities using fishing rods as main equipment. At this time the condition for fishing was very good which meant that they could fish in the channel and there were plenty of marine products. Their catch was for self consumption and to exchange for other goods with other nearby villages. The surrounding natural resources were mainly mangrove forest where the villagers cut down trees to use for charcoal.

During the 1980's the number of households grew rapidly in the village. People from other villages also cut trees from the mangrove, which led to a decrease in fertility of the forest and decrease of marine animals. This meant longer time at sea for the fishermen, since they had to go further out to find fish. In 1983 the area around the village was declared part of Laem Son National Park, which led to a law in 1989 against cutting trees in the mangroves. In 1992 the roads were asphalted, which meant better infrastructure and connection to other villagers and access to market.

In 2004 the village was separated from village 3 and named Ban Hadsaikao. December 26th of the same year, the tsunami destroyed 50 houses and many boats, and killed 7 people from the village. The fishermen couldn't fish since they didn't have any boats and relied on aid from the government and organizations for living. The environmental effects were also great since the mangrove was destroyed and carried more sand into the channel, which worsened the sedimentation and made it even harder to access the sea through the channel. In 2008 higher temperatures were noticed which decreased amount of fish in the area.



Diagram 1. Time line of important events in Ban Hadsaikao

Description of the study area

(Main Author: Mayling)

Ban Hadsaikao village is located in the southwest of Thailand, specifically in Ranong Province, downstream of Kamphuan channel which connects the village with Andaman coast (Figure 2). It covers a total area of approximately 28.44 rai (\approx 4, 60 ha) within National Park Laem Son. It limits to the north and east by village Nakha (number 3), and to the south and west by village Ban Nuea (number 2). Mountains, forest and mangrove forest, are part of the geography surrounding 6 different zones which composed the village (Figure 3).

There are 150 households registered, 35 follow Muslim beliefs and the rest of the households practice Buddhism. The total population is around 444 people, 100 are Burmese (75 live legally in





the village). Villagers lack land tenure, however, nowadays some meetings are taking place to request for residential certification to authorities (Information from headman interview).

Fishing activity represents the main livelihood strategy by far throughout the villagers. Few farmers grow cash crops such as pararubber (*Hevea brasiliensis*), and oil palm (*Elaeis guineensis*); others grow subsistence crops such as banana (*Musa sp.*), papaya (*Carica papaya*) and raise goats, and chickens; moreover, 5 middlemen, daily labors and some merchants define the different occupations in Ban Hadsaikao.

Regarding climate, the temperature is warm all year long, annual of 27 °C, around 4320 mm precipitation per year an average of 1, 8 km/h wind speed (during June, July and August wind reaches the fastest speed

in the year) (FAOCLIM2 program). There are two seasons. Dry season, defined by villagers as "very hot", is characterized by intense radiation, migration of fishermen and constant changing of the sea's tide (Figure 4 & 5) it starts in December and finishes in April. Southwest monsoon blowing from Andaman coast brings rain and with it, the fishermen who had left the previous season. Wet season goes from May to November.



Figure 4. View of low tide from a port in Ban Hadsaikao. Picture by M. Flores



Figure 5. View of high tide from a port in Ban Hadsaikao. Picture by M. Flores

Background

(Main Author: Simone)

According to literature, fishing activities in Thailand have a key role in the country's economy and fishery is one of the most important sectors of export. With a total production of 2.122.854 tons and a total export of 1.617.647 in 2006, the export value in the same year was of 5.172.093 (USD 000) (URL 4) .Fishery contributes with a wide range of benefits to the population, for example as a direct source of food and income which can be used on education and services for the community.

Looking at the province of Ranong, our area of the field study, the fishermen population can be divided in 2 main categories, the small scale artisanal fishermen and the medium-large scale commercial fishermen. The first category include from the 70% to the 80 % of the total fishermen population. Even though they include the majority of the population they cover less than 10 % of the total catch by value and 5–6 % by volume. The large differences between high number of artisanal fishermen and their relative importance in the total production and value of fishery products is related with the technological gap in the equipments and the facilities compared with the commercial boats. (Costal fishing FAO, the 1995 marine fishery census).

Fishing activities are often complex, dynamic and adaptive. Fishing can be done in full-time or as part of a mixed livelihood or as a seasonal activity. In the province about 70 % of the small scale fishermen are engaged full time in the activities, the 13% is mainly engaged and the 11% is only a part-time fisherman (Costal fishing FAO, the 1995 marine fishery census).

Fishing based livelihoods are depending on several factors that could be the cause of vulnerability.

The fishing activities may be negatively influenced by external impacts, shocks and trends like natural resources degradation, the hostile environment of the sea, and climatic and marine resources seasonality.

Small fishing communities often lack access to basic services like education, health care and formal credit services. This situation is even worse for migratory fishers, who are temporary or new residents in an area. The Ranong province is adjacent to Myanmar, therefore commercial fishery employ a large number of

Burmese labors. A part of the population in the province is Burmese, and without their labor, the fishery sector could not be sustained (Costal fishing FAO).

From pre-study (URL1) in the area of field work there are several external impacts and trends that affect the fishing based livelihood.

The seasonality of fishing activities is characterized by a dry and wet season as effect of local climatic conditions. Another external impact that affects the area of the Kamphuan channel is the sedimentation of the channel by the sand from the sea that in particular during the dry season make the channel water depth so shallow that the fishermen can't reach the sea with the low tide and carry out their activities.

In the area, the livelihood-strategies in agriculture are limited because of the constitution in 1988 of the Laem Son National park that under national laws prohibit new exploitation of the area for agricultural uses. The only agricultural activities allowed in the park are the one carried out in the areas occupied by farmers before the foundation of the national park.

Justification

(Main Author: Alicia)

As our own knowledge allowed us to analyze the information of the study area, the first feelings and considerations about Ban Hadsaikao before setting foot on Thailand were focused on the study of the fishermen's perception of the limitations on fishing and therefore, the effects that this activity has on the villager's livelihood, always taking in consideration the socio-economic effects on the households and the



students made our mind change, explaining us the impossibility of studying our previous third research question related with the land use potentialities because of the lack of land or the impossibility of access to land (the information was corroborated by the Our village is inside of Park, and the few areas for agriculture the village already have are their lives depend of the grace of the sea, and perhaps bad luck.

support received (see Apendix 7: Synopsis).

From many sources we heard the fact that fishery is the main activity. Considering this, the challenge that we suggested ourselves was to study the land use potentialities and the fishermen's willingness for this activity. However, once we were in Thailand the reality forced out feet back to the ground, and some changes were done in order to agree with our Thai counterparts (Diagram 2).

Therefore, the study is focusing on how it is to be a fisherman in Ban Hadsaikao and the characterization of the fishing activities, and finally, the impact that the limitations has on the fishermen livelihood that lead them to bear the challenge of their survival.

First, we wanted to use the whole sustainable livelihood framework in our study but due to unavailability of enough time and the complexity of the framework, the vulnerability context as a framework was decided to be our guide to discuss the limitations on the fishing livelihood strategy of the villagers of Ban Hadsaikao (URL 2). Due to the mainly unique and uncontrollable source of income that support their livelihood, the fishery, and the factors that affect them limiting even more their survival due to the non diversified livelihood strategy, the context seem for us vulnerable.

Research questions

(Main Author: all)

What are the characteristics of fishing activities in Ban Hadsaikao?

What are the main limitations in fishing activities?

How do the limitations in fishing activities affect the livelihoods of villagers in Ban Hadsaikao?

Key Definitions

(Main Author: Mayling)

"A **household** is a group of people who eat from a common pot, and share a common stake in perpetuating and improving their socio-economic status from one generation to the next."(URL6)

"A **livelihood** comprises the capabilities, assets (including both material and social resources) and activities required for a means of living."(URL6).

Livelihood strategies are the activities that householders practice to ensure social and economic security (Messer and Townsley, 2003).

Fishermen are any men or women who practice fishing activities as the main source of income or identify themselves as a one.

Artisanal fishermen are those who carry out fishing activities on long tailed boats, and do not last more than one day one the sea harvesting marine products.

Commercial fishermen characterized by the combination or the presence of the use of modern technologies, use of bigger boats than artisanal modality, and spend from 3 to 7 days on the sea to catch marine products.

Livelihood assets are components of the livelihood framework. They are defined by 5 different capitals. Human: skills, knowledge and health that allow the person develop livelihood strategies. Social: networks, memberships, and relationships between people to aim common livelihood goals. Natural: represented by natural resources` flow and service that can be exploited to make a living. Physical: encompasses tools, equipment and infrastructure that allow livelihoods strategies to develop (e.g. roads, electrical systems). Financial: financial components that support consumption and production of people (e.g. savings, loans, income) (Diagram 3) (DFID, 1999).

Limitations on fishing activities are conditions that hinder fishing activities to develop in an optimal scenario from the fishermen's point of view. To analyze the different limitation on fishing activities we used the vulnerability context.

Vulnerability context encompasses external conditions such as trends, shocks and seasonality that influence the people's livelihood. Trends on people's migration; shocks such as natural disasters and weather and production seasonality are some examples that describe the vulnerability context (DFID, 1999).

As was explained in the justification, after some brilliant failed ideas, the guidance to analyze and discuss the data obtained related to limitations on the fishermen livelihood followed this context –which is a part of the sustainable livelihoods framework (Diagram 3).



Diagram 3. Sustainable livelihoods framework.

Modified from IDIF, 1999 (URL2) by A. Merino.

"The livelihoods framework is a tool to improve our understanding of livelihoods, particularly the livelihoods of the poor. It was developed over a period of several months by the Sustainable Rural Livelihoods Advisory Committee, building on earlier work by the Institute of Development Studies (amongst others).[...] The framework is centred on people. It does not work in a linear manner and does not try to present a model of reality. Its aim is to help stakeholders with different perspectives to engage in structured and coherent debate about the many factors that affect livelihoods, their relative importance and the way in which they interact."

Methodology

We decided to apply 4 Participatory Rural Appraisal (PRA) on the same day, through two simultaneous sessions conducted by different groups - 2 students from Copenhagen University, 2 from Kasetsart University and 2 interpreters per group. The division of PRA was based on the kind of information to obtain from them. To have general information and time line of the village, community history and Venn diagram were conducted together, and to obtain technical information related to fishery and income, seasonal calendar and fishing activities mapping were applied together by other group.

Following certain requirements established beforehand by us (mixed group in terms of age), Ganda set up a meeting with villagers to apply the PRAs.

Seasonal calendar

(Main author: Mette)

We chose to do a seasonal calendar to get an overview of how the income, expenditure, different weather seasons, limitations, marine products caught and migration patterns were distributed throughout the year.



information we

6 fishermen (1 female, 5 male) participated in this activity, and mostly they all took an active part in filling out the calendar which worked out great.

We had planned to spend 1 hour in each PRA, but this took a little longer since the calendar contained a lot of information to be filled out. The challenge with this method was that the

wanted very was complex,

e.g. we asked about all the expenditure sources, which might have been better to ask in an interview and also it was hard for our participants to calculate the average of income and expenditure per month for the villagers.

Mapping

(Main author: Mette)

To get information about which places the fishermen go out to fish, and what they catch each place, we did a participatory mapping of the coastline near the mouth of Kamphuan Channel. The fishermen then marked each area where different marine products are found and caught, and colored these areas with different colors to distinguish which kind of product (see Figure 7). This map doesn't contain all species, but only the most frequently caught marine products.



Figure 7. Map of area of marine products. Picture by C. Likkhachai. Note:For a color version see appendix 8

Community History

(Main author: Mayling)

Relevant events in the past of Ban Hadsaikao were essential for us to understand what had caused current limitations affecting directly or indirectly the fishermen livelihood strategy.

Five people were the number of villagers that we were expecting; however 6 arrived, showing their interest to participate.

Date, description of the event and impact on villagers were the variables on big white sheets. We were also interested in defining livelihood strategies throughout the years, adaptation and development of them.

Having a complete picture of the dynamic of Ban Hadsaikao in the past and present, factors that had influenced fishermen could be identified.

While the community history evolved all the notes were written down in a big sheet placed in from of the villagers, so for them was easy to add comments and corrects misunderstandings.

The interpreter could translate for us the general ideas during the community history, so in all moment we kept following the sequence of the PRA, and we were able to ask to get deeper information when considered superficial but relevant for the research.

In certain moments were difficult to keep the six people that participated in the PRAs on the desired path, probably because of combination the size of group and our inexperience. However, we managed to grasp relevant first-hand data from the information surged from the knowledge, memories and point of view of villagers.

Venn diagram

(Main Author: Mayling)

Venn diagram was used to collect information related to the identification and level of interaction of institutions, organizations, group of people with villagers. The main focus was to understand how these relationships influenced the fishermen's livelihood within the village context. From the information gathered we studied kind of support to fishermen to cope the limitations on fishing activities.

Four different circle sizes represent level of importance on interactions that institutions/organization/group of people have with villagers (being the biggest the most important), the distance of the circles from the middle of the sheet determine how easy or difficult is to get support from that institutions (Figure 8). Finally the red lines define positive impacts whereas black lines represent negatives impacts, under each line the villagers wrote down what they received and what the give back to the institution, organization or group of people.



Figure 8. Villagers participating in the Venn Diagram. Picture ByT. Nindam.

Many of the organization were related to the fishermen, but

not was affecting the fishing activities, thus some information gathered wasn't that interest to present or discuss in the project. When the villagers list the different institutions we should have doubled check that all of them were connected to fishing activities.

Focus group

(Main Author: Simone)

In the research of the data with the Burmese migrants the decision was to have a different approach. Mainly due to language constraints (from informal interview only 10 Burmese workers could speak Thai in the village) and also because our relative Thai group didn't want apply the questionnaire to them. As arrangement we decided to use this important tool as the focus group is to discover the differences the between Burmese fishermen and the local Thai. For the sampling we tried to find all the Burmese migrants that are Thai speakers. With the



Figure 9. Focus group meeting with Burmese workers. Picture by Nindam.

help of Ganda Sumplao-ngern, the headman assistant, we arranged a meeting in a private house garden. At the meeting there were six Burmese, all of them work in the village. Only two of them could speak Thai fluently, however they translated the questions and the answers to the other interviewees. The age of the Burmese workers was from 25 to 50, but almost all of them were 25-30 years old.

The interview was conducted by a Thai student and two Danish students assisted by one interpreter.

Ranking

(Main Author: Simone)

This PRA method was used to look at the fishermen's perception of the relevance that the limitations in the fishing activities have to the livelihoods of Ban Hadsaikao fishermen. From the pre-analysis of the questionnaire were selected the limitations mentioned by the fishermen and it was asked to ranking them in relation to the effect on the income, on the household and how difficult is the solution. The sampling was randomly.

Observations

(Main Author: Alicia)

Guided marine products catch observation

Around 7 am, the dawn was breaking while the artisanal boat of the research station was leaving from Ban Nuea. Sitting in this boat, 7 still sleepy but anxious students, 4 Danish and 3 Thai students, departed towards the sea that glided them to the patient fishermen's boats waiting for the arrival of the grace of marine resources. Contrasting with the traditional touch of the boat, the GPS was following our trail, losing sometimes the satellites in the tracking but always present in the different improvised meetings with the fishermen, being in total 5, who gently invited us to pass to their boats to obtain our data. (See Table 1 and Figure 10).

The method was chosen to triangulate the information about marine species caught in the area from the seasonal calendar, mapping and marine products catch assessment, while our minds realized what is to be a fishermen in this area.

Data	GPS tracks	GPS points	Different kind of marine species caught
Fish (kind, amount, price, benefit), fuel (liters and price), time of departure from the pier, among others.	11	5	12 fishes and 3 other marine products

Table 1: Data collected in the fishermen's boats.



Figure 10. Guided marine products catch observation. Picture by A. Merino. Our boat was also artisanal, in this way we were in the same role as the fishermen, that don't hesitate on collaborate with us.

Fishermen journey observation

Demonstrating that second parts also can be as good as the first parts, our second observation was focused on the squid catch due to the fact that all fishermen in the village catch this, it is the high season for this marine animal and just because we had the chance to do it. Conducted by the husband of Ganda Sumplao-Ngern (assistant of the headman) called Saneh, and his nephew, 2 Danish and 1 Thai student helped by a interpreter departure from the pier just below Ganda's house.

While we were working in the different areas (see Table 2 and Figure 11) Saneh was telling us how he survived to the Tsunami and about how the commercial boats destroy his equipment. On this journey we experienced how their feeling is after a journey when the sea is scarce in squid.

This method was chosen mainly to assess the real techniques and difficulties of everyday in the fishing livelihood.

Area	Place	GPS points (number of squid traps)
1	Near Lan Island	10
2	Near Lan Island	20

Table 2. Different studied areas.

The data collected was obtained in two of the three areas where the traps where situated due to the strong wind and therefore threatening waves. However the time spend at sea was enough to realize that destroyment of the equipment is a problem of the day to day. We found some traps lost in the sea (some from Saneh and other from another fishermen) due to the of commercial boats (not accidentally) or accidental entanglement with other artisanal boat's equipment.



Interviews

(Main Author: Simone)

The first interview with the headman was conducted by all the Thai and Danish group members assisted by the interpreters and we collected the basic data of the village and a short introduction of the village history. From this data were set up the final priorities and the approach to the research.

After the collection of 30 questionnaires to focus in the specific data were carried out three semistructured interviews with fishermen, selecting them by different level of income, type of fishing activity and years of experience of fishing. Besides we also did a interview with a middleman. These interviews were conducted by different sub-groups composed by Thai and Danish students assisted by one interpreter directly in the interviewee's house.

During the time spent in the observations in the village of Ban Hadsaikao, we had the opportunity to carry out 7 informal interviews with other fishermen, another middleman and a coordinator of a project of health care in the village. This kind of information were necessary to confront and triangulate the data acquired to improve their reliability.

Questionnaire

(Main Author: Mette)

To get an overview of the fishing activities and perception of limitations among the fishermen, we conducted a questionnaire survey with 30 fishermen. We chose this method since it's a relative fast way to get quantitative data.

The advantages of this method was that while walking around the village we got to know it better, came to the private houses of the fishermen and could sometimes combine the questionnaire survey with seeing equipment and taking photos. This method also had its difficulties since it for us became a time consuming activity that we didn't expect. We ran into different obstacles such as getting different information about how many fishermen lived in the village, using list of household that wasn't updated, and in the end having a hard time finding enough informants since many fishermen were working in another province in this season. We spent some time discussing and changing our sampling, e.g. first we had planned to do it by visual assessment with different house sizes (which should represent different income levels), then we changed it

to a systematic random sample from a list of households, then to a stratified random sample where we each took a zone from the village and in the end we combined this last with snowballing (see Figure 11).



Figure 11. Diagram of the changes of amount and sample for questionnaire. To the left in orange boxes are the causes for changing, in the middle amount and target group for questionnaire and to the right sampling strategy.

Marine product catch assessment

(Main Author: Mayling)

Kind of marine products fished, gear used, time on the sea, and amount fished were four parameters that we considered essential when characterizing fishing activities. To achieve these, we went to the piers and waited for fishermen to arrive from the sea and make a direct observation of what they had fished.



Figure 12. Fisherman returning from his journey on the sea. Picture by T. Nindam

GPS

(Main Author: Alicia)

The GPS was used to show some points in our study, as the main piers where the marine catch assessment were done and also the participatory catch assessment were carried out using the GPS.

At finally, this information about the methods can be establish in the real map of the village.

Marine products catch observations

As is already explained, two observation trips were done in the field work, guided marine products catch observation and fishermen journey observation.

The GPS accompanied us plotting relevant single points and tracking discontinuously (because of the continuously lost of the satellites reception in the tracking) (see Table 1 & 2 and Figure 13). We repeated this for a total of 5 days; usually we divided in couples plus one interpreter if needed and went to different piers. At the end we carried out 12 different marine product observations .The information was filled in a table including the different parameters of our interest described above and comments from fishermen. We complemented the assessment by asking if the marine products were for autoconsumption or to sell, if so, to whom.

Through the marine observation, we had the opportunity to get familiarized with different gears and use, name of fishes and techniques (Figure 12).



This method will triangulate the information of the mapping relating to the areas where the different marine species are caught and will be used to capture in maps the relevant points of our study.

Results and Discussions

Fishing Activities in Ban Hadsaikao

(Main author: Mayling, Co: Simone, Other authors: Mette and Alicia)

Fishing activity represents by far the most important livelihood strategy in Ban Hadsaikao, every villager is related to fishery, the headman mentioned. Indeed, for a high percentage of the fishermen (around 60%) is the only source of income. It is important to mention that, the percentage can be even more dramatic if we

Box 1. Artisanal fishery, a work for two.

Usually two persons per long tailed boat (artisanal fishing) work together on the sea. When boats are owned by a fisherman, the companion can be a member of the family (save expenditure in paid labor) or a hired fisherman (Burmese fisherman, cheap wages); whereas both fishermen are hired it is because the boats are owned by middlemen, retired fishermen or other. Regarding the number of fishermen on commercial fishing, can be up to 9 per boat. had included in the questionnaire Burmese fishermen, but due to the design of the questionnaire didn't take in consideration the different conditions (from Thai fishermen) in which Burmese have to exist and also as a consequence that only 10 of them speak Thai, we decided to do a focus group with the Burmese instead. However, we also could have applied a "special" questionnaire, adapting the original one to the 10 Burmese able to speak the language. Nevertheless, this is a small sample when looking for statistical inference.

For the fishermen in Ban Hadsaikao the journey starts early, tramps and nets are loaded on the boat while the sun rises. Around 6:30 am, the snore of the

engines shakes the dark blue Kamphuan channel from the different piers in Ban Hadsaikao. This scenario is

repeated by fishermen during almost every day during the dry season and around 5-10 days in wet season (Data gathered from the questionnaires).

Once the boats passed through Kamphuan channel, and had reached the sea, fishermen holding the constantly vibrating steering stick head the boat to the area where the desired marine product can be found (Figure 14 & Table 3). Marine products to fish, determine kind of gear used and technique



Box 2. Burmese fishermen.

Even though Burmese are working in the village as fishermen they have some restrictions that deprive them to develop their livelihood as Thai fishermen could (e.g. they cannot own a boat nor run they own business).

applied. Fishermen adapt themselves to the season, depending of it; they caught different marine products (Table 3). What they aim to fish also depends on the middlemen's market contacts, given that none of fishermen can reach the market directly (lack of financial and physical capital).

Normally, more than 2 hours are required to place from 45 to 60 tramps- positioned in row- in three different places, at 14 meters deep (Figure 14). As a bait, squid's eggs (*Sepistenthis sp.*) hang inside the tramp, on the top palm leaves are tied, so the tramp look like a house for the squid, a fisherman affirmed. Around 6 mollusks can be fished per tramp in average, but in dry season from 5 to 20 kg per day are the amount fished. Using a machine(Figure 16) the tramps are pulled up, fishermen spend 3 hours to take out 60 tramps. With the squids on the boat, and the tramps placed again in the sea for the next day, fishermen are ready to go back to the pier as long as the tide allows then to reach the coast (From fisherman journey observation, questionnaire, and marine products catch observation).

MARINE												
PRODUCTS	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1. Swimming crab												
Portunus Pelagicus												
2. Three spotted												
swimming crab												
Portunus												
sanguinolensis												
3. Red crab												
Tolomito spinimono												
4. Silver sillago												
Sillago sihama												
5. Banana shrimp												
Panaeus												
merguiensis												
6. Splendid squid												
Loligo sp.												
7. Soft cattle fish												
Sepistenthis sp.												
8. Mackerel												
Rastrelliger												
brachysoma												
9. Octopus												
Octopus sp.												
Table 3. Seasonal Calendar with kind of marine products caught depending on the month. Source: Ban Hadsaikao												
villagers by A.Merino.												



Figure 14. Areas where marine products are caught in the Andaman Coast, information gathered from Participatory Community Mapping, Guided marine catch obs., and Fishermen journey obs. Colors represent different marine products: Brown Shrimp, Red *Crabs*, Pink Squid, Green Octupus, Blue Silver Sillago, Yellow Mackerel. Drawn by M. Flores

Note: For color version see appendix 9



Figure 15. Cuttle fish, Soft cattle fish (*Sepistenthis sp.*), Tramp to catch squids. Pictures by T.Nindam and M. Flores



Figure 16. A fisherman pulling up the net for fishing crab, next to him there is the machine to pull the nets and tramps up. Picture by A. Nindam

The story changes when talking about octopus *(Octupus sp.).* On our guided marine catch observation, we had the opportunity to see this technique. A long rope full Noble Volute's shells *(Cymbiola nobilis)* (Figure 17) is place in the sea the morning before. The fishermen return to the point where the rope was set, 24 hours ago. Using gloves, the gear is pulled up manually to the boat. After a couple of minute the octopus goes out the shell (Figure 17) -dragging the head while trying to get...nowhere- fishermen stored them in a bucket, around 4kg was the amount harvested (this was non-profit day for the fishermen)-. The gear has 500 shells, which means that potentially 500 octopus can be fished when the best months to catch them



Figure 17. Shall to catch Octopus. Picture by Alicia Merino, T. Nidam. Modified by M.Flores.

arrive, in January and February (20-30 Kg).

To catch shrimp (*Parapenaeopsis sp.*), crabs (*Portunus sp.*) (*Figure 18*) average 6 kg/day, and fishes such as silver sillago (*Sillago sihama*) 20 kg/day and mackerel (*Rastrelliger brachysoma*) 50 kg/day - average from questionnaires' data-, the fishermen place the nets on the same day, however the techniques varies depending of the marine product to fish. The gears also varies, a triple layer net , are used to catch shrimp (Figure 17) whereas to catch crabs and different fishes the main difference between the nets are the size of the hole.

In both, dry and wet season the pattern of consumption of marine products are similar. Around 50 % of fishermen consumed less than a half and 35% don't consume at all marine products, thus most of the catch is sold.

From the marine products catchment assessment, we observed that once the journey is over, and the fishermen are back to the pier, the catch is downloaded from the boat. They head to the middleman with

whom they have commercial relationship. After the marine products are weighted and preserved by them, they received the payment of the day.



Figure 18. Fisherwoman taking out a crab from the net . From the top to the bottom Charybdis feriata (*Crucifix crab*), Swimming crab (*Portunus pelagicus*), Red crab (*Thalamita spinimana*). Picture by A. Merino and M. Flores

Commercial fishermen, have a different routine from the artisanal describe above. Depending on the fishermen' "fortune", the duration of the days on the sea can vary from 3 to 7. Sonar, GPS systems, and trawl nets are some of the technologies and use by commercial fishermen. Thus, the combination of days and technologies allow them to fish higher amount of marine products than artisanal modality. About 15 ton per day of anchovies, and 1250 kg per day of splendid squid (Loligo sp.) within other are



fished. Particularly this last one, is caught at night. Green, yellow and red lights that seem like boat's decoration to cheer up the long journey (figure 19), actually have an important role in the fishing activity, splendid squid is attracted to the net by the lights at night, thus they get trapped (From interview, questionnaire, and guided marine catch observation).

A constant competition for the marine products is daily present on the Andaman Coast. As an open natural resource, fishermen from other villages fish in the same area. From our guided marine products catch observation we witnessed this situation.



Figure 20. Color Cloths as gratitude gesture to the spirit of the boat. Picture by A. Nindam

Related to the amount of fish caught. The number of samples per marine product related to kg/day in some cases were small, due to the variation between the fishermen (to whom we applied the questionnaires) of the marine product harvested. Perhaps, we could have done a pre-survey a divide the fishermen per marine product of interest and obtain more samples and detail information for marine product. However, we complement the information from the questionnaires with the marine observation and the participatory fishing realized. Another alternative could be, to focus on the livelihood strategy of 2 -4 different fishermen selected by kind of marine products fished by them, and make a case study. In that way more detail information could have been gathered.

At the end, independently of the marine product of interest, gear or technique every fishermen hope to participate on the spirit of the boat's ceremony and have the opportunity to tie several cloths of different color to the boats as a gesture of

gratitude for all the good fishing days during the season (Figure 20)

Fishing as livelihood strategy

(Main Author: Mette, Co: Alicia, Other authors: Simone and Mayling)

In this chapter we will make a short presentation of livelihood strategies and assets. In this section it is important to look at which assets the fishermen have access to and the possibility for them to combine assets.

Human capital

From the questionnaire we see that while only 2 out of 30 of the fishermen have high school as the highest educational level, most of the fishermen have been fishing all their lives and therefore have great experience and local knowledge they can draw on (see Figure 21). 60% of the fishermen are older than 50 years which influence their work capability and strength. Regarding health in general among the population many suffer from work related aches, such as back pain due to a long life at sea with hard physical activities, and after the tsunami many got stress or depressed caused by difficult living circumstances with no boats and psychological trauma to experience this natural disaster.



Social capital

Trust, support and exchange are important key words when talking about social capital. They help each other economically in difficult times, but they don't have much corporation at community level. Unfortunately there is no association for fishermen. It existed once to keep control of marine resource management, but didn't work out and is no longer functioning. At the same time after the tsunami there have been some conflicts about corruption, which might weaken the unity of the community as shown in other studies (Ajjimangkkul & Srisomwong 2004:33). As a local fisherman told us: *"The ex-headman received around 1.000.000 baht although his house was not destroyed. The ex-headman distributed 40% to the villagers of what he received"*.

Physical capital

Regarding physical capital the middlemen play a vital role. First of all the main pier, which is the only accessible one in low tide, is owned by one middleman where the fishermen have to pay, if they don't sell fish to her. The middlemen are also the connection to the market, since the fishermen can't afford the high cost of transportation, so the middlemen can decide the price of the fish. The high cost of equipment also affects the fishermen's possibility to create a good livelihood for themselves.

Natural capital

The Laem Son national park is influencing the fishermen's access to one natural capital, since it's is a protected area where they can't cut the mangroves or do any agriculture. From different informants we heard that the condition of the soil around Ban Hadsaikao isn't good for growing any crops.

Financial capital

As mentioned earlier in the section about fishing activities their income is very unstable, which makes their

livelihood insecure. It was for the fishermen hard to determine exactly their income. The reasons are that first of all it varies a lot from season to season, even day by day so it is difficult to make an overview. Secondly it might be a sensible subject for the fishermen, since they don't make a lot of money so they might won't tell us the correct amount. Apart from cash inflow from occupation financial capital can also be in form of remittances which 3 households receive.

In general from observations, informal talks and interviews we know that many people have a hard time getting enough for their daily expenses and from the survey we see, that 23 out of 30 have a loan from the middleman, bank or village fund.



Livelihood strategies and outcome



Box 3: Livelihood strategies from fishermen. What to do??

He has no other career choices apart from fishing. He doesn't know what to do because the soil here is not good for agriculture and he has no capital to do other jobs. If he had enough money, he would be a merchant since he thinks that being a merchant can give him more money. (Information taken from interview with artisanal fisherman)

As a coping strategy due to decrease in marine animals he catches fish that the others don't want to catch, since the price is only 5-6 baht/kg. He used to fix damaged boats and would like to do the same, but the high cost of equipment to do it is too expensive so now he only carries out fishing. (Information taken from interview with artisanal fisherman)

After mentioning the different livelihood assets we want to make a description of the different livelihood strategies by fishermen in Ban Hadsaikao. Out of the 30 fishermen we did the questionnaire survey with, we only found 3 other types of occupation (see figure 23). They have tried making Thai desserts and handicraft with help from the government, but the fishermen quickly gave up since they weren't good at it and couldn't sell the products.

The two examples in box 3 sum up the general picture of life for the fishermen. They only have their experience and knowledge about fishing (human capital) to draw on and limited access to other livelihood assets, which make them very dependent on one livelihood strategy and very vulnerable, when this way of living is threatened. The access to livelihood assets and the livelihood outcome for the Burmese is another story. Local rules deny them to own boats, start a company or fish other places than in Ranong province. They earn 25% while the Thai get 75% since they are only seen as labors, which give them a smaller financial base, and they are not allowed to borrow money from the bank, which makes them even more dependent on the middleman. Their access to health facilities are controlled by the Thai which means they often don't get the same treatment. Their social network is limited by rules saying they have to be indoor after 9 pm, and there not much corporation between the two groups. This makes them the poorest and most vulnerable part of the population.

Limitations

Introduction to limitations

(Main author: Alicia. Co author: Mayling. Other authors: Mette and Simone)

Our own effort and study during the field project provided us a common list of limitations that reflect the key points of their vulnerability context. Beginning with the **Seasonal Calendar** where just the sedimentation, the transparency of the water and the big waves were mentioned by the fishermen (see Table 5) going through the **questionnaires** where more limitations where included by our ourselves based on relevant information from headman interview and informal talks for be order by level of impact, there after looking at the **interviews** where the fishermen comment with depth detail those limitations and ending with the **ranking** (see Table4) to finally sum up and order all of them depending on the level of impact and importance under the fishermen point of view to triangulate information.

LIMITATION	1	2	3	4	5	6	7	8	Sum Score	Final Score
Decrease in marine resources	18	13	5	12	16	4	3	4	75	2
High fishing cost	6	12	10	11	6	5	14	9	73	1
Monsoon	10	20	16	8	14	14	6	16	104	6
Hot water (dry season)	18	15	15	19	20	21	11	15	134	7
Sedimentation /shallow depth	18	11	13	3	6	13	15	5	84	3
Decrease price of marine products	7	10	18	12	10	17	14	16	104	5
Commercial boats	7	3	7	19	12	10	21	17	96	4

Table 4. Ranking table



Table 5. Limitations from Seasonal Calendar. Circles show level of impact: from 5 (highest impact) to 1 (lowest impact). The fishermen draw about sedimentation.

Vulnerability context framework

(Main author: Alicia.. Co author: Mayling.. Other authors: Simone and Mette)

Our framework to analyze the limitations is focused on the vulnerability context. It is composed by the Trends, Seasonality and Shocks (see Diagram 3).

All of the factors included in the framework as limitation where mentioned by all the informants, excepting the Tsunami. From the informal talk with the Health Care organizations, we were told that the people tend to forget some chapters of their lives when they are exposed to a shock. Based on that, Ban Hadsaikao villagers only depend on fishing as their livelihood strategy, which means that, every day, they have to push their boats with their tired bodies, without knowing the future holds; is pure survival as the mind is capable of covering some black holes and let them go by destiny to the sometimes furious sea.

Taking into account this relevant factor, the Tsunami is included in the framework. In this framework the different limitations are explained based on the cause (which is above of the limitation) & effect (below of the limitations) diagrams.



TRENDS

Decrease in marine resources

(Main author: Simone. Co author: Mette. Other authors: Mayling and Alicia)

From the PRA ranking for the fishermen perceptions on limitations, this seems to be one of the main factors of vulnerability that affect their livelihood (see Table 3). Looking at the national level, the natural



marine resources are declining since the beginning of 1980s. In fact, nowadays the catch rates are only 7% of the 1960s level (URL 5). From the end of the 1970s the fishing catches have exceeded the sustainable level. In particular the overexploitation of marine resources is higher in the Andaman coast sea than in the gulf of Thailand (URL 5). In the study area several causes contribute to the decline of fishery resources. The main reasons of the decrease in marine resources seems to be the high number of artisanal fishing boats, and presence in the area the of commercial boats ,mainly from the province of Ranong. The origin of the

high number of artisanal fishermen in the area is due to the high number of boats that were given as aid after the tsunami. In particular the" ARC foundation" gave for free, new long tailed boats to all the villagers that requested it, and the total number of artisanal boats in the village shifted from 37 before the tsunami to almost 100 two years after the tsunami (information gotten from Venn diagram and interviews).

The commercial boats contribute to the reduction of the marine resources by their use of destructive gear, such as trawls and they operate illegally within the 3 miles coastal zone reserved for artisanal fishermen. The higher pressure that all this factors put to the environment, the natural resources don't have the time to regenerate adequately.

The effects on the fishermen's livelihood of Ban Hadsaikao are several, both economical and social. The main economical effects are direct and indirect. For instance, less quantity of fish caught per day has a direct impact on income, and indirectly, their debts go up. Another relevant effect is the fact that the fishermen have to move to other fishing area further away from the coast resulting in increasing expenditure for oil. A social affect is more time away from home and increasing stress conditions.

Sedimentation

(Main author: Alicia. Co author: Mayling .Other authors: Mette and Simone).

The first contact with the sedimentation limiting factor was during the Seasonal Calendar, obtaining that has the highest impact during the wet season (see Table 5). After, this limitation appear in many methods helping us to understand the situation (see Diagram 6).

The sedimentation is due a seasonal factor, the monsoon, this strong wind is the reason of the

intimidating waves that carry the sand from the sea to the cost increasing the layer of sediments in the canal and therefore decreasing the canal depth. Twice was tried to solve this problem carrying out the excavation of these sediments and depositing them in the mangrove (polluting the mangrove), but that

choice was not as good as could be though because those sediments via erosion returned to the canal doing the situation worse. Also the Tsunami destroys the mangrove and the erosion was increased and the amount of sediments dragged to the canal, decreasing even more the depth of the canal. Thereafter, the access to the canal depend on the high tide, limiting the kind and amount of fish species caught by the time at what the fishermen can go out to fish (every day half an hour later) that doesn't have to coincide with the time when the fish is available. In the case of not coincidence, the equipment has to be put during the evening to take it out the



morning after or another areas or species have to be chosen by the fishermen, with the economic consequences that this cause (different species prices, different equipment, etc). On the other hand, sometimes the tide is not enough to carry out the fishing activities (causing gap of income) so one solution is to place the boats as far as the sedimentation is lower, however, when this place is the private port of one of the middleman, some money is required to allow these fishermen to tie the boat (causing less profit) or look for other suitable area.

As we can see, the effect is social (they have to vary their fishing schedule, fish catch, place to fish) and economic (gap of income, decrease of profit, etc).

High cost

(Main author: Simone. Co author: Mette. Other authors: Mayling and Alicia)

From the PRA ranking data this is the most important limitation factor that affects the fishermen's livelihood. One of the major causes of the high cost of fishing activities seems to be the rising price of oil associated with the increase in the quantity needed of oil, as showed in the decrease of marine resources limitation. Another important cause is the price of the equipment that often is needed to be bought or to be repaired (sometimes by their selves).

The main economical effects are the fact that there is a direct increase of the expenditure due to the



increase of oil needed and therefore a decrease of the profit so the livelihood is more exposed to debits. The main social effects are related to the work division inside the livelihood. With the rising costs of the oil and the equipments the fishermen can't pay the extra labor force that they need. As consequence, some members of the household must shift occupation to help carrying out the fishing activities, for instance, the wife shifts her occupation from housewife to help her husband in fishing or the children stop attending school to help the father or some relatives in fishing as was mentioned in the headman interview.

Commercial boats

(Main author: Alicia. Co author: Mayling. Other authors Mette and Simone).

There are two important changes in the Thai fishery since ten years ago, one is the increase of number of households depending on aquaculture (in our village some aquaculture projects failed due to the lack of

available space) and the other is the domination on the production by the commercial boats (URL8). As our area is included in the second most important fishing area (Andaman Coast), the problem because of the increase of the commercial boats is reflected in the fishermen's livelihood.

The main consequence is the over exploitation of the marine resources (URL7) and degradation of the environment (because of the equipment and way of fish). This over exploitation cause that there are less area to go fish per boat and also less amount of potential fish



per boat, focusing in the first one, the necessity of look for new areas to fish is determining their livelihood strategy and profit. This conflict is getting important when the fishing artisanal equipment is destroy by the commercial boats. The commercial boats are not the only reason of the destruction of the fishing equipment because of their trawls that all destroy while they are fishing, also entanglement with other artisanal equipment happens. This factor decrease their profit cause the expenditure in equipment increase.

On the other hand, the decrease of available fish per boat has as main consequence for their economies the decrease of their income as is explained in the Decrease of marine resources limitation.

SHOCKS Tsunami 2004

(Main author: Simone. Co author: Mette. Other authors: Mayling and Alicia)

The Tsunami of December 2004 had caused serious damages in the Andaman Coast, therefore, our village was affected as is shown in the History of the village. On the other side, the health and psychological problem that tsunami caused still nowadays affects some of villager's health with diseases like stress, sadness, hypertension and depression. Even if from the interview with the head man didn't emerge any information about it, from the informal talk with the coordinator of a health assistance program, this information was confirmed. Thereafter, we assumed that due to the gravity of the shock and the willingness of erase that event, any information about the health situation was mentioned, just some fishermen stories about their survival to the tsunami.

SEASONALITY

Monsoon

(Main author: Alicia. Co author: Mayling Other authors Mette and Simone.)

The strong wind that characterize the climate in the study area during the wet season is the cause of the sometimes intimidating waves that don't allow the fishermen to carry out their fishing activities as they



would like, there after the number of the fishing days is much lower than in the hot season but obtaining much higher amount of fish per day that might be due to the different conditions of the sea and also the impossibility of over-exploitation of the marine resources in this season (impossibility of go to the sea every day). From the **Seasonal Calendar** is known that from 5 to 10 days is the average of the fishing days per month in this season. When these waves destroy their equipment is needed to be repaired using the savings when the profit is not enough. Due to the force of the sea, the sand from the sea is carried until the canal of Ban Hadsaikao, incrementing the layer of sediments in the canal and therefore making worse the fishermen situation.

Rising of sea water temperature

(Main author: Simone. Co author: Mette. Other authors: Mayling and Alicia)

From the questionnaire and the ranking this seems to be a limiting factor that affect indirectly the livelihood of the fishermen of Ban Hadsaikao. The causes are not yet well known but some studies and meteorological records shows the slight rising of the Andaman sea -surface temperature since 1946 (see Figure 24)(B. E. Brown ~, R. P. Dunne ~, H. Chansang. 1995) in particular during the dry season. Studies on climate change are carried out by a network between Thailand , China and Australia. The effects of the high temperature on marine ecosystems are already known by the fishermen, for instance, some of the marine species move to colder waters which decreases amount of marine products available and this has direct impact on the income and the necessity of move to other fishing area like Chumporn and Suratthani.



Comparison with previous study

(Main author: Simone. Co author: Mette. Other authors: Mayling and Alicia)

From the comparison between the results discovered in this research and the results of previous studies of other district of the same area there is the possibility to mark the differences and similarities within the regional and provincial context. We use a case of study of a fishing village, Sai Dang, located in the same province, 23 kilometers far from the main city Ranong. Even if this study is from the end of 90's, there is still a common base between the two villages and there is the chance to look at the changes happened during this gap time.

Looking at the village context there are several similarities and differences. In both the villages the main occupation activities is related with fishery, with high percentage of the population involved (more than 90% in Ban Hadsaikao and 70 % in Sai Dang). In both the villages more than the 90% of the households are headed by male. In Ban Hadsaikao the head of the households age is mainly over 50years old (60% of the sample) instead in the second village they are mainly included in the 30–39 and in the 40–49 age groups.(Table 6 & Box 4)

At village level the majority of the householders interviewed in Sai Dang mention border-related problems with the Myanmar sea boundary patrol, and moreover their second main concern is the high fishing costs, in particular the cost of the oil.

At province level for the fishery, one relevant problem identified by the Office of Environment Policy and Planning is the depletion and the overexploitation of fishery resources caused by the declining quality of the seawater, greater use of more effective fishing gear, and illegal fishing. A second problem is the decreased fishing areas available, caused by the rising number of fishery boats in the province. The second limitation mentioned at village level and the first at province level seem to be confirmed in the village of Ban Hadsaikao as important problem that still is affecting fishermen's livelihood of the Andaman Sea.

Reflections on methods and data

(Main author: Mette, Simone, Alicia and Mayling)

In this chapter we want to reflect on methods, how these might have had impact on data and also in general about our group dynamics and results.

Each method we have been using in the field has its weaknesses which are important to take into account, especially if this have had an impact on the data. The way we formulated some of the questions in the questionnaire were too open which made it hard to use and compare the data. We also had to change our question regarding income per year since it was too hard for the fishermen to answer this. We have learned that we might with benefit next time add some open ended questions to some questionnaires and combine it with semi structured interviews since we had a tendency to ask too many questions beyond the questionnaire which made it time consuming.

The data from the Venn diagram might have been influenced by the fact that the assistant of the headman was participating in this PRA. We see that only 1 out of 23 of the institutions mentioned have a negative impact but when talking to fishermen we got a different picture. This is from the assistants point of view probably a way to present the village from its nicest side and avoid showing conflicts.

In general we were satisfied with PRA's since the people participating were very active and quickly understood what was expected of them. As with all the PRA's we didn't have influence over the participants since the assistant of the headman chose the participants for us. This might have given us biased data, but since we will be comparing with data from other methods it shouldn't be a problem.

On the focus group we encounter some challenges. The selection of the sample and the language barriers were the main difficulties. More over the presence of some Thai villagers during the discussion influenced the answers and the result of some interviewees.

To collect all the interviews we had to face some challenges. First of all the sampling strategy were changed and adapted to the different situations starting with the planned semistructured interviews, passing trought the improvised open and at finally informal interviews. Second, through the triangulation we discovered that some of the interviewees voluntary omitted some key informations. In particular the respondent of the semistructured interviews hided and denied for example the presence conflicts in the village. This happened probably because they wants to give us a better image of the village and also the interviews were carried outside the respondent house often at the presence of other villagers that influenced the answers. More over, in the some interviews and questionnaires we received the answers not directly from the householder but from his wife, and this could affect the reliability of the data.

In the Ranking/questionnaire regarding the limitation "decrease in price of marine product", we didn't put in report, since we discovered during community meeting the people said it wasn't true, or it was maybe not good defined.

Reflections on group work and approach

In general we find our group work as very well functioning where we have been respectful, helpful and flexible to each other, but of course there are always some difficulties. We spent a lot of time talking and planning where we feel the time could have been used more efficiently but of course it is also necessary to all be part of the decisions. At the end, we learned to divide the work more but still in this way we never had time to go through the findings of the day. This for the Danish group would has been very useful since we often found that the Thai knew much more than us which they didn't share unless we specifically asked for it. As we see it, this is not due to bad interpreters or unwillingness from our counterparts to share information but more the obvious fact that we were placed in a context where we didn't speak the language. We experienced that we thought we had agreed on something with our counterparts but the next day they did another thing which was frustrating but we think it was lack of communication.

A lot of good information was gotten during unplanned observation or casual talk with the fishermen. In retrospect we would have liked to spend more time in the village but as mentioned above the group discussions took time. During the field study we tried to work intercultural so we mixed the Thai and the Danish group for all methods and also among our own group so everyone tried to work together at one point. Some questionnaires we conducted being only one Thai and one Danish group member without interpreter which of course made it harder for the Danish group member to understand all but on the other hand it was a good practice for the Thai to speak some English and also just a fun working experience.

Conclusion

Main authors: Alicia, Simone, Mette and Mayling

We had the opportunity to study the fishing activities in the dry season where they mostly catch soft cuttle fish, cuttle fish, few swimming crabs and octopus. Choice of marine products caught is a combination of the season, equipment the fishermen have available, the middleman connection to the market and price paid for the marine products compared to how difficult and time consuming it is to fish. The sedimentation and the high and low tide also limit the choice of marine animals the fishermen can catch since some species are easier to catch certain times of the day. The dry season is characterized by the possibility of carrying out fishing activities the majority of the days. However, going to the sea specifically in this season doesn't guarantee to return with any marine product caught. After a long journey the fishermen might end up with not profit at all also due to a few marine products fished that don't compensated the expenditure, mainly the fuel.

We can conclude that many of the limitations are connected, interacting as cause or effect between them. For example, the decrease of the marine resources is an effect of commercial boats overfishing in the area which at the same time causes the artisanal fishermen to go further away to catch fish and hereby spend more on fuel. The biggest impact from all the limitations is a decrease in income for the fishermen's livelihood since 28 out of the 30 questionnaires put this as an effect on their household. This is a trend starting 20-30 years ago where fishermen have told us that they used to earn around 30.000 baht per month compared to 5.000-6.000 per month now.

The theory related to "The persistent tendency towards depletion" (concept developed by Waugh, G) fits with the scenario that the fishermen drew for us, scenario that also we witnessed, when we were waiting in the piers for the fishermen to return and they arrived with the hands empty, after a long journey without caught anything. In Ban Hadsaikao, fishing activities in the past were easily carry and even in the channel they used to caught marine products, as the years passed and intensification on fishing activities increased (for example, due to the evolution of the gear from a rod to nets and tramps), and with it the income, up to a point when the fishermen were required further from the coast to be able to fish. Nowadays, the fishermen earn less than previous years. An increase pressure on marine resource without proper management led to this situation. However, scientific assessments have to be done in order to confirm this situation.

Most of fishermen in Ban Hadsaikao rely only in one source of income and there are few livelihood strategies available. In addition, to the limitations found related to fishing activities (e.g. strong winds, fatigue of marine resources), lead to a high dependency in a vulnerable livelihood strategy without the possibility of other alternatives in agriculture, because the lack of land availability and in other sectors because of limited market access, lack of skills and facilities. Looking at the livelihood assets they have much life time experience and local knowledge about fishing (human capital) which might be due to the fact that it's an art or skill you learn through generations. The other capitals have constraints and this leaves them with a very weak asset base. The role of natural resources in the vulnerability context is highly important (DFIF, 1999) and from our data we see that the trends, shocks and season mostly are related to the natural resources. In our study the fishermen don't have access to agricultural land in the National park, the condition of marine products are deteriorated, and the sedimentation affects their access to sea.

The most sensitive fishermen to the main limitations are who have the lower income in Ban Hadsaikao village. They are the most vulnerable to the high costs of fishing activities and the more susceptible to the reduction of the marine resources. In fact, because the trend of less availability of fishes in the nearest area of the coast the fishermen must go further into the sea, increasing the expenditure cost of the oil. Another important factors of limitation is the conflict between the artisanal and commercial boats that , as we seen in the previous chapter, is also a cause of more expenditure for the artisanal fishermen because they have to repair or buy again their equipments. As a consequence of the trends present in Ban Hadsaikao, the low and medium income fishermen, generate a dependency to loans from different sources increasing their exposition to debits. Also the household structure is affected because of changes in members' occupation, the housewife helps out in fishing or even looking for new occupation.

As a Sub-Saharan Africa is to Africa, Burmese fishermen are to Thai, in terms of vulnerability
Perspective

Main authors: Mayling, Mette, Simone, Alicia

In this section we want to propose what should be done to try to positively contribute to cope with the main limitations and also to describe interesting aspects or themes from our research that could lead to further studies.

As Orlove proposed in his book related to fishery in Peruvian Lake, a local control of the amount of marine products caught by the fishermen in Ban Hadsaikao could lead to a change from an open-access resource to a common property, through this; a control on the fish can be established. However, fishermen from other village fish in the area, thus, such control is difficult to apply.

A diversification of livelihood strategy should be implemented in the village. Learning from previous intents of applying other source of income (e.g. handicraft) a study of the markets follow by the selection of different options suitable could lead to a finding of an alternative livelihood strategy.

A common opinion between the fishermen is that the natural resources are diminishing throughout the years. Extenuation of marine resources and consequently potential lost of fishermen livelihood strategy could be prevented by further research and marine products management. Assessment in marine resources could be done in order to prove the impression of the fishermen the. Orlove used a pre-design format to be filled daily by the fishermen for certain period of time (with a previous training) can be one of the method used to reach this assessment.

To control that the commercial and artisanal boats carry out their activities following fishery national law of 1947 (e.g. to avoid that commercial boats enter into the 3 miles from the coast reserved for artisanal fishermen), a better network of coastal guard controllers can be used. Also to prevent the use of environmental harmful equipments and gears there is the necessity of a better sets of rules and polices.

Regarding other perspectives on our study area we find that a proper organization or association for the fishermen would be of social and economic value. However, actual organizations don't work out or are not functioning any longer. It would have been interesting to dig deeper into the circumstances for the failure of these initiatives since it could create better unity among the villagers but at the same time be a good way to support each other and to make a plan for sustainable management of the resources. Moreover, there are many conflicts and different groupings in the village where corporation between them were almost impossible and a lot of corruption had been going on involving tsunami aid.

Discrimination and ethnic problems among the Thai and Burmese population would also have been interesting. The Burmese were categorized as "labors" and not as fishermen which gave them a lower social status. They were all "bound" to a middleman and this power relation between them could have been another study. To look at the middleman as a kind of more invisible and informal institution and also just en general a more in depth analysis of the how different institutions affect the livelihood assets and access to these could also have been relevant.

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Appendices

Appendix 1: Table of Methods

Interviews	5 semistructured interviews
	7 informal interviews
Focus group	1 focus group with Burmese
Questionnaire	30 questionnaire
PRA	Seasonal calendar
	Mapping of marine resources
	Community history
	Venn diagram
	Ranking
Observation	Guided marine product catch observation
	Fisherman journey observation
	Marine product catch assessment
GPS	GPS marks

Appendix 2: Questionnaire

Questionnaire artisanal fishing

Area: Ban Hadsaikao, village 7, Khampuan district, Ranong
Address Way to recognize house
Name of head of household
Name of interviewee
Relation to head of household
Name of interviewerDateDate
Number of questionnaire:

1. Background information

1.1 How many people live in your household.....

Status in household	Gender	Age	Educational level	Occupation	Other income than fishing
1.					
2.					
3.					
4.					

5.						
6.						
7.						
8.						
9.						
10.						
1.2 What is your	source of income	(Rank 1,2,3 in de	ecreasing order)	I	L	
☐ Fishing		Daily labo	or			
🗌 Aqua cult	ture 🛛 A	Agriculture				
☐ Merchant	t	Process m	narine product			
□ Remmitances □ Other						
1.3 How much income do you get from fishing per yearbaht. Per day ir seasonbaht. Per day in wet seasonbaht						
1.4 How long have you lived in Ban Hadsaikao?years						
Born here Move from other place						
Reason for moving						
1.5 Land tenure						
How many fields do you have access to						

dry

Field	Size (rai)	Rent/own	Land certificate	Land use

2. Fishing information

- 2.1 Howe long time have you been fishing?.....years
- 2.2 What is your reason for fishing (you can choose more than one)





Got support from organization



Just want to try



Think that fishing is more profitable than other careers

Other.....

2.3 Which period of the year do you go fishing

Period (months)...... Hpw many days in this period.....

Period (months)	Hpw i	many day	vs in	this	period
i choù (monulo	/	ו ווייי וו	many da	y 5 m 1	uno	peneu

Period (months)...... Hpw many days in this period.....

2.4 Do you own any boats? Yes No but rent No but go with other

Туре	of	How	Price of boat	Cost	of	Expected		How	many	Cost	of
boat		many		fuel day	per	lifetime boat	of	people	/boat	maintena per year	ince

2.5 Equipment in fishing

Туре	How many pr boat	Price	Expected

2.6 How many people works for you regarding fishing activities.....

Number of Thai.....Salary in baht per day....

Number of Burmese.....Salary in baht per day.....

2.7 Type of marine product

Туре	Kg/boat/day	Price/kg	To which market	Way of sale (direct/via middleman)

2.8 How much of your catch is for consumption?

Dry season (Nov-April) All Most Half Less than half None

Wet season	(May-Oct)		□Most	□Half	Less than half	□None
------------	-----------	--	-------	-------	----------------	-------

2.9 Source of capital for fishing

Source	How many bath	Interest rate %
Saving)	
Loan from bank of agriculture)	
Loan from middleman)	
Village fund)	
From relative)	

3. Organizations and limitations

Name	.Reason for membership
Name	.Reason for membership

3.1 Are you a member of any group/organization? Please list below

3.2 What are the limitations in fishing activities? You can choose more than one. (Rank 1,2,3, with 1 being the limitation with the biggest impact)



High fishing costs.....

Hard to find labor

Monsoon

Decrease of price of marine product
There is no village coorporation
Other
3.3 Have the limitations decreased the number of fishermen in the village?
□ No □ Yes
3.4 Has there been any cooperation in the community due to the limitations?
□ No □ Yes 1
2
3
3.5 How have the limitations affected your household? (you can choose more than 1)
\square Increase in working with the other sources of income, please state which
└ New sources of income, please state which
☐ The children quitting school ☐ More family members working in fishing
☐ Other

3.6 Have you received any support from institutions/organizations?

Name	What kind of support				
	Financial	Educational	□Equipment	Other	
	Financial	Educational	□Equipment	Other	
	□Financial	Educational	Equipment	Other	
	Financial	Educational	□Equipment	Other	

.....

Appendix 3: Semi-structure interview guide for headman

Presentation of ourselves: We are a group of students from the University of Copenhagen (Denmark) and Kasetsart University (Thailand) studying land use and natural resource management. We would like to ask you some questions which will approx take 1.5 hour in order to get information for our project related to constraints in fishing activities. We appreciate your time and want you to know that your information will only be used for our research.

Date of interview:

Interviewer:

Interviewer/notes:

Interpreter:

- 1. How long have you been the headman?
- 2. How many people live in the village?
- 3. And, which are their main jobs? (how many fishermen/farmers and how many work in both occupations?)
- 4. How is the organization of the village? How is the people distributed in the village? (by occupation, level of income?)
- 5. What types of fishing activities are in the village? (time of fishing, days)
- 6. Can you tell us the history of the fishing activities of the village?
- 7. About fishing, which is the annual income in the village?
- 8. How important in terms of income are the fishing activities, compared to other occupations?
- 9. How important in terms of income are farming activities?
- 10. What are the limitations in fishing? (when do they occur, how often, possible solution)
- 11. What are the economic and social effect of the limitations on fishing on the fishermen?
- 12. Do the fishermen have any support? From where, what, how is distributed?

- 13. What is the possibility of a fishermen to get access to land?
- 14. Can you tell us about the history of land use (crops, livestock)
- 15. Do you use irrigation for the farming? If yes, which are the main sources of water?
- 16. Given the gap of income for the fishermen caused by limitations, what would you suggest as alternative sources of income? (agricultural).

Appendix 4: Semi-structure interview guide for middleman

Presentation of ourselves: We are a group of students from the University of Copenhagen (Denmark) and Kasetsart University (Thailand) studying land use and natural resource management. We would like to ask you some questions which will approx take 1 hour in order to get information for our project related to constraints in fishing activities. We appreciate your time and want you to know that your information will only be used for our research and your name will be kept anonymous.

Date of interview:

Interviewer:

Interviewer/notes:

Interpreter:

- 1. How long have you been a middleman? Explain us your experience.
- 2. Where and how do you sell your marine products? Which is more marketable?
- 3. How have these limitations affected the role of your social organization of village? (conflicts)
- 4. Is there any cooperation between fishermen? Is any referring to the limitations on fishing?
- 5. Do you have any land tenure? Do you have any land tenure? Do you rent some land? If not, which possibilities do you have to get access to land?
- 6. What kind of support from institutions and organizations have the fishermen received, if any? And how?
- 7. Do you have any participation in marine resources management? How?
- 8. Do you think the marine resources have changed and how?

Appendix 5 : interview guide for focus group with Burmese

Presentation of ourselves: We are a group of students from the University of Copenhagen (Denmark) and Kasetsart University (Thailand) studying land use and natural resource management. We would like to ask you some questions which will approx take 1.5 hour in order to get information for our project related to constraints in fishing activities. We appreciate your time and want you to know that your information will only be used for our research and your name will be kept anonymous.

Date of interview:

Interviewer:

Interviewer/notes:

Interpreter:

- 1. How many years have you lived here and what is the reason for moving?
- 2. Please describe your fishing activities (who do you sell to, when do you go fishing throughout the year, fishing methods, equipment, how often etc.)
- 3. Are there any traditions, believes related to fishing activities?
- 4. Please explain about the limitations in fishing (which, when, how big impact, or maybe ask " what is the most difficult aspect of fishing)?
- 5. How do these limitations affect you and fishing activities (income, debts, household etc)?
- 6. What other sources of income t'do you have?
- 7. What corporation/groups among Burmese and among Burmese-Thai exist in the village?
- 8. Do Burmese have any restrictions in the village? (If yes, how do they affect you)
- 9. Please compare your life here to your life in Burma

Appendix 6 : Semi-structure interview guide for fisherman

Presentation of ourselves: We are a group of students from the University of Copenhagen (Denmark) and Kasetsart University (Thailand) studying land use and natural resource management. We would like to ask you some questions which will approx take 1 hour in order to get information for our project related to constraints in fishing activities. We appreciate your time and want you to know that your information will only be used for our research and your name will be kept anonymous.

Date of interview:

Interviewer:

Interviewer/notes:

Interpreter:

- 1. Could you please describe your fishing activities? Do you fish by yourself, hire Burmese laborers or own boat rental business?
- 2. Where and how do you sell your marine products?
- 3. How are fishing activities distributed during the year?
- 4. What are the main reasons that don't allow you to carry out your fishing activities? (Monsoon, sedimentation, wind...) Why?
- 5. When and how often do these limitations occur?
- 6. How do these limitations affect the fishing activities? (severity)
- 7. How have these limitations affected your income, expenditures, debts and savings?
- 8. How have these limitations affected the role of your social organization of village? (conflicts)
- 9. How have these limitations affected the role of your household? (woman work more, children quit school...)
- 10. Is there any cooperation between fishermen? Is any referring to the limitations on fishing?
- 11. Which other activities do you practice to earn an income when you can't fish? Which others would you like to do?
- 12. How have these activities affected the role of the people in your household?

- 13. Do you have any land tenure? Do you have any land tenure? Do you rent some land? If not, which possibilities do you have to get access to land?
- 14. What kind of support from institutions and organizations have the fishermen received, if any? And how?
- 15. What kind of support have you received for other activities?
- 16. Which is your capital to support your fishing activities?
- 17. Are there any traditions, cultures or believes related to fishing activities?
- 18. Do you have any participation in marine resources management? How?
- 19. Do you think the marine resources have changed and how?

Appendix 7: Synopsis Interdisciplinary Land Use and Natural Resource Management

THAILAND FIELD PROJECT

Final synopsis
Date: 24th of Feb 2010
Words: 2.642 ③

FISHING LIMITATIONS AND LIVELIHOOD STRATEGIES IN BAN HADSAIKAO



Group members:

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Introduction

Thematic context

"Worldwide around 38 million people are employed in fisheries and aquaculture, 95% of them in developing countries. The majority are involved in small-scale fisheries" (URL4).

Fishing activities can be exploited in different contexts (from lake and river to the ocean), with different level of specialization and time frame. Some fishermen carry out their activities full time all the year. Usually most of the fishermen's activities are done in a part time frame during the favourable seasons of the year.

The fishermen activities and resources required for a means of living can be defined as livelihood. Livelihood is composed of 5 assets which consists of human, financial, natural, social and physical capital. The resources consisting of personal skills and abilities are called human capital. The land, the sea and the other biotic and abiotic factors can be defined as natural capital. An example of financial capital can be savings and loan. All the facilities and the equipment used by the fishermen can be called their physical capital, while their social capital consists of their relations to others and their networks. (DFID, 1999:4).

People involved in fishery-based livelihoods are vulnerable and depending on several factors and limitations. The main risks are related to the unstable and uncertain conditions of the natural resources, the hostile environment of the seas, the seasonality due to the climate, biological factors and all the socio economic issues of the migration flux.

To reduce the main risks, fishing is often integrated with other economic activities at the local level, like agriculture, trading and the provision of labour. In fact, part time activities generally allow to have time for alternative activities such as farming and rearing livestock. (URL7)

Thailand is one of the ten most important countries for the fishery production and export, both for caching fishery and aquaculture. Fishery activities have a significant relevance for food security and export earnings in the agricultural sectors of Thailand (URL6)

For the traditional Thai fishermen until the intensive use of fishery resources, the income derived from the exploitation of their activities was sufficient for the family and to earn an income from selling the surplus in local market. At present, the resources are dwindling and the increasing pressure of the other limitations making fishing only a subsistence occupation (URL6 & URL7).

Thai fishermen faced a huge catastrophe, when on the 26th December 2004 the tsunami wave devastated the livelihoods of thousand of coastal people, many of them poor fishers and fish farmers in the area of the provinces on the Andaman coast of Thailand. In particular almost 500 villages were destroyed, having dramatical socio-economic effects (URL5). Moreover the tsunami wave and its backwash had a strong impact on coast morphology and on natural resources of the region. It modified watershed and the ecosystems of Andaman sea coastal areas, often causing direct and indirect constrains to fishermen as it will be introduced in the specific case of our field work.

Ban Hadsaikao Village

Our fieldwork will be taking place in a small fishing community called Ban Hadsaikao, which is situated on the downstream of Kamphuan Channel at the Andaman Coast in the province of Ranong in the south west of Thailand. Its geography consists of high mountains, abundant main-land forests and mangrove forests. The overall climate of the village can be divided in two seasons, which are the wet (May-October) and dry (November-April) season. In particular the village is more affected by the south-west monsoon, since it is connected to the Andaman Sea by the canal of Kamphuam. The village consists of 121 households with a total population of 402, and the community area is approximately 45 hectares. Most of the villagers earn an income from fishing and others are working as farmers, merchants and herdsmen.

Nowadays the village is facing several limitations related to the fishing affecting traditional and commercial fishing activities. Among them is the climate seasonality due to the monsoon winds in the wet season, when villagers are not able to fish, because of the impracticable ocean conditions. In the village there's a lack of livelihood strategies choices and opportunities. This limitation generates a seasonal gap of income involving mostly the traditional fishermen.

The second main problem is related with the physical effects of the backwash of the tsunami of 2004. In fact, it raised the sedimentation effect on the bottom of the channel during the backwash and now the depth of channel is shallow, which is an obstacle for transportation of commercial boats at the time of ebb tide. Furthermore, at the channel mouth the sedimentation also has increased the wave braking effect, making it more difficult to access the sea in particular for small traditional fishermen. (URL1).

Objective and research questions

Objective: to identify the limitations of fishing activities, to analyze the impact of these limitations on livelihood of fishermen and assess agricultural livelihood strategies for the fishermen as a supplementary income source.

- 1. What are the fishermen's perceptions of limitations on fishing activities?
 - 1.1. Which are the characteristics on fishing activities?
 - 1.2. What are the main limitations?
- 2. How have the limitations in fishing activities affected the livelihoods of the household of the fishermen in Ban Hadsaikao?
 - 2.1. What are socio economic effects on the households?
 - 2.2. What kind of support from institutions and organizations have the fishermen received, if any?
- **3.** What are the agricultural land use potentialities for alternatives livelihoods strategies for fishermen in the area?
 - 3.1. What is the traditional use of land?
 - 3.2. What are the biological, physical and chemical conditions of the area?
 - 3.3. How is the availability of land?
 - 3.4. What is the local willingness for agricultural land use potentialities?

We will focus on fishery, since it's the main occupation for the villagers and therefore an important livelihood strategy. According to the introduction the villagers face different problems, that limits fishing activities. We chose to study the fishermen's perception on the limitations, since we in this way will take our departure from the fishermen's point of view instead of secondary data. The impact of the limitations on the livelihood is essential due to the vital role of fishing activities in the community. The limitations lead to gaps in income and make the livelihood more unstable and insecure for the fishermen. In this perspective we would like to contribute to a solution for the fishermen, and therefore investigate possible agricultural land use options in the area.

Methods and data

To answer the above research questions we will use different social and natural science methods in the field. Among the social methods we will carry out 6 different Participatory Rural Appraisal (PRA), these methods describe a community context, identify problems and potential solution with the active participation of community members (Selener et. al, 1999)

Observation

By observing the fishermen we can note what kind of different livelihood strategies they use, which can be connected to the 2nd research question, and by making observation of the farmers we will gain a better knowledge of land use, which is important for our 3rd research question. However observation will be used in the other methods to compare data obtained here with observations and also to give us new knowledge and data for our objective, which can lead us to central questions (Mikkelsen 2005:88). Overall, observation is crucial in gaining knowledge about the social rules and norms of the village, which will help us to act tactful in the field and to create good rapport with our informants.

We will be doing observation from the very first day, and it is a method all group members will conduct.

Community history

The basic information of interested with the application of this tool is to obtain the livelihood strategies adopted by villagers to overcome the difficulties or opportunities from the historical events related to fishery and farming (e.g. tsunami, changes in fishing activities, aids, sedimentation, lack of access commercial boats, land tenure). The collection of these data will lead us to a greater understanding of how the changes in fishing activities have affected the livelihoods of household of the fishermen.

Dates, description of the event, impacts and fishermen response are part of the variables on the community history tool. This approach should include elders and young people (Selener et. al, 1999), in our case 2 group members, 1 interpreter and approximately 6 fishermen of different ages.

Mapping (village sketch)

The purpose with the application of the mapping is to identify the distribution of and position potential land use in the village that can be exploited as alternative agricultural livelihood strategy. Also, this map will be useful when selecting soil and water samples locations.

The map is to be drawn by the villagers not by the facilitators (Selener et. al, 1999). This information will be complemented with information collected and plotted using GPS and GIS respectively. 2 group members, 1 interpreter and 6 villagers (different gender, ages and occupation) are required to apply this method.

Transect walk

The data desire from the transect walk is mainly: land use; location of well, pond or any other source of water; type of crops, livestock and infrastructure. The purpose in the implementation of this method is to identify and locate current land use, natural resources, types of crops, kind of livestock to identify potential land use in the area based on the observation and comments, which are to be complemented with other methods (e.g. soil and water sampling, questionnaire).

The transect is drawn by the villagers, with the different features observed by them and the notes taken by the facilitator of their own comments during the walk. The first column may include items such as: soil, land use, water crops, problems, opportunities, potential solutions, on the following columns each items is analyzed based on the section of the transect (Selener et. al, 1999). This method includes: the whole group, 1 interpreter and 2 villagers.

Seasonal calendar

The aim in the implementation of this tool is to collect information related to: monthly production activities, dry and wet period, sow and harvest period, seasonality of crops diseases, gap of income, food shortage/surplus, influx/exodus of people, and when alternative livelihood strategies take place in time. The frequency and severity on fishery constraints will be studied as well.

The data described above will lead us to the understanding of the effects of the limitations in fishing activities on the livelihoods of the fishermen. Moreover, the data collected through this method will provide information related with agriculture in the area that will be used when describing potentialities of land use.

A vertical diagram with the months in the top and the activities located on the left hand of the sheet (Selener et. al, 1999) is the style to be applied. The participants on this method will be 2 group members, 1 interpreter, 6 villagers (farmers, fishermen)

Venn diagram

The purpose on the implementation of this method will be to gather information about organizations, institutions and group of people that influence on fishing activities. That information will give an overview to

study the level of support to fishermen in overcoming the limitations on fishery activities and effects on their livelihoods.

Different circles sizes represent the level of importance to the village, and the distance between them establish how close (in terms of cooperation) are the different institutions, organization and groups to the village (and between them) (URL2).

Two group members, 1 interpreter, 5 fishermen will be required to apply this method.

Ranking of preference of agricultural livelihood strategies

From the different potential land use strategies from the previous analyzes (e.g. questionnaire, observation, soil and water sampling), we will aim to study which are the most and less preferred among the different options, thus, obtain the willingness of acceptation of different potential land use strategies by the villagers. The list of participants names are placed in the top of the sheet, and on the left hand the different livelihood strategies are written vertically. Each villager give to each strategy a number (based on a grade system established beforehand), the rank is going to be obtained by the sum of the numbers by each row. Two group member and 5 to 8 villagers are required to participate to apply this method.

Semi structured interview

We will conduct a key informant interview with the headman of the village. The purpose of this interview is to get an overview of the village organization and its different components and to identify the farmers and fishermen in the village and the characteristics of fishing. This data we will use to stratify the different groups for questionnaire and PRA methods. We will also ask about general information about fishing limitations, the village's relation to outside institutions and a picture of access to land of different occupation groups.

Then we have planned 5 interviews with fishermen to get in depth information about their perceptions on limitations in fishing activities, their changes in livelihood and other sources of income. They will be chosen from the 30 questionnaires made by fishermen and stratified according to income from fishing.

All interviews will be carried out by two group members and interpreter. We calculate that the interview with the headman will last between 1-2 hours, while the fishermen interviews will last around 1 hour.

Questionnaire

This method can give us an overview and quantitative information in a short time. We are going to carry out 40 questionnaires, which are aimed at the following people: 30 fishermen and 10 farmers. We will use random stratified sampling to locate the different groups, and we have chosen to stratify the groups, since we want the different livelihood strategies from each group to see and compare how well fishing and farming complement each other. The data we want from the fishermen are about their perceptions in limitations and changes in livelihood to get a representative view of all fishermen in the village. The farmers can give us information

regarding land use and their income from this. These results will be used in the SWOT matrix (see appendix) complemented with the natural science methods about soil and water quality to show the potentialities of land use.

Soil analysis

This study is related to the third research question. To study the potentialities of the land it is necessary first to study the current condition of the soil (R.Q.3.a), the samples will be located by GPS and some pictures will be taken.

Two group members will do around 10 samplings with the information about the relevant areas for our study form different methods, as the mapping, transect walk and headman interview.

The soil sampling will be divided into two main categories due to the expected different characteristics. These are agriculture and natural soil.

The data will be gathered with a table (see Appendix 10).

Water analysis

The study of the water quality is used as to assess the potentiality for irrigation of agriculture land (R.Q. 3a.). The samplings should be taken in areas where the water can be used to irrigate fields (e.g. well, pond, river) and the information from the headman interview, mapping, transect walk among others methods will be taken into account to select the areas of the samplings.

Two group members will conduct the water sampling from different areas with the information from some methods as mapping, headman interview, transect walk between others. The GPS will be use to situate the samples and some pictures will be taken.

Aerial photograph and GIS

Those techniques are used to localize the different spots of the water and soil samplings in the area of study and compare with the land uses over the time and process with GIS. Also this method could be used to complement the mapping, village distribution, transect walk. With this method different maps could be done referring to many aspects, for instance, land use, natural resources, main activities, watershed between the main factors.

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Appendices

Appendix 1: Definitions of concepts

"A **household** is a group of people who eat from a common pot, and share a common stake in perpetuating and improving their socio-economic status from one generation to the next."(URL5)

"A **livelihood** comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain its capabilities and assets both now and in the future, while not undermining the natural resource base."(URL5).

Land tenure can be defined as the relationship between law and people, which establish rights to use, control and transfer the land by people and for a determined period of time (URL3)

Community history

Chronological time line which describes the most important event in the village's and villagers' past. It should include a brief explanation of how the different events affected the village and villagers and theirs reaction due to those events (Selener et. al, 1999).

Mapping (village sketch)

It is basically a map which identifies and allocates different components of the village including households, sea/coast, channel, rivers, wells, ponds, crops, market, natural resources, land use, etc (Selener et. al, 1999).

Transect walk

It is a transversal representation and analyze of production systems of the village, or farm. The route should include the greatest ecological diversity, determined beforehand by a previous walk through the village or farm or making use of a village map (Selener et. al, 1999).

Seasonal calendar

It is graphical representation, identification and characterization of different production cycles throughout the year (e.g. agriculture, forestry, commercialization, livestock, fishery) (Selener et. al, 1999).

Venn diagram

It is a graphical representation of the external and internal institutions, organizations, and group of people that interact with the village and their relationship (URL2).

Ranking of preference of agricultural livelihood strategies

This tool identifies and ranks the agricultural livelihood strategies preferred by the villagers in ascendant or descendent order (Selener *et. al*, 1999).

Soil analysis

The soil analysis method is used to study the main factors that influence the quality of the soil. There are two different aspects to take into account, the structure and the different nutrients; the first one is based in the different size of the particles and the aggregation. The soil fractions are sand, lime and clay and the organic material play an important role with the second aspect of study, the nutrients. The availability of the nutrients for the plants depends on the pH, and there are different key factors, as aluminium and salinity that limit the growth of some crops. The samples will be taken from the upper stratum (approximately 20cm) this part is the main that influences the crop development.

The analyses to be used are:

- ✓ pH: electronic measurement in the field.
- \checkmark EC: electro conductivity that study the salinity of the soil.

- \checkmark Nutrients analysis: nitrate, phosphate, potasium, aluminium, organic matter¹ among others.
- ✓ Field observation: Soil texture&structure (aggregation and compacting layers among others analyze with FAO structure triangle matrix among others methods), soil colour, vegetation, erosion, etc.

Some diagnosis methods will be used to relate the analysis results and conclude the quality of the soil (see Appendix 9)

Justification: The samples on the <u>agriculture land and natural land</u> are used to study the current condition of the land due to the original material and the sediment material, and salinization from irrigation (in the case of be used in the agriculture land) or due to the run up of the tsunami. Other relevant

Through the field observation some natural process and the effects, for instance, water and wind erosion, rainfall leaching and drainage, to compare these autochthon areas with the logged areas to identify the potential exploited and non-exploited land and livelihoods, are going to be studied.

Water analysis: pH, salinity, nitrate, phosphate, dissolved oxygen.

The water quality study is for the agriculture use.

The salinity of the water can decrease the water availability of the crops and induce some infiltration problems.(URL8)

Other parameters as phosphates and nitrates can contaminate the water and affect the aquatic organisms and the crops yield.

Different parameters are needed:

pH: electronic measurement in the field.

EC: electro conductivity that study the salinity of the water.

Nutrients analysis: nitrate, phosphate.

Suspension solids: to measure the turbidity of the water

GPS

The Global Positioning System is used to locate the transect walk and the different samplings to combine this information with the PRA methods to have an overview of the land use and village distribution.

SWOT

A matrix of four data is done based on internal and external analysis of the area that could help us to determined alternative strategies for the villagers.

Internal analysis:

Strength: endogenous resources and skills that could be used for the development of the area.

Weakness: endogenous unfavorable factors of influence in the area and vulnerabilities: sources, activities and risks.

External analysis:

Opportunities: exogenous natural environmental factors that can improve the activities/situation of the area.

Threaten: exogenous unfavorable factors of influence in the area.

¹ If it's possible to do it.

Appendix 3: Process and analysis of data

For processing the data Microsoft Excel/Microsoft Access will be used to generate tables and graph with the information collected. GIS and Google map are going to be used to digitalize map and transect made by the villagers.

Different graphs, tables and matrix needed to analyze the information collected will be included in the appendix.

In the analysis and diagnosis of the data collected the triangulation of quantitative and qualitative methods are required to study the social, economical and agronomical aspects.

Interviews will be analyzed using narrative approach, in which the information gathered is structure as a coherent story, making emphasis on the point of interest (Brett, 2007)

The soil and water sampling results will be analyzed with the specific matrix and parameters chosen.

Finally, to analyze the potentialities of the area based on the sustainability of the land use and natural resources, a method SWOT (Hill *et al.*1997) is proposed to answer the RQ3.

To conduct this method it's required to consider the environmental analysis, interest groups, economic and demographic situation. Therefore, in general, all the information that will be obtained will be used to do the diagnosis of the land use by all the group members during the field trip and after.

Appendix 4: Questionnaire for fishermen and farmers

Number of questionnaire:_____

Date: _____

Name of group members:_____

Name of interpreter:_____

Presentation of ourselves: We are a group of students from the University of Copenhagen (Denmark), Mahidol University and Chulalongkorn University (Thailand) studying land use and natural resource management. We would like to apply this questionnaire that takes aprox. 25min. in order to get information for our project related to constraints in fishing activities and potential livelihood strategies. We appreciate your time and want you to know that your information will only be used for our research and your name will be kept anonymous.

Part I: Background information

- 1. Name_____
- 2. Gender: M F
- 3. Age:_____
- 4. Ethnic group:_____
- 5. How many people are living in your household?
 - a. Adults:_____
 - b. Children:_____
- 6. What is your occupation? (you can chose both)
 - a. Fishing (go to part II)
 - **b.** Farming (go to part III)
- 7. What are your households sources of income?
 - a. Farming
 - b. Fishing
 - c. Remittances
 - d. Merchant
 - e. Daily labor
 - f. Employer
 - g. Other:_____
- 8. Please rank your households sources of income in decreasing order based on amount of income, e.g. number 1 being the main source of income, number 2 being the second source of income etc
 - 1. _____
 - 2. ______
- 9. How much land do you own? ____(rai)
- 10. How much land do you rent?____(rai)

Part II: Fishing activities

- 11. How many years have you worked as a fisher?:_____
- 12. How many of the households members besides you are engaged in fishing activities?
 - a. None
 - b. 1-2
 - c. 3-4
 - d. 5-6
 - e. More than 6
- 13. What proportion of your income comes from fishing?
 - a. All
 - b. Most
 - c. Half
 - d. Less than half
 - e. None

14. How much do you earn from fishing per year? _____(bath)

- 15. How much of your catch is sold?
 - a. All
 - b. Most
 - c. Half
 - d. Less than half
 - e. None
- 16. How much of your catch is for consumption?
 - a. All
 - b. Most
 - c. Half
 - d. Less than half
 - e. None
- 17. What are the 3 most influential limitations to fishing activities, according to you? List them with 1 being the worst
 - 1. _____
 - 2. ______

18. Have the limitations decreased the number of fishermen in the village? Yes No

- 19. Has there been any cooperation in the community due to the limitations? Yes No If yes, in what way:
 - a. Occupation improvement
 - b. Central fish market in community
 - c. Seeking new income
 - d. Helping each other with fishing
 - e. Other:_____
- 20. How have the limitations affected your household? (you can choose more than 1) a. Less income
 - b. Increase in working with the other sources of income, please state which:_____
 - c. New sources of income, please state which:_____
 - d. The children quitting school
 - e. More family members working in fishing
 - f. Other:_____
- 21. Have the village received any support from institutions/organisations? Yes No If yes, have you receive any of this support? Yes No

If yes, what kind:

- a. Financial
- b. Educational
- c. Material, please specify:_____
- d. Other:_____

If yes, do you think the support was handed out fairly? Yes No

If no, why:_____

- 22. Which other sources of income would you like to engage in? Rank them after attractiveness with number 1 being most attractive.
 - 1. _____
 - 2. _____
 - 3. _____
- 23. Which *agricultural land uses* would you like to engage in as a alternative source of income, rank them after attractiveness with number 1 being most attractive:
 - 1. _____
 - 2._____
 - 3. _____

Part III: Agricultural activities

- 24. How many years have you worked as a farmer?_____
- 25. What proportion of your income comes from farming?
 - f. All
 - g. Most
 - h. Half
 - i. Less than half
 - j. None

26. What kind of land use do you have? You can choose more than one

- a. Cash crop land
- b. Subsistence crop land
- c. Forestry
- d. Grassland
- e. Livestock
- f. Other_____

27. Which crops do you grow? Rank according to quantitative proportion, with a) being the one you grow most

- a. _____
- b. _____
- c. ______ d. _____
- e. _____

28. Which type of land use gives the biggest income? Rank them with a) being the most profitable.

- a._____ b._____ c._____ d._____
- e.
- 29. Which type of land use will you characterize as the most important for the support/survival of your family? Rank them with a) being the most important.
 - a. _____
 - b. _____
 - c. ______ d. _____
 - e.
- 30. What kind of livestock do you have, if any? Rank according to quantitative proportions, a) being the livestock you have most of.
 - a. _____
 - b. ______ c. _____

- 31. Do you use any agrochemical? Indicate in which crop(s)
 a. Fertilizer ______
 b. Herbicide ______
 c. Fungicide ______

 - d. Insecticide _____
 - e. Other:_____

Appendix 4:Semi-structure interview guide for headman

Date of interview:

Interviewer:

Interviewer/notes:

Interpreter:

Gender of informant: F M

Presentation of ourselves: We are a group of students from the University of Copenhagen (Denmark), Mahidol University and Chulalongkorn University (Thailand) studying land use and natural resource management. We would like to ask you some questions which will approx take 1.5 hour in order to get information for our project related to constraints in fishing activities and potential livelihood strategies. We appreciate your time and want you to know that your information will only be used for our research and your name will be kept anonymous.

- 10. How long have you been the headman?
- 11. How many people live in the village?
- 12. And, which are their main jobs? (how many fishermen/farmers and how many work in both occupations?)
- 13. How is the organization of the village? How is the people distributed in the village? (by occupation, level of income?)
- 14. What types of fishing activities are in the village? (time of fishing, days)
- 15. Can you tell us the history of the fishing activities of the village?
- 16. About fishing, which is the annual income in the village?
- 17. How important in terms of income are the fishing activities, compared to other occupations?
- 18. How important in terms of income are farming activities?
- 19. What are the limitations in fishing? (when do they occur, how often, possible solution)
- 20. What are the economic and social effect of the limitations on fishing on the fishermen?
- 21. Do the fishermen have any support? From where, what, how is distributed?
- 22. What is the possibility of a fishermen to get access to land?
- 23. Can you tell us about the history of land use (crops, livestock)
- 24. Do you use irrigation for the farming? If yes, which are the main sources of water?
- 25. Given the gap of income for the fishermen caused by limitations, what would you suggest as alternative sources of income? (agricultural).

Appendix 5: Semi structures interview guide for fishermen

Date of interview:

Interviewer:

Interviewer/notes:

Interpreter:

Informant:

Gender of informant: F M

Presentation of ourselves: We are a group of students from the University of Copenhagen (Denmark), Mahidol University and Chulalongkorn University (Thailand) studying land use and natural resource management. We would like to ask you some questions which will approx. take 1 hour in order to get information for our project related to constraints in fishing activities and potential livelihood strategies. We appreciate your time and want you to know that your information will only be used for our research and your name will be kept anonymous.

- 1. Could you please describe your fishing activities?
- 2. How are fishing activities distributed during the year?
- 3. What are the main reasons that don't allow you to carry out your fishing activities?
- 4. When these limitations occurred?
- 5. How often they occurred throughout the year?
- 6. How have they affected your income?
- 7. How have they affected the role of your household?(woman work more, child quit school)
- 8. How have they affected the social organization of village? (conflicts)
- 9. Have been any cooperation between fishermen due to limitation on fishing? Which?
- 10. How has the monsoon affected your fishing activities?
- 11. Regarding to the reasons that do not allow you fishing, how the channel's depth is connected to them? (Sedimentation)
- 12. Which other activities do you practice to earn an income when you can't fish?
- 13. How have these other activities affected the role of your household?
- 14. In your opinion, what could be a source of income while the fishing cannot be exploited?
- 15. Do you know how many fishermen work also as farmers in the village area?
- 16. Would you be interested in working in agriculture as a source of income (during gap of income)? Why?
- 17. Do you have any land tenure? Do you rent some land? if not, which possibilities do you have to get access to land?
- 18. What kind of support from institutions and organizations have the fishermen received, if any? (List)
- 19. What kind of support have you received?

Appendix 6: SWOT matrix

Table 1. SWOT matrix							
	XX7 1						
	weaknesses	Strengths					
Present	-						
	Threats	Onnortunities					
	Threats	Opportunities					
Future							
Future							
Future							

SWOT MODEL

Enhanced SWOT Ana	Ilysis	
Translate into tasks for the Project Plan	Strengths	Weaknesses
Opportunities	How do I us these strengths to take advantage of these opportunities?	How do I overcome the weaknesses that prevent me taking advantage of these opportunities?
Threats	How do I use my strengths to reduce the likelihood and impact of these threats?	How do I address the weaknesses that will make these threats a reality?

Appendix 7: Data and method matrix

RQ1: What are the fishermen's perceptions of limitations on fishing activities?							
Sub Questions	Data	Source	Methods				
1.1. Which are the characteristics on fishing activities?	Identification of fishermen Number of fishermen Type of fishing activities	Headman	Semi structured interview				
1.2. What are the main Type of limitation, when, I often		Fishermen Headman	Semi structured interview Questionnaire Seasonal Calendar Community history				
RQ2: How have the limitation fishermen in Ban Hadsaikao?	ns in fishing activities affected the	e livelihoods of the h	ousehold of the				
	Income from fishing and others (including proportion of each)	Fishermen					
2.1. What are socio economic effects on the households?	How much fish for sale/consumption Changes in roles in household	Headman DOF: Statistic on sale of fish (Ranong or Kamphuang)	Semi structured interview Questionnaire Seasonal Calendar Literature review				
	Adaptation strategies						

			Venn Diagram
2.2. What kind of support from institutions and organizations have the	List of institutions, organizations etc.	Fishermen	Community history
fishermen received, if any?			Semi-structure
, ,	Kind of support Headman	Headman	interview
			Questionnaire

RQ3: What are the agricultural land use potentialities for alternatives livelihoods strategies in the area?

			Observation
	Types of land use		Observation
3.1. What is the traditional	Main crops grown		Questionnaires "
use of fand?	Define livestock	Farmers	Village sketch
	Location		Transect walk
	Land use in the past (soil history)		
	Local climatic condition (precipitation, temperature)	Meteorological stations	Observation
3.2. What are the biological, physical and chemical conditions of the area?	Soil quality (pH, EC, Al,	Agricultural,	Soil Analysis
	macronutrients, structure, color)	natural, sedimentary soil	Water Analysis GPS points
	Water quality (pH, EC)	Well, pond	

3.3. How is the availability of land?	Access to land	Headman Fishermen Farmers	Semi-structure interview Questionnaires
3.4. What is the local willingness for agricultural land use potentialities?	Rank of potentialities	Fishermen	Questionnaires Ranking of preference of livelihood strategies

Appendix 8: Time table



M: Morning, A: Afternoon, E: Evening

This time table is to get an overview of how long each method approximately will take and the order of how we will conduct the methods. The time table is flexible and will be readjusted with Thai group in the field and according to when the villagers/informants will be available. The time periods not specified in the time table will be used to prepare for the following days methods and to process data. Each color represents a group member and we will try to rotate within the methods so everyone in the group will have tried to work together and have tried different methods.

Appendix 9: Soil & water analysis tables and matrix

Soil texture



COMPARISON OF PARTICLE SIZE SCALES



84

pH and nutrients availability



Sample	Coordinates	pН	CE(dS/cm)	N(ppm)	P(ppm)	K(ppm)	Al (ppm)
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

Sample	Texture	Structure	Color	Vegetation	Compacting layers	Other observations
					-	
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Appendix 11: Water data table

Sample	Coordinates	рН	EC (dS/cm)	Color	Turbidity	Other observations
1						
2						
3						
4						
5						
6						

Appendix 8: PRA Mapping



Appendix 9: Map of areas where marine products are caught

