Self-Recruiting Species in Aquaculture: Their Role in Rural Livelihoods

Participatory Rural Appraisal in Ban Saingam

Case Study 4

(PRA Report from 2001)

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Chai-ngam village

Chaingam Village

Introduction

Background

The status of aquatic systems in this province particularly in this village has not been established. To the outsider, knowing the general background of the village is very important. The information to be gathered can be used to develop new programs or design other development interventions in the area. It is also very important that the information is generated from and with the primary stakeholders themselves – the farmers/villagers.

Objectives

The main objectives of this study are to have a clear picture of the livelihood activities in the village as a whole and to establish rapport with the villagers. To attain these main objectives, the following are the specific objectives:

1. To assess the local conditions in the village;
2. To gather baseline information on the status of aquatic animals in the area;
3. To work with the villagers in facilitating the identification of issues in the community.

Participatory Rural Appraisal Team

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Schedule of Activities

The workshop was done in five days including the collection of secondary data for selection of village (see Table 1). During the first day collection of secondary information was conducted in two provinces close to each other. Selection of villages was done during this time as well as well being ranking which was used to identify participants for next day's activity. On the second day the PRA team introduced to the villagers the activities of the project and conducted preliminary exercises prior for the next day activity. Mapping and tracing the history were done.

The second and third day were spent in generating more information about the village and its different activities. The last day of the workshop was used for processing and collating of outputs from the three days activities. On the last day, the data generated were presented and validated with the participants and other villagers.

Chai-ngam village

Table 1 Schedule of Activities for PRA workshop in Ban Saingam

Date	Activities
09 July 2001	Collection of secondary data
10 July 2001	Introduction of project with the village head Village profile Identification of PRA participants
11 July 2001	PRA exercises (Rich group)
12 July 2001	PRA exercises (Poor group)
13 July 2001	Processing of PRA outputs Presentation of PRA outputs

Yasothon Province

Province Description

Location: Situated in northeast Thailand with an altitude of 15^0 – 16^0 north longitude 104^0 – 105^0 East. Approximate distance from Bangkok at 552 km.

Total area: 4,161.664 km

Boundaries:

Northern: Roi-et and Mukdahan province
Eastern: Ubolratchathani and Amnatecharoen
Southern: Srisaket province
Western: Roi-et province

Administrative:

9 district
79 sub districts
838 villages

Total population : 553,982

Main occupation: Agriculture (Production depending on the climate)
Main crops: Rice, cassava, kenaf, water melon

Topography: Flat and highland (227 ft above sea level). Some areas are mountainous, especially in the northern part.

Soil type: Sandy soil and low water retention. Low fertile and some areas are high in salinity.

Water resources: Chi river, Lamsay by, Lampong, Tabtoo stream, Lamyung

Rainfall average: 1618.67 mm per year – heavy rain on July and August
Total days of rainfall : 85 days in a year

District Commune Description

Khamkeankeaw District

Chai-ngam village

Location: Situated on the eastern part of Yasothon province and approximately 23 km away from the province proper.

Total area: 638.40 km^2
Boundaries:
Northern: Muang district of Yasothon province
Southern: Mahachanachai district
Eastern: Muang district of Yasothon and
Western: Phanomprai district of Roi-et province

Administrative:
13 sub-districts
109 villages

Total population: 74,387
Total households: 14,810
Main source of income: Agriculture
Main crop: Rice, kenaf, cassava, etc.
Total land for Agriculture: 33564.48 hectares

Topography: Generally flat but highland. Sandy loam-type of soil and low capacity to hold water.

Water resource: Chi river, Lamsayby (both traverse the district and supply most of the agriculture area), Thom stream, Kalaos stream, Phrom stream, Lekpiek stream, Kudnai stream, Sanab stream, Muangkea and Boakea stream.

Rainfall: 1600 mm per year

Village Description

Total Households: 137 households
Total population: 1,051 individuals

Distance: 23 km away from Yasothon province
13 km away from Khamkuankeaw district

Total area: 461.76 hectares
Main occupation: rice cultivation (even during dry season), practice integrated system
Migration: Mostly young people moved to Bangkok for work and come back to the village during festivals.

Selection Process for the Village

The selection of the village was done after visiting the district office. Secondary information about the different villages in the district was collected during the visit. Information about the economic situation of the village, agriculture practices, water bodies were some of the information gathered. Using the map and secondary data, the area selected was visited to do transect of the place and checked the distance from the river. The village was chosen because it represents the poorest village in the

district, which is located not so far away from the river. It has an approximate distance of not more than 3 km from the river. The household number is not so large (more than 60 households but less than 200 households). Although in the secondary data, the village development level is 3 which means the village is developed and not the priority of the district development plan. However, it is evident during the transect activity that development still needs to be done in the area.

Specific Methods Used

Village (Resource) Map – Mapping of the resources was conducted to generate information about the different resources present in the village and how these resources impact the villagers.

Timeline – This activity was conducted to trace the development trends in the village. This also showed the different "shocks" the village encountered from past to present.

Well-being Ranking. Mapping of the socio-economic context of the village was done. This activity determined the different social groupings in the village and how villagers naturally grouped themselves.

Seasonal calendar. This illustrated the different situations in the village during the year. Information about the weather, traditions and festivals, economic activities, when people migrate and the health conditions were included in the calendar.

Activity profile. This activity was meant to identify the common activities in the village and to differentiate the priorities of each group.

Aquatic animals identification/ranking. This was accomplished to find out the available and unavailable aquatic species in the area. This activity also determined the importance of each aquatic animal to the villagers.

Aquatic animals' seasonality. This activity showed the status of each aquatic animal during the year. The location where aquatic animals can be caught and the gear that can be used were also included in the seasonality diagram.

Aquatic animals' trend. This activity showed the perception of the different groups on the status and condition of the different aquatic animals in the village. The causes of the increase as well as the decrease of a particular aquatic animal were also analyzed.

Transect. Established "ground truths" to cross check the map.

Process

The workshop was divided into three parts. The first part focused on gathering of secondary information and validation. It also included the introduction with the villagers and collecting general information/background about the village. The mapping (village map) exercise was done during the first day with a group of key informants in the village headed by the village headman. The list of all households in the village was obtained from the village headman. This was used in the well being ranking activity.

Names were written down in cards and farmers (informants) grouped the different names according to what they thought was the well being of the farmer/villager.

Participants for the next two days' activity were identified using the results of the well being ranking. Representatives from the poor and rich groups were listed down. A total of four groups were identified: two groups representing the poor men and women, and another two groups of rich men and women.

During the second day of the workshop the group of better-off villagers were invited and joined the workshop. The group was divided into two groups according to gender (5 men and 5 women). During this day more detailed information were generated with the participants. Differences between gender perceptions were observed. The participants discussed the different activities in the village, the seasonality of the village and situations of the aquatic animals and systems in the village.

After the activities of the rich group, the poor group then did the same activities that the better-off participants did the other day. Again differences among gender were illustrated from the discussion and output of the exercises.

After the field activities, the team then collated all the outputs from the PRA. Translations were done and a preliminary analysis on the data. A list of issues were listed and discussed with the farmers during the farmers' meeting the following day. The validation was the last part of the workshop.

Setting the Context

Mapping the Current Resource Context

Mapping exercise was done with the village headman and some key informants. This exercise showed the different resources available in the village based on the farmers' perception. The participants identified different resources (see Figure 1) during this exercise. Different resources and its status were also discussed during the activity.

Land resource. A large portion of the village is being used for rice farming. Surrounding the whole village is mainly paddy fields. Due to the large portion of this land being used for farming, it then becomes the main source of income. Aside from the paddy fields, a portion of the village is elevated and being used as forest area where wild plants and animals are being collected.

Water resource. There are a number of aquatic systems available in the village. The village is situated between the *Chi* river and *Ram Hui Kao* (stream). These big bodies of water serve the villagers for their farming needs and also for collecting aquatic animals. Aside from the said bodies of water, small lakes (nong), swamp and ponds are also present in the village. Most of the *nong* are of open access to the villagers for collecting animals. They also use the water for farming. There is also irrigation in the rice fields that benefits the farmers in the village.

Physical/social resource. Different physical structures and services are also available in the village. This is one reason why the village was not ranked as the poorest

in the district. A school was constructed in the village for the children to have access to education. A village house is situated at the centre of the village where community activities are held. Services for farming like rice mill are also available in the village, so farmers need not to go to other villages or district to mill their harvested rice. Another physical structure that is very important in the village is the temple, which is also located at the centre of the village.

Mapping the Development of the Village

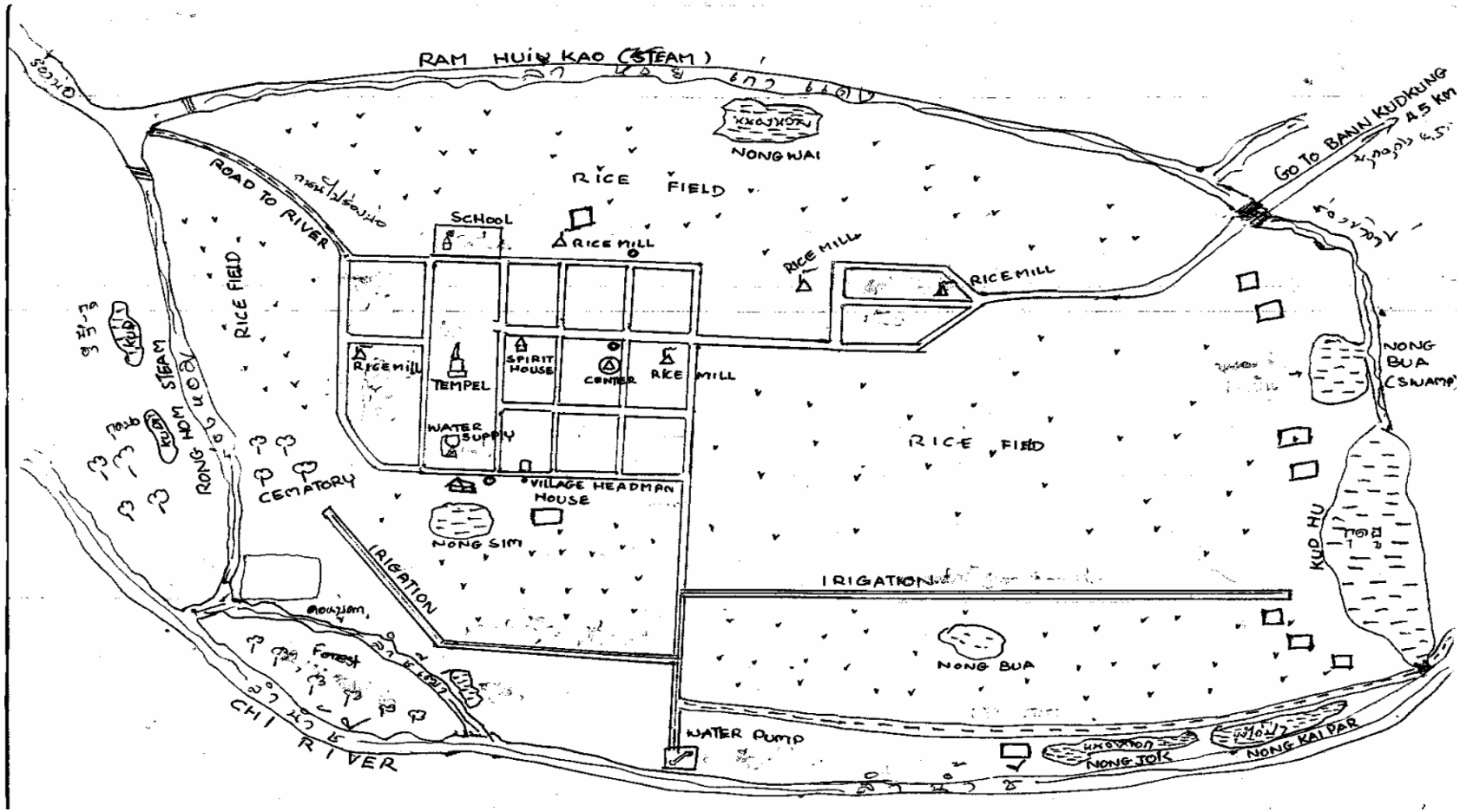
The village was established when villagers (3 households) migrated to the area from another village since 2444 (1901). During this period other households started migrating also. It was also during this period when the environment is abundant with natural resources like wild plants and animals (see Figure 2). As early as this stage development already started in the area when villagers began building the temple. During this period the village has no official name until 2450 (1907) when the village was named 'Saingam'.

More development continued after the village was given its official name. Temples and the school were established few years later. It was in 1960 when the village had their first shop in the area and villagers can buy their basic needs. The introduction of the radio and other appliances followed during this period. The construction of the road only started in 1972 and it was also during that time when the first bus came into the village. Improvement of the road brought a lot of changes in the village. Agriculture and fishing activities were also affected.

Agriculture had been the major activity and source of income in the village. Development in agriculture started in 1970 when villagers started using 4-wheeled tractors in cultivating their lands. The introduction of the fertiliser also happened a few years after the introduction of the tractor. Since then a lot of changes had happened in agriculture. One of the latest agriculture-related developments in the village aside from the introduction of rice varieties is the method of planting rice. In the year 2001 (to present), villagers started using the 'broadcast method' for rice planting which saves time especially during the dry season or in areas with limited water.

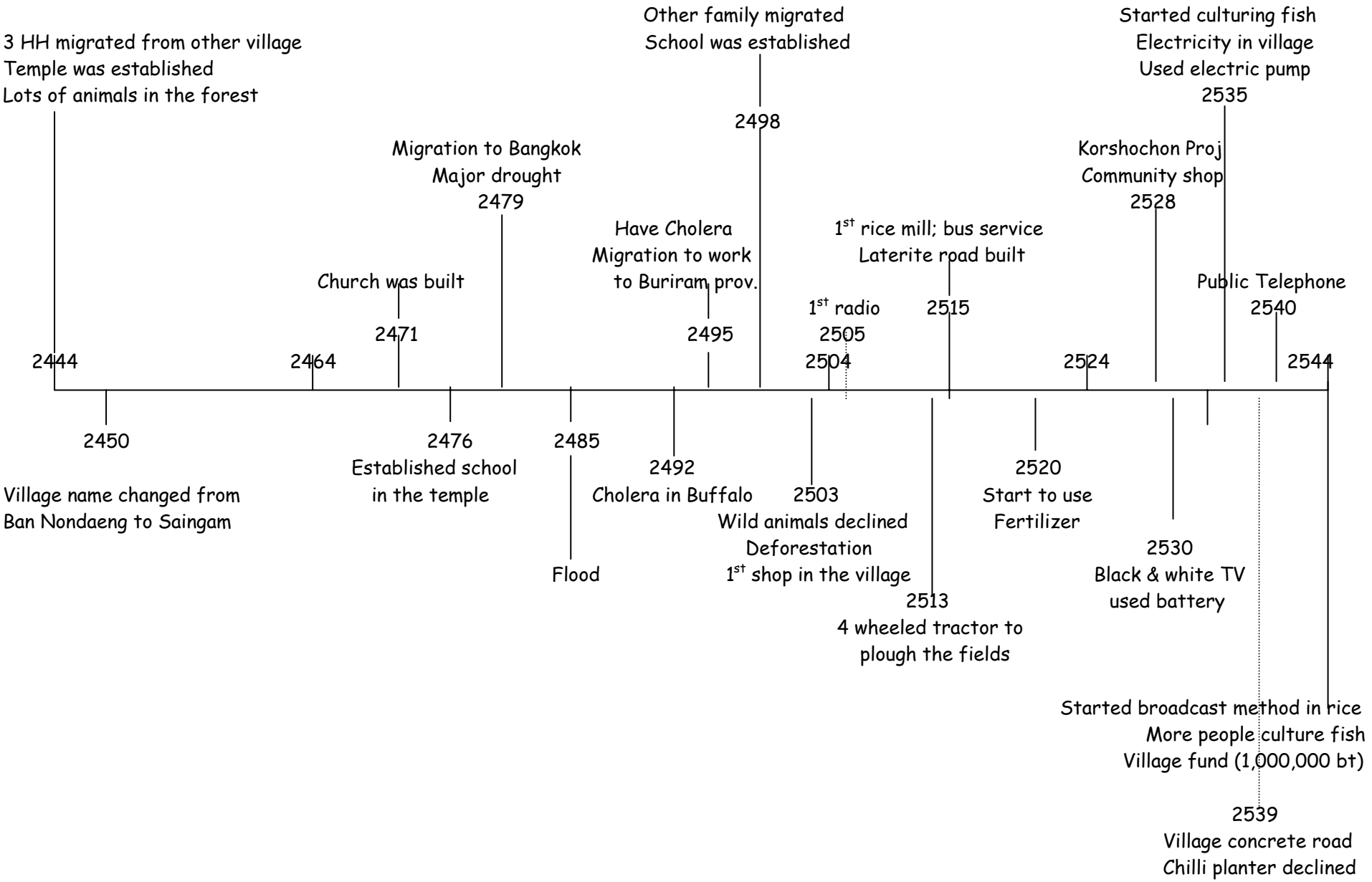
Fishing was not mentioned in this activity although it was very obvious that villagers had been capturing aquatic animals since the very beginning. However aquaculture was part of the historical development in this village but was started late in the area. It was only in 1992 when villagers started constructing ponds and culturing fish. At present the number of villagers culturing fish is increasing.

Figure 1 Mapping the Resources of Saingam Village



Chai-ngam village

Figure 2 Mapping the Development of the Village (Timeline)



Chai-ngam village

Aside from the development, there were also some 'shocks' that the villagers experienced during the period. Natural calamities had occurred in the area. In 2479 (1936), the village suffered from a long drought that affected mainly their crops and aquatic resources. The villagers also experienced flooding. There were also problems on an epidemic in cows and buffalos in 1949 and this also affected the activities in the rice-fields. Because of these shocks, a lot of wild animals were affected and decreased in population. At present the wild animals especially in the forest are very limited due to deforestation activities.

During the PRA exercise, the level of development in the village seems to be low. The government might need to do more relevant development projects in the area.

Mapping the Social Context

Although there a lot of development interventions had been done in the village, the area is still relatively poor. There are several factors affecting the well being in the village and one of it is the limited alternative livelihoods options. Most of the villagers in the area are farmers and fully dependent on selling their agricultural products for their income. Although relatively poor, there are still some villagers that are considered better-off or in the middle of the range.

During the exercise villagers identified and grouped the households into five (5) socio-economic groups using different criteria. Well-being in this village was based not only on income but also other factors like health, education and other social aspects.

Socio-Economic Characteristics

Land ownership. One of the most important criteria used in the well being ranking is land ownership. Households belonging to the lower or poor group generally own small piece of land (3 – 5 rai). In some cases particularly those belonging to the lowest group, households do not have land at all to cultivate. Better-off families usually own at least 15 – 20 rai of land. These tracts of land were acquired by the households either by buying from other farmers or were inherited from their parents.

Livestock. Also related to agriculture activities, livestock was also used as an indicator for better-off families. Livestock is also one of the resources that is lacking among poor families. In most cases, they just rent livestock to cultivate small land they own. There are also families that look after livestock owned by the middle and rich farmers. When the livestock are sold, these families get a percentage from the sale. On the average, rich families own 3 to 5 heads of livestock.

Source of income. As discussed earlier, this village has very limited source of income. Majority are farmers. Among poor families, aside from working as hired help or labourers in other farms, they also do non-farm activities. Some poor families look after rich families' livestock and farm. The former gain a percentage from the income from the harvest or sale of the product. For rich families, there are some that have permanent sources of income, particularly those who occupy positions in the local government. Aside from this, rich families also have some businesses in which they derive additional income for the family.

Health. Generally the health condition in the village is good. However, there are some variations in the level or quality of state of health among the different groups. Families belonging to the lowest group have some health problems. Rich families also have some minor health problems but the vulnerability of poor families is higher. In this village there are household members from the poor group who are disabled and not in good health. This is mainly due to the food/nutrition deficiencies and also to the level of work they do which basically consume all of their energies.

Education. There is not much significant difference in terms of level of education among the household heads. There are some household heads belonging to the middle and even rich group who did not reach a high level of education. The capacity of household head to send their children to school is one indication of well being. Generally poor families cannot afford to provide their children with a high level of education. Apart from the lowest group, all the rest of the groups can send their children to school. However, children coming from rich families are able to study in a better school and even get to earn a bachelor's degree.

Food supply. The level of supply of food depends mainly on the yield or production level of the farmers. Most of the better-off families can produce more than they need so food is available to them the whole year. They can even sell some of their extra produce to other families or in the market. For poor families, their production is usually not enough. Food also gets limited in some months particularly towards the end of the rainy season and before harvest.

Houses. Sometimes, the size of the house may not be a good or reliable indicator for well being. For this village, the condition of the house and the construction materials used became the basis for the indicator. Generally small houses are common among the poor families. Although it was not written but was mentioned during the discussion, materials used for houses of poor families are light and local to the village. On the other hand, houses of rich families are in good condition, most of them made from concrete or semi-concrete. The sizes of houses also vary, from small to big and some with partitions. Poor families do not have partitions in their house.

Farm equipment. In this village, the poor families do not have modern farming equipment unlike the rich group. The former only use simple agricultural tools. They only rent or borrow equipment from their relatives or other farmers if they need one. On the other hand, rich families have tractors that they use in their farms. They also let other people rent or use their equipment in exchange for labour. Aside from tractors, some rich families also own their own rice mill. They use this mainly for milling their own production but is also a source of income.

Access to credit. Basically every farmer in the village has access to loan but the credit sources are different for each farmer. Most of the time, poor farmers cannot access formal credit services in the area because they do not have property that be used as collateral. In this exercise as presented in the Table 2 the poorest families do not have debt but middle and rich families have. Families acquire loans from BACC, co-operatives and other small lending organisations but poor families can only loan from their friends and relatives.

Transport. The last criterion used in the well being ranking is the possession of a mode of transport. Generally only rich families can afford to buy a vehicle that they also use to move their products from and inputs to the farm. Most of the rich families have at least a motorcycle and some families have a car. Middle-level families also use their tractor as a form of transport. On the other hand, poor families do not own any kind of vehicle at all.

Table 2 Well-being ranking in Saingam village

	Men group	Women group
I	Stay alone Landless Not enough rice to eat in a year Some are disabled	Do not have livestock Mostly old people Living alone Landless
II	Have new family Small land holding Have some home appliances Wage labour Raising livestock More debt	Have livestocks (1-3 heads) Have land (3-5 rai) New family Small house and some part not complete Have home appliances Hand tractor Can send children to school
III	Raising animals (4 – 5 heads) Have land 10 – 30 rai Rice cultivate (occupation) Have enough food to eat in a year Some have debt Have money to pay for loans Get remittances from young member of household	Have cows 3 – 5 heads Have land of 10 – 15 rai Have house facilities Motorcycle, and hand tractor Not enough rice to eat through the year
IV	Do not have loans Large land holding Big concrete houses Have car Working in government	Have livestock (3-5 heads) Have land 15 – 20 rai Big family Have facilities Motorcycle, car, rice mill, and hand tractor Good house Have enough rice to eat Can send children to school (secondary)
V		Have car for rent Have livestock (3-5 heads) Have regular income salary, and from business Government officials

Activity Profile

As mentioned in an earlier discussion, the major or most important activity in this village is farming. Farming is the source of food and income of most farmers. As presented in Table 3, all groups ranked rice cultivation as the highest or most important among thei activities. The numbers of different activities among groups are almost the same. There are non-farming activities also that were mentioned in all groups.

Ranking of activities between well being groupings did not have much difference at all. Most of the productive activities were ranked highly and the reproductive activities had a low ranking. In terms of gender, there is difference in priority between the men and women. Both rich and poor men do not include reproductive activities in the list while women included other activities like housekeeping and collecting food in the forest in their list.

Fishing was ranked highly by the poor men's group, who are basically the fishermen in the village and are the ones benefiting from it. Although fishing was included in the list of the other groups, it was ranked low. Both rich and poor women ranked fishing as less important than other activities like weaving, livestock rearing, housework etc.

Table 3 Summary of important activities of villagers by socio-economic group and gender

Group	Gender	
	Men	**Women**
Rich	Rice cultivation Sawing wood Livestock Fishing Charcoal making Vegetable growing Forest food	Rice cultivation Forest food Livestock Housekeeping Making charcoal Vegetable growing Weave cloth and mats Fishing
Poor	Rice cultivation Fishing Forest food Vegetable/chilli growing Wage labour Charcoal Livestock Wickerwork	Rice cultivation Weave mats Weave cloths Housework Vegetable growing Forest food Fishing Livestock/sewing Cow

Seasonality

The seasonality pattern of the village illustrated the average situation of the village in a given period in a year. The condition of the weather, their activities on-farm, off-farm and non-farm were also included. This situation or overall can give outsiders an idea and can help them plan for their activities. For this exercise, four groups made four kinds of seasonal calendars based on their own perceptions. All of the groups started the year in January except for the rich men group, who started the calendar in December.

Weather. The weather in this village is normal. The village has three main seasons that affect all the activities in the village. The cold season starts in late November to early February. All the groups indicated this period as the cold season except for the poor women, who mentioned that it starts early, during the month of October (see Annex 1.4). The hot weather in the village can be experienced during the period of late February to middle of May. During this period the village is very dry. On the other hand, the rainy season is from June to October. July to September is the peak period for the rainy season and in some cases flooding can be expected in some areas particularly the lowland area.

Tradition and culture. Majority of the festivals and socio-cultural activities in the village are related to religious beliefs. Two New Year celebrations are observed in the village: one in January, which is the international New Year and another in April which is the local New Year. Aside from the rice festival and wedding ceremonies, the rest of the festivals are Bhuddism-related. There is only one month – June – when the villagers do not have any celebration or festival. During this period the farmers are busy in the field for transplanting and fertiliser application.

Economic activities. Being an agricultural village most of the economic activities of all groups are farming-related. In general rice farming is the major agricultural activity and in between seasons, farmers also grow other vegetables in the field.

All groups have activities related to rice cultivation. Preparation of the seedbeds starts as early as May but in some cases farmers wait until the rain comes and if the water is sufficient already. Except for the rich women, all groups have activities in the rice fields all year-round. The rich women on the other hand have months wherein they do not have any activity, mainly in May and September.

Aside from rice cultivation there are other activities being done the whole year. As presented in table 4, livestock, sewing, and fishing, were mentioned by all groups. Other economic activities are being done by season. Vegetable growing is one example of a seasonal economic activity.

In terms of fishing as an economic activity, rich men collect of AA year-round. Rich women on the other hand only collect snails from January to February and almost no fishing activity. This is also the same with poor women who collect AA during the

months of December to January. Poor men like the rich men do collection of AA the whole year.

The areas where collection is done are different depending on the season. There are only two areas that both rich and poor men collect AA from: chi river, stream, swamp during the dry season, and rice-fields during planting or rice season.

Table 4 Summary of economic activities by socio-economic and gender group

Group	Gender	
	Men	**Women**
Rich	Rice farming Livestock Sewing Vegetable growing Fishing Forest food Wage labour Charcoal making	Rice cultivation Weaving Vegetables growing Livestock Forest food Housework Charcoal making Fishing
Poor	Rice cultivation Livestock farming Fishing Forest food Daily wage Wicker works Vegetable	Rice cultivation Sewing Weave cloth Weave mats Forest food Livestock Vegetables growing Fishing Housework

Migration. In all groups, migration was mentioned as happening only among young people, although poor families experience having other household members moving. There are two types of migration in the village. The first type is one characterized by a household member who goes to Bangkok or other provinces to work after the planting and harvesting season in his/her own village. The other type of migration is that wherein a household member has been working for a long time outside the village and only sends remittances to his/her family back in the village. It is only during festivals and special occasion when these "migrant" household member return to visit their families.

Health. As mentioned in the well-being exercises, generally the health condition in the village is in good. There has been no instance of serious ailment suffered by the villagers in all groups. The only most common illnesses or health problems the villagers experience are fatigue and colds that usually happen during the end of a season when the weather changes rapidly sometimes. Villagers also get very tired especially those from poor families during peak of farming activities.

Role of Aquatic Animals

Being close to perennial water and the presence of other aquatic systems in the village, villagers get a lot of benefits particularly from aquatic animals. One of the major benefits from the system is water but in general the villagers also benefit from the aquatic animals. Having mentioned it as one of the most important economic activities in the village, fishing or collecting aquatic animals evidently plays an important role to the villagers.

Source of food. Being far from the district and market, the availability of affordable food is very important to the villagers. In the summary of criteria for ranking the importance of AAs as presented in Table 6, majority of the criteria used were for consumption. Although it did not rank as number one reason, it was mentioned in all groups that one of the reasons why farmers collect AAs is to have food for their household. All groups consider the taste, versatility in cooking for women and it's preservability. Some households preserve AA that had been collected by fermenting or drying them. These processed AA will then serve as reserved food or ingredients for other dishes like papaya salad (*som tam*).

Alternative source of income. Since they are based in a farming area, the farmers spend majority of their time to farming activities. But the income from farming is sometimes not enough for the household particularly to those households belonging to the poor group. Resource-poor group with no or less land area for cropping needs other source of income. The availability of several aquatic systems in the area is an advantage for the villagers. Farmers collect AA mainly for additional income. As presented in Table 6, all three groups ranked the price of AA as the most important criterion. While for the group of poor men, the price factor came second to the one on accessibility (or easy to catch). The farmers would usually sell the collected AAs to the village. Sometimes a middleman would come to the area to harvest from trap ponds. This activity generates income which helps sustain the villagers until its time for harvesting rice.

Important Aquatic Animals

A huge list of important aquatic animals were produced during this exercise (see Annexes 3.1 to 3.4). The importance of these species was ranked according to several criteria like consumption and economic value. The different groups presented different list of important aquatic animals but overall most of the AA on the top most were wild aquatic animals (Table 5).

The selection of important species by socio-economic groups varies according to species. But most of the species selected by both poor and rich groups are big fishes. No non-fish AA was ranked highly by both groups apart from water bug (by rich women). Snakehead and catfish still ranked high followed by other small fishes and also coming from the wild. Species of barb was included in the top AA by the poor group.

In terms of gender factor, the selection is also different but most of the species selected are big fishes also. Both men and women groups in the two socio-economic group ranked big fishes high and of less importance are the small AA fish

species and non-fish species. Aside from the size, most of the species selected are available year-round and can be found easily in almost all aquatic systems.

Table 5 Summary of important aquatic animals by socio-economic group and gender

Group	Gender	
	Men	Women
Rich	Black ear catfish *Helicophagus waandersii* Walking catfish Eel Twisted jaw sheatfish Snakehead	Snakehead Yellow mystus Water bug Sheatfish Walking catfish *Ompok*
Poor	Snakehead *Ompok* Jullien's mud carp Common sheatfish Twisted jaw sheatfish Soldier river barb	Walking catfish Snakehead Siver barb Common sheatfish Eye spot barb Soldier river barb

Source. The important aquatic animals in this village can be seen in various areas in the village. The presence of a number of different aquatic systems makes these species more available in the area. The most common source of AA in the village is the river surrounding the village. The villagers have access to this river the whole year so supply of AA is not limited. Ponds and swamps are other sources of AAs in the area. These systems can provide AA to the villagers especially during the dry season. Rice-fields is another system where villagers can collect aquatic animals from, either for consumption or for income purposes. But the collection of AA from this system is only seasonal. One of the most common and probably the most important source of AA in the area is the trap pond system. Some of these systems was dug-out for other purposes but most of it now are playing a big role in AA collection both for consumption and income purposes.

Gear. Fishing gears in the village are very common in each household. In most houses different types of gear can be seen. As presented in annexes 4.1 to 4.4 there are a lot of fishing gears used. The type depends on the species to collect and who is using it. In this village the use of cast nets is very common especially in deep water bodies like river and swamp. Bamboo traps, gill nets are also being used to trap AAs. Women who collect AAs in this village use nets with handles like lift net, traps and sometimes by hand specially when collecting from rice fields.

Table 6 Summary of Different Criteria Used in Ranking the Importance of Aquatic Animals by Gender and Socio-Economic Group

Group	Gender	
	Men	**Women**
Rich	Good price Taste Preservable Catch Versatility in cooking	Good price Versatility in cooking Taste Preservable
Poor	Easy to catch Good price Taste Versatility in cooking Preservable	Good price Versatility in cooking Taste Preservable Easy to catch

Seasonality of Aquatic Animals

The seasons can dictate the quantity and quality of species in a particular system in the village. As presented by all groups (see annexes 4.1 to 4.4), the status of the different important AAs varies depending on the cycle of the season. In this village three distinct seasons were identified and relate to the quantity of the species. The different groups have different views on the seasonality of the different important species.

During summer the quantity of some important AA is abundant according to three groups except the rich men. For the rich men group almost all of the important species are less in terms of quantity. But for the three groups most of the species like snakehead and catfish are abundant during this season. Fishermen can easily get these species in shallow water like trap ponds and swamp during dry season. Most of the rich group do not go on fishing during this season because most of the system with water is far from their houses. Unlike poor group, both men and women, they go to areas where there is water and where AAs are concentrated.

During rainy season, most of the AA are abundant and it was mentioned by all groups during the exercise. During this period most of the villagers collect AA in the rice fields especially women. Men normally go to the stream and river during this period using cast net. Most of the villagers are busy during this period in the field but also they are busy collecting AA.

During the cold season, which is from late November to early February, majority of the important species are decreasing in population. Some species are not available and some get diseases during this time of the year. Among the important species, sheatfishes and ompok were the only species that are abundant during this period. Snakehead and catfish are limited and in some cases infected by disease (EUS).

Trends of Aquatic Animals

In general the community is traditionally consuming aquatic resources and also wild resources. In the beginning or even before the village was established, the resources were abundant and villagers were able to get the most from these resources. There were only a few villagers living in the area so there was an over supply of resources. However the amount of resources started to decline for several reasons. This can be due to man-made causes and some can be from the environment. At present, due to this continuing scenario aquatic animals are less in quantity, with some species becoming deficit in supply.

Factor affecting the trends of AA

Natural calamities. An uncontrollable 'shock' mentioned in the trends concerning aquatic animals is the occurrence of natural calamities. In past, a number of these calamities had affected the aquatic systems in the village. In some cases natural calamities could actually have a good effect. However, in other cases it also adversely affects the aquatic systems, and thus the livelihood of the villagers. Some of the "calamities" that could bring good effect on AA is flooding. This was mentioned several times in the trend illustrated by the villagers (see annexes 5.1 to 5.4). . During this period species from other systems go with the flow of the water. On the other hand this event could also have a negative effect on the AA as well as the systems. It was noted that some important aquatic animals started to decrease in quantity during the time when there was flooding. Sometimes the flood destroy the environment that is needed for the fish to grow or to spawn. It can also carry diseases that are harmful to the aquatic animals.

Pollution. There are two kinds of pollution mentioned in the PRA. One of the pollutants in this village resulted from the establishment of factories and industry near the big bodies of water wherein they use the river as their waste outlet. This mainly affects the environment of AA in the river causing the decrease in population. Another pollutant is agro-chemicals in the rice fields. Due to intensification of use of agricultural inputs and high dependant of farmers with these chemicals, the ecosystem in the rice-field was destroyed. The deterioration goes on with the continuous use of these chemicals.

Fishing/collection practices. Before, villagers used simple and traditional gears in collecting AA and farmers still had a choice in terms of what to collect in a given aquatic system. Nowadays, since the purpose of collection has also changed from subsistence to cash activity, modern fishing gears are being used for collection. Selection of species is no longer being practiced, i.e. even the juveniles and gravid females are now being collected. The introduction of harmful gears contributed to the rapid decline in the population of these important species.

Population. Increasing population in the village also affects the population of the species. Due to the increasing demand for fish, the AA can no longer reproduce.

Farmers Meeting

The last important activity of the PRA was the meeting with the farmers and some of the villagers. Although not all the participants attended the meeting, the activity was successful. This meeting was done after the group had translated all the outputs and collated the information. The team also made a simple summary of the outputs to show the differences between gender and well being. During the meeting some unclear issues were clarified with the farmers and participants checked and verified the interpretation done by the team. The villagers acknowledged that they also learned a lot during the exercises and they intend to use the data collected in planning for their village's development.

Annexes

PRA outputs

Seasonal Calendar

Annex 1.1 Seasonal calendar of rich men group

Activities	**Dec**	**Jan**	**Feb**	**Mar**	**April**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**
Climate	Cold		Cold & sunny	Sunny	Very sunny	Sun & rain	rainy	Heavy rains			Rain	Cold
Tradition/culture		New year	Sticky rice festival	Buddist festival Wedding	Songkran	Village festival		Buddist lent	Rice ceremony		End of Buddist lent	Roykrathon Wedding ceremony
Rice farming	Rice threshing		Stock hays		Sow seed	Seedling;fertilizer			Application of fertilizer		Harvesting	
Animal raising	Graze in the rice fields					Cut grass for livestock in the house					Graze in the ricefields	
Sewing	During free time or after working in the field											
Vegetable		Harvest		Harvest chilli							Sow seed/cultivate	
Fishing	Catch in chi river, swamp						Catch in ricefields, goote, swamp and chi river					
Forest food				Collect mushroom, bamboo shoot Collect insect								
Wage labour					Plough fields			Rice cultivation				
Make charcoal			Making charcoal									
Income/expenses	Busy-rice harvest Income from rice		Pay BACC Income from weaving		Busy rice cultivation		Income from weaving			Busy rice harvest sell rice		
Migration	Young people go to Bangkok											
Health		Happy			Happy	Common colds and flu						

Annex 1.2 Seasonal calendar of rich women group

Activities	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Climate	Cold	Cold & sunny	Sunny		Sunny & start to rain	Heavy rain →			Rainy	Rainy	Start to cool	Cold
Tradition/culture	New year	Rice festival	Buddist festival Wedding	Songkran	Monk ordained Wedding Rocket		Buddist festival	Rice festival		End of buddist lent	Buddist festival Wedding	
Rice farming	Sell rice ↔		Preparation of seedbed			Transplanting ↔				Harvesting ↔		Threshing ↔
							Fertilizer application ↔					
Weaving	↔							↔				
Vegetables	Harvest onion, chilli, bean, cucumber ↔											Planting
Livestock	Graze in the field ↔					Cut grass to supply for livestock in pen ↔				Graze in the field ↔		
Housework	Cleaning, washing clothes, cooking ↔											
Forest food	Cricket ↔		Ant eggs ↔		mushroom & bamboo shoot ↔		Cricket ↔					
Charcoal	↔											
Fishing	Collect snails											
Income/expenses	Sell rice		Pay BACC			Busy ↔				Busy harvesting rice ↔		
Migration	Back from Bangkok	Go to bangkok ↔		Back for festival		Back for planting	Go to Bangkok ↔				Back for harvest	
Health				Diarrhea ↔		Fever (Dengue) ↔					Common colds ↔	

Annex 1.3 Seasonal calendar of poor men group

Activities	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Climate	Very cold	Cold	Sunny	Very hot	Starts to rain	Raining		Heavy rains		Raining	Start of cold season	Cold
Tradition/culture	New year Wedding	Sticky rice ceremony	Buddist festival Wedding	Songkran day	Village festival Wedding	Rice ceremony Buddist lent				Buddist Katin festival End of buddist lent		
Rice cultivation	Threshing	Ploughing/sow seed	Care	Harvesting Ploughing	Planting		Fertilizer application	Care		Harvesting		
Animal raising	Graze in the field				Cut grass for the animals in pens						Graze in the field	
Fishing	Catching by cast net, gill net in Chi river, stream, swamp					Catch from rice fields and swamps						
Collecting food in forest					Bamboo shoot, insect, mushroom							
Daily wage						Rice cultivation			Collecting rice hays			
Wicker work	Wicker bamboo trap				Wicker trap, gill net, cast net							
Vegetables	Corn & chilli			Corn & chilli								
Income/expenses	Pay BACC					Income from rice cultivation Buy fertilizer Busy for rice cultivation	Buy rice			Harvesting rice		
Migration	Young people go to Bangkok											
Health			Diarrhea			Fever (Dengue)				Common cold		

Chai-ngam village

Annex 1.4 Seasonal calendar of poor women group

Activities	**Jan**	**Feb**	**Mar**	**April**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
Climate	Cold	Cold & sunny	Sunny	Sunny & raining	Start of raining	Heavy rains Flooding		Raining	Rain & windy	Cold	Very cold	
Tradition/culture	New year Village ceremony	Sticky rice festival	Buddist ceremony Wedding	Songkran	Village ceremony Wedding		Buddist lent Wedding	Rice ceremony		End of buddist lent	Buddist Katin Festival	
Rice cultivation	Threshing			Ploughing →			Take care	Fertilise →			Harvest →	
		Sell rice →		Sow seed	Cultivate →							
		Dry rice straw										
Sewing	←		→									
Weaving cloth												
Weaving mats	←		→									
Forest food	Snail		→		Mushroom, bamboo shoot →							
Buffalo/cow	Graze in the rice fields ↔				Cut grass for livestock in pens ↔			Graze in the rice fields ↔				
Duck/chicken	For eating ↔											
Vegetables	Chilli, corn, cucumber, eggplant											
Fishing	Collection											Collection
Housework	Washing clothes, cleaning, cooking											
Income/expenses		Buy rice →		Buy veges →	Busy rice cultivation →						Busy rice harvest →	
Migration	Come home to family	Work in Bangkok		Back for festival	Back for rice cultivation →			Work in bangkok →				
Health			Diarrhea		Common colds, red eye, fever (Dengue)				Common colds →			

Group Activity Profile

Annex 2.1 Activity matrix of rich men group

Activities	Name of Farmer					Total
	Boonjuab	Huadorn	Kong tong	Huadorn	Huadorn	
Rice cultivation	7	6	7	5		25
Animal raising	8	1	2	0		11
Sewing	0	8	0	6		14
Vegetables	0	1	3	2		6
Fishing	3	1	3	3		10
Forest food	0	1	2	2		5
Wage labour	0	0	0	0		0
Charcoal	2	2	3	2		9
Total	20	20	20	20		80

Annex 2.2 Activity matrix of rich women group

Activities	Name of Farmer				Total
	Samai	Gaasai	Huadorn	Huadorn	
Rice cultivation	5	6	3	4	18
Weave cloth,mats	1	2	2	2	7
Vegetables	2	1	2	3	8
Livestock	3	2	3	2	10
Housekeeping	2	2	2	3	9
Forest food	3	3	2	3	11
Making charcoal	3	3	1	2	9
Fishing	1	1	3	1	6
Total					

Annex 2.3 Activity matrix of poor men group

Activities	Name of Farmer					Total
	Huadorn	Seapsutho	Huadorn	Boonthai	Srichana	
Rice	6	5	6	5	5	27
Animal raising	0	3	0	2	3	8
Fishing	4	2	2	6	2	16
Forest food	2	2	3	3	3	13
Wage labour	3	3	4	0	2	12
Wicker work	0	0	0	3	0	3
Vegetable (corn,chilli)	3	3	3	1	3	13
Charcoal	2	2	2	1	2	9
Total						

Annex 2.4 Activity matrix of poor women group

Activities	Name of Farmer					Total
	Pirapark	Boonkoiy	Somrak	Wongprajan	Puntop	
Weave clothes	4	3	3	3	2	15
Rice cultivation	3	4	3	4	3	17
Weave mats	5	3	4	3	2	17
Sewing	0	0	0	0	3	3
Forest food	1	3	3	2	2	11
Housework	4	0	3	5	2	14
Livestock (bufflo)	0	3	0	0	0	3
Livestock (Cow)	0	0	0	0	2	2
Vegetables	2	2	2	5	2	13
Fishing	2	2	2	0	2	8
Total						

Role of Aquatic Animals

Annex 3.1 Identification and ranking of important aquatic animals by rich men group

Aquatic animals	Criteria					Total
	Good price	Taste	Easy to catch	Versatile	Preservable	
Snakehead	1	1	2	1	1	6
Walking catfish	2	1	2	1	1	7
Climbing perch	1		2	1	1	5
Swamp eel	2	2	2	1		7
Spotted spiny eel	1	1		1	1	4
Rasbora			1		1	2
Jullien mud carp			1	1	1	3
Acanthopis			1		1	2
Yellow mystus	1	1	2	1	1	6
Great white sheatfish	3	2		1		6
Irediscent mystus	1	1	2	1	1	6
Blotched snakehead					1	1
Stripped tiger nandid					1	1
Common sheatfish	3	2	0	1	0	6
Ompok kratensis	1	1	2	1	0	5
Twisted jaw sheatfish	3	2		1	1	7
Helicophagus waandersii	3	3	0	1	1	8
Tiger loach	1	0	0	1	1	3
Soldier river barb	2	1	1	1	1	6
Black ear catfish	5	3	0	1	1	10
Greater bonny lipped barb	1	1	1	1	1	5
Greater black shark	1	1	1	1	1	5
Red check barb	0	0	0	0	1	1
Giant snakehead fish	1	0	0	0	1	2
Gray feather back	1	0	1	1	1	4
Tail gar fish	0	0	0	0	1	1
Spotted feather back	1	0	1	0	1	3
Three spot gourami	0	0	0	0	1	1
Silver barb	1	1	0	0	1	3
Nile tilapia	1	1	0	0	0	2
Common carp	1	1	0	0	0	2
Snakeskin gourami	1	0	0	0	1	2
Siamese rock catfish	1	0	0	0	0	1
Giant bagarius	1	1	0	0	0	2
Whitelady carp	1	1	0	0	1	3
Eye spot barb	1	1	0	0	1	3
Armed spiny eel	2	1	0	0	1	4
Siamese river abramine	1	1	0	0	0	2
Siamese pangasius	1	1	1	0	1	4
Giant catfish	2	1	0	0	0	3
Smith barb	0	0	0	0	1	1
Red tail tinfoil barb	0	1	0	0	1	2
Freshwater prawn	0	1	0	0	1	2

Soldier river barb	2	2	0	0	0	4
Pangasius sp	2	2	0	0	0	4
Sand goby	2	1	0	0	0	3
Giant freshwater prawn	0	1	0	0	0	1
Common frog	2	0	0	0	0	2
Shelled turtle	2	2	0	0	0	4
Chi river catfish	1	1	0	0	0	2
Total	60	44	23	19	33	179

Annex 3.2 Identification and ranking of important aquatic animals by rich women

Aquatic animals	Criteria				Total
	Price	Preservable	Versatile	Taste	
Yellow mystus	3	1	2	3	9
Sand goby	1	1	1	1	4
Snakehead	3	0	4	2	9
Irediscent mystus	2	0	2	1	5
Ompok	3	0	2	2	7
Black eared catfish	2	0	1	1	4
Climbing perch	1	1	1	1	4
Greater black shark	1	1	2	1	5
Three spot gourami	0	1	0	0	1
Mystus	4	0	2	1	7
Armed spiny eel	1	0	0	0	1
Greater white sheatfish	1	1	0	0	2
Spotted spiny eel	1	0	1	0	2
Tiger loach	2	0	2	1	5
Yellow tail botia	2	0	1	2	5
Jullien mud carp	1	1	1	0	3
Soldier river barb	1	0	1	1	3
Common sheatfish	3	0	2	2	7
Blotched snakehead	1	0	1	1	3
Walking catfish	3	0	2	2	7
Nile tilapia	2	0	1	0	3
Common carp	1	0	1	0	2
Snakeskin gourami	1	0	0	0	1
White lady carp	1	1	0	0	2
Tail gar fish	2	0	1	0	3
Spotted feather back	1	0	1	1	3
Gray featherback	1	0	1	1	3
Red cheek barb	1	1	0	0	2
Siamese rock fish	2	0	0	0	2
Siamese pangasius	1	0	2	1	4
Siamese tiger fish	2	0	0	0	2
Stripped tiger nandid	1	1	1	2	5
Smith barb	1	0	0	1	2
Swamp eel	2	0	1	0	3
Chao phraya giant catfish	0	0	1	0	1
Red tail tin foil barb	0	1	1	0	2

Silver barb	1	0	1	1	3
Giant snakehead	1	0	1	1	3
Freshwater prawn	1	0	1	1	3
Apple snail	1	0	0	0	1
River snail	1	0	2	0	3
Snail	1	0	1	2	4
Snail	2	0	1	2	5
Snail	1	0	2	1	4
Crab (black rice)	1	0	1	2	4
Turtle	1	0	1	2	4
Frog (small)	1	0	1	1	3
Low land frog	2	0	1	3	6
Bull frog	0	0	1	1	2
Insect	2	0	2	3	7
	2	0	2	1	5
Giant water bug	3	0	2	3	8
Total	76	11	59	52	198

Annex 3.3 Identification and ranking of important aquatic animals by poor men group

Aquatic animals	Criteria					Total
	Good price	Taste	Versatile	Easy to catch	Preservable	
Black eared catfish	3	2	1	0	0	6
Greatwhite sheatfish	2	1	2	1	0	6
Mystus sp	2	1	2	1	0	6
Helicophagus waandersii	2	0	2	1	0	5
Twisted jaw sheatfish	2	2	2	1	0	7
Common sheatfish	2	2	2	1	0	7
Ompok krattensis	2	2	2	2	0	8
Yellow mystus	2	1	1	2	0	6
Irridescent mystus	1	1	1	2	0	5
Soldier river barb	2	2	1	1	1	7
Spotted feather back	1	2	1	2	1	7
Gray featherback	1	1	1	2	0	5
Greater bony lipped barb	1	2	1	1	1	6
Greater black shark	1	2	1	1	1	6
Silver barb	1	1	1	2	1	6
Snakehead	1	2	2	2	1	8
Walking catfish	1	1	1	1	1	5
Spotted spiny eel	1	1	0	1	0	3
Armed spiny eel	1	1	0	1	0	3
Swamp eel	2	1	0	1	0	4
Climbing perch	0	1	0	2	0	3
Sand goby	1	0	0	1	0	2
Three spot gourami	0	0	0	2	0	2
Jullien's mud carp	0	1	2	2	2	7
Osteochilus pidocephaliochthys	0	0	2	2	2	6

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White lady carp	0	0	0	1	1	2
Yellow tail botia	2	1	0	0	0	3
Siamese rock catfish	1	1	0	0	0	2
Stripped tiger nandid	0	0	0	1	0	1
Kryptopterus cheveyi	2	1	0	0	0	3
Rasbora	0	0	0	2	1	3
Freshwater gar fish	1	0	0	1	0	2
Siamese river abramine	0	0	0	1	0	1
Siamese pangasius	2	1	0	1	0	4
Freshwater prawn	1	1	0	2	0	4
Common lowland frog	1	1	0	0	0	2
Small frog	1	0	0	1	0	2
Giant snakehead	0	1	0	0	0	1
Pangasius spp	1	1	0	0	0	2
Nile tilapia	0	0	0	1	0	1
Common carp	0	0	0	1	0	1
Eye spot barb	0	0	0	1	0	1
Acanthopis	1	0	0	1	0	2
Siamese glass fish	0	0	0	1	0	1
Smiths barb	0	0	0	1	0	1
Giant bagarius	1	1	0	0	0	2
Snakeskin gourami	0	0	0	1	0	1
Silver barb	0	0	0	1	0	1
Barb	0	0	0	2	1	3
Black rice crab	0	0	0	2	1	3
Giant water bug	1	1	0	0	0	2
Water beetle	0	1	0	0	0	1
Soft sheeled turtle	2	1	0	0	0	3
Chi river catfish	2	1	0	0	0	3
Total	50	45	28	55	15	193

Annex 3.4 Identification and ranking of important aquatic animals by poor women

Aquatic animals	Criteria					Total
	Good price	Versatile	Preservable	Easy to catch	Taste	
Walking catfish	3	3	3	1	3	13
Climbing perch	0	2	2	1	2	7
Snakehead	2	2	2	2	2	10
Silver barb	3	2	1	1	2	9
Rasbora	0	1	0	2	0	3
Nile tilapia	0	1	2	1	2	6
Snakeskin gourami	0	1	1	1	1	4
Common carp	0	1	1	1	0	3
Jullien's mud carp	2	1	1	1	1	6
Siamese pangasius	0	1	1	1	1	4
Mystus Irediscent	0	1	1	1	1	4
Giant snakehead	2	1	1	0	1	5
Small scale mud carp	1	0	2	0	0	3
Red tilapia	0	0	2	0	0	2
Red tail tin foil barb	3	1	0	1	2	7

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Common sheat fish	3	2	1	0	2	8
White lady carp	0	0	2	2	0	4
Sand goby	1	0	1	0	0	2
Ompok krattensis	3	0	0	0	1	4
Spotted feather back	2	1	2	0	0	5
Gray featherback	0	1	0	0	0	1
Spiny eel	0	0	0	2	0	2
Soldier river barb	3	2	0	0	2	7
Greatwhite sheatfish	1	0	1	0	0	2
Yellow mystus	3	0	1	0	0	4
Yellow mystus	3	0	0	0	2	5
Moon river catfish	0	2	0	0	0	2
Siamese rock fish	0	1	0	0	1	2
Blotched snakehead	0	2	0	0	0	2
Eye spot barb	0	2	2	2	2	8
Kryptopterus cheveyi	0	0	1	2	0	3
Twisted jaw sheatfish	0	2	0	1	1	4
Siamee river abramine	3	0	0	0	2	5
Black eared catfish	0	0	1	1	0	2
Hoeven slender carp	3	1	0	0	2	6
Freshwater prawn	3	0	0	0	2	5
Common skimmer	0	2	0	0	2	4
Mole crickets	0	1	0	0	0	1
Black rice crab	0	1	1	0	0	2
Stripped tiger nandid	0	1	1	0	0	2
Freshwater gar fish	2	1	0	1	0	4
Common lowland frog	3	0	1	0	1	5
Insect	0	2	0	0	1	3
Snail (pond)	2	0	0	0	0	2
Snail (apple)	2	0	0	0	1	3
Total	**53**	**42**	**35**	**25**	**40**	**195**

Aquatic Animals Seasonality

Annex 4.1 Perception of rich men group on the seasonality of important aquatic animals

	(Feb – May)				June - October				November - January			
Aquatic animals	Amount	Gear	Who	Where	Amount	Gear	Who	Where	Amount	Gear	Who	Where
Black ear catfish	Double	Gill net cast net	Adult men	Chi river	3 times	Fish hook	Adult men	Chi river	Single	Fish hook	Adult men	Chi river
Helicophagus waandersii	Single	Gill net cast net	Adult men	Chi river	Double	Trap	Adult men	Chi river	Triple	Gill net	Adult men	Chi river
Walking catfish	Single	Cast net	Adult men	Swamp goote pond	Triple	Electric Trident, cast net, fish hook, trap hole	Adult men	Stream, rice fields	Double	Trap hole, bamboo trap, pumping pond	Adult men	Stream, rice fields, trap ponds
Eel	Single	Bamboo trap	Adult men	Goote pond swamp, trap pond	Triple	Bamboo trap, fish hook	Adult men	Goote pond, swamp, trap pond	Double	Spear, bamboo trap	Adult men	Goote, trap pond, swamp
Twisted jawsheatfish	Single	Gill net fish hook	Adult men	Goote pond, Chi river	Double	Trap net	Adult men	Chi river	Triple	Fish hook	Adult men	Chi river
Snakehead	Single	Cast net fish hook	Adult men	Goote pond, swamp, trap pond	Triple	Electric, trident, trap (wood), fish hook	Adult men	Goote pond, swamp, stream, rice fields	Double	Trap hole, fish hook	Adult men	Rice field, stream, swamp, and canal

Annex 4.2 perception of rich women group on the seasonality of important aquatic animals

Aquatic animals	Summer (February – May)				Rainy (June – September)				Winter (October – January)			
	Amount	Gear	Who	Where	Amount	Gear	Who	Where	Amount	Gear	Who	Where
Snakehead	Triple (Abundant)	Cast net, fish hook, pumping pond, trap	Both men & women; children	Goote pond, swamp, stream	Double	Electrofishing, cast net, bamboo trap, trident, knife	Men	Rice field, stream, swamp	Single	Trap hole, gill net, cast net, trap	Men	Stream, swamp
Yellow mystus	Single	Refuge, trap, big gill net	Adult men	Chi river, stream	Triple (Abundant)	Fish hook, big bamboo trap, gill net	Men	Rice field, stream, swamp	Double	Fish hook, cast net, bamboo trap	Men	Chi river, stream, swamp, canal, small lake
Water bug	Lacking				Triple	Dip net, electro fishing	Women	Rice field, swamp	Lacking			
Sheatfish	Double	Refuge trap, cast net, big gill net, gill net, fish hook	Adult men	Chi river, stream, swamp, canal	Triple (Abundant)	Fish hook, gill net, cast net, refuge trap	Men	Chi river, swamp, stream	Lacking			
Walking catfish	Triple (Abundant)	Cast net, pump pond, trap, gill net, fish hook	Adult men	Goote pond, swamp, canal, chi river	Double	Electro fishing, cast net, gill net, knife, bamboo trap, trident	Men	Swamp, lake (small), chi river, canal	Single	Trap hole, bamboo trap, cast net, gill net	Men	Chi stream, swamp, rice fields
Ompok	Single	Cast net, gill net (big)	Adult men	Chi river, stream, swamp, canal	Triple (Abundant)	Trap, gill net, fish hook, cast net	Men & women	Swamp, stream, chi river, paddy	Double	Trap, gill net, bamboo trap, cast net	Men	Stream, chi river, swamp

Annex 4.3 Perception of poor men group on the seasonality of important aquatic animals

Aquatic animals	March – May				June - October				November - February			
	Amount	Gear	Who	Where	Amount	Gear	Who	Where	Amount	Gear	Who	Where
Snakehead	Triple (abundant)	Pump water, cast net, hook	Men & women, children	Pond, chi river, goote, swamp	Double	Hook, cast net, trident, torch	Men and children	Rice field, swamp, goote, floodplain	Single	Bamboo trap, trap hole, fish hook, trident	Men & women; children	Rice fields, swamp
Ompok	Double	Pump, dip net, gill net	Men & women, children	Pond, chi river, goote, swamp, paddy	Triple (abundant)	Gill net, bamboo trap, fish hook	Men	Chi river, goote, trap hole, swamp	Triple	Bamboo trap	Men & women	Floodplain, goote, chi river, swamp
Jullien's mud carp	Triple	Gill net	Men	Chi, goote	Abundant	Gill net, bamboo trap	Men	Goote, chi river, swamp	More abundant	Bamboo trap, gill net, cast net	Men	Chi river, goote, swamp
Common sheatfish	Double	Gill net, fish hook	Men	Chi river	Single	Gill net, bamboo trap, fish hook	Men	Goote, chi river, swamp	Triple	Fish hook, gill net	Men	Chi river
Twisted jaw sheatfish	Single	Gill net	Men	Chi goote	Lacking				Double	Fish hook, gill net	Men	Chi river
Soldier river barb	Double	Gill net, cast net, fish hook	Men	Chi goote	Single	Fish hook, bamboo trap	Men	Chi river	Double	Gill net, fish hook	Men	Chi river, goote

Chai-ngam village

Annex 4.4 Perception of poor women on the seasonality of important aquatic animals

Aquatic animals	March - May				June - October				November - February			
	Amount	Gear	Who	Where	Amount	Gear	Who	Where	Amount	Gear	Who	Where
Walking catfish	Triple	Both men & women; children	Water pump, dip net, trap net	Pond draining	Triple	Trap, hook, gill net	Adult men & young men	Rice fields, chi river, stream, swamp	Double	Trap hole, trap, gill net	Men & women	Rice fields
Snakehead	Triple	Both men & women; children	Water pump, cast net, bamboo trap, dip net	Pond draining	Double	Hook, trident, bamboo trap, gill net	Adult men	Swamp, rice fields, stream, canal	Triple	Trap hole, bamboo trap, gill net	Men and children	Rice fields
Silver barb	Triple	Men & women	Gill net	Pond draining	Triple	Gill net	Adult men	Chi river, stream	Double	Bamboo trap, gill net, net	Men & women	Chi river, stream
Common sheatfish	Triple	Men	Gill net	Chi river, stream	Triple	Gill net	Adult men	Chi river, stream	Double	Fish hook, gill net	Men & children	Chi river, stream
Eye spot barb	Double	Men	Gill net, cast net	Chi river, stream	Triple	Gill net	Adult men	Chi river, stream	Single	Bamboo trap, trap, gill net	Men	Chi river, stream
Soldier river barb	Single	Men	Fish hook, gill net	Chi river, stream	Single	Hook, gill net	Adult men	Chi river, stream	Double	Fish hook	Men	Chi river, stream

Chai-ngam village

Aquatic Animal Trends

Annex 5.1 Perception of rich men group on the trends of important aquatic animals

Annex 5.2 Perception of rich women group on the trends of important aquatic animals

Aquatic animals	**40 years ago**	**30 years ago**	**20 years ago**	**10 years ago**	**5 years ago**	**present**
Snakehead	- Catch to eat - Uses old fishing gear - No chemicals **9**	-Fish decreased because of fishermen catching for sale - Used old gear **4**	**3**	- Pollution from industry - Catch for sale - Disease - Use of chemicals **2**	**1**	**1**
Yellow mystus	**8**	**5**	**3**	**1**	**2**	**1**
Water bug	**10**	**4**	**3**	**2**	**1**	-Decrease because electrofishing -Catch for sale **0**
Sheatfish	**9**	**4**	**3**	**2**	**1**	**1**
Walking catfish	**8**	**5**	**3**	**2**	**1**	**1**
Ompok	**7**	**6**	**2**	**2**	**1**	**1**

Annex 5.3 Perception of poor men on the trends of important aquatic animals

Annex 5.4 Perception of poor women on the trends of important aquatic animals

Aquatic animals	40 years ago	30 years ago	20 years ago	10 years ago	Present
Walking catfish	Many, floods Catch to eat Uses old fishing gear 6	Many, floods Catch to eat Uses old fishing gear 5	Catch for sale Many fishermen Uses modern gear 3	Polluted water Drought Fish disease 2	Fish culture Floods Catch for sale 4
Snakehead	Many, floods Catch to eat Uses old fishing gear 5	Many, floods Catch to eat Uses old fishing gear 5	Catch for sale Many fishermen Uses modern gear 3	Polluted water Drought Fish disease 2	Fish culture Floods Catch for sale 5
Silver barb	Many, floods Catch to eat Uses old fishing gear 6	Many, floods Catch to eat Uses old fishing gear 5	Catch for sale Many fishermen Uses modern gear 3	Polluted water Drought Fish disease 1	Fish culture Floods Catch for sale 5
Common sheatfish	Many, floods Catch to eat Uses old fishing gear 6	Many, floods Catch to eat Uses old fishing gear 5	Fast reproduction (so less decrease) 4	Polluted water Drought Fish disease 1	Fish culture Floods Catch for sale 4
Eye spot barb	Many, floods Catch to eat Uses old fishing gear 6	Many, floods Catch to eat Uses old fishing gear 5	Fast reproduction (so less decrease) 4	Polluted water Drought Fish disease 1	Fish culture Floods Catch for sale 4

Soldier river barb	Many, floods Catch to eat Uses old fishing gear 6	Many, floods Catch to eat Uses old fishing gear 5	Fast reproduction (so less decrease) 5	Polluted water Drought Fish disease 0	Fish culture Floods Catch for sale 4