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

Participatory Rural Appraisal in Ban Nong Pham

Case Study 9

(PRA Report from 2001)

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Nong Pham Village

Introduction

Background

The status of aquatic systems in this province particularly in this village has not been established. For an outsider, knowing the general background of the village is very important. The information to be gathered can be used to design new programs or in exploring 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 the 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 this main objective 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 and facilitate the identification of issues in the community.

Participatory Rural Appraisal Team

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Schedule of Activities

Collection of secondary data for this village was done while data collection in another village within the province was on-going. This became possible since the three selected villages came from one district only. Like with the other PRA exercises, the area was visited first for ocular inspection of the topography and the distance from the perennial water bodies.

The actual visit of the village was done on the first day. During this time the team was able to generate information about the village and its history. Participants for the next day's activities were also identified. The rest of the schedule was devoted to generating more information about the different activities in the village. The last day of the workshop was for presentation of the results from the three days' exercises.

Table 1 Schedule of Activities during the PRA Workshop in Ban Nong pham

Date	Activities
26 June 2001	Introduction of project with the village head Village profile Identification of PRA participants
27 June 2001	PRA exercises (Rich group)
28 June 2001	PRA exercises (Poor group)
29 June 2001	Processing of PRA outputs Presentation of PRA outputs

Ubon Ratchathani Province

Province description

The province is located between 16^0 10-$16^0 15^1$ latitude north and $104^0 52^1$ – $105^0 24^1$ longitude east. On the average large part of the area is on 68 meters above sea level. Land is sandy loam and with a total area of 15700 km^2 and has a distance of 630 km from Bangkok. The province can be reach by car, train and domestic plane.

On the boundaries, from the north this province is sharing border with Yasothon, Amnatcharoen and Mukdahan provinces. The province of Srisaket and part of Cambodia is located on the southern part of this province. The Laos People's Republic is situated on the eastern side and Yasothon and Srisaket on the west. The province has a total of 18 districts and 5 sub-district. A total of 2243 villages with 1,679,867 population. The whole province has a total number of households of 262208. Located on the Basin of Korat, the main sources of income are rice production, crops and other gardening activities.

Water resources.

Kong river, Chi river, Moon river, Lamsay By, Lamsay Bok, Lamdom Noi, Lamdom Yai.
2 large irrigation (Sirithon Dam and Pakmoon Dam)
11 sub irrigation system
100 small irrigation (spillway 63, reservoir 63 projects that pump water for 37 electric projects.

Rainfall: 1980.7 mm per year
Rain: 146 days (Data source 1994)

District Description

Muangsamsib District

The district is located on the north of Ubolratchathani province 34 km away from the main province. The district is sharing boundaries with several provinces. On the northern side, its connected to Muang district and Huataphan district of Amnatcharean province. Amphue Muang of Ubol province and Khangnai district of Amnatcharoan province is located on the southern border. Amphue Muang of Ubol province and Phana district of Amnatcharoan province are the boundaries on the eastern

border. In the western border, Khuangnai of Ubol province and Hua Thaphan of Amnatchareon are the boundaries.

Total land area: 927.587 km2
Sub-district: 14
Villages: 154 villages
Total number of households: 14,399
Total population: 82,927

Main sources of income: Rice farming, crop, vegetable gardening (chilli), and livestock
Topography: plain and flat 0-2% slope

Natural water bodies: Lamsaybok, Lamsayby, Phrarode stream, under ground water (60 meter depth) – cannot go deeper because of saline water.
Rainfall: 1600 mm per year

Village Description

Distance from urban area : 10 km
Number of households:85 households
Occupations: Rice farming; livestock; handicraft (bag making) and wage labour

Migration: Young people and adult go to Bangkok or nearby provinces to work after planting and harvesting season

Topography: Flat-plain near Hui Phraroad (Stream)

Soil type : Sandy loam

Water resources:
Huiphraroad in the south (1.5 km far)
Norng Dam on the west (2 km far)

Selection Process for the Village

The basis for selection of the village is its proximity to the urban area. Another factor is that the province is representative of a type II site, which is flooded during a short period. After identifying the province for this type the selection for the village was carried out.

The village was selected after visiting the district office and assessing the information given about the area. During the visit aside from introducing the team to the commune/district office, a brief interview was done with the officers in the station. The interview focused on the general information about the area, topography, agriculture situation and aquatic resources. After the interview the group selected the village and visited the area to clarify initial information gathered. They were also introduced to the villagers. The bases for selection of the village were: (1) the village is

representative of a backward village, (2) the number of households, (3) its distance from the river, and (4) the abundance of water resource.

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 activity 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 illustrates 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 how important each aquatic animal is 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 understood.

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

Process

The workshop was divided into three parts. The first part was done with the key informants during the first day. The mapping (village map) exercise was done with a group of key informants in the village headed by the village headman who provided a list of all households in the community. This was used in the well being ranking activity. Names were written down in cards that the farmers or informants grouped according to what they thought is the well being of the farmer/villager.

Using the results of the well being ranking, participants for next day's activity were identified. 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.

The group of better-off household were invited first and did the exercises and generated a lot of good information. On the following day the group of poor household was invited and did the same activities.

In each group, the team separated the men and women and asked these subgroups to do the same activities. At the end of the exercises, the facilitators compared the results from the different groups. All the outputs from the first to the third day activities were then collated and summarised by the team. During the last day of the visit, validation and presentation of outputs were done with the villagers.

Setting the Context

Mapping the Current Resource Context

Generally the village is a plain and flat area that is close to a big stream in the southern part of the village (see Figure 1). The community is basically an agricultural village wherein much of the land is utilized for rice cultivation. During summer other farmers grow other crops.

Water is abundant in this village. Aside from the stream that surrounds the village there are four small swamps that are rich in aquatic resources. Trap ponds and culture ponds are also present in the village.

Services in the village are also available. Water supply was built in the village for drinking purposes. There are also a number of shops where the village get their basic needs. Temples and schools, which are very important to the children, are also present.

Mapping the Development Context

The farmers started the timeline with the period when the village was first established. The time line illustrated the different major events that happened in the village from the past to present. Some of the events brought a negative impact and some led to developments in the village.

The village started with 10 households that migrated from other villages in 2184. This was also the year when the first temple in the village was established. From that period not much development happened until 2501 (1958) when the first radio was introduced to the village. A year after that, a laterite road was constructed and from this time on more developments happened in the village. The first rice mill was established three years after the road construction. With this development, villagers were able to mill their rice without doing it manually and the hard way. The villagers also did not have to go to another place for rice milling.

Another development in the village is the installation of electricity in 2519 and it was followed by the construction of the school the following year. Aside from the schools, community shops and a church were also built later.

There was no information given on the condition of agriculture during the early days of the village. One of the first and major events that happened related to agriculture was the introduction of fertilizer in 2501. An increase in the production of rice was observed after this event. In 2524 (1981), the first hand tractor was used in the village in cultivating the land and since that year other villagers started acquiring hand tractor for their land. At present, so much development had happened in the village, with the practice of modern agriculture and intensified use of chemicals.

Development in fishing and aquaculture was not mentioned in the time line. Even the condition of the aquatic system in the early years was not illustrated in the diagram. Up to the present times drought, floods and diseases were the common problems in aquatic life in this village. The trend of fisheries is declining due to several factors.

Figure 1 Mapping the Current Resources of the Village (Village map)

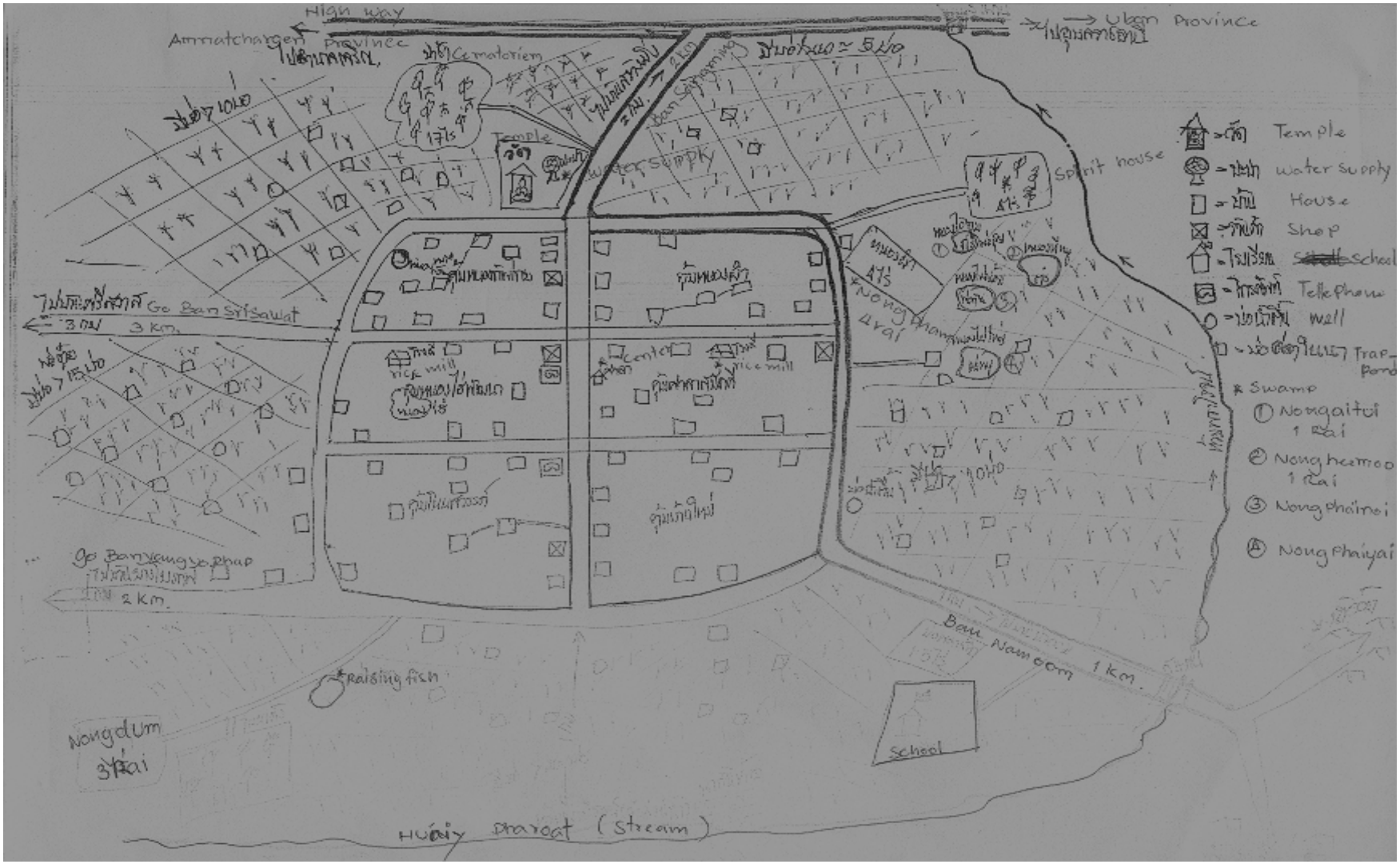
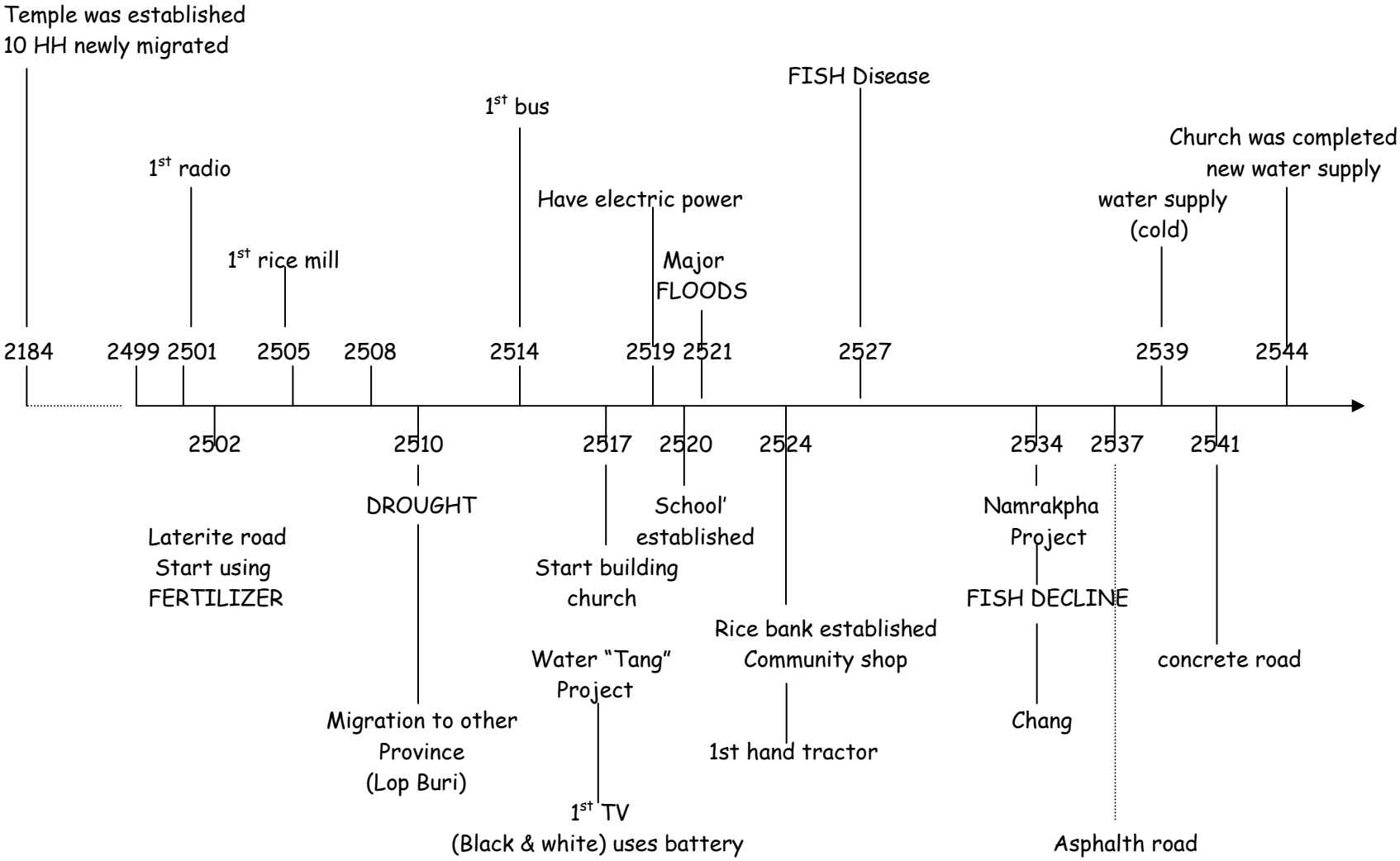


Figure 2 Mapping the Development of the Village (Timeline)



Mapping the Social Context

The socio-economic levels of the people in this village are not homogenous. There are some households that can be considered very rich and also some families that can be considered the poorest. Majority of the villagers belong to the middle group. During the PRA exercise the villagers were able to group all the households into five levels. Different variables were used in the grouping of the villagers and are presented in Table 2. Villagers developed their own characteristics for each level. Unlike in other villages, very few variables were common in the two trials conducted for the well-being ranking. The two trials provided two different sets of criteria in each level.

Socio-Economic Characteristics

Land ownership. Land is given more weight in grouping the well being of households in this village. It is very obvious that farmers who received big tracts of land are better-off and those with little are from the poor families. During the exercise participants indicated that poor families normally do not own land. The better-off families usually own 30 to 70 rai of land. There was no clear information about the size of land for the middle group and better-off families.

Sources of income. The amount and the frequency of gaining income also dictate the well being of households in the village. Rich or better-off families in the village generally have regular source of income either from their job or from their business. In this village the main source of income is rice farming. For poor families who do not have land, they get their income from wage labour. Sometimes, they do not have any income at all.

House. Ownership and quality of house was also used to gauge the well being of households in the village. Some poor families do not have their own houses and are just sharing house with another family. If a family has a house, most of the time it is made of cheap materials like leaves and bamboo. The quality of house of the better-off families was not mentioned in the exercise.

There were other variables used in grouping the well being of the households in this area. Number of livestock was also considered but not in all level. For the middle group (to which majority of the families belong), livestock are available. The kind of available transport was also mentioned in some of the groups. Common assets like farming equipment, appliances in the house, shops and rice mills was also be used in gauging the well being of a household.

Table 2 Well being Ranking in Ban Nong pham

Rank	Group of men	Group of women
I	Not have permanent house (Staying with other relatives) Landless Mainly working for others as source of income	Mostly earning daily wages Land less No permanent house
II	Little land (< 10 rai) Newly separated family (new house) Some just lost their head of the household Earning from daily wage Some migrating to work in Bangkok	Have land 8-15 rai Some have debt Mostly rice farmers Livestock 2 – 3 Big household member and studying (not earning income) Some are wage labour
III	Little land (6 – 10 rai) Less livestock Have regular source of income Also do trading	Government officials Getting remittances from relatives in Bangkok Traders Some members are government officials Have some loans Have car as transport Some have rice mill Raising livestock (cow and buffalo)
IV	Rice farming Much regular income Do not lack of money Land holding of 10 – 30 rai Can lend money to others Have car Some are government officials	Land holding of >30 – 70 rai Can sell rice production Can lend money to others Can save some money Relative working as government officials No loans Few household member Have rice mill
V	Have rice mill Raising pigs for sale Can sell rice production Land holding of 30 rai Saving money Some household member works for the government	

Activity Profile

Majority of the households in the village gain income from rice farming. This is one of the reasons why all groups ranked rice cultivation as the most important activity

in the village. The number of activities and priorities of different groups differ as illustrated in Table 3. The list of activities from the men group is longer compared to the list of women's activities.

Unlike in other villages, all the groups in this village did not include household activities as one of the most important to them. All the groups only mentioned productive activities and generally related to agriculture.

Raising fish is important only with the group of rich men while the rest of the group did not even include it in their list. In terms of collecting AA, only poor women did not mention it.

Table 3. Summary of Important Activities in the Village

Economic Group	Gender	
	Men	Women
Rich	Rice cultivation Livestock Raising fish Vegetable Charcoal making Daily wage Wickerwork Capture fish* Collect wood*	Rice farming Livestock Fishing Chilli
Poor	Rice cultivation Trading Livestock Daily wage Collect forest food Construction* Capture fish* Vegetables	Rice cultivation Daily wage Livestock Crocket handback Vegetables

Seasonality

The seasonality diagram illustrated the situation in the village within a year. The groups have different calendars and showed differences in their activities. All the groups used the same month to start their calendar, which is January. Differences in perception as influenced by gender and well-being group were clearly illustrated in the diagrams produced during the PRA workshop (see Annexes 1.1. to 1.4)

Weather. The perceptions about weather by the four groups are similar. The village experience three distinct seasons in a year. The cold season starts in October and ends in early March. The peak of the cold season is between December and January. For summer, which is the shortest season, the climate begins to get warm from March and the peak is in April when most aquatic systems become dry. The rainy

season follows summer and is the longest season in the year. Rain will start coming towards the end of April or beginning May then finished in October or sometimes in early November. Flooding was mentioned by both rich and poor men and is normally experienced by the village during the period of August to September. This is also the peak of the rainy season in the area.

Tradition and culture. Festivals and celebrations are some of the ways to know the culture in a given area. In this village there are a lot of festival-related activities that go on. Majority of the celebration is about their religion and traditional beliefs. Association with a socio-economic group is not a limitation in celebrating different festivals in the village. As presented in Annex 1.1 – Annex 1.4, all of the groups celebrate the same festivals. For the month of June, which is the busiest period during the farming season, three groups (rich men & women, and poor women) do not have any cultural activities or festival. In the illustrations of seasons, men have listed down a number of festival activities while rich and poor women only mentioned the New Year and Buddhist lent.

Economic activities. Having a large area of rice fields, it can be easily deduced that the most important economic activity in this area is most likely rice farming. In all groups rice cultivation was mentioned as an economic activity. The number of economic activities listed by both rich and poor men are greater then the women group. The economic source of women in this village is very limited.

In rice cultivation, the activities of the different groups also differ during the year. In Annexes 1.1 to 1.4, poor men perform work related to rice cultivation for almost the whole year. For rich men they start working in February but not much activity in June to August, which is the peak season of activities for poor men. For women, both groups start working in April, from ploughing the field to rice harvesting in December.

Among the different economic activities listed, only livestock rearing is done for the whole year. During rainy season most of the livestock are in pens and farmers collect grasses and food in the field. During the dry season farmers let their livestock graze in the field. Vegetable crop is also seasonal in the village. As mentioned by all groups, most of the farmers grow crops like chilli that are cultivated during summer after rice harvesting.

In fish culture most pond operators harvest during summer from January to March. This is in preparation for the next rainy season so new stock will be put in the system. For capture fisheries, collection is done by rich men during the rainy season. However, poor men collect almost the whole year. Poor women do not have fishing activities while rich women collect AA occasionally during dry season and rainy season.

Table 4 Summary of Economic Activities in the village

	Gender	
Economic group	Men	Women

Rich	Rice cultivation Livestock Vegetable crop Rice-fish Fishing Fish culture Collect forest food Handicraft Charcoal making Wage labour	Rice cultivation Planting chilli Livestock Capture fishing
Poor	Rice cultivation Livestock Trading Vegetable crop Construction Catching fish Collect forest food Wage labour	Rice cultivation Vegetable crop Livestock Daily wage

Migration. Migration is happening in all groups. There are two types of migration in the village. Some member of the household leave the area and commonly go to Bangkok to work as labourer during the end of farming season and only come back when farming starts. Other villagers migrate to other places for permanent work and just send remittances to their family like what was mentioned by the poor women group.

Health. Generally the health condition of the village is normal. Villagers can get ordinary colds and fever regardless of the socio-economic group. Sickness normally occurs during the end of season or changes in the weather. During farming season most of the villagers are tired especially poor families since they need to work more in the field than the rich group.

Role of Aquatic animals

Aquatic animals are playing a very significant role in the village's livelihood. Although was not ranked as the most important activity, Fishing is considered as another economic activity for them. The regular flooding and the presence of the different aquatic systems make the AA almost available the whole year. Because of this situation access to the AA resources are not limited and so villagers are really benefiting from it.

Important aquatic animals

All groups were able to identify and ranked the most important species in the village. The list of aquatic animals present in the village is presented in annexes 3.1 to 3.4. The criteria in ranking the importance were also presented. In all groups as summarised in table 6 most of the selected important species are big fishes and

commonly found in the wild. Snakehead, catfish, climbing perch were always ranked high in this village.

Between socio-economic groups, the selection of species is almost the same. There are a lot of common species selected by both groups that are similar although was not ranked the same. The only difference in terms of the selection of species between socio-economic groups is that the poor group did not rank non-fish species as high as the rich group.

Comparing the selection of species in terms of the gender variable, the composition of species in both groups also has a lot of similarities, particularly the first three highest ranked species. Overall there were no cultured species selected as most important in the village.

Table 5 Summary of Important Aquatic Animals in the Village

Economic group	Gender	
	Men	Women
Rich	Snakehead Walking catfish Snakeskin gourami Climbing perch Freshwater prawn* Silver rasbora*	Walking catfish* Silver rasbora* Climbing perch** Frog** Snakehead Spotted spiny eel
Poor	Snakehead* Climbing perch* Walking catfish** Golden little barb** Swamp eel** Spotted spiny eel	Snakehead Climbing perch Walking catfish Snakeskin gourami Grey featherback Siamese riverine abramine

Source.

In the village as shown in Figure 1, there are a lot of water resources that serve as the place for collection of these important species. The big stream the almost surround the village can provide a huge amount of aquatic animals to the villagers whole year since the water here do not dry up. There are 4 small swamps in the village where wild aquatic animals thrive. This is the place where mostly women and children go to collect AA. Trap ponds in the rice fields are a good source of important aquatic animals especially during summer. Most trap ponds are pumped dry during summer. The household ponds, and the rice fields also serve as breeding grounds for some important aquatic animals.

Gear

Collection of aquatic animals in the village can be done using simple gears. In the seasonality calendar of aquatic animals were different gears were also identified, a lot of gears are used by farmers. Some of the gears are made from local resource like the

traps and baskets. Cast net is the most common gear used in the village especially by men and when who collect species in not-so shallow water and big bodies of water. In the rice fields and trap ponds small gears like hook, traps, dip net are some of the gears used. Some villagers also use their hands in collecting small aquatic animals like crabs, shrimp, tadpole etc.

Table 6 Summary of criteria used in ranking the importance of aquatic animals

Economic group	Gender	
	Men	Women
Rich	Taste Good price Availability Preservability	Taste Versatility in cooking Availability Good price Breed naturally
Poor	Availability Taste Good price Preservability	Versatility in cooking Good price Availability Preservability Breeds naturally

Seasonality of Aquatic Animals

The different situations of the different AAs were presented and discussed by the villagers during the PRA. During the exercise the four groups identified the three distinct seasons. The quality and quantity of the important aquatic animals change with the season. Location of the source also changes depending on the season. Fishermen tend to move with the source of the AA during the year.

In summer, the amount of wild aquatic animals particularly the big fishes are limited in the wild environment but sometimes abundant in private areas like ponds and trap ponds. During rainy season most of the aquatic systems have available species to be collected specially the rice fields. Ricefields is the biggest area for collection during rainy season and all men, women and children can collect here. In cold season some of the species are lacking also and some get disease. More detailed information is presented in Annexes 4.1 to 4.4.

Trends

In general, most of the important aquatic animals in the village are now declining in population. In the trend diagrams did by poor group and rich women it shows that the decline of these species are very fast and was caused by several factors. Among the important species listed by all groups, only two species were identified that are increasing in population. These are snakeskin gourami and featherback.

Factors Affecting the Trend

Natural calamities. In all diagrams for the trend and even in the historical transect of the village, calamities like drought and floods caused negative and positive effect on the status of important aquatic animals. Some 20 years ago (see annexes 5.1 to 5.4) the villages has been experiencing drought and long period of no rain. When this thing happened the first resource that is being affected is the water resource where the important aquatic animals thrive. However during rainy season and when heavy rains come, most of the important aquatic animals increase in population since some of the species were brought in by the flood.

Fish disease. It was five years ago when aquatic animals in the wild were badly affected by disease. The disease normally occurs during cold season till the end of summer. Broodstock and juvenile get infected with the disease thereby decreasing the population.

Use of agro-chemicals. The intensification of agriculture some what gave a negative impact on the production of aquatic animals. Most of the chemicals being used now in the paddy fields are hazardous to aquatic species. It was illustrated in the timeline and trend diagrams that after the use of chemicals in the field, the population of aquatic animals decreased.

Collection/fishing practices. Before when the population of aquatic animals are abundant, most of the fishermen collect AA just for household consumption. But due to the increasing population and the need to survive, villagers need to collect more than what they need to consume to help them get additional income. Because of the intension of collecting large amount of species some fishermen tend to use gears that harm the species and destroy the habitat.

Farmer's 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 plan to use the data collected to plan for the village development.

Annexes
PRA outputs

Seasonal Calendar

Annex 1.1 Seasonal calendar of rich men group

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Weather	Very cold		Cold + windy; start of hot season	Hot	Hot; start to rain	Rainy (good)	More rain	Heavy rains (floods)		Less rain start cold season	Little rain; cold wind	Strong cold wind
Social events	New year		Weddings	Songkran	Weddings		Buddist festival (monks ordained)				Full moon festival	Prepare for new year
Rice cultivation		Reconstruct bank	Buffalo manure	Ploughing + broadcasting	Transplant				Fertilise (formula 15)	Harvest early rice	Harvest	Straw collection
Livestock	Cow in the field; Chicken + duck				Cow in pen; cut grass to feed							Cow in the field
Vegetables	Growing										Growing/harvesting	
Rice fish					Stock fish in TP	Fish move to field	Feed fish by chicken manure				Fish return to trap pond	Harvesting
Fishing	Fishing in public pond			Catch tadpole, uses hook + bait for frogs In the rice fields								
Fish culture	Drain ponds									Stock fish		
Forest food	Mice, lizards, birds				Mushrooms		Ant eggs + bamboo shoots					
Handicraft	Make fishing gear for own use				Weave mats							
Charcoal	Produce charcoal for own use											
Wage labour	Pond construction				Rice cultivation					Harvesting		
Income/busy months	Selling rice (year round); Pay bank (high interest); Sell fish				Fertilizer, fuel; Labour; School fees	Very busy				very busy	Sell rice seeds; Pay bank interest	
Migration	Young people work in Bangkok and send remittance to their families											
Health	Very happy	Happy	Happy	Happy	Sad (tired)	Very sad (busy)	Happy			Colds	Happy	

Annex 1.2 Seasonal calendar of rich women group

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Weather	Cold ←	→	Less cold and start summer	Summer and start to rain	Less sunny + less rain	Raining	Raining	Raining	Raining	Less rain + cold	Cold ←	→
Tradition/culture				Songkran			Buddist lent					
Rice cultivation				Ploughing + sow seed ←	→	Transplanting ←	→		Care	Harvesting ←	→	Threshing
Plant chilli	Care	Harvesting										Seedlings
Animal raising	Graze in the rice fields ←	→				Cut grass to feed livestock in pens ←	→					In the rice fields
Capture fish		Harvesting trap ponds		Collection		Trap aquatic animals				Trap		
Income, expenses, busy	Remittance, selling rice	Pay BACC		remittance		Pay planting rice Confusing					Pay rice straw Confusing	Confusing
Migration	Back home	Go to Bangkok →		Back home	Migrating to Bangkok for work →							
Health					Colds							

Annex 1.3 Seasonal calendar of poor men group

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Climate	Cold and windy	Sunny & windy	Hot	Very hot	Little rain	Rainy season ↔		Little rain flooding	Rain Flooding	Sunny & windy	Sunny & windy	Cold and windy
Tradition/culture	New year	Buddist festival	Marriage	Songkran festival	Rocket festival	Monks ordained	Buddist lent			Loi krattong		End of year
Rice cultivation	Stock rice	Selling	Sow seed	Ploughing	Seedling	Planting	Care ↔				Husk rice	Threshing
Livestock	Raising in the field ↔				Raising in pens and cut grass in the field for feeding ↔							
Trader	Trading								Sale husk			
Vegetable gardening	Chilli, onion, garlic, gourd, pumpkin ↔				Cucumber, bean ↔							
Construction	Build houses, tables ↔											
Catching fish	Catch in public pond ↔					Catch in rice field by fish hook ↔						
Collect food in the forest	Rats, birds, lizards		Ant eggs		Mushrooms and bamboo shoots ↔							
Daily wage			Hiring plough		Hiring for planting					Collecting rice straw		
Income, expenses Busy	Pay BACC ↔ / Selling rice ↔				Wage from ploughing, fertilizer and pesticide application ↔					Pay husk rice ↔		
Migration	Go to Bangkok								Go to Bangkok			
Health	Happy	okey	Sad	Happy	Colds	tired		sad	Okey	Happy ↔		

Annex 1.4 Seasonal calendar of poor women group

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Climate	Cold	Cold but sunny	Sunny	Sunny & starts to rain	Rain	Heavy rain	Rainy	Rainy	Rainy and cold	Cold	Very cold ↔	
Tradition/culture	New year			Songkran			Buddist lent			End of buddist lent		Year end
Rice cultivation				Ploughing	Sow seed	Care	Transplanting	Growing	Care	Harvesting ↔		Threshing
Vegetable	Cultivation ↔											
Livestock	Graze in the fields ↔				In pens, cut grass for feeding livestock ↔							In the field
Daily wage						Planting rice ↔				Harvesting and collection of rice straw ↔		
Income Expenses Busy	Selling rice	Pay BACC		School expenses	Pay BACC	Pay for cultivation ↔			Pay for study			Income from rice
Migration	Come back ↔			Back for festival	Back to Bangkok for work and send remittances to the family ↔							
Health	Common colds		scours ↔			Common colds ↔						

Group activity profile

Annex 2.1 Activity matrix of rich men group

Activities	Name of farmer					Total	Rank
	Chaipheuk	Lunlar	Ton	Koon	Chaiwat		
Rice farming	6	7	6	7		26	1
Livestock	3	5	3	3		14	2
Vegetable growing	4	-	3	2		9	4
Raising fish	3	2	2	3		10	3
Capture fish	2	-	-	2		2	9.5
Collect food	-	-	1	1		2	9.5
Wickerwork	-	-	3	1		4	7
Charcoal	1	2	2	1		6	5
Daily wage	1	4	-	-		5	6
Total	20	20	20	20		80	

Annex 2.2 Activity matrix of rich women group

Activities	Name of Farmer					Total	Rank
	Saesom	Sontitum	Phontat	Tongsa	Warich		
Rice farming	7	4	6	6	6	29	1
Chilli	4	5	5	3	3	20	4
Livestock	4	7	4	7	5	27	2
Fishing	5	4	5	4	6	24	3
Total	20	20	20	20	20	100	

Annex 2.3 Activity matrix of poor men group

Activities	Name of Farmer					Total	Rank
	Yanyajan	Boonpong	Srisawat	Namlee	Suban		
Rice farming	5	5	7	4	4	25	1
Livestock	3	1	2	3	3	12	3
Trading	6	5	1	2	1	15	2
Vegetable	-	1	1	2	2	6	9
Construction	-	1	3	1	3	8	6.5
Capture fish	1	2	1	2	2	8	6.5
Collect food in the forest	1	2	2	2	2	9	5
Daily wage	3	1	2	3	1	10	4
Culture fish	1	2	1	1	2	7	8
Total	20	20	20	20	20	100	

Annex 2.4 Activity matrix of poor women group

Activities	Name of Farmer					Total	Rank
	Sampao	Roekngam	Tongkool	Boonsan	Sittipol		
Rice farming	9	7	6	7	6	35	1
Vegetables	-	-	-	4	3	7	5
Livestock	4	3	4	-	3	14	3
Crochet handback	4	-	4	-	3	11	4
Daily wage	3	10	6	9	5	33	2
Total	20	20	20	20	20	100	

Role of Aquatic Animals

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

Aquatic Animals	Criteria				Total	Rank
	Availability	Taste	Good price	Preservability		
Snakehead	4	4	3	2	13	1.5
Climbing Perch	5	2	1	5	13	1.5
Walking Catfish	3	4	3	1	11	5
Moonlight Gourami	4	1	1	2	8	8.5
Silver rasbora	4	1	-	3	8	8.5
Spotted Spiny Eel	2	3	4	-	9	7
Bocourt river catfish	1	1	2	-	4	24.5
Golden little barb	2	3	1	5	11	5
Silver barb	1	2	2	-	5	21
Grey featherback	2	3	2	-	7	11.5
Whisker sheatfish	2	3	2	-	7	11.5
Swamp eel	2	5	4	-	11	5
Nile tilapia	1	2	2	-	5	21
Common carp	2	2	3	-	7	11.5
Small scale mud carp	1	2	2	-	5	21
Blue danio	2	1	1	2	6	16
Snake skin gourami	5	2	2	3	12	3
Striped croaking gourami	2	1	1	2	6	16
Sand goby	1	2	2	-	5	21
Yellow catfish	1	3	3	-	7	11.5
Pond snail	3	2	1	-	6	16
Freshwater shrimp	2	2	2	-	6	16
Insect	1	1	-	-	2	28
Water beetle	1	1	1	-	3	26.5
Common lowland frog	2	2	2	-	6	16
Small toad	2	1	1	-	4	24.5
Bull frog	1	-	-	-	1	29.5
Black rice crab	2	1	-	-	3	26.5
Giant water bug	1	2	2	-	5	21
Turtle	-	1	-	-	1	29.5
TOTAL	62	60	50	25	197	

Annex 3.2 Identification and ranking of important aquatic animals by poor women group

Aquatic Animals	Criteria					Total	Rank
	Versatility	Good price	Availability	Breeds naturally	Preservability		
Snakehead	8	7	3	-	3	21	1
Walking catfish	5	4	2	-	-	11	3
Climbing Perch	5	2	3	-	3	13	2
Snake skin gourami	4	4	2	-	-	10	4
Spotted spiny eel	3	2	1	-	-	6	7.5
Silver barb	2	2	1	-	-	5	10
Silver rasbora	1	-	1	-	1	3	22.5
Moonlight gourami	-	-	-	-	1	1	39
Eye spot barb	2	-	2	-	-	4	16
Bocourt river catfish	2	-	-	-	-	2	29.5
Whisker sheatfish	2	-	-	-	-	2	29.5
Nile tilapia	-	-	-	-	-	-	
Common carp	3	2	-	-	-	5	10
Rohu	-	-	-	-	-	-	
Striped tiger nandid	-	-	-	-	-	-	
Sand goby	2	-	-	-	-	2	29.5
Grey featherback	4	2	-	3	-	9	5
Striped croaking gourami	-	-	-	-	-	1	39
	-	-	-	-	-	1	39
Golden little barb	-	-	-	-	2	2	29.5
Siamese glassfish	-	-	-	-	-	-	
Julliens mud carp	-	-	-	-	1	1	39
Yellow catfish	2	2	-	-	-	4	16
Great white sheatfish	2	2	-	-	-	4	16
Barb	-	-	-	-	2	2	29.5
Giant snakehead fish	-	-	-	-	-	-	
Freshwater garfish	1	-	-	-	-	1	39
Pangasius larnardi	3	3	-	-	-	6	7.5
Greater black shark	2	-	-	-	-	2	29.5
Siamese pangasius	-	-	-	-	-	-	
	-	-	-	-	-		

Striped catfish	2	1	-	-	-	3	22.5
Small scale mud carp	-	1	-	-	-	1	39
Golden little barb	-	-	-	-	2	2	29.5
Siamese river abramine	2	2	-	1	2	7	6
Blue danio	2	-	-	2	-	4	16
Yellow tail botia	2	2	-	-	-	4	16
Apple snail	2	2	1	-	-	5	10
Apple snail	1	-	1	2	-	4	16
Pond snail	2	-	-	-	-	2	29.5
Clam	2	-	-	-	-	2	29.5
	2	-	1	-	-	3	22.5
	2	-	-	-	-	2	29.5
Golden snail	-	1	-	-	-	1	39
	-	1	-	-	-	1	39
Black rice crab	-	1	-	2	-	3	22.5
True water beetle	-	1	-	-	-	1	39
Giant water bug	-	2	2	-	-	4	16
Freshwater prawn	-	2	2	-	-	4	16
Eel	-	2	-	2	-	4	16
TOTAL	72	50	22	12	17	173	

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

Aquatic Animals	Criteria				Source	Total	Rank
	Taste	Availability	Price	Preservability			
Snakehead	6	6	6	6	ricefield	24	1
Walking catfish	5	5	5	5	Trap pond	20	2
Snakeskin gourami	4	4	4	4	Public pond	16	3
Climbing perch	3	4	3	4		14	4
Nile tilapia	2	2	2	2	culture	8	8.5
Common carp	2	2	2	2		8	8.5
Striped catfish	1	-	1	-	Buy from market	2	26
Small scale mud carp	3	3	3	-	Catch from pond	9	7
Rohu	2	1	1	-	"	4	18.5
Freshwater prawn	3	4	3	3	ricefield	13	5.5
Silver rasbora	3	4	3	3	"	13	5.5
Pond snail	1	1	-	-		2	26

Silver barb	2	-	2		Culture; ricefield	4	18.5
Golden little barb	4	-	-	-		4	18.5
Grey featherback	4	-	-	-		4	18.5
Barb	4	-	-	-		4	18.5
Spotted spiny eel							
Swamp eel	4	-	-	-		4	18.5
Greater black shark	4	-	3	-	stream	7	10
Moonlight gourami	2	3	-	1		6	11
Bocourt river catfish	3	-	1	1	ricefield	5	13
Sand goby	1	-	1	-		2	26
Great white sheatfish	1	-	1	-		2	26
Whisker sheatfish	1	-	-	-		1	29
Common lowland frog	3	-	2	-	ricefield	5	13
Small toad	1	-	1	-		2	26
Bull frog	1	-	-	-		1	29
Black rice crab	1	1	-	1		3	23
Giant waterbug	2	-	2	-		4	18.5
Insect	3	-	2	-		5	13
Water beetle	2	1	1	-		4	18.5
TOTAL	78	41	49	32		200	

Annex 3.4 Identification and ranking of important aquatic animals by rich women group

Aquatic Animals	Criteria					Source	Total	Rank
	Availability	Breed naturally	Taste	Price	Versatility			
Walking catfish	4	4	4	4	4		20	1.5
Snakehead	4	4	3	4	3		18	5
Climbing perch	4	4	3	4	4		19	3.5
Moonlight gourami	2	2	4	-	-		8	9
Silver rasbora	4	4	4	4	4		20	1.5
Striped croaking gourami	2	-	-	2	2		6	12
Siamese glassfish	-	-	-	-	-		-	
Spotted spiny eel	5	4	2	3	3		17	6
Freshwater garfish	-	-	-	-	-		-	
Common lowland frog	3	3	5	4	4		19	3.5
Nile tilapia	-	-	-	-	-		-	
Nile tilapia	-	-	2	-	2		4	16.5
Common carp	-	-	2	-	2		4	16.5
Silver barb	-	-	2	2	3		7	11
Striped catfish	-	-	3	-	2		5	13

Grey featherback	3	-	3	-	2		8	9
Eye spot barb	3	3	-	2	2		10	7
Bocourt river catfish	-	-	-	-	-		-	
Whisker sheatfish	2	2	-	-	-		4	16.5
Acantopsis	-	-	-	-	-		-	
Common sheatfish	-	-	-	-	-		-	
Sand goby	-	-	-	-	-		-	
Pidocephalichthys	-	-	2	-	2		4	16.5
Golden little barb	-	-	2	-	-		2	22.5
Jullien mud carp	-	-	2	-	-		2	22.5
	-	-	2	-	2		4	16.5
Tiger loach	-	-	2	-	2		4	16.5
Red tail botia	-	-	-	-	-		-	
Yellow tail botia	-	-	-	-	-		-	
Striped tiger nandid	-	-	-	-	-		-	
Snakeskin gourami	2	-	1	-	-		3	20.5
Pond snail	2	-	1	-	-		3	20.5
Apple snail	-	-	-	-	-		-	
Freshwater shrimp	2	-	2	2	2		8	9
TOTAL	42	30	51	31	45		199	

Aquatic Animals Seasonality

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

	Dry Season				Rainy season				Cold season			
Aquatic animals	Amount	Gear	Who	Place	Amount	Gear	Who	Place	Amount	Gear	Who	Place
Snakehead	Medium or max in ponds	Net; gill net; dip net; pump	Adult & children	Pond; public pond; stream	Max	Fish hook; bamboo trap; trap; trident	adult	In the field	Min	Bamboo trap; cast net; trap	Adult and children	In the field; stream
Catfish	Medium or max in ponds	Cast net; gill net; dip net; pump	Adult	Pond	Maximum	Gill net; bamboo trap; trap; fish hook; trident	Young boy Adult	Pond	Min	Bamboo trap; cast net; gill net; trap	Boy Adult	In the field
Snakeskin gourami	Medium or max in ponds	Cast net; gill net; dip net; pump	Adult Child + adult	Pond	Maximum	Gill net; bamboo trap; trap	Adult	In the field	Min	Dip net	Adult Child	In the field
Climbing perch	Medium	Dip net; cast net; pump	Child Adult	Pond Stream	Maximum	Cast net; gill net; bamboo trap; trap	Child Adult	In the field	Min	Trap net; dip net	Adult Child	In the field
Shrimp	Maximum	Green net; dip net	Adult (men & women)	Public pond	Minimum	Trap	Adult	In the field	Med	Dip net; green net	Adult	In the field
Rasbora	Medium	Green net; cast net	Adult	Public pond; pond; other ponds	Medium	Trap; bamboo trap	Adult	In the field	Max	Dip net; green net	Adult Child	In the field

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

Aquatic animals	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Catfish		Adult men & women Pump in ponds 60 kg/pond					Fish hook Trap – 4 – 5 kg/time Oblong Trap – 1 kg / time Gill net – 2 – 3 kg / time					
Silver rasbora					Adult men & women Trap – 1 – 2 kg/time			Adult men & women Dip net; trap 5 – 6 kg/ time				
Frog					Battery; trident 1-2kg/time adult men							Men & women Spade; hook 1-2kg/time
Climbing perch		Pump from ponds 10 kg/ pond Men and women			Trap (small fish) 20 – 24 kg/time			Fish hook (men & women) Trap - Oblong trap - 12 kg/time Dip net -				
Snakehead		Pump from ponds 10 kg/ pond Men and women						Fish hook; trap; gill net; oblong trap; funnel trap Men and women 10 kg/time				
Spotted spiny eel		Pump from ponds 10 kg/ pond Men and women						Gill net; fish hook; trap; dip net 1 kg/time 2 times per season				

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

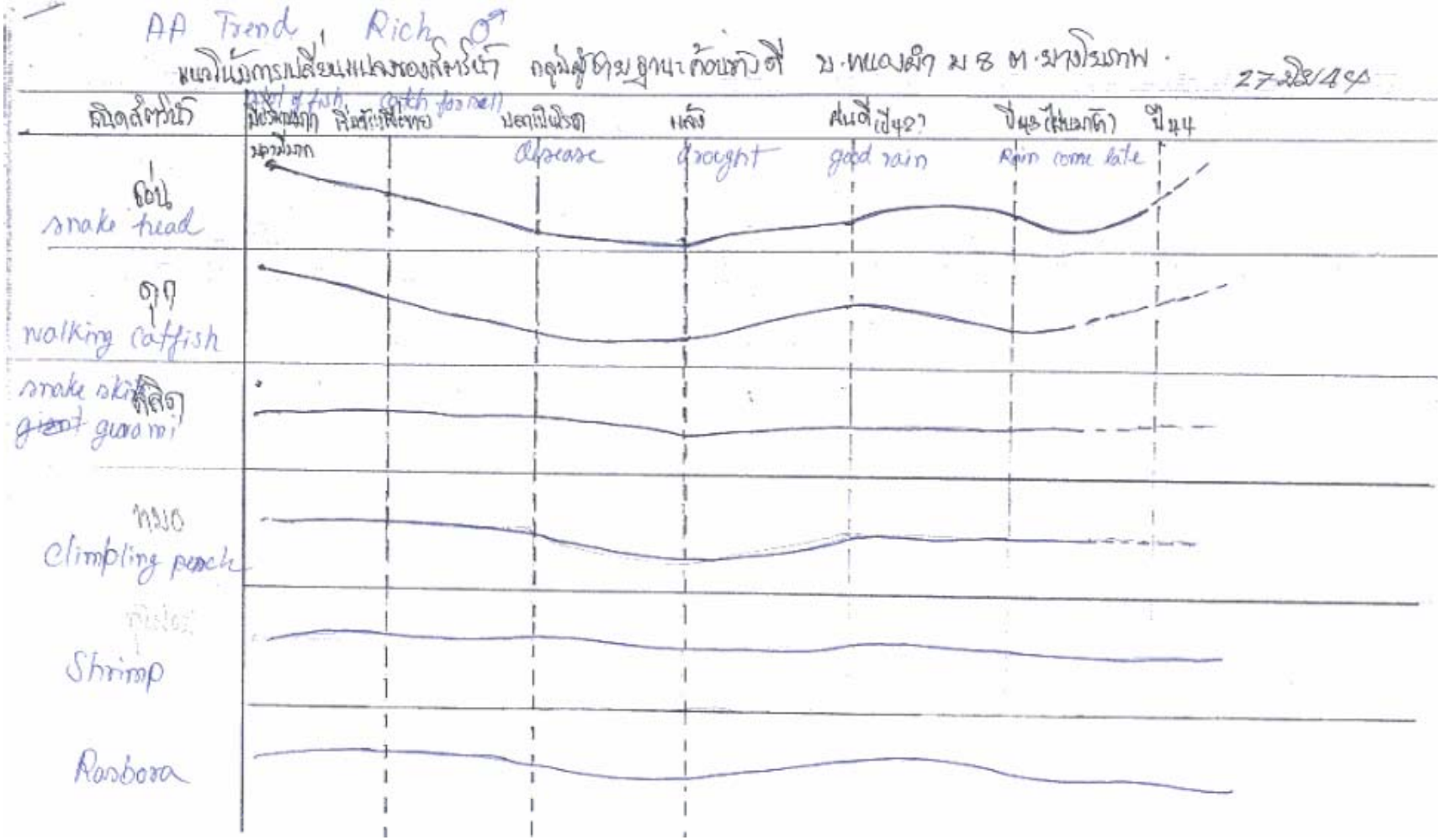
Aquatic animals	Dry				Rainy				Cold			
	Amount	Gear	Who	Place	Amount	Gear	Who	Place	Amount	Gear	Who	Place
Snakehead	Other place minimum	Cast net; dip net	Adult child	Public pond Pond	Max	Bamboo trap; fish hook; trap net; gill net; trident	Adult	On their field and relatives	Med	Trap; bamboo trap; trap	Adult	On the field Other place
Climbing perch	Min	Pump Cast net Trap	Adult child	Public pond Pond	Max	Gill net; fish hook; trap; bamboo trap	Adult	Field; swamp + stream	Med	Bamboo trap; trap; dip net	Adult Child	On the field
Snakeskin gourami	Min	Pump Cast net	Adult child	Public pond Own pond	Med	Gill net; trap	Adult	Own field	Max	Dip net	Adult Child	Own the field
Catfish	Min	Pump Cast net	Adult child	Public pond Own pond	Max	Gill net; fish hook, diff. Traps	Adult Child	Own field	Med	Trap	Adult	Own the field
Jullien's mud carp	Min	Cast net Pump	Adult child	Own pond Huiy pha road	Max	Gill net; diff. Traps	Adult	Own field	Med	Dip net; gill net	Adult	Own the field; huiy pha road
Spotted spiny eel	Maximum other place	Dip net Pump	Adult	Huiy pha road; other pond; public pond	Med	Gill net; diff.traps	Adult	Pond	Min	Hand; dip net	Adult	Own field

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

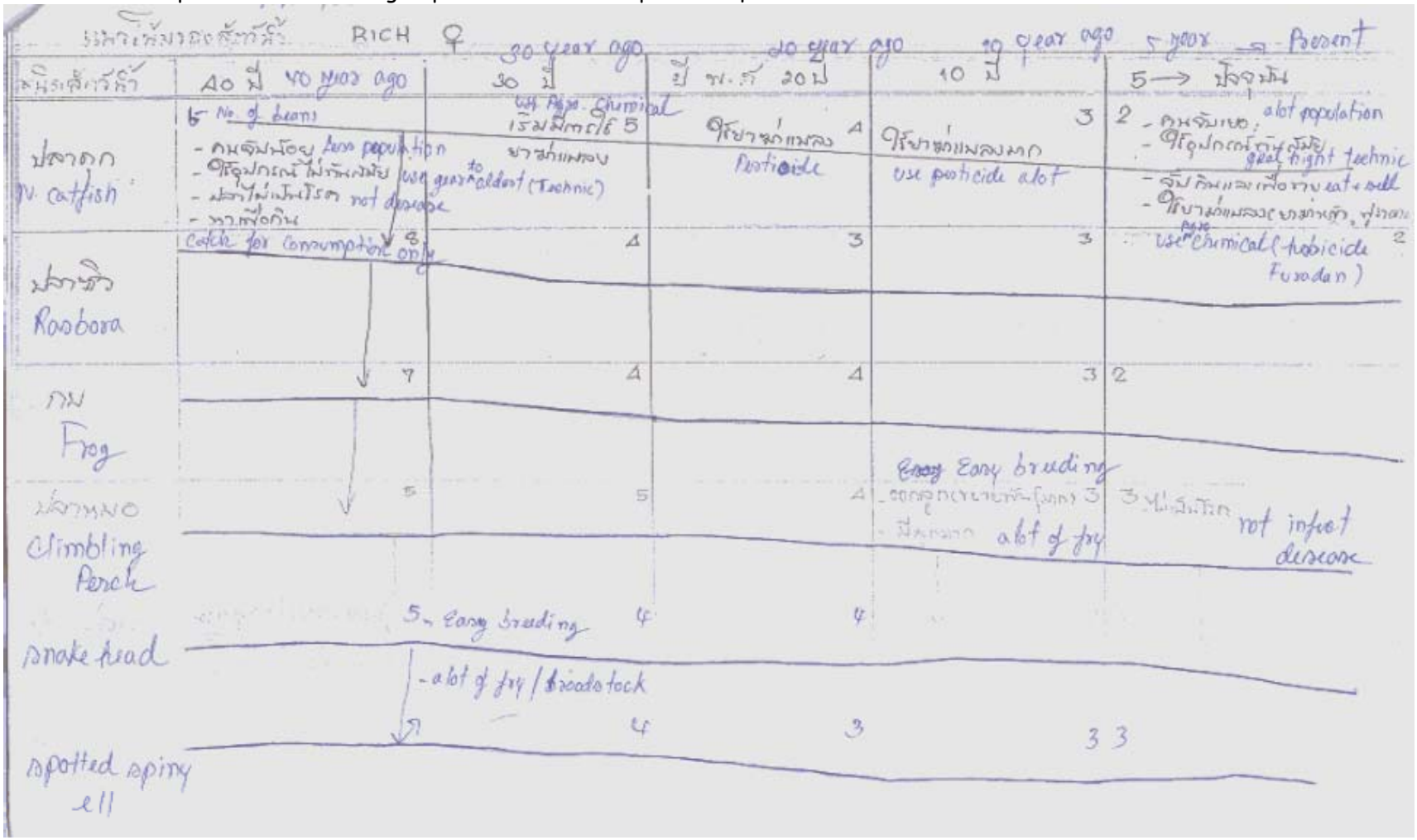
Aquatic animals	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Snakehead	Pump from pond Men & women 50 kg/ pond					Fish hook (men and women) 40-50kg/season Trap – 50 – 60 kg/season Gill net (men and women) – 20 – 30 kg/ season						
Climbing perch	Pump from pond Men & women 20 – 30 kg/ pond					Fish hook – 9 –10 kg / season Funnel trap – 30 kg / season Bamboo trap – 40 kg/ season Gill net – 40 kg / season						
Catfish	Cast net and pump from pond Men and women 60 – 70 kg/ pond									Bamboo trap Gill net 50 kg/season		
Snakeskin gourami	Drain and pump pond; cast net Men only 50 kg/ pond									Bamboo trap Gill net 50 kg/season		
Black stripped featherback	Drain and pump pond; Men and women 40 kg/ pond											
Rasbora (Danio)						Funnel trap; oblong trap 50 – 60 kg/ season						

Aquatic Animal Trends

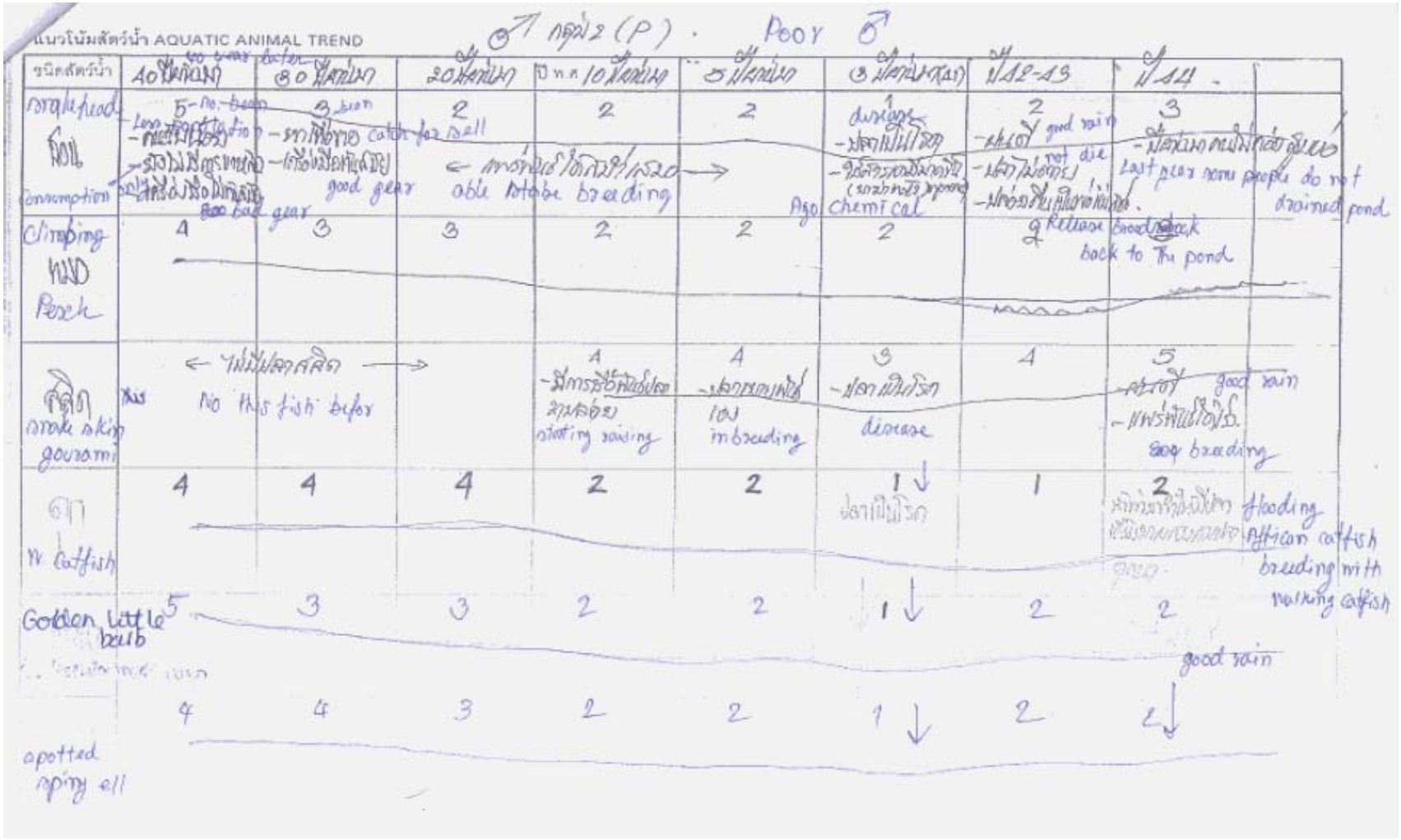
Annex 5.1 Perception of rich men group on the trend of important aquatic animals



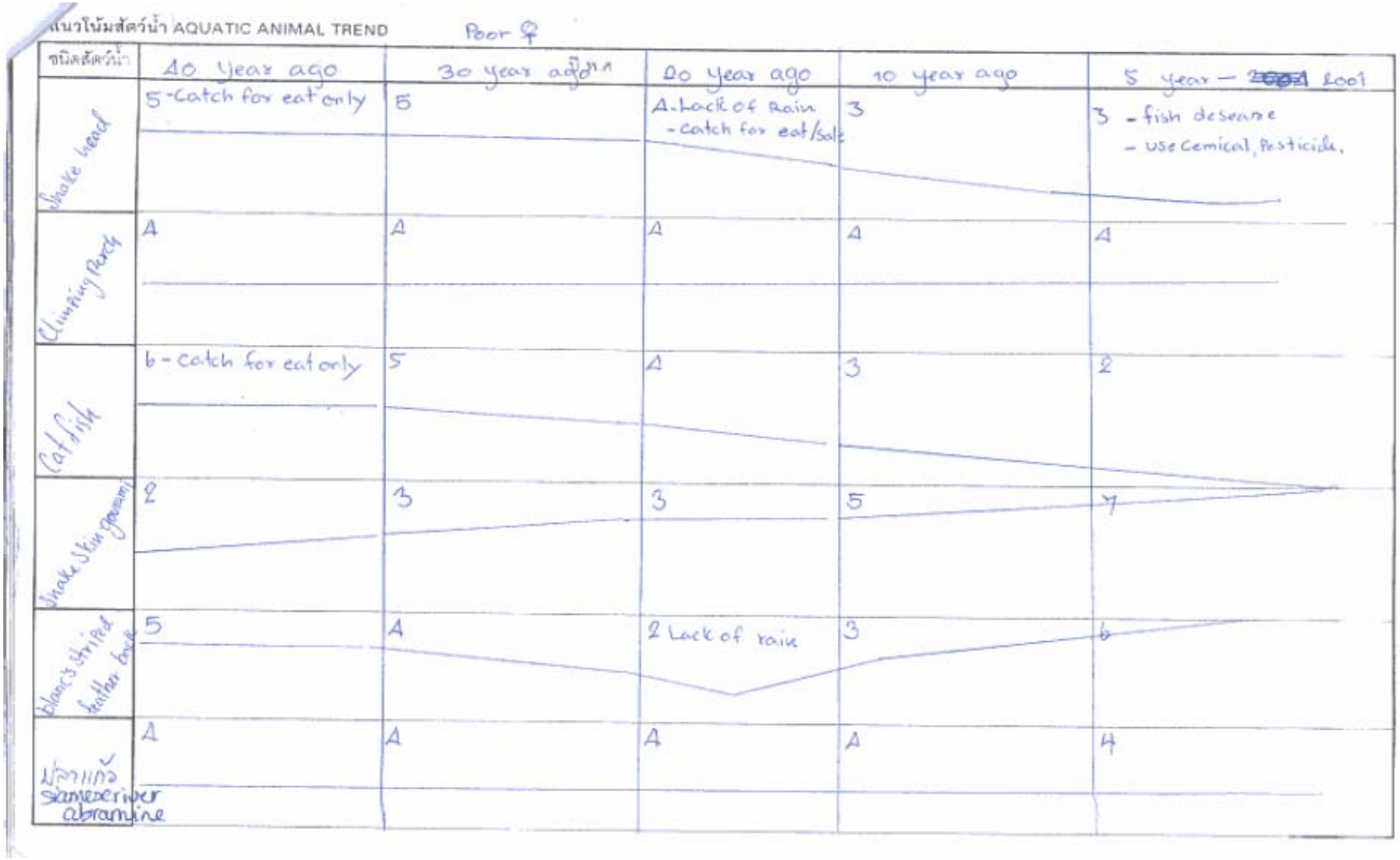
Annex 5.2 Perception of rich women group on the trend of important aquatic animals



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



Annex 5.4 Perception of poor women group on the trend of important aquatic animals



แนวโน้มสัตว์น้ำ AQUATIC ANIMAL TREND Poor ♀

ชนิดสัตว์น้ำ	40 Year ago	30 year ago	20 year ago	10 year ago	5 year – 2001
Snake head	5 - Catch for eat only	5	4 - Lack of Rain - catch for eat/sale	3	3 - fish desease - use cemical, Pesticide,
Climping Perch	4	4	4	4	4
Cat fish	6 - catch for eat only	5	4	3	2
Snake Skin Gourami	2	3	3	5	7
Black Striped Feather back	5	4	2 Lack of rain	3	6
ปลาแก้ว Siamese river abramine	4	4	4	4	4