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

Participatory Rural Appraisal in Ban Pet

Case Study 7

(PRA Report from 2001)

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Ban Pet 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 develop new programs or design development activities in the area. It is also essential that the information is generated from the primary stakeholders – 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 these objectives, the following are the more 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

Collection of secondary data for this village was done while gathering data in another village within the province since three selected villages came from one district only. Like the other PRA activities, the area was visited first for ocular inspection of the topography and the distance of the perennial water bodies.

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

Table 1. Schedule of Activities during the PRA workshop in Ban Pet

Dates	Activites
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. A large part of the area is 68 meters above sea level. Land is sandy loam and with a total area of 15700 $km^{2..}$. It is situated at 630 km from Bangkok. The province can be reached by car, train and domestic plane.

In terms of its boundaries, the northern part of the province shares its borders with Yasothon, Amnatcharoen and Mukdahan provinces. The province of Srisaket and a part of Cambodia are located at the southern part of this province. The Lao People's Democratic Republic is situated at the eastern side and Yasothon and Srisaket on the west. The province has a total of 18 districts and 5 sub-districts. A total of 2,243 villages hold the 1,679,867 population. The whole province has a total number of households of 262,208. Located at 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 towards the north of Ubolratchathani province, 34 km away from the main province. The district is sharing boundaries with several provinces. On the northern side, it is connected to the Muang and Huataphan districts of Amnatcharean province. Amphue Muang of Ubol province and Khangnai district of Amnatcharoan province are located at the southern border. Amphue Muang of Ubol province and Phana district of Amnatcharoan province are the boundaries in its eastern border. Towards the west, Khuangnai of Ubol province and Hua Thaphan of Amnatchareon are the boundaries.

Total land area: 927.587 km2

Subdistrict : 14
Villages : 154 villages
Total number of households: 14399
Total population: 82927

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

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

Village description (Ban Pet)

Distance from urban area : 5 km
Total households: 90
Occupation: Rice cultivation, chilli production and livestock.
Topography: flat, nearby stream (Hui jaramair)
Soil type: Sandy loam
Water resources:

Hijaranair – north of the village (0.5 km far)
Huiwurngboisang (stream)- southern part (1 km far)
KudHu – western (3Km far)
Norng Konhair – southern part of the village

Selection Process for the Village

The selection of the village was based on its proximity to the urban area. The province was also selected as representative of type II site, which experiences flooding on short durations. After identifying the province for this type, the site selection was done.

The village was selected after visiting the district office and assessing the information acquired 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 decided on the village and visited the area for clearing and to be familiar with the place. The criteria for selection were the following: the village represented a "backward village", the number of households, the distance from the river, and the abundance of water resources.

Specific PRA Tools 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 was conducted to trace the development trends in the village. It 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 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 exercise was meant to identify the common activities in the village and to differentiate the priorities of each group.

Aquatic animals identification/ranking. This was done to find out the available and unavailable aquatic species in the area. It 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 was done with the key informants on the first day. The mapping (village map) exercise was done 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 or informants grouped the different names according to what they think is the well being of the farmer/villager.

Using the results of the well being ranking, participants for the 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 was invited first and carried out the exercises and generated a lot of good information. On the following day the group of poor household was then invited and did the same activities that the rich group conducted on the previous other day.

For each group, the team separated the men and women and asked them 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. On the last day of the visit, validation and presentation of outputs were done with the villagers.

Setting the Context

Mapping the Current Resource Context

Flat plain and near the river are the general characteristics of this village. Despite being flooded during the rainy season, the village has a lot of resources that are their main source of livelihood. There are common resources in the village that villagers have access to and there are privately-owned resources as well (see Figure 1).

Most important resource in the village is the land where they derive a lot of benefits. In general land is being used for agriculture. Rice fields typically surround the whole village. Aside from rice, other crops like chilli are being grown. There is also a sloping area in the village that serves as the mini forest where wild animals are being collected. Other household needs could be also found in the forest.

The water resource is also important in the village since it is basically an agricultural village. Apart from the floodwater that almost submerge the village during rainy season, other perennial water like stream surround the village. A village pond is also located towards the lower portion in the village and near the stream. Other aquatic systems like ponds and trap ponds are also present which are sources of aquatic animals. During the rainy season, the rice fields become a big aquatic system that provides a lot of benefits to the villagers.

Mapping the Development Context

Development of the village started when the village was established in 1950. A lot of events happened from this period to the present. Natural changes in the resources, shocks and man -made changes were discussed in this activity.

The village started with only 30 households who migrated from Ban *Nonglai*. During this period the village was rich in resources. The forest was abundant with wild plants and animals. It was also the same with the quantity of aquatic resources. In the illustration (Figure 2) it discussed the road construction. Some of the development mentioned was the introduction of radio that improved communication in the village in the year 2502 (1959). The installation of electricity came late in the village (1982). Construction of schools and temples were not mentioned in the exercise.

Regarding agriculture, in the past the production of rice was very low and it was only during 2508 (1965) when the production started to increase because of the introduction of agro-chemicals. After the introduction of agro-chemicals, the use of organic fertiliser was introduced in 1982. This was the time when rice production again

started to decline. It was also during this year when insecticide was introduced. At present both organic and commercial fertilisers are being used as well as chemicals.

The aquatic system also developed through the years, as well as its practices for collecting species. Before, when the population of AA was still abundant, villagers only used kerosene lamp to collect AA. Later on, the villagers learned how to use chemicals in collecting AAs which had a negative impact on the AA population.

The problem in the resources seemed to have occurred after a new development strategy was used. When a new management strategy and/or technology were introduced in the rice fields, it greatly affected the aquatic resource. The species started to decline. Aside from the negative impact of development, natural calamities also caused the decline and destruction of resources in the village. As presented in Figure 2 drought and floods also contributed to the problem.

Figure 1 Mapping the resource context of Ban Pet (Village Map)

Figure 2 Mapping the development context of the village (Timeline)

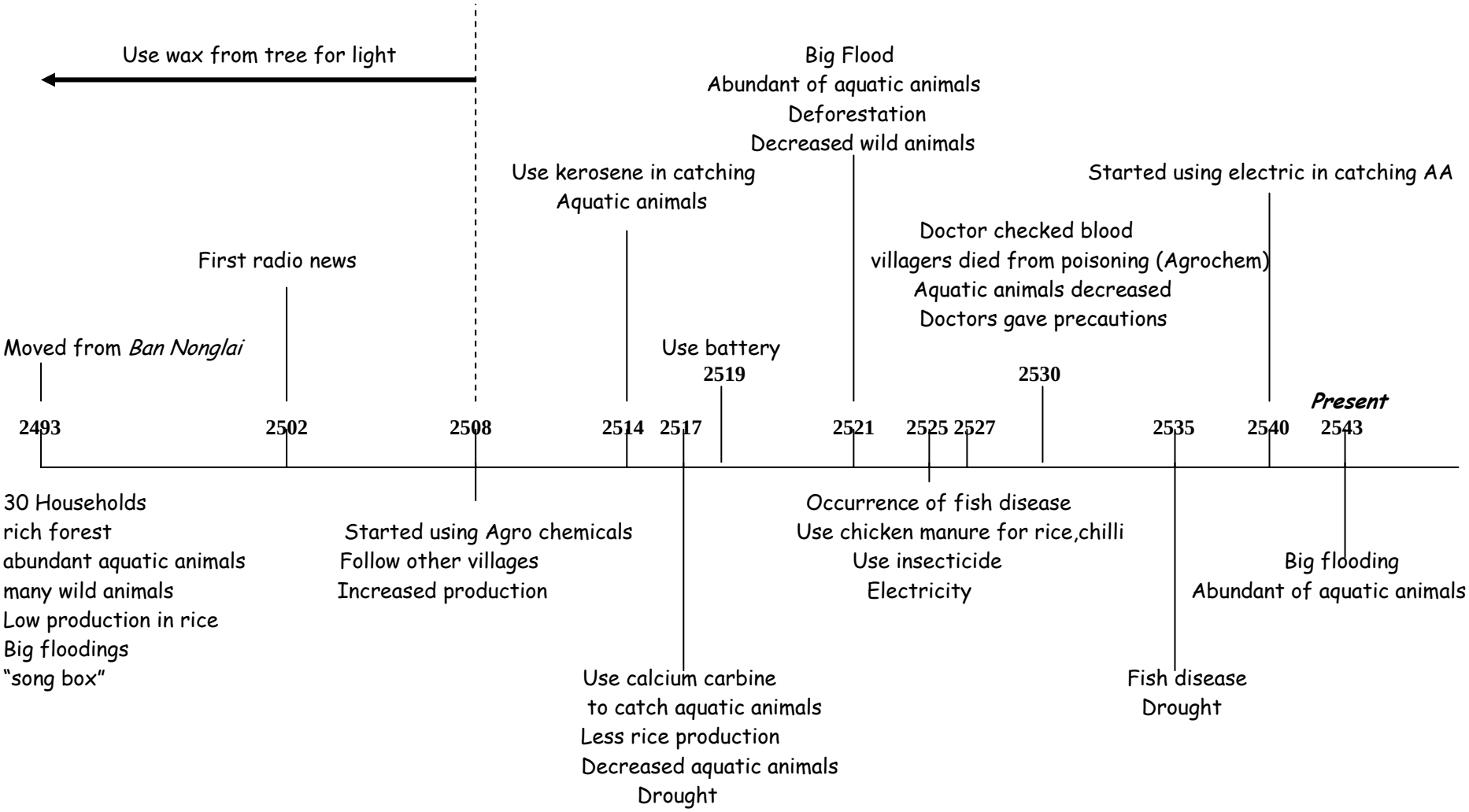


Figure 3 Ban Pet Historical Map (Timeline)

Mapping the Current Social Context

The socio-economic levels of the villagers are not the same. There are some households that can be considered very rich and also some families who can be considered the poorest. This village is 'better-off' compared to villages in the types I and II sites. Majority of the villagers belong to the middle-income group. During the PRA exercise the villagers were grouped into five levels. There are different criteria used in the grouping of the villagers and is presented in Table 2. Villagers developed their own characteristics for each level.

Socio-Economic Characteristics

Land ownership. General criteria for well-being in an agricultural area is the size of the land owned by the farmers. In this village the poorest is not the same with other villages that do not have land at all. Poor families still own a small parcel of land. The average poor family owns between 2 – 5 rai of land. The better-off families own huge tracts of land. Farmers own at the most 40 rai and a minimum of 15 rai. The size of the land owned by families belonging to the groups between the poorest and better-off range from 7 to 15 rai.

Source of income. Unlike other low-income villages, households in this village have alternative livelihoods or sources of income. Income from farming is just one of their several sources. Even the poorest family has other sources of income. In Table 2, the different sources of income by each group are presented. For the poor families, aside from farming, they can also get income as wage labourer, working in Bangkok and planting other crops. These sources are also common among families belonging to other socio-economic levels. For better-off families, income comes mainly from rice farming, salaries from permanent job, trading, remittances from household members working outside the country and other business in the village. With regards to the families belonging between the poorest and the better-off, which most of the villagers belong to, the main source of income still rice farming and planting chilli.

House. One of the most visible criteria in grouping the socio-economic level of the family is the condition of the house. The difference in size, materials and quality depend on the level of the farmers/household. For poor families some of the houses are not in good condition. This means that houses are either not finished or partially constructed, or uses light materials for building like leaves, bamboo, cheap wood and so on. Families in the middle group have houses in good condition although some families also use cheap materials. However, most of the houses are finished and have common appliances. For better-off families, houses are commonly made of cement and tiles. Their houses are typically big and complete with appliances.

Education. The level of education for the household head was not discussed in this exercise although it was evident that most of the better-off families had gone to higher education because of the nature of their job. Members of poorest families however did not go to school or did not finish secondary school. For the capacity of sending children to school, most of the poorest families can only send their children up to primary level. Children from the better-off families are the ones who are able to

reach and finish higher education. For the middle group, most of the households can send their children up to secondary level only.

Livestock. The number of livestock was also used to group the well being in the village. Owning livestock in this village is very common. They used their livestock in the farm and sometimes they let other people rent their cow for farming use also. Selling cows and other livestock for meat is another purpose of growing it.

For families belonging to the lowest level, at most they can own up to five cows, which is already a lot more compared to other villages in this area. The middle families own livestock like cow ranging from 10 to 30 heads. The numbers of livestock for the better-off families are not totally different from the middle group. There are also households belonging in the better-off that do not have livestock because it is not their priority and they have other activities to do.

Farm equipment. The most common farming equipment that is being used as criteria in well being ranking is the tractor. A two-wheeled tractor can be used in ploughing the field as well as transporting farming inputs from the market to the field. It can also be used as engine in pumping water from the lake or river. Middle-income to better-off families own this farming equipment. Other farming equipment like sprayer and pump are common also with these two groups, although it was not included in the list but was mentioned during the group discussion.

Access to loan. Although it was included in the list of criteria, there was no clear cut explanation regarding the access of different groups to credit. As presented in Table 2, some groups need to get a loan to be able to plant other crops. The group of the poorest families do not have loans for two reasons: they do not have the capacity to pay and second is that they do not need a loan. The better-off group members also do not have loans. In the group of middle-income families, some people get loans and some do not.

Transport. The type of transport also dictates the level of well being in the family. In this village almost everybody has transport, even the poorest group. The poorest group members normally own motorcycle or other simple transport while better-off families and even those belonging in the middle group have cars and other forms of expensive transport.

Migration. Leaving the village for work is another option for livelihood in the village. In all groups some members of the family go to Bangkok and other places for work. Members from better-off families have a great chance to work abroad because they have the money to process all the documents and expenses needed to go outside the country. The poor and middle group family members usually work in Bangkok and send remittances to their families.

Table 2 Criteria used by farmers in well-being exercises.

	Trial 1 Assistant chief of the village	Trial 2 Group of women
	Average income per year = 5000 Bt Source of income – rice and chilli	2 –4 rai land owned

I	Land holdings : average of 5 rai No two-wheeled tractor Average of 5 cows Wage labor (other source of income) Have motorcycle for transport Can send children to primary level educ House not in good condition Mostly migrating to Bangkok	No two-wheeled tractor Need loan to plant crops Work in Bangkok Son/daughter may have small house in rice fields
II	Average income per year : 20,000 Bt Source of income : rice and chilli Land holdings: 7 – 8 rai Mostly have two-wheeled tractor Have at least 20 cows Lack capital for investment Children graduated from primary level Most have motor cycle Migrate to Bangkok for work Uses leaves for house wallings Wage labour	5 – 10 rai land two-wheeled tractor Children go to college Need loan to plant crops Son/daughter work in Bangkok
III	Average income 30,000 Bt Source of income : rice and chilli Land holdings : 10 – 12 rai Most have two-wheeled tractor 35 heads of cow Some money for investment Not bad condition of the house Can send children up to secondary level Some have debt Most have home appliances (TV,Ref)	5 – 10 rai land two-wheeled tractor children already separated Can send children to college Need loan to plant crop Work in Bangkok
IV	Average income : 40,000 Bt/year Source of income : rice and chilli Land holdings : 15 rai Have motorcycles Total cow of 15 heads Mostly with two-wheeled tractor Can send children to secondary level Capacity to invest Good condition of house Can loan money from government org. Some migrate to Bangkok for work Some wage labor	Minimum of 40 rai land Two-wheeled tractor Pick-up truck Can send children to college Inherit land from parents Have capital to plant crops Can get job abroad
V	Rice farmer Some income from trading Working abroad Income not less than 60,000 Bt/ year Land holding area : 40 rai Have car and motorcycles Have rice mill Good house condition With 10 heads of cow Can send children to bachelor/college	

	Can invest No debt Complete home appliances	

Activity Profile

Although there are a lot of non-farm activities mentioned in earlier discussions, all groups cited rice cultivation as the most important activity in the village. However, there is a difference in priority among men and women, and among socio-economic groupings. In a comparing of the list of important activities of men and women under the two well-being group as presented in Table 3, men just listed productive activities while women included and even ranked highly the reproductive activities. In the group of women, both rich and poor ranked housekeeping as second highest or most important activity for them.

Fishing activity was considered important by three groups although did not rank high. For poor women fishing was not considered important and so was not included in the list. However, poor women still collect AA/do fishing mostly during rainy season.

Table 3 Summary of important activities in the village

Economic group	Gender	
	Men	Women
Rich	Rice cultivation Chilli production Temple activities Fishing Forest food Charcoal	Rice cultivation Housekeeping Vegetable gardening Livestock Forest food Fishing Wage labour
Poor	Rice cultivation Chilli production Fishing Livestock Forest food Charcoal	Rice cultivation Housekeeping Chilli production Wage labour Forest food Livestock

Seasonality

The seasonality diagram illustrates the situation of the village within a year. Different groups have different calendars and shows differences in their activities. All the groups use the same month to start their calendar, which is January. The differences in perception according to gender and well-being groups are clearly illustrated in the diagrams produced during the PRA workshop (see Annexes 1.1. to 1.4)

Weather. The perceptions on weather among the four groups are similar. The village experiences three distinct seasons in a year. The cold season starts November and ends in February. 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 on April where most of aquatic systems become dry. Rainy season follows the summer and it is the longest season during the year. Rain will start coming from end of April or beginning May then ends in October or sometimes early November. Flooding was not mentioned during the activity but months with heavy rains were identified.

Tradition and culture. Festivals and celebration are some of the ways of exhibiting the culture of the area. In this village there are a lot of activities going on regarding their festival. Majority of the celebration are related to their religion and beliefs. Socio-economic level or status is not a limitation in celebrating different festivals in the village. As presented in Annex 1.1 – Annex 1.4, all groups celebrate the same festivals. In June, being the busiest month during the farming season, three groups (poor men & women, and rich women) do not have any cultural activity nor festival. The month of December is also not a festival month for all groups. Normally this month is the time for rice harvesting and post harvest activities.

Economic activities. Several economic activities were illustrated in the calendar (Annexes 1.1. to 1.4). A summary of the different economic activities of all groups is presented in Table 4. Being mentioned as the most important activity, rice farming is one of the major economic activities in the village by all groups. The list of economic activities for poor is almost similar with the rich group.

During the year rice farming activities of rich men starts one month earlier in compare to the rest of the groups. All three groups start activities in rice cultivation in May. But this also depends on when the rain starts to come and if the water is enough to start cultivating the land. A lot of activities going on from July to August in rice farming since these are the months for transplanting, fertilisation and other management activities. Harvesting is another tough activities for the rice farmers during the months of November and December. All the groups are doing the same activities during these periods.

Other economic activities mentioned by different groups are done in certain months of the year. For rich men, during the months after harvesting economic activities like catching rat, construction, making charcoal and carpentry are being done. Wage labour or harvesting chilli is one of the activities of rich women during this period. Other activities of rich women include taking care of livestock, and collecting food in the forest. For the poor group of men and women, wage labour such as chilli harvesting, collecting food in the forest was also included in the activities after rice farming.

Fishing is being practice by all groups. Both rich men and poor men collect AA or do fishing whole year. For the rich men collection of AA is done in streams and public ponds during dry season and in the paddy fields during rainy season. The poor men also do the same and in addition to the sources, poor men also collect AA in trap ponds during cold season. For the women group, collection of AA is done from May to June and they

normally collect tadpoles. While working in the field, women also collect non-fish AA like snails and crabs.

Table 4 Summary of economic activities in the village

Economic group	Gender	
	Men	**Women**
Rich	Rice cultivation Vegetable/chilli Fishing Forest food Livestock labour Wage labour	Rice cultivation Housekeeping Fishing Forest food Livestock Wage labour
Poor	Rice cultivation Vegetable/ Chilli Livestock Wage labour Fishing Forest food Charcoal making	Rice cultivation Vegetable/Chilli Livestock Housekeeping Fishing Forest food Wage labour

Migration. Migration happens in all groups. There are two types of migration in the village. Some members of the household leave the area and commonly go to Bangkok to work as labourers during the end of farming season. They 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 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 play a very significant role in the village's livelihood. Although it was not ranked as the most important activity, fishing was just considered as another economic activity by all groups. 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.

Source of food. Based on the result of the ranking exercise, which is presented in Table 6, one of the main reasons villagers collect AA is for food consumption. Majority of the criteria used by the villagers relate to consumption. As taste ranked as the most important criterion, this really shows that villagers are collecting for their consumption.

Availability of the AA in the village due to several aquatic systems makes it more accessible to the villagers. They don't have any problem regarding the source of cheap protein in their diet as long as they know how to collect and what to collect in any aquatic system they have in the village.

Source of additional income. As presented in the seasonal calendars (annexes 1.1 to 1.4), fishing can be an additional source of income by the villagers. It is also supported by the criteria that villagers used in ranking the importance of the AA species. The three groups ranked good price high except the rich women group. For the rich women the value is not important in AA since very few of this group sells AA.

Important Aquatic animals

The list of important aquatic animals is presented in Annexes 3.1 to 3.4. All four groups ranked and identified species available in the different system in the village and even nearby water bodies. The summary of important aquatic animals is presented in

Table 5 where all the four groups use their own criteria for ranking these species. Most of the species ranked high are considered as wild species. In all groups majority of the species selected are big fishes although was not ranked the same. There were some cultured species that were ranked high men group like tilapia and barbs

Table 5). In all groups except poor men non-fish AA are included in the top most important. Frogs ranked high in rich men and women and from the group of poor women.

Table 5 Summary of Important Aquatic Animals in the Village

Economic group	Gender	
	Men	**Women**
Rich	Snakehead Gunther walking catfish Common lowland frog Climbing perch Small frog Common sheatfish	Snakehead Climbing perch Common lowland frog Lanchester Freshwater prawn Gunther walking catfish Mud carp
Poor	Snakehead Gunther walking catfish Climbing perch Nile tilapia Common silver barb Common carp	Gunther walking catfish Snakehead Tiger frog Climbing perch Osteochilus Spotted spiny eel

Source. The different groups discussed and presented the sources of AA in the village during the PRA exercises. As shown in the village map (Figure 1) and also from the identification and ranking activities, several sources or aquatic systems are present in the village. There are natural and communal water bodies in the villages, which serve as collecting area for AA species by the villagers. Aside from these natural bodies of

water other villagers collect AA in private ponds, trap ponds and paddy field specifically during rainy season. During rainy season the whole village serves as collection area of AA.

Gear. Like other villages, Ban pet also uses traditional and simple fishing gears. In the exercises during the PRA (see Annexes 4.1 to 4.4) different groups indicated the different fishing gear they used in a particular season for a particular species. The most common gear being used by men both rich and poor is cast net. Aside from cast net, other gears like bamboo traps, gillnet and lift net are also used by the villagers. For farmers with capital they even use pump to drain the trap ponds to collect AA. In collecting AA in the rice fields or shallow area, villagers only use simple gears, traps and sometimes their bare hands.

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

Economic group	Gender	
	Men	Women
Rich	Good taste Good price Versatility Easy to catch Easy to breed Can be preserve Can keep for long	Good taste Easy to catch Can be preserve Versatility
Poor	Good taste Easy to catch Good price Versatility Can be preserve Easy to breed Easy to trap	Good taste Easy to catch Can be preserve Good price

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.

During hot season some important AAs are abundant but some are lacking. The quantity also depends on the area. In the streams and public ponds species like snakehead and walking catfish are abundant. Frogs are lacking or none according to the group of rich women all the rest of the other group mentioned that frog are still available even during hot season but only in wet places and in streams. During this period the used of cast net and pump are very common since most of the villagers harvest or

drain their trap ponds/systems. In collecting in trap ponds, both men and women and even children participate. However it would mostly be men and children in the streams.

Unlike in other village, majority of the important AAs in the village are less abundant during rainy season. One of the reason here is that water level is very high and collecting AA is very difficult. Collection is being done also in streams, ponds using cast net also and gill net. During the start of cold season the quantity of most of the important AA increased.

Trends of Aquatic Animals

The trend of important aquatic animals in the village at the moment is increasing. Before, the aquatic resources are abundant but due to several shocks both nature and man-made, the aquatic resources started to decline only up to year 2535 - 2536 (1992 – 1993) when the quantity of important species started to increased again.

Most of the species from the list have the same trend from the beginning up to present. Species decreased and increased at almost the same rate as illustrated by all groups in the trend diagram. However there are still some species that have different trend like common carp by the poor men group. Common carp was stable from 2498 to 2527 and only 2527 when the trend increased and this is due to the introduction of aquaculture.

Factors Affecting the Trend

Natural calamities. The biggest factor that is affecting the status/trend of AA in the village is the different calamities. At present the main reason why population in AA increased was due to frequent flooding in the village. However flooding has a counterpart that gives bad effect on AA, which is drought. The poor men and women groups mentioned that some species started to decline in the year 2505 because of the long drought that was experienced by the village.

Disease. Three groups mentioned disease as a cause of decline in the species of AA. This disease started when people started using chemicals in the rice fields. The occurrence of the disease normally observed during cold season up to the end of dry season.

Changes in collection practices. Collection practices also caused the decline in quantity of AA in the village. Before people are catching AA for consumption only and used simple gears. But due to the increasing population and the demand for immediate food supply is increasing villagers now are using other gears that are sometimes harmful and destructive to the environment. The non-selection collection of AA also threatens the AA with extinction.

Introduction of cultured species. The increase of a particular species was also brought by the introduction of cultured species. Like the common carp and silver barb, the amount increased when villagers started culturing it into their system.

Use of agrochemicals. Due to the intensification of agriculture, which is considered the most important source of income in the village, villagers tend to use harmful chemicals. This negative effect in AA was discussed and brought out by all groups during the PRA exercise.

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 plan to use the data collected to plan for the village development.

Annexes

PRA output

Seasonal Calendar

Annex 1.1 Seasonal Calendar of Rich men group

	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Climate/ Weather	Windy & very cold	Windy & sunny	Sunny	Very sunny	Sunny but rain starting	Raining with little sun	Heavy rain	Heavy rain	rain	Rain & sun	Windy & start to cold	Very cold
Traditions	New year	Rice ceremony	Buddist festival Wedding	Songkran	Buddist festival	Buddist lent	Rice ceremony		End of buddist lent	Village festival Wedding		
Rice cultivation				Ploughing	seedling		Start transplanting		End of planting	mgt	Harvesting	
Vegetable /chilli	Harvest						Seedling	Take care	Soil preparation	growing	Take care	Harvest
Livestock	Release in Rice field							Harvest grass for feeding			Feed rice straw	
Fishing	Pump in ponds Catching in stream, *lamsay*, public ponds					Catching fish, frog in paddy and stream						
Forest food	Catching rat in paddy											
Building temple Hall	Men construct temple hall for free											
Livestock labor			Making charcoal									
Wage labour	Construction & Carpentry											
Income/ expenses	Sold rice Busy with chilli Busy for rice cultivation, livestock & harvest Brought chicken manure, rice cultivation, selling rice send children to school							sell rice				
Migration	Most villager do not go to Bangkok but young villager (10 persons) go and come back during festival											
Health	Happy				Fever(cold)				Cold		Busy	
					Busy in rice planting							

Annex 1.2 Seasonal Calendar of Rich women group

	Jan	**Feb**	**Mar**	**April**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
Climate/ Weather	Cold		Hot	Very hot	Rain	Rain	Heavy rains			Less rain	Cold	Very cold
Traditions	New year	Rice festival	Buddist ceremony	Songkran	Buddist ceremony Wedding		Buddist lent Wedding	Rice ceremony		End of buddist lent	Buddist ceremony	
Rice cultivation	Transport to storage				Seedling →		Application of manure		Application of fertilizer & transplanting		Harvesting →	
Housekeeping	← Less busy →				← Very busy →				← Busy →			
Fishing					Collect tadpole ← →					Collect fish when water is low		
Forest food		Collect insect		Red ant eggs	Mushroom, insect, ant's egg		Male cricket	← Big male cricket →				
Livestock	← Release in the field →				← Harvest grass for feeding buffalo in homestead →							
Wage labour	Harvesting chilli →											
Income/expenses	Payment to VACC ← →					← Busy rice cultivation →						
	← Selling chilli, some rice →				← buy chicken manure →		← selling rice →					
Migration	Majority of the people work in the village and only few go to bangkok for work											
Health					Fever and colds					*Leptospilosis,* colds		

Annex 1.3 Seasonal Calendar of Poor men group

	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Climate/ Weather	Very cold	End of winter	Start sun	Hot	Very hot	Start raining	Raining	Heavy rain		Raining	Start cold	cold
Traditions	Weeding	Sticky rice festival	Buddist ceremony Wedding	Songkran	Village ceremony Visakha		Buddist lent	Rice ceremony	→	End of buddist lent	Buddist Katin festival	
Rice cultivation					Ploughing and seedling	Transplanting →			Put organic fertilizer		Harvest	Storage
Vegetable /chilli	Harvest 1st crop			Harvest 2nd crop			Soil prep & seedling		growing	Seedling II		Harvest I
Livestock	Let buffalo, cow in paddy fields →								Harvest grass for feeding →			
Wage labour			Cut Eucalyptus Tree Carpentry →			Growing →					Harvest rice	
Fishing	Catch in stream, public pond, public pond, lumche buy (stream) →					Catch tadpole, frog in paddy		Catch in paddy →				Trap pond
Forest food		Collect insect →				Collect mushroom						
Charcoal			Make charcoal for family use									
Income/expenses	Sell rice →			Expenses for fertilizer →								Sell rice
	Busy for rice cultivation, livestock, growing chilli →											
Migration	Go to Bangkok		Back to village	Few people go to bangkok →							Back for harvesting	Back to bangkok
Health	Happy	Happy lots of festival & ceremony		Cold and fever	Busy in rice farming →							Happy

Annex 1.4 Seasonal Calendar of Poor women group

	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Climate/ Weather	Cold		Hot			Raining					Cold	
Traditions	Monk ceremony Wedding	Sticky rice festival	Buddist ceremony Wedding	Songkran	Village festival Monk ceremony		Monk Wedding Buddist lent	Rice ceremony		End of buddist lent	Wedding Monk Katin	
Rice cultivation					Seedling	Start transplan ting	Transplant				Harvest	Finish harvesting
Vegetable /chilli	Harvesting chilli						Seedling		Planting		Planting	Harvesting
Livestock	Tie in the paddy								harvest grass for the livestock			
Housekeepin g												
Fishing					Collect tadpole					Collect in paddy		Dig crab & snail
Forest food		Collect insect		Red ant eggs		Mushroom & bamboo shoot					Mushroom & insect	
Wage labour	Harvest chilli (3 Bt/kg)				Seedling	Transplant rice					Harvest rice	Harvest chilli
Income/exp enses	Sell chilli busy for rice cultivation, plant chilli			Spend money for chicken manure						sell rice		sell rice
Migration	Young people go to Bangkok not comeback & send remittance to family											
Health					Fever & cold						*Leptospirosis* & fever	

Group activity profile

Annex 2.1 Activity matrix of Rich men group

Activities	Name of Farmers					
	Sawai	Kong	Noo	Pravate	On-sa	Total
Rice cultivation	5	3	5	6	6	25
Chilli	4	3	5	3	3	18
Livestock	1	2	2	1	1	7
Fishing	3	3	2	3	3	14
Forest food	2	2	2	2	1	9
Temple	3	3	2	4	4	16
Charcoal	2	2	2	1	1	8
Wage labour	-	2	-	-	1	3
Total	20	20	20	20	20	100

Annex 2.2 Activity matrix of Rich women group

Activities	Name of Farmers					
	Kumaree	Sri	Nookate	Lap	Wilai	Total
Rice	4	7	5	3	5	24
Vegetables	8	4	-	4	3	19
Housekeeping	5	3	4	5	5	22
Fishing	2	-	-	-	2	4
Forest food	3	-	5	4	1	13
Livestock	-	5	6	4	2	17
Wage labour	2	-	-	-	2	4
Total	24	19	20	20	20	99

Annex 2.3 Activity matrix of Poor men group

Activities	Name of Farmers					
	Loam	Morn	Somsak	Wichai	Prathuang	Total
Rice cultivation	7	7	6	7	6	33
Vegetable/chilli	5	5	5	4	5	24
Livestock	2	2	2	2	-	8
Wage labour	-	1	-	3	2	6
Fishing	3	2	3	2	4	14
Forest food	1	2	2	1	2	8
Charcoal	2	1	2	1	2	8
Total	20	20	20	20	21	101

Annex 2.4 Activity matrix of poor women group

Activities	Peng sarak	Noodee Vongkalee	Praphai Boonchad	Sathean Bokkam	Boonmee Pipat	Total
Rice cultivation	5	3	6	9	6	29
Vegetable/chilli	-	3	-	5	5	13
Livestock	2	2	-	-	2	6
Housekeeping	4	9	8	3	4	28
Fishing	3	-	-	-	1	4
Forest food	3	3	2	-	-	8
Wage labour	3	-	4	3	2	12
Total	20	20	20	20	20	100

Role of Aquatic Animals

Species Identification and ranking

Annex 3.1 Identification and ranking of Aquatic animals by Rich men

Aquatic animals	Criteria							Total
	Easy to catch	Delicious	Preservable	Good price	Can keep for long	Easy to breed	Can be cook in diff ways	
Nile tilapia	1	1		1		2		5
Common carp	1		1	1			1	4
Silver barb	1		1	1			1	4
Juliens golden price barb	1		1	1	1		1	5
Small scale mud crab	1			1			1	3
Gunther walking catfish	2	3		2	2	2	2	13
Snakehead	2	3		3	2	2	2	14
Climbing perch	2		2	1		2	1	8
Silver rasbora	2		2			2		6
Spotted spiny eel			1	2			1	4
Irediscent mystus							1	1
Ompok kratensis		1		2			2	5
Yellow mystus		2		3			1	6
Armed spiny eel							1	1
Swamp eel		2		2			1	5
Siamese riverine arvine								-
Barb	1	1	1			1	1	5
Eye-spot barb	1	1					2	4
Red cheek barb	1	1	1			1		3
Julian mud carp	1	1				1	1	4
Whisker sheatfish	1	1					1	4
Common sheatfish		2		2	1		2	7
Spotted-featherback		1		1				2
Sand goby		1		1				2
Greater black shark		1		1			1	3
Stripped tiger nandid								-
Greater long lipped barb								-
Smith barb		1		1			1	3
Soldier river barb		2		2			2	6
Great white sheatfish		2		2			2	6
Giant snakehead								-
Golden little barb		1	1					2
Puntius goinotus	1	1	2			1	1	6

Siamese river abramine								-
Freshwater garfish								-
Acanthopis	1	2		2			1	6
Tiger loach		2		1			1	4
Yellow tail botia		2		1			1	4
Snakeskin gourami	1		1	1				3
Moonlight gourami	2		2					4
Siamese grass fish								
Frog	2	2		2	2	2	2	12
Small toad	2	2		1	1	2	1	9
Total	27	39	16	38	13	18	36	187

Annex 3.2 Identification and Ranking of Aquatic animals by Rich women

Aquatic animals	Criteria					Total
	Delicious	Easy to catch	Can be preserve	Can cook in diff ways	Source	
Stripped snakehead	5	5	2	3	Catch	15
Gunther walking catfish	4	2	1	2	Catch	9
Common climbing perch	2	5	4	1	Catch	12
Silver rasbora		1	3		Catch	4
Common silver barb	2	1	2	1	Cultured	6
Snakeskin gourami	2	2	2	1	Cultured	7
Yellow mystus	5	1	2		Catch	8
Iridescent mystus	4	1		1	Catch	6
Spotted spiny eel	4	1	1		Catch	6
Eye spot barb	2	1	2	2	Catch	7
Golden little barb	3	2	3		Catch	8
Puntius goinitus	3	3	3		Catch	9
Stripped tiger nandid		1	1		Catch	2
Osteochilus	3	1	2		Catch	6
Lancester freshwater prawn	5	3	2		Catch	10
Pond snail	4	3			Catch	7
Black rice crab	1	1	1	1	Catch	3
Frog	4	3	2		Catch	10
Insect	2	3			Catch	5
Water bug	6	1	1		Catch	8
Nile tilapia	3	3			Cultured	6
Common carp	3	2			Cultured	5
Moonlight gourami	1	5	2		Catch	8
Siamese glassfish					Catch	
Ompok krattensis	5	1			Catch	6
Small scale mud carp	4	1	2		Cultured	7
Spotted featherback	3	1			Catch	4

Common sheatfish	4				Buy	4
Pangasius conchophilus	5		2		Buy	7
Stripped catfish	3	2			Buy	5
Total	92	56	40	12		200

Annex 3.3 Identification and Ranking of Aquatic animals by Poor men

Aquatic animals	Criteria							Total
	Easy to catch	Delicious	Preserve	Can be cook in diff ways	Good price	Easy to trap	Breeding easily	
Stripped snakehead	3	2	2	3	3	2	2	17
Gunther walking catfish	3	2		2	2	2	2	13
Common climbing perch	3	1	2	1	1	2	2	12
Common silver barb	2	2	3	2	1			10
Nile tilapia	2	2	2	2	1		2	9
Common carp	2	1	1	2	1			7
Julien golden price carp	1	1	1	1	1			5
Ompok krattensis	1	2						3
Iridescent mystus	1							1
Yellow mystus	1	2			3			6
Barb	1	2	2	2				7
Stripped tiger nandid								
Sand goby	1	2			3			6
Spotted spiny eel	2	1		1	1			5
Swamp eel	1	1		2	2			6
Armed spiny eel	1	2		1				4
Greater black shark	1	2			2			5
Spotted featherback	1	2			1			4
White lady carp								
Barb	1	1	2	1				5
Greater black shark	1	1						2
Pond snail	1	1			1		1	4
Apple snail	1	1						2
Gold snail	1	1						2
Rice snail	1	1						2
Lanchester freshwater prawn	1	2			1			4
Black rice crab	1	1		1	1			4
Frog	1	2		1	2			6
Bull frog	1	1			1			3
Small toad	1	1			2			4
Silver rasbora	1	1	2					4
Julien mud carp			1					1
Puntius goinituis			1					1

Moonlight gourami	1	1	1		1			4
Snakeskin gourami	1	1	2		1			5
Transerse barbarbs	1	1		1			1	4
Freshwater garfish								
Greatwhite sheatfish	1	1			1			3
Stripped catfish		1			1			2
Julien mud carp								
Bighead carp		1			1			2
Red tail botia		1						1
Water bug		2			1			3
Yellow mystus		1			1			3
Total	43	51	22	23	37	6	10	192

Annex 3.4 Identification and Ranking of Aquatic animals by Poor women

Aquatic animals	Criteria				Source	Total
	Easy to catch	Delicious	Able to preserve	Good price		
Stripped snakehead	3	5	3	3	Stream, paddy, pond, lamcha	14
Common climbing perch	3	2	3	1	Stream, paddy, & pond	9
Golden little barb		3			Stream, paddy, & Lamcha	3
Common silver barb	3		3		Stock	6
Gunther walking catfish	3	4	3	4	Stream, paddy, pond, lamcha	14
Small scale mud carp	2	2	2	1	stock	7
Common carp	2	2	2	1	Stock	7
Nile tilapia	2	3	2	1	Stock	8
Stripped catfish					Buy	
Black ear catfish		2		2	Stream, paddy, pond, lamcha	4
Iridescent mystus	1				Stream, lamcha	1
Yellow mystus	1	2		1	Stream, paddy, pond, lamcha	4
Ompok krattensis	1	3		1	Stream, paddy, pond, lamcha	5
Silver rasbora	3		4		Stream, paddy, pond, lamcha	7
Greatwhite sheatfish		3			Stream, buy, lamcha	3
Lanchester freshwater prawn	3	3			Stream, paddy, pond, lamcha	6
Spotted spiny eel	2	3	2	1	Stream, paddy, pond	8
Moonlight gourami	2		2		Stream, paddy,pond	4
Snakeskin gourami	2		2	1	Stream, paddy, pond	5

Spotted feather back	1	2			Stream, pond, lamcha	3
Stripped tiger nandid	2				Stream, lamcha	2
Stripped croaking gourami	1	1	1		Paddy, pond	3
Siamese glass fish		1			Stream, paddy	1
Green blowfish	1				lamcha	1
Greater black shark			2	1	lamcha	3
Siamese rock catfish					Lamcha	
Freshwater gar fish		1			Stream	1
Red tail botia		3	2	1	Lamcha	6
Common sheatfish		3			Lamcha	3
Siamese tiger fish		1			Lamcha	1
Barb	1	3		1	Lamcha	5
Greater bony lipped barb	1				Lamcha	1
Jullien mud carp	1	2	2		Stream	5
Armed spiny eel	1	4		1	Lamcha	6
Swamp spiny eel	2			1	Paddy	3
Frog	4	3	1	2	Paddy	10
Bullfrog	2				Paddy	2
Small toad	3				Paddy	3
Siamese river abramine						
Wanders bony lipped barb		2			Lamcha	2
Water bug	1	2		2	Paddy	5
Insect	2	2			Stream, paddy, pond	4
Pond snail	2	2		1	Stream, paddy, pond	5
Apple snail					Canal	
Rice snail					Paddy	
Osteochilis	2	3	2	2	Stream, lamcha	9
Mystus soldier river barb					Buy	
Total	60	72	38	29		199

Aquatic Animals Seasonality

Annex 4.1 Perception of rich men group on the seasonality of Aquatic animals

Aquatic animals	Hot season				Rain season				Cold season			
	Quantity	Gear	Who	Where	Quantity	Gear	Who	Where	Quantity	Gear	Who	Where
Snakehead	30%	Cast net, pump	Male & female children	Pond, stream, public pond	40%	Fish rod, gill net, bamboo trap	Adult male, son	Paddy field, stream	30%	Bamboo trap, cast net, hole	Adult male & female, children	Individual paddy, stream
Gunther walking catfish	30%	Cast net, pump	Male & female children	Pond, stream, public pond	40%	Fish rod, gill net, bamboo trap	Adult male, son	Paddy field, stream	30%	Bamboo trap, cast net, hole	Adult male & female, children	Individual paddy, stream
Tiger frog	10%	Spade	mother daughter	Trap pond & paddy	60%	Fish rod, frog trap, battery & light	Adult male, son	Paddy field, public area	30%	Light & battery, trident	Adult male & son	Individual paddy, stream
Climbing perch	20%	Cast net, pump	Father & son	Pond, swamp, public pond	50%	Gill net, fish rod, bamboo trap	Adult male, son	Paddy field, public area	30%	Cast net, gill net, battery & light, trident, hole	Adult male & son	Individual paddy, stream
Small frog	50%	Nylon net, batteries and lights	Father & son	Paddy, wet place	20%	Battery & light	Adult male, son	Individual paddy field	30%	Hole	Adult male & son	General canal
Common sheatfish	10%	Cast net, gill net	Father	Lamsay, buy	40%	Gill net, big bamboo trap	Adult male	Lamsay, buy	50%	Cast net, gill net	Adult male	Lamsay, buy

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

Aquatic animals	Hot season				Rain season				Cold season			
	Quantity	Gear	Who	Where	Quantity	Gear	Who	Where	Quantity	Gear	Who	Where
Snakehead	Abundant	Drained pond, cast net	Adult men & women, children	Pond, stream, swamp	Small amount	Fish rod, trap	Adult male, son	Owner, paddy	Less abundant	Hole, bamboo trap	Adult male & female	Paddy
Climbing perch	Less abundant	Pump, cast net	Adult men & women, children	Pond, stream, swamp	Small amount	Gill net	Adult male & female, children	Swamp, stream	Abundant	Paddy, hole, bamboo trap, trap	Adult male & female, children	Paddy
Tiger frog	None	-	-	-	Abundant	Frog trap, fish rod	Adult male	Paddy	Less abundant	Spade	Adult female	Stream, paddy, swamp
Lanchester freshwater prawn	Abundant	Dip net, nylon net	Adult men & women	Trap pond, stream, swamp	None	-	-		Less abundant	Dip net, nylon net	Adult male & female	Trap pond, swamp, stream
Gunther walking catfish	Adundant	Pump, cast net	Adult men & women, children	Pond, stream, swamp	Small amount	Fish rod, trap	Adult male, children	Paddy	Less abundant	Hole, bamboo trap	Adult male & children	Paddy
Mud carp	Less abundant	Pump	Adult men & women, children	Trap pond	Small amount	Gill net	Adult male, children	Swamp, stream	abundant	Rice field, dip net	Adult female	Paddy

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

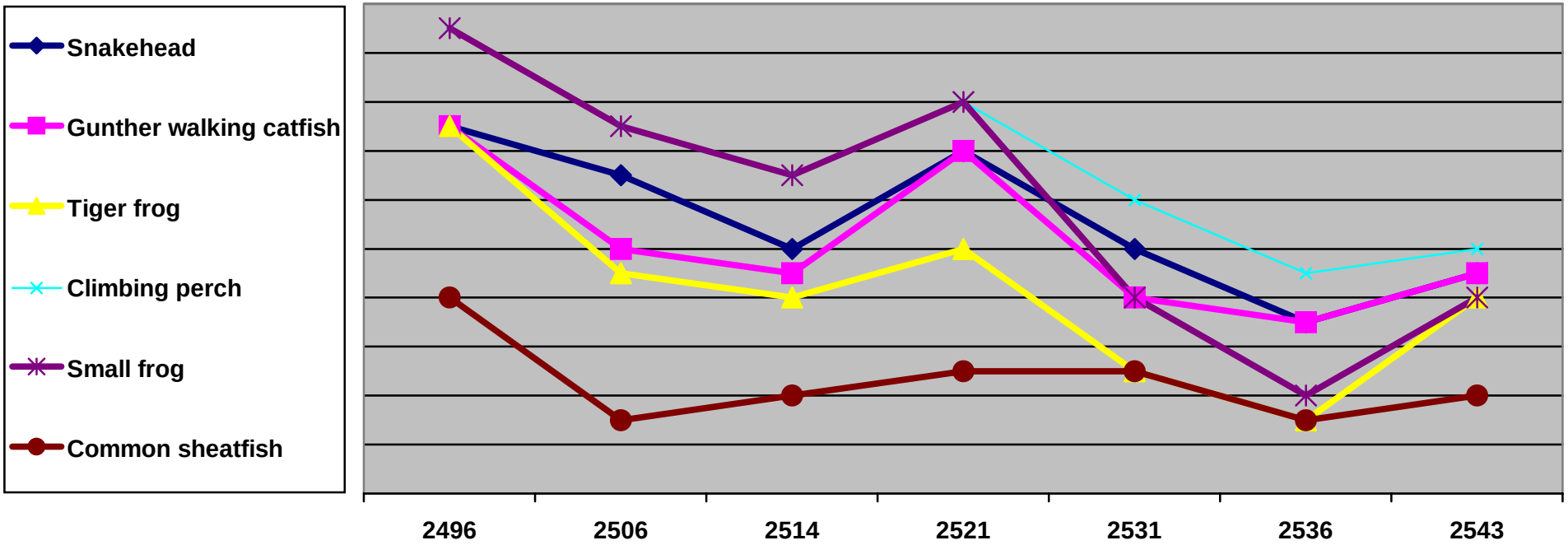
Aquatic animals	Hot season				Rain season				Cold season			
	Quantity	Gear	Who	Where	Quantity	Gear	Who	Where	Quantity	Gear	Who	Where
Snake head	50%	Cast net, pump	Adult male & female, children	Public pond, stream, pond	20%	Fish rod, gill net, trap, bamboo trap	Adult male & son	Individual pond, stream, public pond	30%	Hole, bamboo trap, trap	Adult male & children	Individual paddy
Gunther walking catfish	50%	Cast net, pump	Adult male & female, children	Public pond, stream, pond	20%	Fish rod, trap, bamboo trap	Adult male & son	Individual pond, stream, public pond	30%	Hole, trap	Adult male & children	Individual paddy
Climbing perch	30%	Cast net, pump	Adult male & female, children	Public pond, stream, pond	20%	Fish rod, gill net	Adult male & son	Individual pond, stream, public pond	50%	Hole, bamboo trap	Adult female & children	Individual paddy
Nile tilapia	60%	Cast net, pump	Adult male & female, children	Individual pond	10%	Gill net	Adult male & son	Individual pond	30%	Decrease water	Adult female & children	Individual paddy
Common silver barb	60%	Cast net, pump	Adult male & female, children	Individual pond	10%	Gill net	Adult male & son	Individual pond, stream, public pond	30%	Decrease water	Adult female & children	Individual paddy
Common carp	60%	Cast net, pump	Adult male & female, children	Individual pond	10%	Gill net	Adult male & son	Individual pond, stream, public pond	30%	Decrease water	Adult female & children	Individual paddy

Annex 4.4 Perception of Poor women on the seasonality of aquatic animals

Aquatic animals	Hot season				Rain season				Cold season			
	Quantity	Gear	Who	Where	Quantity	Gear	Who	Where	Quantity	Gear	Who	Where
Gunther walking catfish	Less abundant	Bamboo trap, trap, hole, fish rod, gill net	Adult male & son	Stream, public pond, individual paddy	Less abundant	Cast net, Gill net, dip net	Adult male & female	Individual pond, public pond, stream	Abundant	Pump, cast net	Adult male, son	Individual pond, stream, public pond
Snakehead	Less abundant	Bamboo trap, trap, hole, fish rod, gill net	Adult male & son	Stream, public pond, individual paddy	Less abundant	Cast net, Gill net, dip net	Adult male & female	Individual pond, public pond, stream	abundant	Pump, cast net	Adult male, son	Individual pond, stream, public pond
Tiger frog	Abundant	Fish rod, frog trap, battery & lights, dip net	Adult male & female, children	Stream, public pond, individual paddy	Small amount	Spade	Adult female	Paddy	None	-	-	-
Climbing perch	Abundant	Gill net, bamboo trap, trap, hole	Adult male, children	Stream, public pond, individual paddy	Abundant	Dip net	Adult female	Paddy	Less abundant	Pump	Adult male, son	Individual pond
Osteochilus	Small quantity	Gill net	Adult male	Canal	Less abundant	Cast net	Adult male	Lamsay, buy, stream	Abundant	Cast net, gill net	Adult male	Lamsay, buy, channel
Spotted spiny eel	Abundant	Trap, cast net	Adult male	Stream	Less abundant	Dip net	Adult female	paddy	Small amount	Cast net	Adult male	Stream

Aquatic Animal Trends

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



Notes:

Snakehead : 2496- species are abundant because of good environment; less villages catching fish since the household number is very limited (30 HH). Villagers catch for consumption only. Do not use improved gear in collecting the species.

2505-06- Decreased fish due to the use of nylon gear.

2521 – Population increased when water dam was damaged.

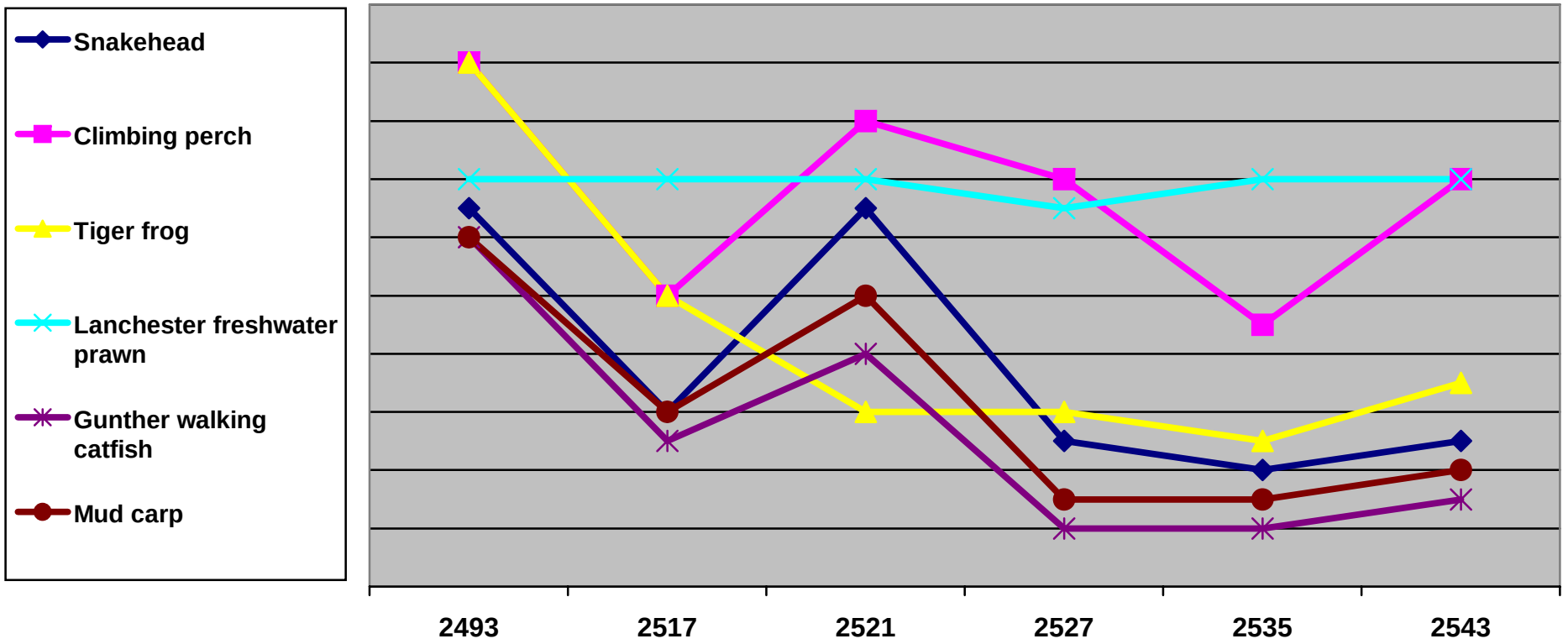
2530- People started using agro chemicals. Fish infected with diseases. Drought

2543- Increased population due to floodings.

Tiger frog: 2521 – Beginning this year species declined very fast

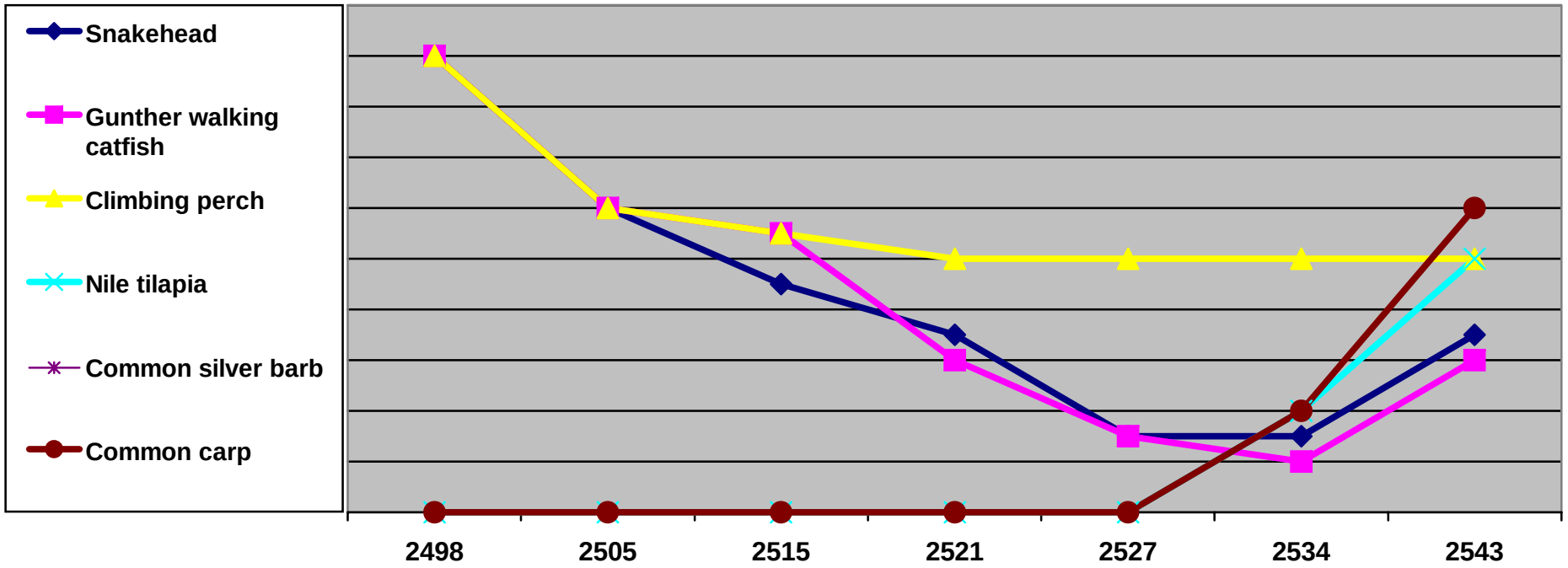
Climbing perch: 2514 – decreasing slowly (no reason)

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



Notes:

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



Notes:

2498 – Snakehead population was abundant; few households in the village the catch; people catching for consumption only; forest is still rich in resources.

2505 – Snakehead population decreased due to big drought.

2515 – Massive mortality of fishes (do not know the reason)

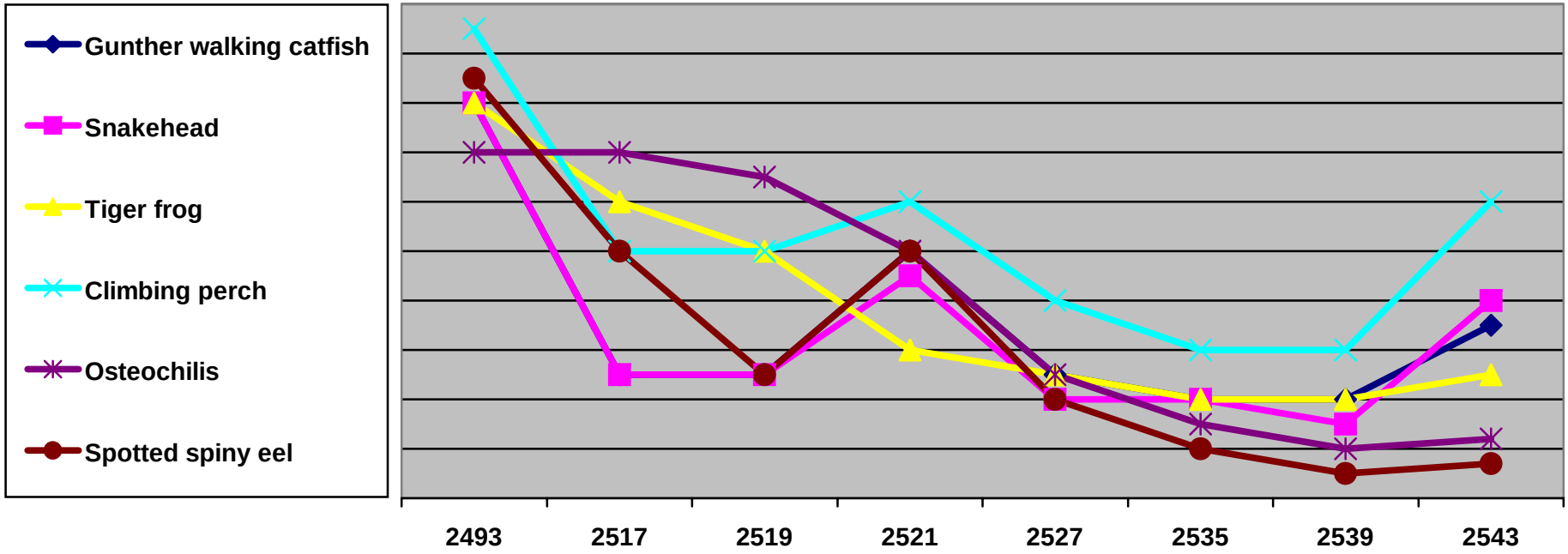
2521 – Started digging in the stream

2527 – Population in the village increased thereby increased number of household catching fish.

2534 – Snakehead decreased due to the use of Agrochemicals

Villagers started raising Nile tilapia, common silver barb, and common carp

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



Notes:

2493 – Big flooding; only few households collecting the species; forest still rich in resources
2517 – Fish decreases due to drought
2521 – Flooding increased aquatic animals population; farmers uses battery and lights in collecting aquatic species
2525-2527 – Fish disease, farmers uses chicken manure; also use chemicals in growing chilli
2535 – drought
2543 - Floodings