

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

## **Participatory Rural Appraisal in Prey Tadoc Case Study 1 (PRA Report from 2001)**



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**July 2002**

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## Prey Tadoc Village

### Introduction

### Background

The present status of aquatic systems in the province as well as the effect of these aquatic systems to the people has not been established. In any development organization and even to government agencies, knowing the general background of the village is very important. An outsider would not see the true and whole picture of the village unless proper baseline gathering is conducted. This information can be used to develop new programs or in designing relevant intervention activities in the area. It is also very important that the information is generated from and with the primary stakeholders themselves - the farmers/villagers.

A lot of development programs had been started in different villages and there have been some problems in sustaining these programs. Most common reason for the low success of development projects is the passive, "disengaged attitude" of the supposed primary stakeholders towards the project or program. This can be attributed mainly to the way the project or program was conceived and the planning process used. Frequently, development interventions are designed and managed using the top-down approach. Projects are initiated and planned at the top, with no prior consultation with the other stakeholders and no involvement of the intended beneficiaries in the planning process. Thus, the communities are left to accept and accommodate the said "intervention". It is therefore necessary to listen to the villagers and to consult them regarding the status of their area prior to starting any activity, rather than just thrusting information and expectations on them.

### Objectives

The main objectives of the study are to assess the general livelihood activities in the village and to establish rapport with the villagers. To achieve 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 using participatory tools;
3. To work with the villagers in facilitating the identification of issues in the community.

### Participatory Rural Appraisal Team

Dr. David Little	Principal Investigator SRS Project
Chhan Sokha	Project Coordinator, Cambodia
Ernesto "Jack" Morales	RA, SRS Project
Ouk Hak	AARM - Takeo - Field Manager
Hun Sotheary	AARM - Takeo - Staff
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Chan Houn  
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 Bun Chhayrong

AARM-Svay Rieng - SRS staff  
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 AARM-AO - Driver

## Schedule of Activities

The workshop was done in four days, which also included the collection of secondary information about the province and the commune (see Table below). During the first day the provincial and commune offices were visited. Secondary information were gathered from these offices that helped the team identify the village for this study.

Before the village was finally selected validation and additional information were asked from the head of the commune. Visitation of the village was also done during the first day where the team was introduced to the villagers. An appointment was also set during this visit.

On the second day, the village profile was generated and participants for the next day's activity were identified. The last day of the workshop was used for collation and processing of outputs from the two days' activities. The last important activity that was done in the village was the validation of the information and getting feedback from the villagers.

Table 1 Schedule of Activities for PRA Workshop in Prey Tadoc

Date	Activities
30 April 2001	Secondary information Introduction to the village
01 May 2001	Village profiling Identification of PRA participants
02 May 2001	PRA exercises
03 May 2001	Processing of PRA outputs Feed backing and validation

## Takeo Province

### Province Description

**Location.** The province is located in the southern part of Cambodia. Takeo is 78 km away from the main capital of the country, Phnom Penh. The province can be reached by two routes: by taking the national road N°2 is about 78 km away and 87 km by national road N°3.

**Total area :** 348.015 Km<sup>2</sup>

**Boundaries:**

North : Kandal province  
 South : Vietnam  
 Eastern : Kandal province and Vietnam  
 Western: Kampong Speu and Kompot province

**Administration.** The province is composed of 10 districts with a total of 100 communes. There are 1,122 villages in this province.

## District Description

**Location.** Tramkok district is situated 12 km away from the center of Takeo province. It covers a land area of approximately 55,045 ha on the western part of the province. The district can be reached by taking national road N°3 from Phnom Penh to Kampot province.

### Boundary:

Northern	- Samrong district
Southern	- Chhouk district
Eastern	- Donkeo and Treang district
Western	- Chumkari and Chhouk district

**General Description.** Tramkok district differs from other districts because of its sandy soil, its topography which is high land, and the major agricultural product which is coconut. In general, this district is also famous for its large production of livestock particularly pigs and cows. Since majority of the population are farmers the total land area for rice cultivation is approximately 34,000 hectares.

Aside from coconut and rice, the crop production in this district is also diverse. Other agricultural products like watermelon, eggplant and cucumber are commonly produced in this district.

The district is also one of the poorest districts in the province due to its topography, which is upland. There are 5 upland districts in this province and Tramkok and Donkeo are the two districts that are considered the poorest.

**Administration and Population.** The district is composed of 15 communes with a total of 242 villages. It has a total population of 147,103. The women population is 51.63% or 75,954 females. The total number of households in this district is 27,954 with an average of 5.26 people per family. The population is estimated to increase at a rate of 2% per year.

**Resources.** The district is poor in water resource as compared to other districts in this province (like Angkor Borei and Borei Choulasa). The aquatic resources in this district used to be abundant but due to several factors these resources are now declining. There are two main water bodies namely Tomnoub Lok and Tomnoub Osaray. A reservoir is also present. These resources are the main sources of aquatic animals in the district.

**Rainfall.** The rain pattern in the area changes every year and so there is no rain pattern that can be established in the area. In general the rain comes during the period of May to October.

**Source of Income.** Aside from agricultural activities as the main source of income, residents from this province get additional income from weaving which is done by the wives.

On the other hand, the husbands usually go to other places like Phnom Penh to work in construction sites.

### Commune Description

**General description.** The commune has a total land area of 2,220 hectares. The rice field has an approximate coverage area of 1, 200 hectares. This area is not flooded and thus the cropping season is only once per year. The main source of water for all agricultural activities is rain. A canal coming from other communes serves as supplementary irrigation for the rice fields in this commune. Due to the limited number of cropping per year because of limited water supply, production of rice in the commune is not enough for the year.

**Sources of income.** Aside from rice, watermelon is also being grown in this commune. Villagers living away from the mountain earn income from making equipment for rice cultivation like plough. During off-season, villagers go to other places for work. Some stay in the village and get income from producing medicinal plants. There are also some villagers who work in brick factories and very few skilled laborers.

#### Administration and Population

1. Prey Tadoc	64 families
2. Painn Meas	114 families
3. Ta Sman	110 families
4. Prosot They	54 families
5. Prey Korki	40 families
6. Phorng Tuk	75 families
7. Kraing Banthay	91 families
8. Tropaing Chouk	39 families
9. Ta Som	74 families
10. Kok Ngay	50 families
11. Tropaing Chiang	50 families
12. Chan Teap	114 families
13. Sam Bour	96 families
14. Ta Phain	74 families
15. Tropaing Thor	52 families
16. Krobay Prey	67 families

**Fish culture.** Among the 16 villages, four villages are engaged in fish culture because of the intervention of an organization known as READ. Species like tilapia, common carp, silver barb and silver carp are being cultured. However because of poor knowledge and water limitation, very few are now culturing fish. Majority of the households in this commune catch aquatic animals during the rainy season. During the dry season, people normally just buy aquatic animals for their consumption.

### Selection Process for the village

The village was selected using the criteria on the status of aquatic resources. In this study the project is looking at different aquatic systems and also the topography of the sites. During the provincial office visit, the district was selected because it is one of the

highest areas in the province. From the district a commune was identified by drawing a transect line through the whole district, traversing the upland to lowland area, which is also from the western to southeastern part of the district. The transect line was divided into three parts and the communes were identified from the three portions of the line: Samrong located in the high and drier area along a mountain, Kus in the intermediate highland area and Nheng Nhang in the wet highland area. Once a commune was selected, a visit to the commune was done to verify secondary information about the commune. The village was then identified after the meeting with the commune head. Some of the bases used in the selection of the village were the amount of aquatic systems present in the area, it represents a backward village (i.e. considered as one of the poor villages), and also the number of households for ease of management purposes. Prey Tadoc represents the high and drier village.

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

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

*Aquatic animals identification/ranking.* This was accomplished to find out the available and unavailable aquatic species in the area. This activity also determined 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 about the status and condition of the different aquatic animals in the village. The causes of the increase as well as the decrease in population of a particular aquatic animal were also analyzed.

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

## Process

The activity was divided into three parts. The first part was done with the village headman with the key informants. During this activity the profile of the village was established. The information about the present resources in the village was generated using the village mapping exercises, which was done by the village headman with the help of other key informants present in the meeting.

For the purpose of getting the social context of the village, the list of households was used by the team in the well being activity. The individual names were written down in cards and farmers/key informants identified the different social groups in the village. Using the results of this activity the participants for the next day activity were selected. Two groups of farmers representing the poor group and the better off group were identified. The team set an appointment with the selected people to participate in the activity for the next day.

The second part of the activity generated more detailed information about the activities in the village and how different social groups differ in their ideas. During this day men and women from poor and better off groups were separated into two. Seasonal calendars and activity ranking matrices were produced during this period. Information about aquatic animals and their importance were also generated during this day.

The children in the village also participated in the activity during the second day of the workshop. Identification of different aquatic animals present in the community was first conducted with the children by asking them to draw all aquatic animals that they see and collect from any aquatic systems in the village. The output of this activity was then used by the adult participants in the exercises on ranking and seasonality of aquatic animals.

The last part of the workshop was the validation. After the team collated all the information generated from the first two days, the team made summaries of the important issues. The team returned to the village and had a brief meeting with the villagers to also validate some information. The follow-up discussion focused on clarifying the contradictory information and the vague ones.

## Setting the Context

### Mapping the Current Resources in the Village

The location of the village dictates the availability of the resources. Generally the village is representative of an upland area in this district. Some resources are limited but some are present and abundant in which most of their livelihood depend on. The following are the resources identified by the villagers during the PRA exercise when the village headman and some key informants discussed and drew the village map (please refer to Figure 1).

**Land resources.** Majority of the land in this village is being used for agricultural activities. This is also the reason that most of the villagers are farmers. Rice fields are



situated around the village. Aside from the rice fields the village also has some upland areas, which they use for planting other crops. Other crops like vegetables are also planted in homestead. The mountain that is situated in the western part of the village serves as a common land for villagers to grow crops and for their livestock to graze. The forest also serves as place where villagers collect wood and wild animals for their consumption and sometimes for selling.

**Water resources.** Generally the whole district is limited in water resource and that is why it was selected for this study. Prey Tadoc as an agricultural village that rely mostly on rain as their main source of water for their farming activities. Aside from the rain the villagers can also get some water from the canal that runs along the village. The canal also became a big water body in the village. The villagers had considered this water body as "ang" or reservoir. Sometimes villagers also call this water body as "boeung" or lake as this water body swells or gets bigger during the rainy season and results to flooding in some portions of nearby rice fields. A number of household ponds are also present in the lake, which the villagers identified during the PRA.

Aside from the land and water resources, basic services are also present although not sufficient. Wells were installed in different locations in the village. There are also small shops around the village where farmers can get their immediate needs.

### **Mapping the Development in the Village**

Based on the discussion, the villagers could not recall a lot of developments that have occurred in the village. Even the period when the village was established was not mentioned in the timeline (see Figure 2). The main events that the villagers could remember are all related to political issues. The timeline reflects information on the situation of the village during the past three regimes.

During the Lonol regime (1970 - 1975), the village had only 30 households. Most of the villagers lived in the forest. There was also bombing during this period, which killed a lot of livestock as well as villagers. The situation in the village got worst when the next regime came. During the Polpot regime, people from this village ate and worked together but not much benefit were given to them. The supply of food during this time was also limited.

It was in 1979 when villagers started going back to the village but it was very difficult for them since most of their property were gone or had been destroyed.

It was only very recent when major developments started in this village. Information about agriculture and fishing were not mentioned during the discussion. One major development in the village that took place but was not mentioned in the timeline but discussed during the exercise was the construction of the road. It was also only a few years ago when the rice yield started to increase due to the use of chemical fertilizers.

At present more children are going to school and also the number of women working outside the homes are increasing.

## Mapping the Social Context of the Village

As discussed earlier the village was selected because it represents a backward or low-income community. In general the village is relatively poor and villagers lack resources they need to improve their livelihood. Although classified as a poor community, the villagers are still able to identify six (6) social groups in their community. The villagers used several criteria in identifying the well being rank of households in the community. Averages and quantities were not mentioned among the criteria. Detailed characteristics of the socio-economic groups are presented in

**Table 2.**

### Social-Economic Characteristics

**Land ownership.** The size of the land owned is the most important criteria used by the villagers in identifying the well being of households in this village. The size can tell whether the household or individual is better off or resource poor. In this village majority of the resource poor group own a small piece of land (measurement was not mentioned during the activity). In some cases especially with the lowest in the group, a few families do not have any land at all to cultivate. Families belonging to the 4-6<sup>th</sup> groups or the better off groups own large tracts of land for agriculture activities.

**Sources of income.** Based on secondary information, majority of the households in this village are farmers. From the result of the well-being activity, there are minor differences with the sources of income of the different socio-economic groups. Better off families get income mainly from agriculture (i.e. income from rice and their livestock). Aside from these sources they also get income from other businesses in the village like trading and payment from services (rental fees for equipment used). A few families receive remittances from their relatives who are working either in Phnom Penh or outside the country.

Poor families have limited alternative livelihoods. For those families with small land, they get their income mainly from farming. For the families who do not own land, most of the time they work as helpers to earn income. Some members of the family go to other places for work as wage labor.

**Production.** Agricultural production in the village is mostly for household consumption only. For better off families the production is enough for household needs and in some cases farmers can also sell some of their produce for additional income. The poor families cannot sell their production since it is mainly for their own subsistence only. Some families under the lowest group are unable to produce enough to sustain their food demand. In some parts of the year, particularly before the harvesting season, some families do not have enough food to eat.

**Livestock.** The number of livestock also dictates the well being of household in the area. Most better off families own at least 4 heads of livestock, either cows or buffalos. Poor families sometimes do not have livestock and if they do, they only have 1 - 2 at the most.

Figure 1 Village Map of Prey

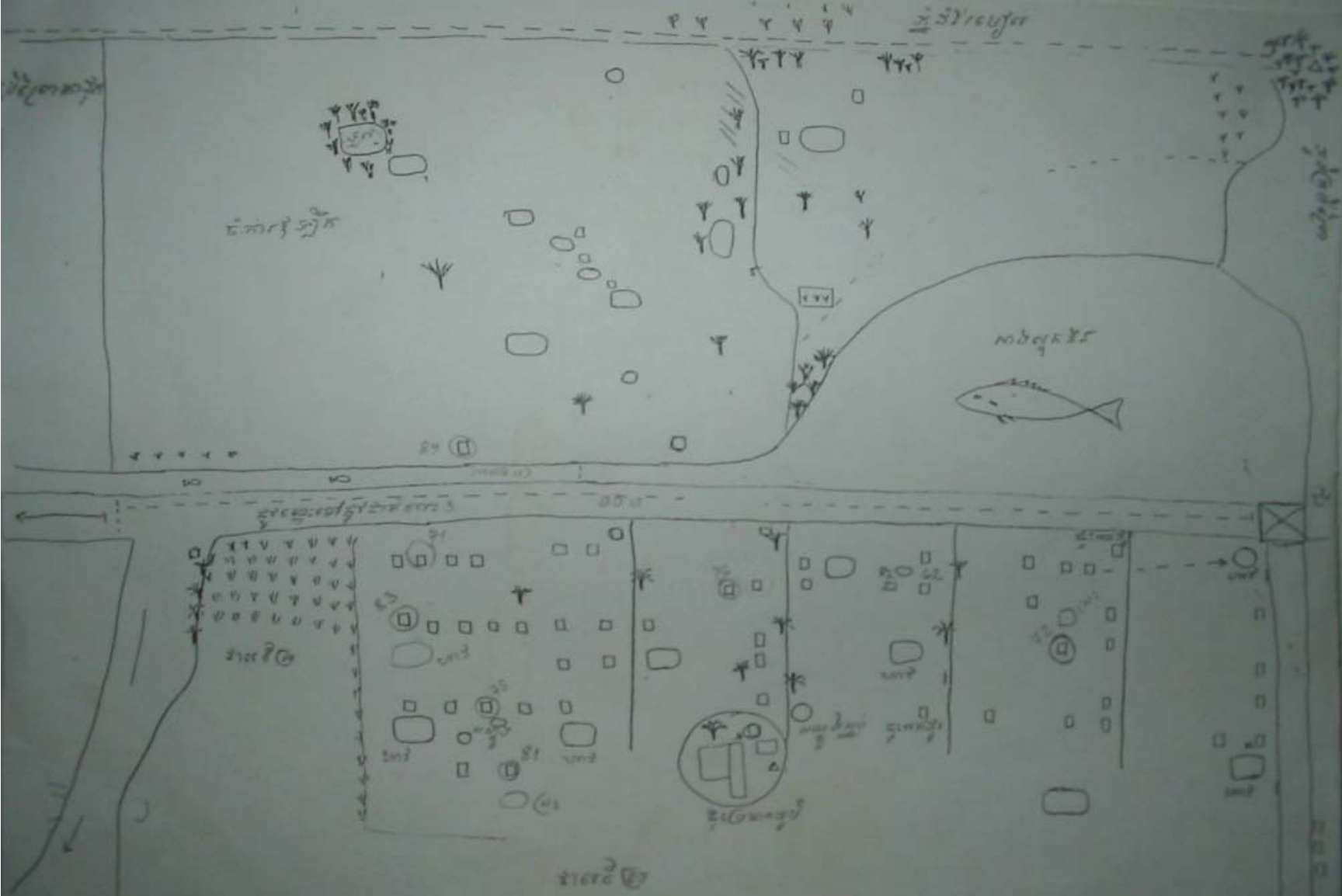
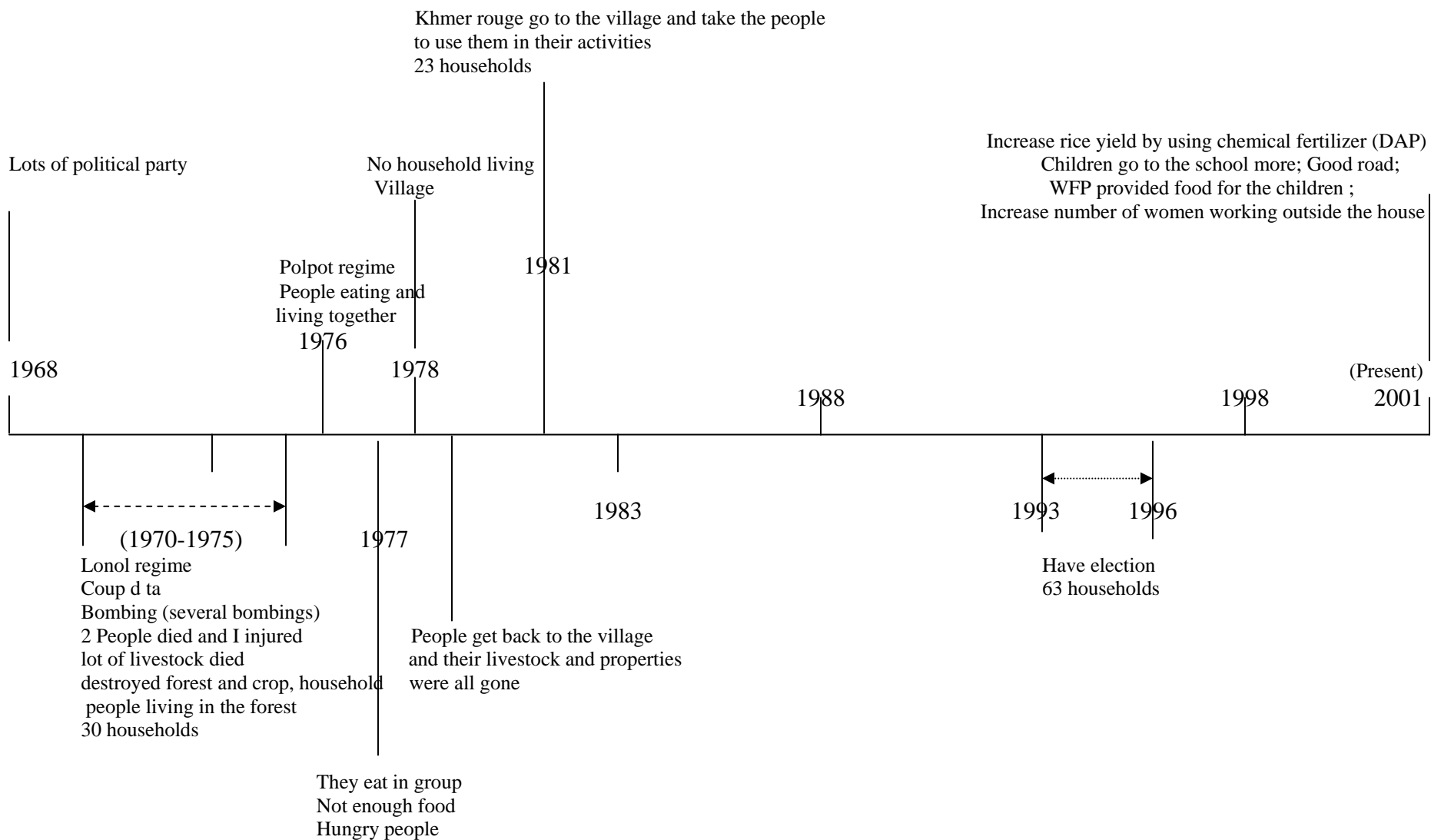


Figure 2 Historical Development of Prey Tadoc



**Transport.** Majority of the poor families do not have any form of transport. In the field they use sleigh to transport their product. Some farmers have bicycle to travel within the village and outside the village. Better off families can afford to have motorbikes. None of the villagers have a car.

**Access to credit.** Families belonging to the middle and better off groups have access to credit. These families can get loans and use them for their farming and other business as capital. Poor families cannot get loans from any formal lending service and they can only get credit from individual lenders in the village or sometimes from their relatives. Some poor families have used their small land as collateral to get loans.

**Other assets.** Aside from having a small house, poor families do not have any major assets or appliances. TV, radio and other home appliances can only be seen in houses of better off families. Some families from the better off group also have better equipment for agriculture activities. Sometimes, these set of equipment get rented out to other farmers also.

Table 2 Characteristics of Socio-economic Groups in Prey Tadoc

Group of women	Couple	Village Chief Kong Chay
<p>I</p> <ul style="list-style-type: none"> <li>• Mostly disabled</li> <li>• Living alone</li> <li>• Large number of family member (6-7)</li> <li>• &lt; 2 livestock</li> <li>• not enough money to buy medicine</li> <li>• used their land as collateral</li> <li>• gather woods in the forest</li> <li>• limited alternative livelihood</li> <li>• crop and rice production not enough for the family</li> <li>• Ordinary house</li> </ul>	<p>I</p> <ul style="list-style-type: none"> <li>• Not enough food for the whole year</li> <li>• Work as helper with other farmer</li> <li>• Sold their land</li> <li>• Average of 4 children</li> </ul>	<p>I (4)</p> <ul style="list-style-type: none"> <li>• do not own land</li> <li>• not enough food</li> <li>• work as helper from rich people outside/inside the village</li> <li>• used their land as collateral</li> <li>• no livestock (pig &amp; cow)</li> <li>• size of family is big (6)</li> </ul>
<p>II</p> <ul style="list-style-type: none"> <li>• own small land</li> <li>• they have enough food to eat</li> <li>• can produce product for own consumption and for selling</li> <li>• collecting wood in the forest as an alternative livelihood</li> <li>• cannot send their children to school</li> </ul>	<p>II</p> <ul style="list-style-type: none"> <li>• Small land</li> <li>• Limited number of livestock (1-2)</li> <li>• Big family</li> <li>• Not enough labor in the family (mostly old)</li> <li>• No money to buy fertilizer for their crop (they can only used 1 bag of fertilizer per year)</li> </ul>	<p>II (16)</p> <ul style="list-style-type: none"> <li>• small land for ricefield</li> <li>• used land as collateral</li> <li>• have limited number of livestock (1 - 2)</li> <li>• no transport</li> <li>• not enough food for 8 months</li> </ul>

<ul style="list-style-type: none"> <li>• have access to credit organization</li> <li>• have livestock to sell</li> <li>• don't earn much for savings; just enough for food</li> </ul>	<ul style="list-style-type: none"> <li>• Go to forest to plant crop and to collect woods</li> </ul>	
<p>III</p> <ul style="list-style-type: none"> <li>• have enough food</li> <li>• owns small land</li> <li>• minimal number of livestock (2 cows); pigs (2); and chicken</li> <li>• with motorcycle and bike</li> <li>• Appliances like TV and transistor radio</li> <li>• Can plant other crops</li> <li>• Have access to credit organization</li> <li>• Can send their children to higher education (secondary)</li> <li>• Good condition of the house</li> </ul>	<p>III</p> <ul style="list-style-type: none"> <li>• can used more than 1 sack of fertilizer for their land</li> <li>• limited number of livestock</li> <li>• enough land for the ricefield</li> <li>• rice yield is 500 kg</li> <li>• food is not enough</li> <li>• income is enough only to buy inputs for their farm</li> <li>• enough labor</li> <li>• collect wood for selling</li> <li>• enough vegetable for the family (cucumber, watermelon, and corn)</li> <li>• can earn some money but cannot save</li> <li>• used land for collateral</li> </ul>	<p>III (15)</p> <ul style="list-style-type: none"> <li>• not enough food for three months</li> <li>• owned land with average area of 50-70 A ( A = 100 m<sup>2</sup>)</li> <li>• average number of family member (5-6)</li> <li>• have livestock</li> <li>• have bicycle</li> </ul>
<p>IV</p> <ul style="list-style-type: none"> <li>• have big area of land</li> <li>• operating a ricemill</li> <li>• have enough food for the whole year</li> <li>• good condition of the house</li> <li>• have livestock (cows, pigs, and chicken)</li> </ul>	<p>IV</p> <ul style="list-style-type: none"> <li>• enough food</li> <li>• can sell product for their income</li> <li>• average land of 1 hectare</li> <li>• majority uses roof tiles in their houses</li> <li>• have TV, cassette player</li> <li>• livestock (cow) 4-5</li> <li>• have transportation-bicycle</li> <li>• ricemill</li> <li>• sell livestock for buying other things</li> </ul>	<p>IV (31)</p> <ul style="list-style-type: none"> <li>• own land (average)</li> <li>• few months in the year have problem with food supply (1 month)</li> <li>• with livestock</li> <li>• most member have transportation (bicycle)</li> <li>• with alternative livelihood (collecting wood in the forest)</li> <li>• some plant crop at the foot of the mountain</li> <li>• can earn money for family</li> <li>• rice production is enough for the family</li> </ul>
<p>V</p> <ul style="list-style-type: none"> <li>• have big area of land</li> <li>• operating a ricemill</li> <li>• have enough food for the whole year</li> <li>• good condition of the house</li> <li>• have livestock (cows, pigs, and chicken)</li> </ul>	<p>V</p> <ul style="list-style-type: none"> <li>• have enough food</li> <li>• can sell product to other farmer to earn income</li> <li>• can use chemical fertilizer</li> <li>• has big land</li> <li>• rice yield is higher</li> </ul>	<p>V (1)</p> <ul style="list-style-type: none"> <li>• no problem about livelihood</li> <li>• have livestock</li> <li>• can allow cow to be rented by other farmer</li> <li>• has motorcycle</li> <li>• have other source of income</li> </ul>

<ul style="list-style-type: none"> <li>with relatives abroad that support their financial needs</li> </ul>	<ul style="list-style-type: none"> <li>large number of livestock</li> <li>can allow their cow to be rented by other farm</li> <li>has motorcycle</li> <li>has bicycle</li> <li>ricemill</li> </ul>	<ul style="list-style-type: none"> <li>able to buy land from other farmer</li> <li>lease land from other farmer</li> </ul>
VI	VI <ul style="list-style-type: none"> <li>have relatives abroad that support their needs</li> <li>have appliances</li> <li>have motorcycle</li> <li>good condition house</li> <li>large number of livestock</li> <li>lease their farm to other farmer (group 1)</li> <li></li> </ul>	VI (2) <ul style="list-style-type: none"> <li>owned big houses and uses brick as material</li> <li>with ricemill</li> <li>generator</li> <li>with appliances in the house</li> <li>more land (ancestral and bought from other farmer)</li> <li>with large number of livestock</li> <li>has motorcycle</li> <li>with relatives abroad supporting them</li> </ul>

### Activity Profile of the village

Generally the villagers in this area are farmers. As presented in **Table 3**, rice production is the most important activity in the village according to all groups. For the group of men, the difference in score or value given for rice cultivation compared to other activities is large. The list of activities for men in both socio-economic groups is composed of productive activities and mainly farming. For women, activities like going to the pagoda and looking after the children are also important to them. In all groups a large number of beans were given to rice production, livestock and cropping. This also means that these three activities provide more benefits to them in terms of income and food.

Fishing was also considered as an important activity in the village. It was mentioned by all groups but ranked as the lowest activity in terms of importance. The limited water resource is one of the reasons why fishing is not so popular in the area.

Table 3 Summary of Important Activities in the Village by Gender and Well-being Group

Socio-econ group	Gender	
	Men	Women
<b>Rich</b>	Rice production (100)	Rice production (24)
	Livestock (63)	Livestock (16)
	Cropping (13)	Cropping* (14)
	Collecting wood (8)	Going to pagoda* (14)
	Sugar palm production (7)	Household work (13)
	Trading (small business) (4)	Taking care of children (10)
	Fishing (2)	Selling (small business) (6)
		Fishing in RF (3)

<b>Poor</b>	Rice production	(22)	Rice production (56)
	Livestock	(13)	Livestock (51)
	Construct house	(12)	Cropping (20)
	Cropping	(11)	Collect wood (10)
	Plowing land	(10)	Weaving palm, coconut (9)
	Collecting wood	(9)	Making mats (8)
	Fishing	(3)	Fishing (7)

## Seasonality

**Weather.** Generally because of the topography of the village, the climate is most of the time warm and humid. Based on the seasonal calendars produced by the four groups, there are only two main seasons: dry or hot and the rainy season. The perception of all groups regarding the time when rain starts has no difference although poor women think that the rain starts one month earlier. In general the villagers experience an average of five months dry period, which normally starts in December and ends in April. The rainy season is experienced from May to November but reaches its peak during the period of August to September. It seems the cold season is not experienced at all in this village. Only the rich group (both men and women) claim to experience cold weather in December.

**Tradition.** Festivals and ceremonies are significant part of the culture of any village. This is their way of expressing their beliefs and traditions. In general most of the festivals and ceremonies celebrated in the village are directly connected or related to their religion, which is Buddhism. Although it was mentioned that everybody observe these festivals and ceremonies, some social groups do not observe some of the events.

Almost every month, there is a celebration or festival in the village. Both the poor men and women groups observe only a few events. Poor men do not involve in social activities during the month of August, October and from December to March. The poor women participate in a few social events. Unlike the poor group, the rich men and women groups engage in various social activities almost throughout the year. It is only during the month of August when rich men do not have any social activity since it is the peak period for agricultural activities as well as heavy rains. Aside from religious occasions, villagers also celebrate activities related to agriculture like ploughing season, harvesting and end of the season festivals.

**Economic Activities.** Identified as the most important activity in the village (see **Table 3**), rice production is also the main economic activity in this village. All groups mentioned this activity in their seasonal calendar. And because of the coverage area of agricultural land in the village, it is very obvious that agriculture is an economic activity for all groups.

The number of economic activities or diversity in livelihood options for each group is different as dictated by their socio-economic grouping. The rich group has other economic activities aside from rice production. Availability of capital is one factor why rich families have other economic activities not related to agriculture like trading, motor taxi and making



mats. For poor families they can only do economic activities that do not require much capital but using only their strength, skills and the resources accessible to them. As presented in **Table 4**, most of the activities of the poor men and women groups only require their skills and are mostly related to agricultural work, although men work in construction for sometime.

Fishing is also considered as an economic activity since it can also give income in some period of the year particularly during peak season. All groups mentioned fishing as one of their economic activities. As presented in the seasonal calendar, the fishing activity is seasonal. This means that during dry season it cannot be counted as an economic activity because of the very low catch. And if fishermen are able to catch some, it would only be enough for their home consumption.

Table 4 Summary of Economic Activities in the Village by Gender and Socio-economic Group

Socio-econ group	Gender	
	Men	Women
<b>Rich</b>	Rice production Sugar palm production Collect woods Livestock Motor taxi Trading Fishing Making mats Weaving thatch Wage labor Cropping	Rice production Collect wood Livestock Making mats Trading Wage labor Fishing Cropping Making <i>pra hok</i> in Phnom Penh
<b>Poor</b>	Rice production Fishing Collect woods Livestock Construction worker Cropping Weaving Thatch	Rice production Collect woods Fishing Livestock Weaving thatch Making mats

The seasonality of economic activities among the groups is also different. The only economic activities that are more or less the same with all the groups are agricultural activities. Both women groups start early in working in the rice fields and both men groups start a month late. The explanation for this is because women are mainly in-charge of preparing the seedbeds and the land prior to transplanting or ploughing, which the men normally do.

For both the rich and poor men's group, fishing is being done the whole year and only the location changes. The men groups do not do collect AA the whole year particularly during the rice harvest season. However the rich women only do fishing during the start of the rainy season and at the start of the harvest season, which is November.

Livestock and collection of wood are two other economic activities that are being done almost the whole year. Like fishing, only the location or place of activities for livestock changes. During summer or after harvest, the livestock activity is easy for the farmers since they will just let their livestock graze in the field. However, during the rainy season and when all the fields are planted with rice or crops, an additional activity for the farmers is to collect food for their livestock. Farmers cut and gather grass from the field for their livestock during this period. Collection of wood in the forest and in the village takes place anytime of the year.

Other activities like weaving, selling, fermenting and others are done whenever farmers have time. They usually do these other economic activities in-between the seasons as additional source of income especially when harvesting has not come yet.

**Migration.** As presented in the calendars produced by the four groups (see Annex), there is a great difference between the movements of individuals according to socio-economic group. For the group of poor families, seasonal migration took place from January to March, mainly to work in construction sites. This is also the period wherein no agricultural activities are happening in the village. However, in the group of rich families, both men and women believe that people migrate to other places every month for work. The rich group mentioned that the number of people leaving the village for work decreases during the peak season of agriculture and tend to increase again after rice cultivation ends.

For those people migrating to other places, the difference between the type of work is clear in terms of gender grouping. For most women, they work in factories or as a helper for well off families. While for men, they usually work in construction sites.

**Health.** In general, the health condition of the villagers is in good state. There was no serious epidemic identified by the villagers that affected the community. All groups experience common illnesses like colds and flu during the end of seasons.

## **Role of Aquatic Animals**

The limited aquatic systems in the area can explain why fishing is not considered as a very important activity in the village. However, even though this resource is limited, the villagers still benefit from it. The collection of AA from the available systems in the village still contributes to their livelihood. The benefits they get from these systems can be categorized into two: for food supply and as source of income. As presented in Table 5, the criteria used by farmers in ranking the importance of aquatic animals can be related to two benefits. Among the groups there are some differences on how aquatic animals were ranked.

**Food supply.** Based on the PRA output, it can be considered that the most important role of aquatic animals in this village is their contribution to food supply. As listed in Table 5, most of the criteria used by all groups relate to their consumption. The availability, taste, and preference for eating were always ranked high in this activity. Ease in catching also ranked high particularly with the group of women. Villagers collect aquatic animals when they are available and when households need food to eat.

**Source of income.** Contribution to income is also a clear benefit that they get from aquatic animals collection. The better-off group ranked the importance of aquatic animals based on its high value while the poor group only considered the ease of selling the product. Villagers tend to sell their collection only when they have a lot of catch especially during the rainy season.

Table 5 Summary of Criteria in Ranking the Importance of Aquatic Animals in the Village.

Socio-econ group	Gender	
	Men	Women
<b>Rich</b>	Availability (43)	Availability (25)
	Family consumption (25)	Easy to catch (21)
	Taste (23)	High value (17)
	Easy to catch (13)	Taste (17)
	High value (11)	Good processing (17)
	Good processing (10)	Bone (?) (9)
		Cheap (8)
		Less Tasty (8)
	Deficit (5)	
<b>Poor</b>	Family consumption (24)	Family consumption (31)
	Prefer to eat (20)	Easy to catch (22)
	Easy to sell (18)	Availability (18)
	Good processing (13)	Taste (14)
	Easy to catch (11)	Good processing (12)
	Taste (10)	Easy to sell (8)
	Availability (9)	Drying (4)
	Drying (7)	

### Important Aquatic Animals

There are a number of important aquatic animals identified both by the young and the adult members of the village. Among the species identified are the big wild aquatic animals like Catfish (*Clarias* sp.), and snakehead (*Chana* sp.). Climbing perch was also ranked high (3<sup>rd</sup>) in the list. Aside from the fishes there are also some non-fish varieties that were ranked as important in this village like small shrimps (4<sup>th</sup>) and frogs (7<sup>th</sup>).

In terms of the gender factor, the list of important aquatic animals have no big difference, with the snakehead and catfish ranked as the most important, although for women, the climbing perch is more important than snakehead and this can be attributed to the ease of catching (see Table 5). Women also give more importance to small shrimp as compared to men.

Regarding the socio-economic group, the list of important aquatic animals also does not reflect significant differences. Both of the groups ranked high the big species, and less for small species like *rasbora* and spiny eel (except for the poor men).

Table 6 Summary of Important Aquatic Animals in the Village as Determined by Gender and Socio-economic Groups

Socio-econ group	Gender	
	Men	Women
<b>Rich</b>	Snakehead (14)	Catfish (17)
	Catfish (13)	Snakehead (16)
	Eel (12)	Climbing perch (14)
	Climbing perch (11)	Freshwater goby (10)
	Frog (9)	Frog (9)
	Whisker sheatfish (9)	Small shrimp (9)
		Rasbora (7)
		Yellow mystus (7)
		Eel (7)
<b>Poor</b>	Catfish (14)	Catfish (18)
	Snakehead (13)	Climbing perch (18)
	Spiny eel (12)	Small shrimp (14)
	Climbing perch (12)	Spiny eel (14)
	Yellow mystus (10)	Snakehead (12)
	Small shrimp (9)	Pygmy Gourami (8)
		Rasbora (8)

### Sources of Aquatic Animals

In the village and as presented in the village map (Figure 1), there are very few areas/locations where aquatic animals can be collected. The main source of AA in this village is the reservoir (*ang*), also known as lake (*boeung*). This reservoir is connected to a canal that traverses the whole village from north to south. The rice fields during rainy season become a common property and become open access for collecting aquatic animals. Small lake (*trapiang*) and ponds (*sra*) are some of the sources of aquatic animals but with limited access.

### Gear Used

Collection of aquatic animals is not a major activity as compared to rice cultivation in this village. Not all households have fishing gear that they can use in collecting aquatic animals. In general the most common fishing gears that they use in this village are cast net (*Sam Nangn*), gill net (*mong*), bamboo traps (*trou*) and handled scoopnets (*Ang chong*). These different fishing gears have their own uses and users. For children and females, gears like trap, scoop net and gill net are the most common, while cast net and lines are use by the men.

### Seasonality of Aquatic Animals

The status of aquatic animals in terms of quantity and quality depends on the season. Most of the important aquatic animals identified in this village can be caught the whole year

although in some period the quantity is limited. In general, most of the aquatic animals are abundant during the rainy season and less in population during dry season.

During rainy season rice fields serve as breeding ground for most aquatic animals like snakehead and catfish. The start of the rainy season can be predicted also with the number of frogs being caught in the rice fields. Most villagers collect aquatic animals from small lakes, ponds, ditches and canals during rainy season. On the other hand, the lakes become the main source of AA during dry season when most of the systems are dry.

Beginning on the month of April, snakehead is generally abundant. Villagers collect this specie at night using torch and cast net. Later in May this specie start to decrease in population and farmers still catch it using the same gear in the rice fields. The population of snakehead will increase again when the water in the rice fields start to subside.

The catfish and climbing perch have almost the same trend with the snakehead. Farmers catch it by following the movement of the fish, from the lake to rice fields to canals and to trap ponds, ditches and household ponds.

Like any fish specie in the aquatic system, shrimp and frogs also become abundant during April especially during the peak of the rainy season. Population of aquatic species in wild systems starts to decrease when dry season starts.

### **Trends of Aquatic animals**

During the early years of the village, most of the aquatic animals are abundant. Aside from the large number of aquatic animals, very few fishermen or villagers were collecting AA. The trend diagram that the participants made during the PRA shows that in 1960, aquatic systems in the village were very rich in aquatic resources. However, there were also some species that time that were already less in supply and difficult to catch (like Yellow mystus). Some species remained the same in terms of number up to the present but there are some species also that are now diminishing in quantity due to several factors.

One major factor that is affecting the trend of aquatic animals is the increase in the population in the village. In this case, both the demand for aquatic animals and the number of villagers who are fishing increased. However, the number of villagers managing the system is very minimal. The increase in population resulted to increased competition thereby resulting to the use of illegal fishing methods like electro fishing and small mesh size nets. Degradation of the environment due to natural calamities like drought and flooding also affected the trend of aquatic animals.

### **Farmers' Meeting**

After collating and translating the workshop outputs, the group had a brief discussion about the results and clarified some issues or contradictions in information. Feed-backing was done with the villagers who participated in the workshop and also with some other farmers in the village. Additional activities were done during this period and unclear or vague information were further clarified with the villagers.

**Annexes**

**Seasonal Calendar**

Weather

Poor men

April Hot, windy	May Cloudy, little rain	June Hot, rainy	July Rainy and sunny	August Rainy, cloudy	Sept Rainy and cloudy	Oct Hot, rainy	Nov Rainy and hot	Dec hot	Jan hot	Feb Hot	Mar Hot
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Poor women

Sunny and rainy	Sunny and rainy	Sunny and rainy	Rainy	Rainy	Rainy	Rainy	Rainy	Sunny	Sunny	Sunny	Sunny
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Rich men

Sunny	Sunny and rainy	rainy	Rainy	rainy	rainy	Little rain	Hot, a little windy	Cold am, pm, hot during day	Cloudy and sunny	sunny	Sunny
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Rich women

Sunny	Sunny and windy and storm	sunny	Rainy	rainy	rainy	Rainy and windy	Sunny and windy	cold	sunny	Sunny and cloudy	Sunny and cloudy
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Social events

Poor men

April Khmer New Year	May Blessing of Buddhism statue	June Celebration to generate funds for construction of Buddhism related activities	July Planting  School break	August	Sept Pchumban ceremony	Oct	Nov Full moon ceremony	Dec	Jan	Feb	Mar
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Poor women

Khmer New Year	Blessing of Buddhism statue		School break		Beginning of school, and P'chumban Ceremony	Celebration to generate funds for construction of Buddhism related activities	Water festival		Start of planting season (Meak Bochea)		
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Rich men

Khmer New Year	Plowing ceremony Blessing ceremony	International children day Blessing ceremony	Planting ceremony, start of rainy season		End of rainy season	Celebration to generate funds for construction of Buddhism related activities (Kathantiane)	Water festival Full moon ceremony King birthday, independence day	Blessing ceremony for dead people,	Monks Blessing ceremony of budhist images	As Decemb er	As Dece mber
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Rich women

New year Wedding ceremony	Buddhism moon Internationa l labor day Royal Plowing ceremony Wedding	Int'l childrens day, queen's bday Ceremony for start of rainy season Monk stay in pagoda	Ceremony for start of rainy season	Month of transpla nting	Pchumba n ceremony	End of rainy season ceremony Kathannatiane ceremony King's bday	Water festival, full moon	Harvesti ng ceremo ny	Seven January ceremony	Pachaybou n ceremony Wedding ceremony	Internation al womens day
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**Economic Activity**

**Poor men**

April First rice production, rice field maintenance	May Transp prep, transp, RF maintenance, collect wood,	June Transplanting, fishing of fish and frogs	July Transplanting, fishing, livestock, collect thatch, RF maintain	August Transplanting, RF maintain, livestock, collect wood	Sept Fishing, livestock, collect wood for selling	Oct First harvesting Collect wood, processing	Nov Last harvesting, processing, Collect wood, house construction, carpentry	Dec Livestock Worker for construction	Jan Collect wood, fishing	Feb Crop production	Mar Crop production
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**Poor women**

Collect wood Rice field maintenance, Fishing using small seine net (Chup)	Rice field maintenance, RF prep for sowing Collect wood Fishing using chup	Sowing rice, Collect wood Rice milling (processing) Fishing using chup	RF maintenance, Crop production Fishing using chup and draining	Transplanting, RF maintenance Fishing	As August	Collect grass for livestock feed, Fishing	First harvesting Processing, Fishing	Third harvesting, Rice processing, storing of rice Fishing using chup	Weaving thatch, making mat, livestock, fishing, house/farm maintenance (eg, building fence)	Collect wood Fishing using chup	Collect wood for cooking Weaving thatch (- Fixing roof)
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**Rich men**

Sugar palm processing, collect wood, livestock, crop production, moto taxi, trader, fishing, selling livestock,	RF prep, sowing, crop production, collect wood, selling livestock, fishing, sugar palm processing	RF preparation, RF maintenance, sowing rice, transplanting, thatching, selling livestock, fishing, making mats, collect wood	RF prep. Transplanting, crop production, RF maintenance, sowing second rice, selling livestock, fishing,	Harvesting first rice, transplanting, wet season rice, livestock, worker, collect wood for selling, corop production, fishing	Transplanting, wet season rice, fishing, livestock, selling livestock, worker	Collect feed for livestock, RF maintenance, livestock, collect leaves for mat, collect wood (all sorts), fishing,	Harvesting first rice, (of wet rice), crop production, collect wood, collect leaves for matting, make mats	Harvesting the rice Processing rice, storing rice, trader, livestock,	Storing rice, sugar palm processing, collect wood, crop production	Collecting palm juice livestock Collect and selling wood Crop production	Livestock Collecting palm juice Collecting the wood Crop production
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**Rich women**

Rice field preparation, crop production, collect wood, making mats, livestock	RF preparation, collect wood, trader, worker, house work,	RF maintenance, housework, fishing, taking care of kids, livestock, husking rice, milling rice (processing)	RF preparation, RF maintenance, fishing, crop production, trader, livestock	RF maintenance, livestock,	RF maintenance, crop production, collect wood,	Housework, make fan, make rice storage, make mat, fishing, child care	Harvesting, rice processing, storing rice, collect wood for selling	Storing rice hay for livestock, clean house, go to PP to make fermented fish, (buy, process and take home), worker, trader, (exchange f-fish for rice)	Make f-fish (prahak) worker	Selling (cakes and other homemade produce), mainly at home, housework, take kids to school.	Housework, seller (as before, cakes and other things for cooking), livestock
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**Health**

Poor men

April Happy	May Normal	June Happy	July Normal	August Normal	Sept Happy	Oct Cholera Flu, typhoid, unhappy	Nov Happy	Dec Cholera Malaria Dysentery	Jan Normal	Feb Unhappy	Mar Normal
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Poor women

Fever, stomach problem, unhappy	Normal	Normal	Normal	Flu	Flu	Flu	Difficulty in breathing, cracked lips	happy	happy	Happy	Happy
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Rich men

Happy	Malaria Flu	Normal	Normal	Normal	Normal	Normal	Flu	Happy	Happy	Happy	Happy
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Rich women

Malaria Flu, dengue fever,	Stomach problem, dengue fever, high fever	Malaria Dengue, flu, High blood pressure	Flu, fever	Good health	Good health	Fever, Malaria	Dengue fever, malaria, flu	Dengue, high temperatur e, cold	Cold, high fever	High temperatur e Malaria	Malaria dengue Headache
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Migration

Poor men

April	May	June	July	August	Sept	Oct	Nov	Dec	Jan	Feb	Mar Go to earn money in Battambang province
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Poor women

										Move to Kompot province to sell dried fish, and exchange fermented fish for rice	Move to Kompot province to sell dried fish, and exchange fermented fish for rice	Go to Kompong Speu province, to trade MSG for rice
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Rich men

Most of men go out the village to work	Equal number of men and women working outside the village	Most of men go out the village to work	Most of men go out the village to work	Equal number of men and women working outside the village	Equal number of men and women working outside the village	Only men work outside the village	Equal number of men and women working outside the village	Equal number of men and women working outside the village	Most of men go out the village to work	Only men work outside the village	Only men work outside the village
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Rich women

Most of the women go to other village to work	Most of the women go to other village to work	Most of the women go to other village to work	Few men and women go outside village to work	Few men and women go outside village to work	Few men and women go outside village to work	Few women go outside the village for work	Most of the women go to other village to work	Few men and women go outside village to work	Most of the women go to other village to work	Few women go outside the village for work	Few women go outside the village for work
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### Group activity profile

#### Rich men group

V1rm	Chuoun Kop	Miak Sien	Dou Chhout	Soaor Ra	Um Ngeoun	You Chhoy	Choun Chhal	Kun Sien	Svay Taa	Phum Ront
Ricefield	10	12	8	6	10	9	9	12	11	13
livestock	4	8	6	6	4	7	7	8	6	7
Planting crop	0		3	4	3	2	0	0	3	
Process pjuice	2		1	4	0	0	0	0		
Collect wood	2		1	0	2	2	1	0		
Worker	0		0	0	0	0	0	0		
Fishing	0		1	0	0	0	1	0		
Seller/trader	2			0	1	0	2	0		

#### Rich women

V1rw	Phon Haim	Haim Moa	Touch Soar	Do Bean	Soth Thir
Raising Livestock	0	5	5	3	3
Ricefield	6	5	6	4	3
Planting crop	3	2	3	3	3
Household activity	3	2	2	3	3
Go to Pagoda	6	1	1	2	4
Taking care of children	2	2	2	2	2
Selling at home	0	1	1	2	2
Fishing in ricefields	0	2	0	1	0

#### Poor men

V1pm	Mias Hait	Phum Kea	Thien Sarreoun	Mian Thou
Rice Production	5	6	5	6
Constructing house in the village	3	5	4	0
Plowing for planting crop	4	3	0	3
Collect the wood from forest	0	0	5	4
Fishing	1	0	0	2
Taking care of cow (livestock)	4	2	3	4
Planting crop (corn, cassava, sugarcane)	3	4	3	1

#### Poor women

V1pw	Sdang Moa	Van Reoun	Van Ouk	Op Paal	Jeea Kaam	Nyap Ty	Lao Meang	Meak Pring	Cheao Hoy
Collect wood	1	0	0	0	0	0	0	4	5
Rice field	9	6	8	10	0	10	6	3	4
Fishing	0	0	0	0	0	0	2	2	3
Weaving palm leaves, coconut leaves	1	3	0	0	0	0	3	2	0
Planting crop	1	7	0	2	0	2	3	2	3
Making mat	1	0	0	0	0	0	2	3	2
livestock	9	4	11	8	0	8	4	4	3

## Role of Aquatic animals

### Aquatic Animal Identification and Scoring

Poor men

Species	Characteristics							
	Family consumption	Easy to sell	Tasty	Processing	Drying	Easy to catch	Availability	Prefer to eat
V1pm								
Rasbora	3	0	0	1	0	1	2	1
Small shrimp	3	0	0	1	0	2	1	2
Snakehead	1	4	3	0	3	0	0	2
Climbing perch	2	1	1	3	0	2	1	2
Catfish	3	2	2	1	2	1	1	2
Mystus	2	0	1	0	0	1	1	2
Spiny eel	2	3	1	2	1	0	2	1
Pygmy gourami	1	0	0	1	0	1	1	1
Three-spot gourami	0	0	0	2	0	1	0	1
Whisker Sheatfish	2	1	0	0	0	0	0	1
Yellow mystus	1	2	1	2	1	1	0	2
Frog	1	1	1	0	0	0	0	1
Ricefield Frog	1	0	0	0	0	0	0	1
Freshwater Eel	1	1	0	0	0	0	0	0
Snake	0	1	0	0	0	0	0	0
Freshwater turtle	0	1	0	0	0	0	0	0
Crab/shell/snail?	1	0	0	0	0	1	0	1
Monitor lizard/mouse	0	1	0	0	0	0	0	0

Poor women

V1pw	Family consumption	Easy to sell	Tasty	Good processing	Drying	Easy to catch	Availability
Small shrimp	4			4		3	3
Rasbora	3					3	2
Climbing perch	4	2	4	2		3	3
Pygmy gourami	3					3	2
Catfish	3	4	3	4	4		
Snakehead	4	2	3	2			1
Mystus	2					2	2
Three-spot gourami	1						
Spiny eel	3		4			4	3
Frog	1					2	
Crab						1	
Toad						1	2
Eel	1						
(Big) Snail	1						
Pond/river snail	1						

Rich men

V1rm	Tasty	Availability	Easy to catch	High value	Processing	Family consumption
Catfish	3	3	1	3	1	2
Snakehead	3	3	2	3	1	2
Mystus	1	2			1	1
Yellow mystus	1	1				
Climbing perch	3	3	2		1	2
Whisker Sheatfish	3		2	2		2
Small prawn		3			1	2
Blackline rasbora	3				1	
Roughskin frog		3				
River snail,		3				1
Snail		3				1
Rasbora		3				2
Bivalve		1				1
Crab		3	2			2
Water insect 2 (like big cockroach)		3				
Spiny eel		3				2
Frog		3	2		2	2
Ricefield frog	3		2	1		1
Freshwater goby						
Eel	3	3		2	2	2

Rich women

V1rw	Deficit	Processing	Bony	Cheap	Less tasty	Tasty	Availability	Easy to catch	High value
Climbing perch	0	3	3	0	0	2	2	2	2
Snakehead	0	3	1			3	3	3	3
Catfish	0	2	1	0	0	3	3	4	4
Yellow mystus	1	1	1	0	1	1	1	1	
Spiny eel	0	1	1						
Small prawn	0	1		1			4	3	
Rasbora	0	1		1	1		2	2	
Mystus	1	1	1	1	1				
Freshwater goby	1			1		2	3	1	2
Snail	0				1		1	1	
River snail	0			1	1		1	1	
Eel	0	1	1			2			3
Frog	0					3	2	1	3
Crab	0	1		1	1		1	1	
Ricefield frog	2			2	1	1			
Silver Rasbora	0	2			1		2	1	

**Seasonality of Aquatic Animals**

Poor men

	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
Catfish	Using torch in collecting at night and during the rain, line, gill net, cast net, collect more in the rice field	Abundant torch, line, gill net, cast net, in rice fields	Cast net, oblong trap, line	Cast net, oblong trap, line	Line, oblong trap	Line, oblong trap	Line, oblong trap	Abundant, jump trap, lighting	Cast net, line, fishing in the community pond	Cast net, line, fishing in the community pond	Cast net, line, fishing in the community pond	Cast net, draining ponds and ditch
Snakehead	Abundant in rice field, torch, line, cast net	Abundant, torch, line, oblong trap	Catch small amount, hook long line	As June	As June	As June	As September, but abundant	Abundant, jump trap, lighting	Hook long line, hook line, line, draining	As December	As December	Hook long line in ditch
Spiny eel	Oblong trap Hook	Hook	Hook	Oblong trap, hook	Oblong trap, hook	Oblong trap, hook	Oblong trap, hook	Oblong trap, hook	Oblong trap, hook	Hook Catch in the ditch	As January	As January
Climbing perch	Oblong trap, torch, gill net	Torch, gill net	Gill net, line, oblong trap (Lop)	As June	As June	As June	As June	As June	As June	As June	As June	As June
Yellow mystus	Catch small amount, cast net	Scarce, cast net,	As May	As May	As May	As May	As May	As May	As May	Cast net	Cast net	Cast net
Small shrimp	Scoop net, (collect 2 cages in 3-4 days= abundant?)	As April	As April	As April	As April	As April	As April	As April	As April	As April	As April	As April

Poor women (actually, V1 doesn't have a lake, it is a reservoir)

	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
Snakehead	Abundant Draining, lake and channel	Abundant Gill net, cast net, line	Not so abundant, bamboo net, scoop net	Torch, line, hook long line Men go on fishing	Torch, line, hook long line Men go on fishing	As August, plus oblong trap	As September	Jump trap, trap fish during migration, cast net, line, men go fishing	As November, minus cast net	Lighting, jump trap, bamboo net, scoop net, men go fishing	Jump trap, fish during fish migration, bamboo net, scoop net, men go fishing	Draining, cast net, bamboo net, scoop net
Catfish	Abundant, lake and canal	Abundant, bamboo scoop net	Catch small sizes of catfish, bamboo net, scoop net	Men go fishing, as June	As July	As July	As July	Catch when water in the rice field subsides	Catch when water in the rice field subsides	Catch when water in the rice field subsides	Catch when water in the rice field subsides	Catch when water in the rice field subsides
Climbing perch	Abundant Catch by draining lake, small stream	Abundant, scoop net, bamboo net, only small fish	Moderate, bamboo net, scoop net, men go fishing	As June	As June	As June	As June	As June	As June	As June	As June	As June
Small prawn	Abundant Oblong trap, bamboo net, scoop net, draining	Abundant, bamboo net, scoop net, draining	As May, but moderate	Men go fishing, lighting, line, hook long line	As July	As July	As July	Abundant Catch in rice field when water evaporates	Moderate, scoop net, bamboo net, lake	As December	As December	As December
Rasbora	Abundant Scoop net, bamboo net, draining	Abundant Scoop net, bamboo net	Moderate, scoop net, bamboo net	As June	As June	As June	As June	Abundant Catch as water evaporates from rice field	As November	As November	As November	As November
Spiny eel	Abundant Draining, scoop net, bamboo net	Scarce, scoop net, bamboo net	As May	As May	As May	As May	As May	Abundant Catch when water evaporates from rice field, hook, ditch	As November	As November	As November	As November



Rich men

	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
Snakehead	Abundant Less water, more fishermen, not electro fishing	Moderate A little rain	As May	As May	Abundant, more water, more spawning place, in rice field, draining	Moderate Cast net in channel, enough rain	Abundant Scoop net	Abundant Jump trap, line, gill net, hook long line, rice field	Less abundant, little rain, little water rice field	Less abundant, not enough water	As January	As January
Catfish	Scarce, not enough water	Moderate, not enough water	As May, plus use hard trap and gill net	Moderate Little water, use more illegal gear	Abundant, enough water, fish can spawn	Abundant, more water, more fish	Abundant, heavy rain, more fish,	Abundant Rice field, more water	Moderate, less water, in rice field	Scarce, less water	Scarce, no water	Scarce, no water
Climbing perch	Scarce No water,	Moderate Less water	Abundant More water for fish spawning, gill net and scoop net	Moderate More water for fish spawning, draining trap pond	Abundant More water for fish spawning	Abundant More water	Moderate Catch a few fish	Abundant More water in trap pond	Abundant Fishing in trap ponds and channel	Less abundant Less water	As January	Scarce
Frogs	Scarce, no water	Moderate Dig	Moderate Line	Moderate	Abundant More water, can catch more fish	Abundant Lakes and Ditch	Abundant Trap ponds	Less abundant	Less abundant Less water	Less abundant Less water	Less abundant Less water, hook	Less abundant Lighting
Eel	Moderate Less water, more fishermen	Moderate Eel trap,	Moderate More fishermen	Moderate More fishermen, fewer eels	Abundant Not enough fishing gear to catch all the fish	Abundant Trap pond, ditch	Abundant Rice field	Abundant Lake, ditch, small stream	Abundant Ditch	Scarce Water evaporates	Scarce No place for fishing	Scarce No place for fishing
Whisker feather fish	Moderate Fishing in reservoir	Moderate Gill net	Moderate Few broodstock	Moderate More fishermen, fewer broodstock	Scarce Not enough broodstock	As August	As August	As August	As August	As August	As August	As August

Rich women

	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
Snakehead	Water is poor and fish is not abundant. Fishing at Dok Sap Fishing by hands	Not abundant, not much rainfall, by hand in village reservoir	Not abundant Less rainfall, net	Not abundant Pulling net Average catch of 0.5 kg per fishing in the village reservoir	Not rich Net Little time to fish due to transplanting	Medium Traps, Women can catch in rice fields Average catch 1-2 kg	Abundant Pulling net, in any flowing water in the village	Abundant Jump trap in the rice fields by women	Not abundant Draining rice fields manually to catch them	Scarce Net or bare hands by women	Scarce Net or bare hands by women	Scarce Pulling net or bare hands by women
Catfish (Clarias)	Scarce, Water level very low, catch by hand, can catch only 3 times a month	Scarce, poor rainfall, by hand in reservoir	Scarce, pulling net, village swamp	Scarce, pulling net, some catch lots, some don't catch much, have rain, Don't know how to throw net	Scarce, busy transplanting	Moderate, catch by trap in RF	Abundant, pulling net, collect small fish, in flowing water	Abundant, Jump trap	Scarce, drain field	Scarce, pulling net, by hand, drain water	Scarce, pulling net, by hands	Scarce, by hand and drain water
Climbing Perch	Water dried up Abundant Fish catch is much better than snakehead or catfish, draining, by hand	Scarce By hand in the village reservoir during draining	Scarce, 2-3 ?/time, village swampy area, some rainfall	Scarce, common gear used Don't know how to catch Fishing in village reservoir	Scarce No time to fish due to transplanting	Abundant Common gear, bamboo trap in rice fields Average catch per night 3 – 4 Kg	Abundant Pulling net and bamboo traps in flowing water, rice fields, channel, refuges	Abundant Jump trap, rice fields	Not abundant By draining refuge, hands (or by draining manually??)	Scarce Manual draining of refuge by women (or catch by hands ?)	As previous	Scarce Pulling net and pumping refuges (by hand??)
Rasbora	Not abundant, pulling net, 0.2kg/time, poor rainfall, village reservoir	Abundant Pulling net in village reservoir	Abundant Pulling net in village reservoir, Can catch 0.2 kg at a time	Abundant Pulling net in village reservoir, 0.3 kg/time	Abundant Very few go on fishing due to rice harvest	Abundant Women, bamboo traps in rice fields	Abundant Women, bamboo traps in rice fields	Abundant Women use bamboo traps and pulling net in rice fields	Less abundant Women use pulling net in the rice fields	Moderate Women uses pulling net	Moderate Women uses pulling net	Moderate Women uses pulling net
Spiny eel	Not abundant Low catch Water is poor	Not abundant Pulling net, village reservoir, poor rainfall, never buy	Not abundant Poor catch Lack of water	Not abundant Pulling net, reservoir, sometimes catch nothing, other times 2-3 heads/time	Not abundant No time to fish due to rice cultivation	Not rich Rice fields, bamboo traps at channel in village and rice fields	Abundant, rice fields, channel using bamboo traps, pulling net	Abundant, bamboo traps, pulling net, rice field and channel, stream	Poor, pumping our the rice field water (women)	Poor, pulling net, rice field, reservoir (women)	Poor, pulling net, rice field and reservoir (women)	Poor, pulling net, catch by hand, (women)
Small shrimp	Little, pulling net, big pulling basket, village reservoir	Moderate, pulling net, village reservoir, never buy, woman goes fishing	Moderate, pulling net, big pulling basket, reservoir, never buy	Abundant Pulling net in village reservoir	Rich, less time to fish due to busy with rice cultivation	Abundant, bamboo trap, pulling net, rice field, channel (women)	Abundant Pulling net, bamboo trap, rice field and channel	Abundant Bamboo trap, pulling net, rice field, stream, reservoir (women)	Poor, pulling net, reservoir (women)	Moderate, pulling net, reservoir (women)	Moderate, pulling net, reservoir, (women)	Moderate, pulling net, reservoir, (women)

**Trends of Aquatic Animals**

Poor men

Species	1960	1970	1980	1990	2001
Catfish	Abundant Lines and hooks being used Migration to rice fields take place during rainy season	Abundant in fish and water resources like refuges, and swamps No electro fishing	Abundant Few go on fishing due to Pol pot regime	No change	Low catch but still enough for family consumption
Snakehead	Abundant in rice fields, swamps, and waterways	Abundant	Abundant Few go on fishing due to Pol pot regime	No change	Less abundant Population increased Electro fishing being practiced
Spiny eel	Moderate	Moderate	Moderate	Moderate	Less moderate
Climbing perch	Abundant Available in every water body	Abundant	Abundant	Abundant	Low catch Number of fishermen increased Different fishing techniques being practiced including electro fishing
Yellow Mystus	Less abundant Difficult to catch	Scarce	Scarce	Scarce	Scarce
Small shrimp	Abundant Can be collected in ditches	Abundant	Abundant	Abundant	Moderate

Poor women

Species	1960	1970	1980	1990	2001
Snakehead	Abundant due to no electro fishing. Fish migrate to the rice fields for spawning hard trap ,cast net, line fishing	As previous	Fish is still rich as in 1970	Fish catch is poorer than previous years During wet season fishermen can collect 10 kg per night Number of fishermen increased and modern techniques in fishing being practiced are reasons for declining catch	As 1990
Catfish	Abundant due to common gear use. Fish migrate to rice fields hard trap, cast net, hook long line	As abundant as snakehead Fishermen can catch a lot	As rich as 1970	As snakehead above, fish catch is also the same	Can catch as much as 1990
Climbing perch	Abundant Fish migrate to rice field ecosystem for feed and spawning	Abundant as snakehead Fish catch also as previous	As abundant as 1970	As rich as catfish Fishermen catch fish for family consumption	As 1990
Shrimps	Abundant Can be caught in rice fields and swamp during wet season	More abundant than snakehead and catfish	As 1970	More abundant than other, bigger species	As 1990
Rasbora	Abundant	Abundant Can be caught in both wet and dry season	As 1970	More abundant than other, bigger species	As 1990
Spiny eel	Not rich Poor catch	Abundant Less catch	Not abundant	Less abundant Poor catch	As 1990

Rich men

Species	1960	1970	1980	1990	2001
Snakehead	Abundant because of lots of water resources hard trap being used in catching Few go fishing	Abundant Household number in the village is very small due to war Few fishermen	Abundant Household number in the village increased A lot of fishing gear being used Catch decreased Disease outbreak	Less abundant Population increased A lot of fishing gear being used Catching of broodstock Outbreak of disease	Fish population is small Illegal fishing being practiced by farmers Disease outbreak during October and November
Catfish	Enough water Less fishing gear Few fishermen go fishing	Abundant Household number in the village is very small due to war Few fishermen Fish grow and spawn in trap ponds and swamps	Less abundant Population increased and fishermen also increased Disease outbreak Low catch	Moderate	Poor catch Limited spawning place Electro fishing mostly used by farmers
Climbing perch	Abundant Enough water, a lot of spawning places, fishermen cannot catch a lot due to great amounts of lotus	Not so experienced in catching	Moderate Lack of spawning places	Abundant due to rainfall Farmers catching fish for their own consumption	Fish are abundant in swamps, rice fields and trap ponds
Frogs	Abundant in rice fields and swamps, a few eat frogs	Abundant	Less abundant Number of fishermen increased, long line fishing	Less abundant Number of fishermen increased, long line fishing	Less abundant Number of fishermen increased, long line fishing
Eel	Abundant	Abundant	Abundant	Abundant	Abundant
Ompok	Abundant but lesser compared to above species	Moderate	Less abundant	Less abundant	Less abundant

Rich women

Species	1960	1970	1980	1990	2001
Snakehead	Not so many fisherman catching this species, ordinary fishing gear	Abundant and very few fishermen, ordinary fishing gear	Ordinary fishing gear	Low fish catch	Many fishermen use electro fishing
Catfish	Abundant	Abundant	Abundant Ordinary fishing gear	Electro fishing Fish migrate to other area Low catch	Electro fishing
Climbing perch	Abundant	Abundant	Abundant Ordinary fishing gear	Abundant in the forest	Abundant
Rasbora	Abundant	Abundant	Abundant Ordinary fishing gear	Very few catch it	Abundant
Spiny eel	Abundant	Abundant	Abundant Ordinary fishing gear	Electro fishing being used Species becoming rare	Lot of fishermen using electro fishing Low catch
Shrimp	Abundant	Abundant	Abundant Few fishermen, ordinary gear	Abundant	Abundant Difficult to catch