UNDERSTANDING LIVELIHOODS DEPENDENT ON INLAND FISHERIES IN BANGLADESH AND SOUTHEAST ASIA
(DFID/FMSP Project R8118)

LAO PDR PRA REPORT

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1.0 General

With an estimated per capita income of US$290 in 2000, the Lao People's Democratic Republic (Lao PDR) is one of the poorest and least developed countries in the East Asia region. Bordered by Thailand, Cambodia, Vietnam, China, and Myanmar, landlocked Lao PDR covers 236,800 square kilometers with a population of 5.77 million growing at 2.2 percent per annum. Agriculture remains the major sector of the economy, contributing 53 percent of GDP and employing over 80 percent of the labor force.

Since the introduction of reforms under the New Economic Mechanism (NEM) in 1986, the Government has been transforming the economy from a centrally-planned to a market-oriented system The structural reforms and sound macroeconomic management initiated under the NEM fostered a steady movement towards macroeconomic stability, production growth, the emergence of a small private sector, and increased foreign direct investment and trade flows, particularly with neighboring countries. GDP growth averaged 7 percent between 1992 and 1997, giving the Government hope that it would reach the goal of graduating from the ranks of the Least Developed Countries by the year 2020.

During 1997-1998, however, the reform effort slowed significantly and the macroeconomic environment worsened considerably, with inflation climbing to triple-digit levels, and exchange rate depreciation reaching alarming levels, the kip losing 90 percent of its value against the US dollar. The regional financial crisis provided the initial trigger for the macroeconomic crisis in the Lao PDR; however, a weakening of the fiscal and monetary policy stance multiplied the negative external effects. Weak macroeconomic management was compounded by lengthy consensus building in the decision-making process, rendering it difficult to react quickly to the macroeconomic realities.

The initial impact of the regional financial crisis was less dramatic in the Lao PDR than in other countries in the region, as the majority of the population is engaged in subsistence activities and was initially shielded. Nevertheless, for a country as poor as the Lao PDR, even relatively small changes in social conditions and living standards are cause for concern. Effects varied depending on the level of involvement of groups in the cash economy, their ability to produce sufficient food and other commodities for their own use, the degree of dependence on imported goods or inputs, and their ability to adjust their patterns of consumption or employment.

Since the middle of 1999, the Government took concerted monetary and fiscal measures to stabilize the economy. The exchange rate leveled, and inflation began to slow down from a high of 170 percent, and is currently at single digit levels (CPI increase was 7 percent in 2001). According to Government statistics, GDP growth recovered considerably in 1999 (officially estimated at 7.3 percent) and 2000 and 2001 (estimated at 5.7 percent and 5.3 percent respectively) after slowing to 4 percent in 1998. Continued strong agricultural growth and the initial results of measures to stem the macroeconomic instability seem to be having an impact on production growth. However, improvements in macroeconomic performance, while significant, remain fragile and continued efforts are needed to maintain stability as monetary and fiscal risks remain as many of the underlying structural imbalances continue.

The rural sector accounts for 53 percent of GDP and 80 percent of employment and continues to be important to the Lao PDR economy. There are major constraints,

however, to rural development and diversification, including poor rural infrastructure, access to markets and the limited network of all-weather feeder roads. Sustainable rural development and natural resource management will require correcting policy distortions, improving agricultural productivity, and ensuring appropriate forestry management techniques for environmental sustainability.

The flat lands along the Mekong corridor and the uplands areas have followed divergent paths of development in recent years. The lowlands are entering a period of agricultural transformation where market forces are starting to deliver agricultural inputs through commercial channels and farm households are consuming part of their farm production and marketing the remaining part.

The uplands present a different picture. Here, agriculture is basically subsistence and farm households are locked in an acute poverty trap, created in part by lack of regional market access, absence of productivity increasing technology flows and lack of capital needed to fuel the transformation process. Increasing human pressure on the upland natural resource base is accelerating environmental degradation and creating adverse downstream impacts on the fragile Mekong River ecosystem.

Laos is a landlocked country. As such the inland wild capture fisheries from the Mekong River is of extreme importance to 5.8 million people. Champassak province borders Cambodia to the south and is best known for the islands in the middle of the River locally known as Siphadone or the four thousand islands. Most of the rural villages are situated on these islands or along the banks of the Mekong river. Lao PDR grared towards intensification of agricultural production as supported by the government. As a consequence, the Mekong river has become more shallow and the water run off from the widespread use of chemical fertilizers and pesticide has had harmful effects to the water quality and aquatic life. Subsistence agriculture accounts for half of GDP and provides 80% of total employment. About 41% of the people were in the labour market in 1999.

While there have been significant gains in education in the Lao PDR since 1990, the literacy rate (males: 63 percent; females: 32 percent) is considerably lower than in most neighboring countries, and gender gaps in education are significant. In the area of health, considerable progress has also been made: public health care has expanded in recent years; the country's Expanded Program of Immunization (EPI) has increased its coverage to reach the majority of villages, and measles has been removed as a major cause of child mortality. However, the coverage of medical facilities and health personnel is still limited and remains of poor quality. Infant and maternal mortality rates need to be brought down, and literacy and educational enrollment rates increased, especially for females. Addressing basic social indicators at their core will require broadening access to better quality basic health and education services, continuing to support malaria prevention, and providing assistance for safe motherhood, nutrition, and early child development.

1.1 Methodology

The PRA was conducted in two different regions one in downstream (Champassak Province) and one in Upstream (Luangprabang Province).

1.2 Site selection

Several sites were selected for the PRA exercise for different environment and different stakeholders group.

1.3 Stakeholder definition

Literally there is very few full time fishers. Full time fishing does not provide enough income for the stakeholders group. Those who fish during the peak fishing period are defined as full time fishers. These people are poor and they live on other means of income. Part time fishers fish during their leisure time. They are mostly farmers and fish when they have time.

2.0 Stakeholder livelihood characterization

2.1 Stakeholder Category 1-Full time fishers

2.1.1 Background

Wealth/Poverty criteria

According to the participants in the PRA group, 3 different categories of wealth can be recognized in the area-rich, average and poor.

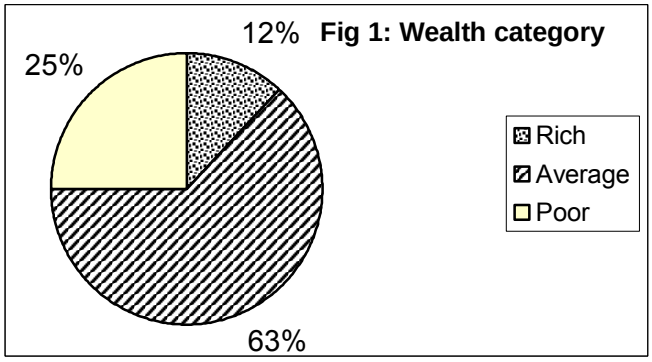


Fig 1: Wealth category

Rich:
- possess complex fishing gear
- own a modest house
- own agriculture land
- possess engine boat, pump and electricity engine
- possess mobile phone

Average:
- possess fishing gears
- possess engine boat
- own a simple house

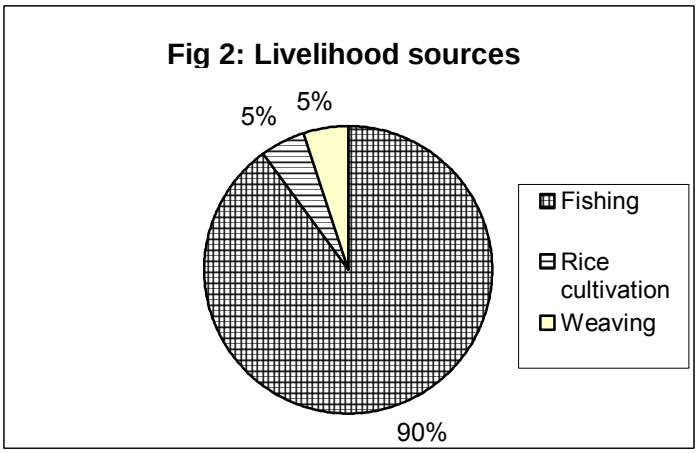
Poor
- possess some fishing gears
- own a small house
- do not have boat
- lend paddy field and cattle from others

Livelihood sources

The livelihoods of the full time fishers depend mostly on fishing (Fig 2). Some of their household members are involved in rice cultivation and some in weaving. Weaving is

mostly a family activity. In between other household works, women and elderly people of the households mainly do weaving. Rice from their own cultivation never is sufficient for the household consumption. They have to buy most of their food grains. Income from fish sale is better in the dry season. During monsoon everybody catch fish and the fish price goes down. During dry season people mostly depend on culture and capture fishery. Capture fish price increases during dry season.

Fig 2: Livelihood sources



Seasonal activities

People grow two rice crops in two distinct seasons. Dry season rice is grown within a short period, but the wet season rice takes longer time to cultivate. Full time fishers usually grow wet season rice as they cannot afford to irrigate crop, as irrigation cost is high. However, some of them now-a days started to grow dry season rice in rented land. Full time fishers reported that their catch fluctuates with the water level, market demand and price and the availability. During full monsoon it is very hard to catch fish due to high water level. When the water level starts to decline they can catch lots of fishes. Weaving is a round the year activity. Women in the household weave and make yarns during their leisure time. Tree planting is usually done at the beginning of the monsoon season.

Fig 3: Seasonal calendar

Activities	1	2	3	4	5	6	7	8	9	10	11	12
Rice cultivation	Dry season rice					Wet season rice						
Weaving	Whole year long											
Fishing	Moderate catch lots of fishes			Catch few fishes			Catch lots of fishes		Catch few fishes			
Tree planting												

1=January… 12=December

2.1.2 Capital assets

i) Human Capital

Health

Malaria and diarrhoea are two important diseases that decreases the ability of the full time fishers during late and early monsoon. Usually scarcity of safe drinking water is a cause of all the stomach diseases. Stranded water, where mosquitoes lay eggs, after monsoon is the cause of malaria.

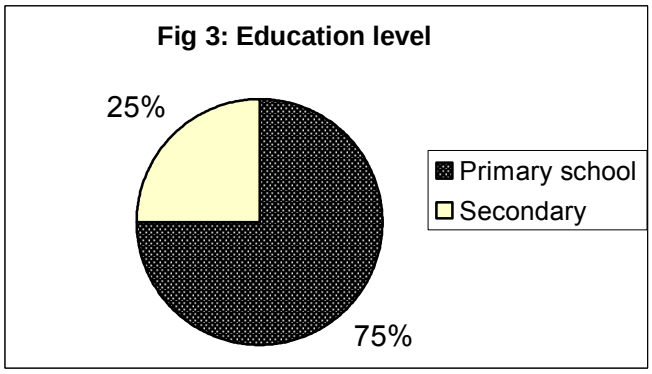
Fig 4: Health and Diseases

Diseases	1	2	3	4	5	6	7	8	9	10	11	12
Malaria												
Diarrhoea												
Conjunctivitis (red eye)												
Kidney infection												
Gastritis												

1=January… 12=December

Level of education among full time fishers is low. Higher education is not desirable for them as they think higher education is needed for them at the same time they need help from the household member. Higher education also costs substantial amount of money. Access to higher education is not easy for the full time fishers. However, some of the young household members are trying to have higher education (Fig 3).

Education



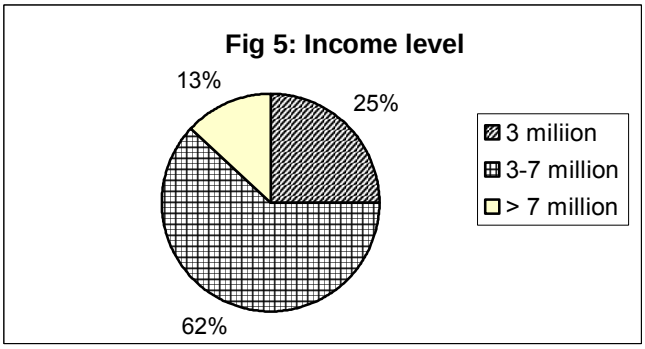
Access to information

Information on different livelihoods aspects are available from radio, television and through mobile telephone. However, they usually receive different information from radio and television programme. They never received any training.

ii) Financial Capital

Loan

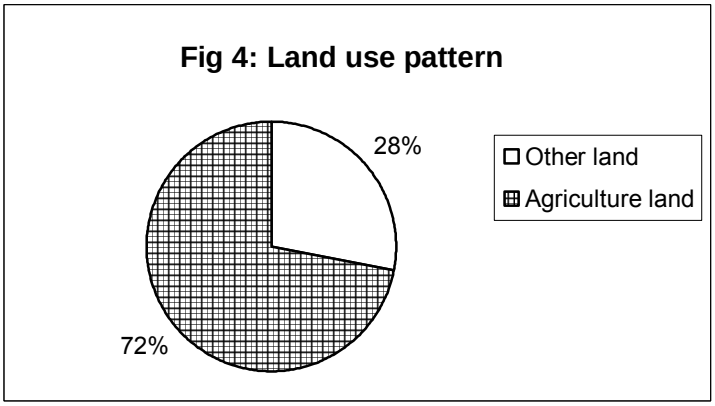
The Provincial Agricultural Bank provides loan with an interest rate of 12%. Most of the full time fishers earn between 3 to 7 million Kip a year. Their expenditure for the fishing activities is about 50% of their income.



iii) Physical capital

Land

Most of the lands are used for agriculture. Other land use includes homestead, gardens and plantation. Full time fishers have no agricultural land and they mostly depend on fishing.



Infrastructure

According to the full time fishers the area has primary level school, temple for worship, village office for the village level official and irrigation pump for the residents living around. However, as there is no electricity students face problem in studying at night, irrigation cost is high due to high fuel cost. Due to lack of road access, fishers face problem in transporting fishes and crops. Although they have irrigation water source, due to lack of safe drinking water sources, incidence of water-borne diseases are high. Moreover, there are no medical facilities around.

People live in wooden houses, which often are infested by termites, specially during monsoon. Open latrine is common in the fishers villages, which makes sanitation level low. All the fishers possess boats and low cost fishing gears. They have to rent-

in big seine net for river fishing. However, use of fishing gears changed since last 20 years. Fishing was done mostly individually 20 years ago when traditional gear use was common. Now-a days fishers use nets made of fine mesh nylon tread. They also use larger nets to catch more fish.

Type of fishing year

At present	20 years ago
1. Gill net	1. Nam (Barbed rattan cone)
2. Cast net	2. Tong (Box funnel net)
3. Scoop net	3. Traditional gill net
4. Seine	4. Traditional cast net
5. Chip (Cylindrical current trap)	5. Scoop net

iv) Social Capital

There is no conflict within the fishers or with any other group in the community. When the fishers go fishing for longer period, other people in the community help their family.

2.1.3 Natural Capital

Water level in the river and canals start rising from June and peaks in September. Maximum height of river water level reaches up to 11 meters. Fishers reported catching highest amount of fish per day in February when water level goes down and fishers can easily catch fish. A fisher can catch about 20kg per day during this peak period. Fishers reported that although they catch more fish in January-February from the river, they consume more fish (3kg/day/household) during the onset of the monsoon when they catch fish from the rice fields. The fish traders also reported that during monsoon people do not buy much fish.

2.1.4 Trends in Natural resources

Access to fishing ground is not a problem for the fishers in Lao PDR. They can fish anywhere they want. However, some communes living around the river has their own rules for fishing. They queue fishing boats and let the fishers fish in a turn. The head of the commune decides the length of time for each turn. Number of fish species decreased over time. The big fishes are now rare. Cultured fish is more available in the market. Fishers complained that the cultured species are increasing in the river. These cultured fishes escape from the cages or from the overflooded ponds. Elderly fishers reported that high value fishes are scarce or extinct. There is no effort to conserve those fishes.

Fishers mentioned water as the most important resources and fish is the next. They mentioned that Mekong river was much narrower and deeper before. There was no river bank erosion in those days. Now river bank erosion increased and the river become wider and shallower due to silt from the bank erosion. Overall quality of rivers for harbouring aquatic resources declined. Decline in fish population has been mentioned as second problem for the full time fishers. During 1980s there were lot of fishes, population was low and they can catch lots of fish from all types of

waterbodies. There was no conservation zone. Now with conservation zone in some areas the fish population or composition did not increase, rather decreased. Other aquatic resources (frogs, crabs, mussels, water lily etc.) resources were not so important for their livelihoods before, now they can sell these resources at a higher price. Forest resources had been decreased in mid 80s due to over exploitation. Timber is one of the main export commodity of Laos. Now-a days people are creating new forest at personal expenses. Government also has given emphasis on forest conservation.

Rice productivity

In the early 80s there was no dry season rice cultivation. Presently farmers cultivate High Yielding Varieties with the help of irrigation. Wet season rice productivity has been decreased to half (2 t/ha) due to decrease in soil fertility. For modern varieties farmers use more fertilizer and pesticide that made soil deficient in organic matter. However, fishers who has little land reported that although farmers produce same amount of rice in a year from both seasons, input cot has increased a lot.

2.1.5 Problem analysis

Decline in fish population is one of the major problem fishers facing in Mekong region. According to them number of fishers have increased over the year, these fishers use harmful gears which destroy all levels of fish. Non-fishers also build dams to block fish movement route and catch fish from that place. According to the fishers about 50% of the traditional fishers lose income every year from this practice.

In the low-lying area of the Mekong region flooding is the main problem. Every year people face problem from flooding. Flooding happens due to heavy rain and stranded water within the embanked area and dam. Good drainage was their suggested solution. According to them about 40% of the fishers community face problem due to flooding. During high flood season they can not fish in the river and lose their income source. They them have to fish in other areas such as rice field. However, fishing in rice field does not provide better income.

Lack of electricity and roads were also mentioned as one of the major problems by the fishers. Due to bad road they cannot transport fish to the city and sell fish to the middlemen who give less price.

2.1.6 Vulnerability and coping strategy

Flooding is a normal event for the fishers. During high flood they cannot catch fish and lose their livelihoods. However, after flood they get more fish. Due to diseases they have to suffer and lose their livelihoods also. However, they said that they can cope with the vulnerable situation with the loan from friend and relatives.

2.2 Stakeholder category 2: Part time Fisher

Among the part time fishers, rich category of people lives in the back swamp and Mekong mainstream area (Table 1). Their villages have pasture to raise animals, most of them have cattle more than five heads; have tractors to cultivate land, they own modest houses, rice mill, plantation and most of them have agricultural land more than one hectare. They are self sufficient in food. At the same time substantial percentages of poor part time fishers live in rice field environment where they can catch very little fish for income. Even if they catch fish for income the price remains low as everybody fish for food during that period and the middlemen pay very little for fish during monsoon. Poor part time fishers possess some of fishing gears, a small house but do not have land or other productive assets; they are either labour or petty trade. For rice production they lend land and cattle from others. Very poor categories are landless seasonal labour, sick and have no professional skill.

Most of the part time fishers are in average category who have two or three buffaloes, two cattle, simple houses made by wood, some garden, some fishing gears, fishing boat and they are also self sufficient in food.

Table 1. Wealth Category

	Very Poor	Poor	Average	Rich
Mekong tributary	0	28	58	14
Back swamp	3	5	16	76
Mekong mainstream	0	25	25	50
Rice field	12	40	44	4

Fishing is important for all the part time fishers in all the environments for food (Table 2). Contribution of income from fishing in the total income of the households of part time fishers is not important. However, rice production is the main activity in all the environments. A fraction of the part time fisher households are also involved in gardening. Mostly women grow vegetables for household consumption and for income. In the Mekong tributaries gardening is easier than the other environment due to availability of larger pieces of land. Gardening is third work after rice production and fishing. Weaving is more import in mainstream environment than in other environments. Aquaculture has not been developed in this area.

Table 2. Livelihood Sources (% income)

Environments	Farming	Gardening	Lives-tock rearing	Aqua-culture	Weaving	La bor	Fishing	Oth ers
Mekong tributary	60	17	-	-	3	5	15	-
Back swamp	63	9	10	3	5	-	10	-
Mekong mainstream	20	10	-	-	50	-	20	-
Rice field	40	5	30		15		5	5

In the river fishers can fish round the year (Table 3). But in the backswamp they observe a closed season and do not allow anyone to fish from September to May.

During this period, fishers fish in the nearby river and canals. Part time fishers cultivate rice in two seasons. Time for the dry season rice crop is very short and if irrigation is not available the cultivated area decreases, so does the production. When production decreases people's livelihoods impact negatively. Weaving is a family activity. The entire village in the mainstream river area weaves to earn money. They make their own thread and then weave skirts for the women. In the later part of the dry season some of the participants make earthen pots. Men and women both work together. Some of the households make alcohol for income and for household consumption during the later part of dry season and in the early monsoon after rice harvest. The wage labourers work either on daily wage basis or they go on subcontract for coffee harvest during the dry season. Gardening is also a female activity. They sell vegetables for income and also use them to feed the family.

Table 3: Seasonal calendar

Activities	1	2	3	4	5	6	7	8	9	10	11	12
Rice culture	Dry season rice					Wet season rice						
Subcontract	Coffee harvest											
Fishing			Fishing in the backswamp									
	Fishing in the river											
Weaving												
Gardening												
Making alcohol												
Handicrafts			Pot making									

Note: 1=January……. 12= December

2.2.1 Capital assets

i) Human Capital

Malaria is widespread among the part time fishers in all the environments. They do not receive proper treatment due to lack of health centers, medicine and doctor. During suffering from Malaria part time fishers lose their earning. Even after recovery they reported weakness and other side effects keep them away from work. Water borne diseases are widespread among the part time fishers of riverine area and the rice field area. Lack of safe drinking water is of the cause of these diseases. Goiter was reported by the part time fishers of the backswamp area. According to them river water that they drink lacks iodine. They also reported other stomach diseases. Women reported female diseases which they said may also cause due to water. Women fish during the monsoon from the rice field.

Table 4: Health and disease

Name of diseases	MKT	BS	MKM	RF
Malaria	Y	Y	Y	Y
Diarrhea	Y		Y	Y
Flu	Y		Y	
Appendicitis	Y			
Goiter		Y		
Stomach ach		Y		Y
Gall stones		Y		
Kidney infection		Y		
Conjunctivitis (red eye)			Y	Y
Female disease				Y

Note: MKT: Mekong tributary; BS: Back swamp; MKM:Mekong mainstream; RF:Rice field

Education

Part time fisher households members very seldom received higher education. Education level in the tributaries and in the rice field area are very low due to access and facilities. Except for backswamp area most of the respondents dropped from higher studies after secondary level (Table 3).

Table 5: Education

Environments	Primary	Secondary	High school	University
Mekong tributary	60	20	15	5
Back swamp	30	10	55	5
Mekong mainstream	40	35	20	5
Rice field	70	20	10	0

Access to information

Part time fishers receive information from TV, Radio and extension workers. Part time fishers in the Backswamp area read newspaper as they are educated and motivated. District extension workers have constant linkage with the villagers and it makes easier for them to get any new messages. Formal training is not so familiar. However, within donor funded project area villagers get training from the project staff. In the backswamp area part time fishers received training on fishery management.

Table 6: Source of information

Environments	TV	Phone	Radio	Extension officers	News paper
MK tributary	Y		Y	Y	
Back swamp	Y		Y	Y	Y
MK mainstream	Y		Y	Y	
Rice field	Y		Y	Y	

ii) *Financial Capital*

Part time fishers have access to Provincial Agricultural Bank loan at an interest rate of 12%. For livestock raising they receive loan at a higher rate but for rice field expansion rate of interest is high. They also borrow money from private banks at a higher rate. Some NGOs and private sectors provide loan for weaving.

Table 7: Credit

Environments	Agricultural promotion Bank	Private sector	Private Bank
MK tributary	12% interest rate		20-30% interest rate
Back swamp	12% Interest rate		
MK mainstream	12% Interest rate 18% interest rate for livestock raising and 8% for rice field expansion	Giving credit for weaving	
Rice field	12% Interest rate		

Part time fishers in the Mekong mainstream in the lowland area earn between 5 to 7 million VND per year (Table 8). However, this amount is higher for the upland area. The main sources are from plantation and tourism. About one fourth of the part time fishers earn less than 3 million VND annually. These poor fishers have very little access to agricultural land as well as job.

Table 8: Income level

Environments	<3MK	4.1 – 5 MK	>5 MK
MK tributary	23	68	9
Back swamp	8	16	76
MK mainstream	25	25	50
Rice field	27	70	3

iii) Physical capital

Part time fishers of the Mekong region use most of their land for cultivation. Their houses are cramped in one place. In case of part time fishers in the rice field area, half of the land are used for agriculture and half for other construction work such as houses, shops, cattle shed etc. These land are not suitable for cultivation due to lack of irrigation and the land level is not even. About half of the back swamp area is covered with forest. Although those forests are not public property they have access right on it. Most of these forested lands are used under the control of a village committee. The income from the forested land is used for the village welfare (such as road repair, festivals etc.) and loan to the needy villagers.

Table 9: Land use pattern

Environments	Agricultural land	Homestead /other purposes	Fallow/forest land
Mekong tributary	69	31	
Back swamp	51	1	48
Mekong mainstream.	95	5	
Rice field	51	49	

Most of the part time fishers have in the PRA area has access to basic infrastructure such as school, temple, village office, market etc. In the Mekong tributary area part time fishers have access to irrigation facilities, rice mill and ground water sources. They also have access to health care facilities. Part time fishers from the rice field area have very few infrastructures. None of the part time fishers from PRA sites have access to electricity, better road, modern health acre facilities and drinking water

sources. According to them better road can increase marketing facilities for the products and materials they produce and for fish trade. They have to sell fish to the middlemen at a lower rate due to lack of better communication with the bigger market in the city.

Types of fishing gears used by the part time fishers have not been changed but some of the gears are not in use any more (Table 10). The ranks of use of different traps have also been changed. The part time fishers did not use big nets 20 years ago. During that period part time fishers were only fishing with simple nets and traps. Harmful gears and materials (electric gears, exploders, chemicals) were not mentioned by the fishers but they are in use.

Table 10: Type of fishing gear

Rank	**At present**	**20 years ago**
1	Gill net	Cast net
2	Cast net	Scoop net
3	Long line	Gill net
4	Chanh trap	Tong (Box funnel net)
5	Lop trap	Big single hook
6	Scoop net	Chanh trap
7	Sone (triangular scoop net)	Lop trap
8	Seine	Nam (Barbed rattan cone)
9	Chip (Cylindrical current trap)	Long line
10	Hook	Plunge basket
11	Sai trap	Chip (Cylindrical current trap)
12	Spear gun	Sai trap
13		Sone (Triangle scoop net)
14		Hook
15		Drift big single hook (lai tao)

i) Social Capital

There is no conflict within the fishers or with any other group in the community. When the fishers go fishing for longer period, other people in the community help their family. In each village there is a welfare committee from which part time fishers can get help during crisis period. To manage backswamp, communal boards has been formed which act as advisory as well as management body. This communal board helps part time fishers, their families and also improves village infrastructure. Part time fishers also are involve in student-parent committee to improve their children's education.

2.2.2 Natural Capital

Fish catch depends on water level. Part time fishers reported that during high monsoon it is difficult to catch fish. During high water level they can only catch few fishes. During early monsoon they can catch as much as 20 kg per day. This period of high catch is very short. During this period they concentrate on fishing only. However, in the area where fishing is controlled by the commune, fishers go for other work as they can only fish when their turn comes. Most of the part time fisher households consume a fair amount of fish during high catch. Some of the part time fishers catch fish from rice field for consumption.

2.2.3 Trends in Natural Resources

Part time fishers in all the environment reported that natural resources have been declined (Table 11). Participants reported that with the decrease in resources and increasing population/users, importance of all natural resources have increased. When population was low and there were abundance of resources around, resources were not so important. Due to open access everybody was collecting natural resources for their own use only. Also there were few customers to sale. However, with the increase in population everything are now on sale and some of the products are for export also. Therefore, rate of exploitation is high. Part time fishers of the back swamp area also mentioned that the some of the forest products have high value in the international market and these products are becoming scarce. Fish export is allowed by law. However, a big amount of fish is exported to Thailand through land border. Secondary stakeholder interview revealed that it is not possible to check all the border area. Part time fishers in all the environment reported that their sources of income from natural resources has been widened and they can earn more now a days. These categories of people are also practicing cultivation of all types of resources.

Table 11: Status and importance of natural resources

Resources	Status								Importance							
	MKT		BS		MKM		RF		MKT		BS		MKM		RF	
	Pr	20	Pr	20	Pr	20	Pr	20	Pr	20	Pr	20	Pr	20	Pr	20
Water in Mekong			7	10	6	10							10	10		
Water in Tributary	3	10	8	10			7	10	10	10						
Fish	4	10	7	10	5	10	7	10	10	5	10	3	10	6	8	2
Other aquatic resources	1	10	4	10	10	10	7	10	10	4	5	1	10	2	10	7
Forest	2	0	3	10	10	6	8	5	10	5	10	5	10	10	10	10
Water lily			10	6					10	4	10	5	10	3	10	2
Bamboo									10	6	8	3	10	8	10	7
Natural pond							10	9							10	10

Note: MKT:Mekong tributary; BS: Back swamp; MKM: Mekong mainstream, RF: Rice field ;
Pr: Present time; 20: 20 years before
Highest score is 10

Fishery resources has been changed over the years. The total number of species as well as high value species have been decreased since then. According to the part time fishers, big fishes are now almost disappeared from the rivers. Number of cultured fishes in the waterbodies have increased. These fishes are occupying the niches of the other rare or extinct fishes. The overall earning of the fishers have been decreased. Some of these part time fishers were full time fishers before. Due to decrease in fish population in the rivers, they cannot earn to keep up with the present expenditure, which forced them to find out other options.

Table 12: Change in status of fish resources

	Now				20 years ago			
	MKT	BS	MKMPT	RF	MKT	BS	MKMPT	RF
Number of species	17	8	27	7	22	8	34	8
Number of high value species	3		3		8		10	
Number of cultured species	3	3	3					

Rice productivity

In the lowland area rice productivity has been increased with the introduction of High Yielding Varieties (Table 13). In 1980s there were no dry season rice. Now with the irrigation facilities, dry season rice is introduced. In the backswamp area, rice productivity decreased due to less attention to this rice. Farmers getting high production from the dry season rice and the overall price of rice is comparatively low. Furthermore, part time fishers from the backswamp area have other sources of income (aquaculture, forest resources, livestock etc.).

However, rice production in the upland area has been decreased due to less water availability. People here also have other options for livelihoods (such as plantation).

Table 13: Rice productivity **Unit: ton/ha**

Environments	Present		20 years before	
	Wet season	Dried season	Wet season	Dried season
MK tributary	1.5	3	0.8	NA
Back swamp	2.8	4	3.5	NA
MK mainstream.	3-3.5	4	2	NA
Rice field	1.7	NA	0.7	NA
Upland	**Lowland rice**	**Upland rice**	**Lowland rice**	**Upland rice**
MK tributary	3	1.5	3	3
MK Mainstream	2.7	0.8	4	1.5

2.2.4 Problem analysis

In the upland area flooding is severe than the lowland. In the upland, flooding occurs due to drainage congestion and in the lowland from the river flow. In the lowland water dies not stand for longer period, but in upland water remains stranded for long. Some years they can not cultivate crop in time due to flooding. According to all part time fishers, decline in fish population is a major problem in all environments. According to the part time fishers, use of pesticides, harmful gears and catching brood fish during breeding period are the main causes of fish decline. Lack of different infrastructure such as school, electricity, road and drinking water sources are the major problems of the part time fishers in all the environments. According to them lack of government initiative for rural development is the main causes of their sufferings.

Table 14: Constrains with percentage (%) of impact

Environments	FI	BR	In	DF	SD/ PS	AD	LE	LD
MK tributary	***	****	-	****	****	*	****	*

Back swamp	*	-	****	****	****	-	****	****
MK mainstream.	***	****	*	****	-	-	****	***
Rice field	*	-	***	-	-	-	****	****

Note: Fl: Flooding; BR: Bad Road, no road accessibility, SD/PS: School was damaged/No permanent school;

AD: Animal diseases; LE: Lack of electricity; LD: Lack of drinking water; DF: Fish declining; *In*: problems

with insects, rats etc.

*: Mild problem; ****: Severe problem

2.2.5 Vulnerability and coping strategy

Part time fishers' livelihoods are in danger in high flood years. These people lose all their livelihoods opportunity-crops and fish catch, due to flood(Table 15). Due to insect infestation to crop some years they cannot harvest rice at a desirable rate. Due to animal disease in some environment also make part time fishers livelihoods in danger.

When they lose crops, cannot fish and they lose their animals they have to borrow from friends or relatives. Sometimes they sell valuables of the household to cope with the shortages.

Table 15: Vulnerability

Environments	Typhoon	Flooding	Insect infestation	Animal disease	Drought
MK tributary	*	*	*		
Back swamp		*		**	
MK mainstream		**		*	
Rice field			**		**

Note *-Mild, **- Severe

Summary PRA Report- Lao PDR

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3.0 PRA by Environment

3.1 Environment 1: Upland Area

3.1.1 Background

Though a mountainous region, Luangprabang Province is rich in aquatic resources with 1,053 km of riverbanks along major rivers, 7,284 km length of medium rivers, and 17,722 km of small rivers and streams (according to GIS analysis of stream data provided by Watershed Classification Project, MRC). There are few floodplain areas but rice fields are habitats for fish and aquatic animals that are extensively exploited.

Fishing and collection of aquatic resources is overall ranked as the third most important activity after rice farming and livestock rearing. In general, in rural Lao PDR the economy is largely non-monetary and fishing, in common with most activities, does not appear to be important for income. About 7% households have professional (commercial) fishermen and out of those households the main income of only 10% comes from fishery and fish related activities. Overall, 83% of the households report they fish and collect aquatic animals, on average in these households 41% of the household members, of whom 20% are children, are actively involved in fishing. A large variety of gears are used for fishing. The most important fishing grounds (habitats) are rivers and streams of varying sizes followed by rice fields. April and May are the most important fishing months followed by March and June, July. However, fishing activities are reported throughout the year. Average individual catch is between 30 kg and 78 kg per year. Half of the fishers catch less than 10 kg per year.

Aquaculture in this area is not as important as capture fisheries. In a survey only 4 households (2%) ranked it at all as important for food, and about 1% of households cultivate fish for income. The average yearly production per household from aquaculture was the same as the average catch of the much larger number of households fishing in rivers.

Most of the fish and aquatic animals are for household consumption. However, a sizeable amount is given away to neighbours, sold, or used in barter-trade. Per capita consumption per year of fish and aquatic animals is low (about 29kg/person/yr) in comparison to the lowlands. In terms of protein intake, fish and aquatic animals contribute at least 55% of the total consumption.

The estimated total production of Luangprabang Province is between 10,000 – 15,000 tons per year, of which about half is fish and aquatic animals that are processed, primarily dried, after catch. Fishing and collection of aquatic animals are very important for subsistence and are integrated with all aspects of people's livelihood strategies. According to the Agricultural Census 35,100 households, or 56%, of the total 62,546 households in the province are engaged in capture fisheries.

3.1.2 Livelihoods Background

During the PRA sessions participants in the highlands described three different categories of wealth in the area: rich, average and poor. They described the wealth categories as below:

Rich: - possess more than 1.5 ha agricultural land and are self sufficient or surplus in rice

- possess more than 5 cattleheads
- possess 2-3 ha industrial plantation (timber)
- possess engine boat and video
- possess own modest house, shops and truck

Average:
- possess 0.3-1 ha agricultural land
- possess 2- 3 buffaloes
- self sufficient in rice but not surplus

Poor cultivation
- do not own low land agricultural land, have only high land for
- do not have cattle
- shortage of rice for 8-9 months in a year
- work as subcontractor or labourer
- possess small house

Table 1. Types of poverty categories identified by the stakeholder

Environments	% Household		
	Poor	Average	Rich
Mekong tributary	26	66	8
Mekong mainstream	35	53	12

All the households in the PRA sites were part time fishers. On average about 10% of the total households in the area were rich, more than 50% were in average category and about one third are poor (Table 1).

The participants described their livelihoods activities during PRA (Table 2). Fishing is not an important livelihoods activity for the upland area but rice production is the main activity of more than half of the participants. Gardening, especially pigeon pea cultivation, and other vegetable cultivation is also an important activity for more than 10% of the households in Mekong tributary. Weaving is one of the main activities in mainstream Mekong region compared with other environments. Especially women and old men do this job in the households. Aquaculture is not developed in this area.

Table 2. Livelihood Sources

Environments	% household				
	Rice cultivation	Gardening	Weaving	Fishing	Other business
Mekong tributary	70	15	5	10	
Mekong Mainstream	57	5	14	19	5

Fig 1 shows a general seasonal activity calendar of the stakeholder groups of the upland area. As there is no full time fisher, fishing is not the main livelihood activity. People fish in two seasons and fish individually. Fishing is a part time work for the people and is done during the late monsoon and in dry season.

Agriculture in the Lao PDR is based on small farm production of largely subsistence nature. People in the highlands area grow two rice crops. Dry season farming activity starts in February and ends in the July. Usually dry season rice is irrigated. However,

wet season rice cultivation overlaps with the dry season rice. Farming is the main occupation for about 53% people but 80% people are involved in agriculture.

Part of the year some people are busy harvesting coffee, and this work is subcontracted to the workers by the plantation owner. Women in the village prepare bamboo crafts and sell those during dry season as dry season crop cultivation is not common for all households due to lack of irrigation facilities. Growing vegetable for consumption and for sale is another income generating activity that women are mostly involved in. Men do the work if the cultivation is in large scale.

Fig 1: Seasonal calendar

	Months starting from Jan											
Activities	1	2	3	4	5	6	7	8	9	10	11	12
Rice cultivation						Wet season rice						
		Dry season rice										
Subcontract/labour												
Handicraft												
Fishing												
Gardening												

3.1.3 Capital Assets

i) Human Capital

The people in the uplands suffer mostly from malaria and diarrhoea, which are very common in the area (Table1). In the Mekong mainstream flu is the main problem during cooler season and in the early monsoon. Malaria frequently makes people sick for which they lose their earning potential. Diarrhoea attacks all the time due to unsafe water, open latrine and lack of awareness about sanitation. Health care is very scarce in the area and poor people have limited access to the health care.

Table 1: Health and disease

Name of diseases	**Upland**	
	Mekong tributary	Mekong mainstream
Malaria	Y	
Diarrhoea	Y	
Flu		Y

Table 2: Seasonality of diseases

	Months (1=January											
Diseases	1	2	3	4	5	6	7	8	9	10	11	12
Malaria												
Diarrhoea												
Flu												

In the upland area nobody had opportunity to attend university due to lack of access to higher education (Table 3). Most people in all environments after graduation from the primary school quit school, a few of them graduated only from secondary school. High rate of drop out after primary school suggests limited access and opportunity or interest to carry on higher studies.

Table 3: Education

Environments	% of people educated			
	Primary	Secondary	High school	University
Mekong tributary	70	20	10	0
Mekong Mainstream	70	20	10	0

The main sources of information for the upland fishers are radio, television and extension officers (Table 4). They get extension services from the extension officers in the government. From radio and TV, they get news about other provinces and other countries especially on Thailand.

Table 4: Sources of information

Environments	TV	Phone	Radio	Extension officers
MK tributary	Y		Y	Y
MK Mainstream	Y		Y	Y

ii) Financial Capital

Laotians feel it a shame to borrow money and they even do not want to expose their poverty to others. Taking loan means they are in poverty. However, taking bank loan needs some security and except for extension of agricultural lands, the interest rate for other trades is very high (Table 5). In Mekong tributary it was reported by the PRA participants that they did not take any loan from any formal institutions. They take loan from immediate relations and from friends and the loan is dependent on trust.

Table 5: Loan/Credit schemes

Environments	**Agricultural promotion Bank**
MK tributary	
MK mainstream	18% interest rate for livestock raising and 8% for rice field expansion

The participants discussed their income levels during the PRA session. It was revealed that the participants from the Mekong mainstream area are well off. They are part time fishers as well as they have other jobs specially business in the town which adds more money to their annual income. Upland area attracts lots of tourist for which many restaurants have been established. These restaurants earn a good amount of money. About 5% of the part time fishers are involved in this business for part of the year. It may be worth mentioning here that a person with Bachelors or Masters degree in government job only receives Kip 2.4 million annually. In the tributary areas most part time fishers have an average income of about 4.5 million

Kip showing average income group. However, about one fourth of the people earn very little and live in extreme poverty in the tributary area. The opportunity for alternate livelihoods is very little.

Table 6: Income level (% of participants)

	Income in million Kip				
Environments	**<3**	**4.1 – 5**	**5.1-7**	**7-15**	**>15**
MK tributary (Part time fishers)	26	66	8		
MK Mainstream (Part time fishers)			35	53	12

Land price depends on the category of land. According to the participants, land price is high in comparison to the annual income. Per capita availability of land is high (0.04 km^2 per person). Out of all the land in the province (236,800 km^2) only 4% is arable land, which is sufficient to feed the entire 577,180 people. Higher lands are used for construction (housing, factory/industries, and other enterprises. Land price for commercial plantation is high as timber is one of the commodities for export and foreign currency earning.

Table 7: Price of land (Unit = million Kip/ha)

Environments	Constructi on land	Rice field land	Garden land	Commercial plantation land
Mekong tributary	5-8	3-4	1	5
Mekong Mainstream	9	10	2.5	NA

iii) Physical Capital

Road access in the upland area is very limited. One main road crosses the area but in the rural area access is very difficult. Lao PDR has policies directed at ethnic minority groups practicing shifting cultivation in upland areas. Some of these policies, such as fruit growing and terracing for vegetables, if implemented where there is no infrastructure to take products to markets, may create more problems than they solve. Inadequate property rights and lack of political power of ethnic minorities and smallholders are often key issues in determining land-use decisions.

Basic necessary infrastructures are available in the Mekong tributaries but in the Mekong mainstream area groundwater supply is inadequate. Although in the Mekong mainstream area surface water irrigation is not a problem in rainy season, due to higher land level water supply or availability of groundwater is a main problem. Overall, only 22% of the total arable land in the country is irrigated, of which 38% of irrigation takes place in dry season by groundwater.

Village health care centres lack good health care facilities and the incidence of pregnant mother and prenatal deaths is high. Due to bad road access in the rural

areas of the mainstream sending sick people to the city health care centres is also a problem. Electricity is only available in the cities - rural areas have no electricity, which limits running power driven equipments. Cost of irrigation also is high with gasoline use.

Table 8: Infrastructure

	Mekong tributary	Mekong mainstream
Existing infrastructure		
- primary school	1	1
- temple	1	1
- road access	√	√
- ground water/water supply	√	
- village health centre	√	

Due to availability of surface water irrigation it is possible to use high amount of cultivable land for agriculture in Mekong mainstream area (Table 9). The main problems of decreased soil fertility; weed infestation and rapid loss of soil moisture are mostly due to shifting cultivation in the upland area. Aquaculture is not well established in the area.

Table 9: Land use pattern

Environments	Agricultural land	Homestead and others land
Mekong tributary	46	54
Mekong Mainstream	90	10

Participants expressed their concern that they were using more gears before than now, but the use of gill net was not extensive. Gill net is considered to be the most harmful gear as it catches all types of fish. Setting long line can also be harmful if it is set on the recruitment passage of the fishes. However, all fishers have gill net and some have cast net. Fishers from Mekong mainstream use more gears than those from Mekong tributary.

Table 10: Types of fishing gears

Rank	Name of the fishing gear	Present time		20 years ago		
		MKT	MKMPT	Name of the fishing gear	MKT	MKMPT
1	Gill net	Y	Y	Traditional Cast net	Y	Y
2	Cast net	Y	Y	Traditional Gill net	Y	Y
3	Long line		Y	Tong (Box funnel net)		Y
4	Hook	Y	Y	Lop trap	Y	
5	Sai trap		Y	Sai trap		Y
6				Hook	Y	
7				Drift big single hook (lai tao)		Y

Note: Y: Existing; MKT: Mekong tributary; MKMPT: Mekong mainstream with part time

iv) Social Capital

Social crime is very limited in the area. There is no conflict among the fishers or with other community members. They always discuss among themselves and they help each other during the planting or harvesting season.

3.1.4 Natural Capital

Participants reported highest water level in October in Mekong tributaries, but it is in September in Mekong mainstream. However, highest level of water in Mekong river is higher

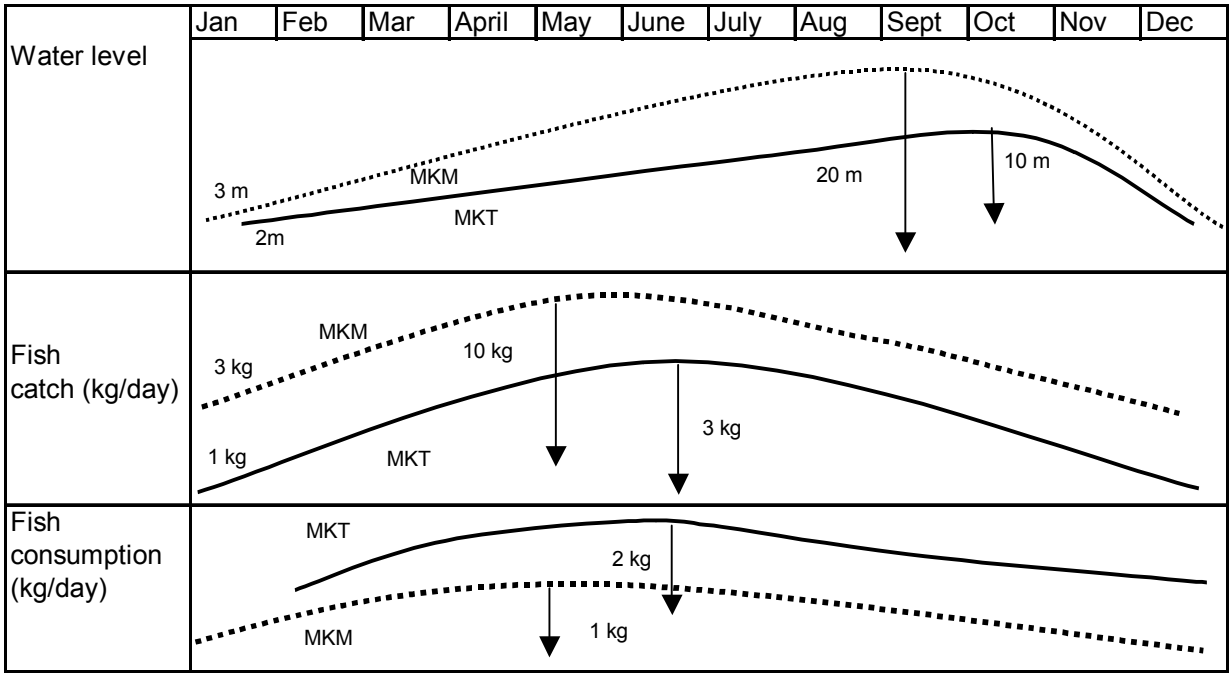

Fig 1: Hydrology and fishery activities

in the mainstream than in the tributaries. Usually water level reaches its highest level in September/October (Fig 1). Tributaries receive water from the mainstream and rise

to their highest level later than the mainstream. Fish catch in the Mekong mainstream is higher than that in the tributaries (Fig 1). Fishers catch fish in the mainstream before those enter in the tributaries. The fishers in the tributaries only catch resident species in the tributaries. However, fish catch in tributaries are mostly for consumption. Daily household consumption in the tributaries is more than that in the mainstream (fig 1). It may happen due to non- availability of the better communication to transport fish to the other places and the lower price fixed by the middlemen.

3.1.5 Trends in Natural Resources

Water and aquatic resources are declining, although their importance is higher than 20 years ago. The resources were abundant 20 years ago and there were fewer people. People were harvesting natural resources for their own consumption as well as for income. However, due to high competition, increased price and less available resources, importance has increased (Table 11). Importance of water resources is same but the status of different waterways has changed over time. River bank erosion is acute, but during the dry season rivers became narrower and shallower and hold little water, but they flood during monsoon. Fish species declined, some species have become extinct and some exotic species are replacing the natural fishes. Exotic species escape the ponds/cages during high flood or from physical damage to the cages. Most of fishers complained that the human population is increasing day by day. Although natural trees declined a lot, the area of plantations has increased several fold due to better export market for the timber.

Table 11: Status of natural resources

Source	Status Rank				Importance Rank			
	Mekong Tributary		Mekong Main stream		Mekong Tributary		Mekong Main stream	
	At present	20 yrs ago	At present	20 yrs ago	At present	20 yrs ago	At present	20 yrs ago
Water	6	10	5	10	10	10	10	10
Soil	4	10	6	10	10	5	10	6
Fish	5	10	5	10	10	4	10	3
Other aquatic resources	5	10	4	10	10	4	10	2
Forest/tree	4	10	5	10	10	4	10	6
Water lily	1	10	0	10	5	5	10	5
Bamboo	5	10	5	10	10	6	10	7

At the same time the respondents reported that due to use of high doses of fertilizers (for which farmers receive loan at a low interest rate), land productivity declined (Table 12). Wet season rice is not so much impacted but the productivity of dry season rice decreased to half. Participants owning farm said that they have to use more fertilizer to keep the production at the same level as before. Production cost is high compared to 20 years ago. Price of locally produced rice is high in comparison with that of imported rice.

Table 12: Rice productivity **Unit: ton/ha**

Environments	Present		20 years ago	
	Wet season	Dry season	Wet season	Dry season
MK tributary	3	1.5	3	3
MK Mainstream	2.7	0.8	4	1.5

Large fishes (catfish, carps) in the main river are already rare, and are almost non-available in the tributaries. Fishers cannot catch those fishes anymore, whereas, those fishes were abundant in the river and tributaries 20 years ago. In the market most of the fishes are from aquaculture or imported sea fish from Thailand.

Table 13: Fish species reported occurring in the area in 2002 and 20 years before

At Present			20 year ago		
Name of fish	MKT	MKMPT	Name of fish	MKT	MKMPT
Bagarius yarrelli		Y	Bagarius yarrelli		Y
Bangana sp	Y	Y	Bangana sp	Y	Y
Cirrhinus prosemion	Y	Y	Cirrhinus prosemion		Y
Cosmochilus harmandi	Y		Cosmochilus harmandi	Y	
Cyprinus carpio		Y	Cyprinus carpio		Y
Hampala sp	Y		Hampala sp	Y	
Hemmibagrus sp		Y	Hemmibagrus sp		Y
Hypsibarbus sp	Y	Y	Hypsibarbus sp	Y	Y
Micronema apogon		Y	Micronema apogon		Y
Morulius chrysophekadion	Y	Y	Morulius chrysophekadion	Y	Y
Mystus nemarus		Y	Mystus nemarus		Y
Osteochilus hasselti	Y		Osteochilus hasselti	Y	
Osteochilus lini	Y		Osteochilus lini	Y	
Puntioplites sp	Y	Y	Puntioplites sp	Y	Y
Puntius sp	Y		Puntius sp	Y	Y
			Pangasius larmaudiei	Y	
			Pangasius saniwongsei		Y
			Pangasius sp	Y	
			Wallago attu	Y	
			Catlocarpio siamensis		Y
			Pangasianodon gigas		Y

Y: Existing; MKT:Mekong tributary; MKMPT: Mekong mainstream with part time

3.1.6 Problem Analysis

The major problems, as indicated by the participants in both the areas, are lack of land for cultivation, fish declining and decrease in agricultural production (Table 14). As a result of all these trends farmer-cum-fishers' livelihoods are affected adversely. These part time fishers depend on agriculture for their household food and for income. In the uplands cultivation is a challenge. Lack of water for irrigation, mountainous structure of land, and soil fertility all limit productivity as well as demand

more inputs. The cost-benefit ratio thus shows a marginal profit from each hectare of land. These people complained that they were subsidizing their income form fish catch from the river and tributaries before but at present fish population declined due to different external as well as internal factors. Moreover, supply from aquaculture is so high that the price of cultured fish is lower than the captured fish, which creates high competition among cultured and captured fish. As a result fishers do not get proper price of the fish if they sell them.

Table 14: Constrains with percentage (%) of impact

Problems	Causes	Solution	Impact
Limited agricultural land	• Mountainous area • Not much land development • Tree plantation • Shifting cultivation	• Allocation of land to the poor • Land development initiative by the government • Reallocate highland	80% poor people are negatively impacted
Low fish catch	• Fish stock declined • Number of fishers increased • No conservation	• Conservation of fish through establishing conservation zone • Promotion of cage culture • Ban all harmful gear use • Control fertilizer and pesticide use	100% fishers are negatively impacted
Agricultural production decreased	• Quality of soil declined • Short time for cultivation • Pest infestation	• Better technology needed • Change in cultivation practices	80% poor farmers are negatively impacted

3.1.7 Vulnerability and Coping Strategy

Peoples' livelihoods and assets in the upland area are not in any major jeopardy from natural hazards. Cattle raising in the upland Mekong area is feasible, but due to high risk of disease people are not willing to take risk. In 1998 they have that problem. This situation forced people to give up cattle raising.

3.2 Environment 2: Lowland Area

3.2.1 Background

Lao PDR contains about 25 percent of the total area of the Mekong River Basin and contributes 35 percent of the Mekong River's annual flow. Conversely, about 88 percent of the area of Lao PDR lies within the Mekong River Basin, excluding only Houaphanh Province and part of Xiengkhuang Province in the northeast. National development and welfare are therefore heavily dependent on how the many beneficial resources and uses of the Mekong River and its tributaries are managed, developed and protected.

The area known as Siphandone in the Champassak province of Lao PDR stretches over approximately 60 km of the Mekong mainstream in the very southern most part of the country, and is adjacent to the border with Cambodia. Numerous mainstream islands are found throughout this region and of the 130 village communities live there, many have established themselves on the larger islands. The largest administrative district in Siphandone is Muang Khong and is home to just over 70,000 people. The main source of income for the Siphandone villagers is rice farming and capture fisheries.

The area supports some of the most productive fisheries in the Lao PDR, which are targeted for both subsistence and semi-commercial purposes. An export trade exists with Thailand for some of the more valuable fish species, and several of the larger

riparian towns in the Lao PDR rely on Siphandone to supply fish and fishery products upcountry. Fish bio-diversity is high in the area, and approximately 200 species are targeted by the riparian population using a wide range of fishing gears. Although some form of fishing activity takes place in most areas all year round, it is often during the periods of annual fish migration that fishing effort intensifies and returns are greatest.

Within the last decade there have been an ever-increasing number of anecdotal reports from local people suggesting a decline in available aquatic resources in the Siphandone area, including fisheries. The reasons for these reported declines are almost certainly complex, perhaps interrelated and as yet poorly understood. It should be noted that reports of a decline in aquatic resources are not confined to the Siphandone area of the Lao PDR only.

3.2.2 Livelihoods background

The PRA participants categorized their communities into 4 groups: very poor, poor, average and rich. According to them, these groups can be characterised as follows:

Rich:
- annual income more than 10,000 kip
- owns more than 1 hectare land
- owns more than 5 cattle and/or buffaloes
- owns agricultural machineries (tractor, electric pump for irrigation etc)
- owns engine boat
- owns rice mill, valuables
- owns at least 2 motorbikes
- owns a modest house
- rice production sufficient for household consumption
- owns big fishing gears (full time fishers)
- owns commercial plantation

Average:
- owns some mixed fishing gears (full time and part time fishers in the mainstream)
- owns engine boat
- owns agricultural land less than 1 hectare
- owns a simple house
- owns cattle/buffaloes less than 3
- owns two or more bicycles
- rice self sufficient for the year
- owns some industrial plantation plots (only in Mekong tributaries part time fishers)

Poor:
- owns some fishing gears
- do not own any agricultural land
- do not have any cattle/buffalo
- do not possess any boat
- annual income less than 500,000 Kip
- cultivate others rice field, borrow cattle for ploughing
- shortage of food
- have very small house

Very Poor:
- mostly labour/subcontracting
- own small house
- no agricultural land, no cattle
- food shortage

The percentages of people in each of the above categories are shown in Table 1. People in the backswamp area are richer than those from other environments in the lowlands. They have forest resources as well as fishery resources. Some of the backswamps are often cultured with fish. They get water for irrigation from the backswamps and have good fertile soil for cultivation. At the same time timber can also be sold for income. People living in the area where rice cultivation is predominant are mostly fishing in the rice field for supplementary income.. More than 50% of the people living on fishing in the rice fields are very poor. On an average more than one fourth of the part time fishers in all the environments are poor.

Table 1. Wealth Category

Environments	Percentages of people in the category			
	Very Poor	Poor	Average	Rich
Mekong tributary PT	0	30	50	20
Back swamp PT	3	5	16	76
Mekong mainstream PT	0	25	25	50
Mekong mainstream FT	0	25	63	12
Rice field	12	40	44	4

Note: PT: Part time, FT: Full time

People from all the environments depend on fishing to some extent (Table 2). Full time fishers from the mainstream area are mostly dependent on fishing. Part time fishers from the other environments are partly dependent on fishing. Although income from rice production is far more than other sources, fishing still brings some income and meets household fish demand. Gardening is a job of women, who sometimes need a male helping hand. However, a considerable share of income comes from this source.

Table 2. Livelihood patterns

Environments	Percentages of household income from main sources							
	Rice field	Gardening	Lives-tock raising	Aqua-culture	Weaving	Labor	Fishing	Others
Mekong tributary PT	50	20	-	-		10	20	-
Back swamp PT	63	9	10	3	5	-	10	-
Mekong mainstream PT	20	10	-	-	50	-	20	-
Mekong mainstream FT	5	-	-	-	5	-	90	-
Rice field PT	40	5	30		15		5	5

In the river fishers can fish round the year (Table 3). But in the backswamp they observe a closed season and do not allow anyone to fish from September to May. During this period, fishers fish in the nearby river and canals. Part time fisher-farmers cultivate rice in two seasons. Time for the dry season rice crop is very short and if irrigation is not available the cultivated area decreases, so does the production. When production decreases people's livelihoods impact negatively. Weaving is a family activity. The entire village in the mainstream river area weaves to earn money. They make their own thread and then weave skirts for the women. In the later part of the dry season some of the participants make earthen pots. Men and women both work together. Some of the households make alcohol for income and for household consumption during the later part of dry season and in the early monsoon after rice harvest. The wage labourers work either on daily wage basis or they go on subcontract for coffee harvest during the dry season. Gardening is also a female activity. They sell vegetables for income and also use them to feed the family.

Table 3: Seasonal calendar

Activities	1	2	3	4	5	6	7	8	9	10	11	12
Rice culture	Dry season rice					Wet season rice						
Subcontract	Coffee harvest											
Fishing			Fishing in the backswamp									
	Fishing in the river											
Weaving												
Gardening												
Making alcohol												
Handicrafts			Pot making									

Note: 1=January……. 12= December

3.2.3 Capital Assets

i) Human Capital

Diseases like malaria and diarrhoea are common in the lowland areas of Lao PDR (Table 4). Goitre is common in the backswamp area. Although this is due to lack of iodine in the water, the participants were not aware of the cause. Malaria is a persistent disease and makes people weak and unable to do any heavy work. These people are poor and they lose their livelihoods during sickness. Stomach diseases are common among the full time fishers in the Mekong mainstream areas due to lack of pure drinking water.

Table 4: Health and disease

Name of diseases	MKT	BS	MKMPT	MKMFT	RF
Malaria	Y	Y	Y	Y	Y
Diarrhoea	Y		Y	Y	Y
Flu	Y				
Appendicitis	Y				
Goitre		Y			
Gastric		Y		Y	Y
Gall stones		Y		Y	
Kidney infection		Y		Y	
Conjunctivitis (red eye)			Y	Y	Y
Female disease					Y

Note: MKT: Mekong tributary, BS: Backswamp, MKMPT: Mekong mainstream with part time, MKMFT: Mekong mainstream with full time, RF: Rice field

The level of education among the fishers is not high. The majority of poor fulltime fishers and fishers who fish in the rice fields have no education or only primary education. . They said that there is limited job opportunity for their children in the area. Therefore, they are not interested to invest money for their children's higher education. These children instead help ther parents to catch fish or do other income generating activities. Part time fishers from the backswamp are richer and they prefer to send their children for higher education which, they think, is an asset.

Table 5: Education

	% of the people educated			
Environment	Primary or none	Secondary	High school	University
Mekong tributary PT	50	20	20	10
Back swamp PT	30	10	55	5
Mekong mainstream PT	40	35	20	5
Mekong mainstream FT	75	25	0	0
Rice field PT	70	20	10	0

Television, radio and extension officers are the main sources of information in the lowland area (Table 6). In the backswamp area people can read newspaper and they rely on this media for information. The full time fishers from the Mekong mainstream area also receive information from friends and relatives through telephone.

Table 6: Source of information

Environments	**TV**	**Phone**	**Radio**	**Extension officers**	**Newspaper**
MK tributary	Y		Y	Y	
Back swamp	Y		Y	Y	Y
MK mainstream PT	Y		Y	Y	
MK mainstream FT.	Y	Y	Y		
Rice field	Y		Y	Y	

ii) Financial Capital

The easiest source of credit is from the Agriculture Promotion Bank. This bank provides credit at 12% interest rate for various activities but the rate for agricultural extension is low. The private sector including NGOs provides credit for weaving. The moneylenders also provide materials in advance for weaving and then they take all the products after finishing. Private bank interest rate is very high although the process for taking loan is easier.

Table 7: Loan/Credit

Environments	Agricultural Promotion Bank	Private sector	Private Bank
MK tributary	12% interest rate		20-30% interest rate
Back swamp	12% Interest rate		
MK mainstream PT	12% Interest rate	Credit for weaving	
MK mainstream FT	12% Interest rate		
Rice field	12% Interest rate		

About one fourth of the fishers from lowland area earn less than 3 million Kip per year. However, about half of all the fishers earn more than 4 million Kip per year, and 30% earn more than 5 million Kip a year.

Table 8: Annual income level (% households under each income level)

Environments	<3MK	4.1 – 5 MK	>5 MK
MK tributary	20	70	10
Back swamp	8	16	76
MK mainstream PT	25	25	50
MK mainstream FT	25	62	13
Rice field	27	70	3

The price of land depends on the type of land (Table 9):

- Homestead and other land for construction far from the main road is 300,000 Kip/0.02 ha,
  near to main road is 1 million Kip/0.02 ha.

- Agricultural land:
  with good quality of soil- 3-20 million Kip/ha
  with medium quality soil- 3-5 million Kip/ha
  not so good quality of soil- 3 million Kip/ha

Land price also depends on the buying capacity of the people. Land near the towns is more expensive than land in the rural areas. However, poor people cannot afford to buy land with their limited earnings. In the village the village head distributes land among the people for cultivation and other activities.

Table 9: Price of land **Unit = million kip/ha**

Environments	Construction land	Rice field land	Garden land	Industry /plantation land
MK tributary	10	8-15	1	7-10
Back swamp	50	10-12-15	2.5	
MK mainstream PT	16	20	2	NA

MK mainstream FT	10-12	5-8	1-2	NA
Rice field	1.5-5	0.3-3	0.5	NA

iii) Physical Capital

More than 50% of the total lands are used for agriculture in all the environments (Table 4). However, most of the lands are used for agriculture in the Mekong mainstream area. According to the PRA participants, agriculture is the mainstay of the peoples of the Mekong mainstream area. The backswamp area is rich in forest. In the backswamp area covered by the PRA very few (109) households live and they received the land use right officially from the government. Very few people moved into the area after establishment of this village.

Table 10: Land use pattern

Environments	% of land					
	Agriculture	Homestead & other construction	Forest	Backswamp	Garden	Fellow
Mekong tributary	69	31				
Back swamp	51	1	38	7	1	1
Mekong mainstream PT	95	5				
Mekong mainstream FT	72	28				
Rice field	51	49				

Fishing Gear:

Types of fishing gear used have not changed over the last 20 years, but the ranking of those used has changed. Previously cast nets were widely used, but presently gill nets are used to catch fish in all the environments. Presently bigger gears and ones with fine mesh are used to catch fish. Rich fishers possess bigger nets and they sometimes rent them out. Scoop nets were widely used 20 years ago, but now use of scoop net is very limited. Conversely, long line was rarely used by the fishers earlier, but now-a-days it is widely used. Poor people have very few gears to catch fish. They mostly depend on traps and rod and line.

Table 10: Types of fishing gears used in the lowlands by environment

Name of fishing gears	MKT	BS	MKMPT	MKMFT	RF
I. Present time					
Gill net	Y	Y	Y	Y	Y
Cast net	Y	Y	Y	Y	Y
Long line	Y	Y	Y		
Chanh trap	Y	Y			
Lop trap	Y		Y		Y
Scoop net		Y		Y	
Sone (triangular scoop net)			Y		
Seine				Y	Y
Chip (Cylindrical current trap)				Y	
Spear gun					Y
II. 20 years before					
Cast net	Y	Y	Y	Y	Y
Scoop net	Y			Y	
Traditional Gill net	Y	Y	Y	Y	
Tong (Box funnel net)	Y		Y	Y	
Big single hook		Y			
Chan trap		Y			
Lop trap		Y			
Nam (Barbed rattan cone)			Y	Y	
Long line			Y		
Plunge basket					Y
Chip (Cylindrical current trap)					Y
Sai trap					Y
Sone (Triangle scoop net)					Y

Note: Y: Existing, MKT: Mekong tributary, BS: Backswamp, MKMPT: Mekong mainstream with part time, MKMFT: Mekong mainstream with full time, RF: Rice field

Most of the villages have primary infrastructure such as primary school and temple (Table 11). However, access roads are not very developed and due to bad road communications farmers and fishers have to sell their products at a lower price to middlemen or at the local market. Therefore, poor producers or fishers always earn less than the market price in towns. Ground water sources are not widespread in the area which limits dry season crop cultivation to the few areas where surface water is available. There was no village health centre in any of the study area sites.

Table 11: Infrastructure and institutions

Infrastructure/institution	**MKT**	**BS**	**MKMPT**	**MKMFT**	**RF**
- primary school	Y	Y	Y	Y	Y
- temple	Y	Y	Y	Y	Y
- village office	Y			Y	Y
- road access	Y				Y
- rice mill	Y				
- ground water/water supply	Y				
- communal board		Y			
- student-parent committee			Y		
- welfare committee			Y		
- water pump (65HP)		Y		Y	

Note: Y: Existing, MKT: Mekong tributary, BS: Backswamp, MKMPT: Mekong mainstream with part time, MKMFT: Mekong mainstream with full time, RF: Rice field

iv) Social Capital

Usually there is a good relationship among different groups within a community and they take good care of each other. There were no major conflicts reported within the

villages. There is good cooperation among the households in the form of labour exchange (during rice planting and harvesting). There are associations, which take responsibility for funerals in the village through collection of money to assist in funeral ceremonies. There is a security committee in rice field area that consists of 20 families and each family has to pay 1000 Kip per month for membership. This money is used to help the members when somebody in the family falls sick. If any incident happens they meet it through mutual agreement. Usually the village head takes the leadership. Each village head has two deputies: one helps him in administration and the other is for technology transfer. Poor villagers exchange fish and wild vegetables for rice. There is a communal board in the backswamp area, which undertakes welfare activities for the villagers. It also takes care of the roads, funerals and helsp families in distress. In the mainstream area there are student-parent committee and welfare committee. The student and parent committee takes care of any problem arisen out of local education system or for a particular student. This committee brings students and parents in one platform to resolve any problem. The welfare committee usually takes care of the welfare aspects of the community.

3.2.4 Natural Capital

The highest water level in the monsoon season varies with the environments (Table 12). The water level in the main river remains higher than in tributaries and backswamp. Usually in tributaries or backswamp water level reaches its highest level after the main river. Fish catch from different waterbodies during the high season (May-June) reaches up to 20 kg per day per household. Fish consumption per day per household at the same time increases to its highest. This shows that the amount of fish consumption is directly related to catch, except for participants of the rice field environment.

Table 12: Hydrology and Fisheries

Environments	Water level	Fish Catch	Fish consumption
MK tributary	10 m[o]	20 kg/day/hh	3 kg/day/hh
Back swamp	2.5 m	20 kg/day/hh	2 kg/day/hh
MK mainstream PT	14 m[s]	15 kg/day/hh	1 kg/day/hh
MK mainstream FT	11 m[s]	20 kg/day/hh	3 kg/day/hh
Rice field	1.5 m[p]	10 kg/day/hh	2 kg/day/hh

Note: Y: Existing, MKT: Mekong tributary, BS: Back swamp, MKMPT: Mekong mainstream with part time, MKMFT: Mekong mainstream with full time, RF: Rice field

3.2.5 Trends in Natural Resources

Natural resources availability has declined several fold in the last 20 years (Table 13). However, their importance for people'se livelihoods increased a few times also. Participants opined that 20 years ago there were less people but more resources for use. Water resources were plentiful in past years but now the river beds have become silted, and the rivers have become narrower with a reduced water holding

[o] water level in October
[s] water level in November

capacity. Aquatic resources were earlier only used for household subsistence but presently they can sell them and make money. Competition for these resources increased as did the importance of these resources. In the tributaries area there was no forest but people now started to have plantations. In the backswamp area under SWIM project forest resources decreased greatly due to overexploitation. In the study area, however, they started to impose certain rules for conservation and sustainable harvest of forest products. In other areas new plantations have increased the forest area. Construction of dam also decreased fishery grounds.

Table 13: Status (abundance/availability) of natural resources

Source	MKT		BS		MKMPT		MKMFT		RF	
	Now	20 yrs ago	Now	20 yrs ago	Now	20 yrs ago	Now	20 yrs ago	Now	20 yrs ago
Water in main river	5	10	7	10	6	10	5	10		
Water in the tributaries	3	10	8	10					7	10
Fish	4	10	7	10	5	10	5	10	7	10
Other aquatic	1	10	4	10	10	10	7	10	7	10
Forest	2	0	3	10			10©	10	8	5
Water lily			10	6						
Natural pond							10©	5	10	9

Note: Scores – 10 = maximum, 1 = minimum, blank – not reported
MKT: Mekong tributary, BS:Backswamp, MKMPT: Mekong mainstream with part time, MKMFT: Mekong mainstream with full time, RF: Rice field

All the natural resources are important to them as the amounts available are becoming less and less at present and the number of people exploiting them is increasing (Table 14). Some of the resources were used before only for their own consumption, but now they can sell and earn from them. According to them forest resources were not abundant in some areas 20 years back, but now that people realized the importance of the forest for income generation, environmental protection and household use, more and more people are inclined to make plantation. In case of fish, as river fishes are declining but the aquaculture sector is growing, people said that fish escape from cages and are taking over the space of natural river fishes, and that the prices of rare fishes are increasing. Importance of these fishes is now increasing for the livelihoods of the poor fishers.

Table 14: Importance of natural resources for respondents' livelihoods

Source	**MKT**		**BS**		**MKMPT**		**MKMFT**		**RF**	
	Now	20 yrs ago	Now	20 yrs ago	Now	20 yrs ago	Now	20 yrs ago	Now	20 yrs ago
Water in main river	10	5	10	7	10	1	10	4		
Water in the tributaries	10	2	10	8					7	10
Fish	10	4	10	7	10	5	10	4	7	10
Other aquatic	10	1	10	4	10	4	10	6	7	10
Forest	7	10	10	3			10	10	9	4
Water lily			10	3						

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Note: Scores – 10 = maximum, 1 = minimum, blank – not reported
Y: Existing, MKT: Mekong tributary, BS: Backswamp, MKMPT: Mekong mainstream with part time, MKMFT: Mekong mainstream with full time, RF: Rice field

Rice production decreased in the backswamps due to reduced silt deposition. Daming of rivers for hydropower has decreased silt deposition and with it soil fertility. Farmers have to use more fertilizer and pesticide than before. Without fertilizer it is impossible to get better yield. Dry season rice cultivation started recently with ground water irrigation. In most of the Mekong lowlands surface water irrigation is possible in the dry season and yields with irrigation are higher.

Table 15: Rice productivity **Unit: ton/ha**

Environments	Present		20 years before	
	Wet season	Dry season	Wet season	Dry season
MK tributary	1.5	3	0.8	NA
Back swamp	2.8	4	3.5	NA
MK mainstream PT	3-3.5	4	2	NA
MK mainstream FT	2	2	4	NA
Rice field	1.7	NA	0.7	NA

When participants were asked to compare the top ten fish species now and 20 years before, it was observed that species composition changed over the years (Table 16). Big river fishes are very rare or almost extinct now. Other fishes took the places of the big fishes. Participants complained that they are earning too little compared to 20 years ago. Very few people still consider fishing as their main occupation and very few are full time fishers.

Table 16: Changes in Ranking of fish species by importance in catch

Name of fish	MKT	BS	MKMPT	MKMFT	RF	Name of fish	MKT	BS	MKMPT	MKMFT	RF
I. At Present						**II. 20 years before**					
Anabas testudineus		6			3	Anabas testudineus		5			3
						Aaptosyax grypus				8	
Bagarius yarrelli			3	5		Bagarius yarrelli	4			10	
Bangana sp	6					Bangana sp	3		7		
Barbodes sp		1				Barbodes sp		7			
Belodontichthys sp	9										
						Boesemania microlepis	1			6	
						Catlocarpio siamensis	2			9	
Channa limbata					4	Channa limbata					4
Channa lucius					1						
Channa sp		2				Channa sp		1			1
Cirrhinus microlepis			5	10		Cirrhinus microlepis	10		9		
Cirrhinus prosemion						Cirrhinus prosemion					
Clarius batrachus		3			2	Clarias batrachus		2			2

Name of fish	MKT	BS	MKMPT	MKMFT	RF	Name of fish	MKT	BS	MKMPT	MKMFT	RF
Cosmochilus harmandi	5		6			Cosmochilus harmandi	9		5		
						Cyclocheilichthys sp					7
Cyprinus carpio	1		7	9	10						
Grass carp	2										
Hampala sp		10			9	Hampala sp					10
						Hemililurus mekongenis			8		
Hypsibarbus malcolmi	3		9	8							
Hypsibarbus sp		4				Hypsibarbus sp					8
Kryptopterus sp	4					Kryptopterus sp		9			
Common carp				7							
Macrognathus siamensis					7	Macrognathus siamensis					9
Megalops cyprinoids					6	Megalops cyprinoids		6			6
Mekongina erythropspila			8								
Micronema apogon				3		Micronema apogon			6	5	
Monopterus albus					5	Monopterus albus					5
Morulius chrysophekadion			4	6		Morulius chrysophekadion	3		10		
Mystus microphthalmus			2	2		Mystus microphthalmus	5		3	4	
						Mystus sp		10			
Nopterus nopterus		5				Nopterus nopterus		4			
Oxyeleotris marmorata		9				Oxyeleotris marmorata		3			
Pangasius kremfy				4		Pangasius kremfy	7				
						Pangasius larmaudiei					
						Pangasius saniwongsei			1	1	
Paralaubuca typus		8									
Probarbus jullienni			1	1		Probarbus jullienni			2	2	
Puntioplites sp	8										
Scapphognathop sp	7										
Systomus sp					8						
Trichogaster trichopterus		7				Trichogaster trichopterus		8			
Wallogo attu	10					Wallago attu	6		4	7	

3.2.6 Problem Analysis

The most important problem raised by all the participants was declining fish. The reason for very few full time fishers in the country is the inability of fishers to rely on a constant fish catch to maintain their livelihoods through this source. Fishers catch fish part time and to complement their income they are involved in other business. In the mainstream fishers feel they do not get a proper price as they have to sell fish at a lower price to the middlemen. Lack of electricity is another problem which they think is a barrier for establishing small scale industries such as cottage industry and increases the cost of irrigation. Education for children is not widespread in the villages, which also makes people depend more on the declining natural resources and restricts their opportunity to access better livelihoods. Lack of safe drinking water causes health hazard and they lose livelihood opportunities. Insect infestation decreases crop production and affects food security as well as livelihoods. The cumulative effect of high input cost (irrigation, pesticide etc.) increases vulnerability to hazards and reduced income.

Table 17: Constraints on livelihoods of respondents with severity ranking

Environments	Flooding/ drought	Bad Road	Insect infestation	Fish declining	No permanent school	Animal disease	Lack of electricity	Lack of safe drinking water	Malaria
MK tributary	*	*****	-	***	*****	*	*****	**	
Back swamp	*	-	*****	*****	*****	-	*****	*****	
MK mainstream PT	**	*****	*	***_	-	-	*****	****®	
MK mainstream FT	**	*****♠		*****		*	*****		
Rice field	*[3]	-	****	***	-	-	*****	,*****	***®

Note: Severity: - not important, * = moderate up to *****=most severe

3.2.7 Vulnerability and Coping Strategy

Flooding is a regular event in the lowlands of Lao PDR. People loss their crops - the main livelihood source in the area. In some areas it is not possible to grow two crops due to flooding. Crops are always vulnerable to flooding and/or to drought in the area. If there is drought, rain-fed rice completely burns out. Houses in the lowland areas are raised up to avoid flooding. The PRA participants complained that termites destroy the houses and they have to replace the logs. Insect infestation in the crops is also one of the main problems for rice production. Due to insect infestation, production decreases at the same time cost of production increases. Part time fishers lose their income in both ways. In backswamp areas due to some unknown disease every year they lose animals. They think it may be the same mineral deficiency that causes goitre in the human being.

They usually borrow money from the bank to cope with disasters. They exchange other products for rice to cope with the shortage of food. Some said they go to the cities and work for others. Women are the worse sufferers as they have to work hard to get other natural resources or forest products to supplement the reduced household income.

Table 18: Vulnerability and natural hazards

Environments	Typhoon	Flooding	Insect infection	Animal disease	Drought
MK tributary PT	1992	1978	1999		
Back swamp PT		1966, 1978		Every year	
MK mainstream PT.		1978, 2002			
MK mainstream FT	1981	1978		1981	
Rice field PT			2001		1991, 2001

[2] Mekong mainstream and full time fishing
♠ No road accessibility
[3] Drought
® Problem with malaria and diarrhea