

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



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**VIETNAM
PRA REPORT**

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1. GENERAL BACKGROUND AND OBJECTIVES

During the period of May to July 2002, An Giang University, in conjunction with the Chau Phu, Thoi Son and Chau Doc District People's Committees, and Can Tho University conducted Participatory Rural Appraisals (PRAs) in four different Provinces. The research findings from this study are presented in this report.

The purpose of this exercise was to better understand the livelihoods of people living in rural areas and depending mainly on inland capture fisheries. Artisanal fisheries are often identified as the main source of livelihood of poor people (fishers), although an even larger but significantly less visible number of poor and vulnerable people depend on inland capture fisheries as a component of wider livelihood strategies. Specific objectives of this exercise were to collect missing information on livelihoods dependent on inland fisheries not yet documented by researchers through Participatory Rural Appraisal methods.

The study focused on 4 different representative stakeholder groups namely fulltime, part time, and subsistence fishers, and fish traders. They are spread over 3 different ecological/environmental locations. The PRA for main river location was conducted in Chau Doc and Can Tho district, the rice field and/or floodplain PRA was in Chau Phu district, the PRA for swamp environment in Phung Hiep district of Can Tho province, and lastly the canal PRA was done in Thoi Son district.

Overall findings showed that all target stakeholders are worse off now than 10 years ago in terms of inland artisanal fisheries status. They have lower income, less savings, lower nutrition and health, although they report having better government services and more of their children are attending school.

Among 4 stakeholder categories, fish traders are the better off group in terms of livelihood, and among this group there was no reported occurrence of poor category households. As fish sources decline over time, people are diversifying and expanding their investment strategies through land purchases, investments in livestock, or other new endeavors, including cultivation of High Yield Variety (HYV) rice, duck raising, or aquaculture as alternatives to their main income. Surprisingly, income from wage labouring as agricultural labour is considerably higher compared to income from fish capture.

The study also found that there is a group of people who are the "static poor" who got trapped in a condition which is hard to change. These static poor are absolutely landless. The returns from selling wage labour (the only viable income generating activity available besides fish capture) are so low that it is impossible for them to save enough to purchase assets, such as land. Most of these people are also in debt to both government lending programs and/or private moneylenders (with very high rate of interest). As they default on government debt, they are not eligible for new loans, and if they cannot repay the principal to private moneylenders, they still must pay high interest rates to service their debts. Many households have paid much more in cumulative interest than they originally borrowed. This type of fishery stakeholder is also not demonstrating any improvements in education, health, or income levels at all. Increased socio-economic differentiation is visible throughout the study as asset markets become more flexible and as successful fishermen begin to benefit from larger-scale production and diversification. This differentiation is also strongly associated with landlessness and land agglomeration.

1.1 Methodology

1.1.1 Site selection

Sites were selected on the basis of availability of the stakeholders groups, easy access and support from the local authority as the resources for the PRA study was limited. Based on the information from People Committee of each village, some households are chosen from different groups: landless, part-time and trader. Every group nominated one person who was separately interviewed with questionnaire, then with all participants in the group took part in PRA. Topography of the area was also a factor for selection.

For PRA study, households having different socio-economic activities were selected. The households' incomes and livelihoods strategies based on water resources were the main criteria for selection of participants. Other steps for data collection were:

- Reconnaissance survey.
- Secondary data collection from local authority.
- Farmer interviews with structured prepared questionnaires (PRA)

The team comprised of more than 20 AGU staff, mainly for the faculty of Agriculture and Natural Resources, as well as the faculties of Economics and Business Administration, and Science, Technology and Environment. Two separate teams of researchers conducted studies in Thoi Son (canal ecological area), Chau Phu (rice field and flood plain ecological area) and Chau Doc (main river ecological area) districts. Other team in Can Tho province comprised of four members.

Researchers used primarily Participatory Rural Appraisal (PRA) tools to understand rural people whose livelihoods depend on inland fisheries and how they define their *well-being*, or what characterizes *good life* (rich) as opposed to a *bad life* (poor). The study also tried to find priorities and concerns of fishermen in order to understand how they identify and implement strategies for sustaining their own lives. In addition, it was important to learn about various support networks that fishermen depend or rely upon.

1.1.2 Stakeholder selection:

- Selection: Discussed with the People's Organisation and chose people from the official documents. People's organization helped in organizing the meetings and the venue. In each group 10-16 people participated.
- Participants' standard: certain criteria in each group were used such as knowledge about the area they are living in, their category of people, and female-male balance. However, the fish trader group mainly consisted of women as fish trading is a female specific job in the area.

Tools used for PRA:

1. Timeline
2. Mapping
3. Venn diagram
4. Seasonal calendar
5. Daily activity
6. Gender analysis
7. Trend analysis
8. Flowchart
9. S.W.O.C
10. Wealth ranking
11. Constrains/problems ranking
12. Web problems

Beside PRA, some additional interviews to related people (agricultural officers, staff of village) were done for collecting general information and data on income sources of households were collected through questionnaire survey.

1.2 Study Sites

1.2.1 An Giang province

An Giang province is situated to the southwest of the Mekong Delta. It is bordered to the northeast by the Tien Giang (Mekong) river, southeast to Can Tho province, southwest by the Kien Giang province, and northwest to the Cambodian international border. Road transportation to Long Xuyen (An Giang's province city capital) from Ho Chi Minh city is generally good, and takes about 5 hours by vehicle, including a ferry crossing over the Hau Giang (Bassac) river. The population of An Giang in 2001 was 2,113,429, of which 1,211,253 are labourers who live in Long Xuyen city, Chau Doc town and 9 other districts: Thoai Son, Chau Phu, Tri Ton, Tinh Bien, Phu Tan, Tan Chau, Cho Moi, An Phu and Chau Thanh. About 100,000 people are ethnic Khmer, while approximately another 10,000 people are ethnic Cham (Malay originated). The major ethnic group, however, is the Chinese.

The economy is predominantly based on the production of rice, and in recent years fishing and aquaculture. Over 80% of the population is dependent on the agricultural sector. The total area of agricultural land is 256,559 ha, of which 234,085 ha are devoted to rice and 24,025 ha to fishing grounds. The soil in the province, however, is becoming increasingly poor in terms of water-holding capacity and nutrients, and is severely affected and/or contaminated by the overusing of agricultural chemicals. Most people survive through small-scale subsistence farming, artisanal fisheries but recently have to find other income generating activities such as agricultural labors.

For food supply, rice farming is considered the most important activity by most households but fishing and collection of other aquatic animals is second in importance. Capture fisheries were ranked first by 29% of households and second most important activity by 32% of households. Compared to livestock rearing, the nearest ranked activity, fishing and collection is assigned a higher overall importance. In terms of income, rice farming is ranked highest by most households but capture fisheries activities are ranked clearly in second place for income. About 29% of households ranked fishing as first and 39% ranked it second for income. The capture fisheries sector is clearly very important for income generation in this area.

There is a high level of employment in the capture fisheries sector, including employed and self-employed fish traders. Self-employment is also common in small-scale fish paste and fermentation industries but there are also bigger operations with hired labour. The Chau Doc is one of the most famous locations of the province. The production of nets, traps and other gears tend to be small-scale household level operations. There are differences between the male and female involvement in fisheries with the commercial catch and fisheries related wage labour being dominated by men. Women are involved more with smaller-scale household food production activities and fish trading. The official statistics (2001) of the gross output of aquatic exploitation is 368 298 VND.

Temporary migration for fishing, for both resident and fishers coming from outside is common. The fishing gears used are very diverse and depend mainly on the habitats exploited, the target species and the purpose of exploitation. The most common small-scale fishing gears used in An Giang are gill nets, hooks, cast-net, and small traps. A previous study on 1002 households in An Giang province confirmed about 55% of all fishing households use gill nets (average 6.8 gill nets/household), 34% of households use hooks (average 44.8 active hooks/household) and 39.18% of households catch fish by hand (scooping with the hands). Only 25% of "professional fishing" households operate large-scale fishing gears (bag nets, or dais, and large traps/barrages).

1.2.2 Can Tho Province

Can Tho Province is located in the center of the 12 provinces of the Mekong Delta. Its capital, Can Tho City, is the provincial political, economic, cultural and transportation centre because it is connected to most other popular centres by a system of rivers and canals in the Mekong Delta. Annual flooding of the Hau River, which is to the north of Can Tho province, allows deposition of large quantities of alluvial soil and contributes to the fertility of the rice fields. The climatic features of the province are similar to other provinces of the Mekong Delta, *i.e.*, air temperature rarely falls under 15°C and the rainy season lasts from May to November. The water conditions of Can Tho can be classified as semi-deep. Agricultural practice integrates fish and prawn culture partly with modern rice and mainly with tall, traditional rice.

The province has an area of 2 965 km² and a population of 1,855,830 as of 1995 (Vietnam Department of Statistics 1995). Can Tho is comprised of 7 districts namely Can Tho City, Thot Not, O Mon, Chau Thanh, Phung Hiep, Long My, and Vi Thanh. Can Tho province is freshwater dominated and mainly relies on agriculture production.

1.3 Stakeholder definitions

Fulltime fishers

This group of households report they are resident “professional fisher” and directly capture fish from river, canal and rice fields throughout the year and/or floodplains during the flooding season, a portion is for self consumption, while the bulk of the total catch is for sale, mainly to middlemen (mainly fish traders), but sometimes to direct consumer, fish breeders and fish culturist. This group catch fish year round. However, during seasons when fish sources are rare, they also go for daily wage labor (harvesting rice, loading rice, and so on) or any other jobs available from which they can earn money. Meanwhile, they continue to catch fish when having free time.

In this typical type of livelihood system, men are main participant in fishing activities. However sometimes, women and children also help them, especially in flood season (from September to November). When fishers bring their catch back home, women sort fishes according to their size and value prior to selling. Fish trading, however, is main task for women. Men and children only help women in sorting out the fish.

Part time fishers

These people do not claim themselves as professional fishers at present. While fishing for a certain duration of year, they normally have some land and often cultivate rice (Winter-Spring and Summer-Autumn crop); after finishing Summer-Autumn crop, in the flood season, farmers go for fishing for home consumption, and the bulk are also sold to make profit. This group seems to be the most progressive.

Gender relations in this particular livelihood category are also similar to fulltime fisher group.

Landless subsistence fishers

This group of fishers have similar fish capture activities to the other two groups. However, this group does not have land for cultivating cash crops. Their livelihood entirely depends primarily on working as daily wage labor, following by fishing. The main fishing season of this group is during the flooding season, when agricultural activities are decreases due to high flood depth. Gender division of labour in is livelihood category is also similar to fulltime fishers group.

Fish traders

This group performs a special kind of employment in the capture fisheries sector acting as middlemen fish traders to make profit. Most participants in the PRA session were female, and they do not pay attention to the social progressing problems and natural condition.

A summarized of stakeholders across environments in this study is shown in table 1

Table 1.3.1 Stakeholders across environments for PRA exercise

Site	Full time FT	Landless LL	Part time PT	Fish Trader TR
Main rivers river	XX			
Canals canal	XX	XX	XX	XX
Rice fields/ floodplains	XX	XX	XX	XX
Swamp		XX	XX	XX

2. STAKEHOLDERS LIVELIHOODS CHARACTERIZATION

2.1 Fulltime Fishers

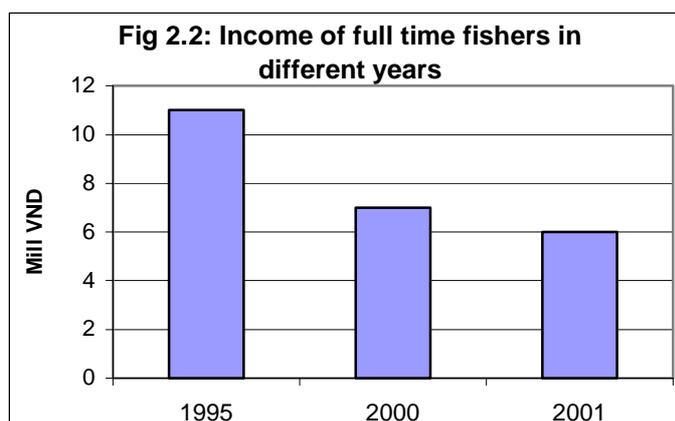
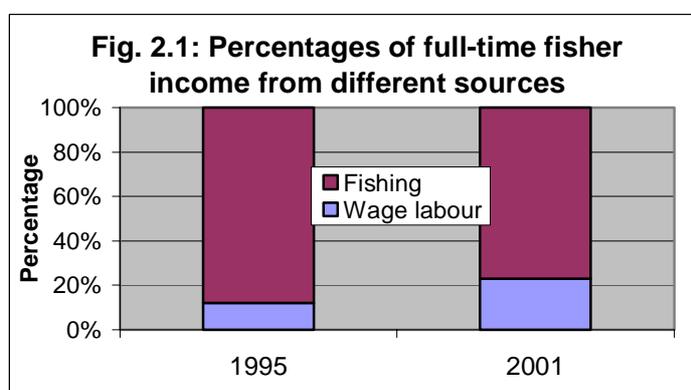
Fulltime fishers' livelihoods entirely depend on natural fish capture, they catch fish year round, and sometimes beside their income from fish capture, some family members also get an additional income from wage labor (agricultural work). They were found in the canal and rice-field environment PRA sites.

These households reported that they are "professional fishers" and directly catch fish from river, canal and rice fields throughout the year, and/or floodplains during the flooding season. Part of their catch is for self consumption, while the bulk of the total catch is for sale, mainly to middlemen (fish traders) but sometimes direct to consumers, fish breeders and fish culturist. They catch fish year round. However, during lean seasons when fish are scarce, in addition to catching fish when they have free time, they go for daily wage labour (harvesting rice, loading rice etc) or any other jobs available from which they can earn money.

In this typical type of livelihood system, men are the main participants in fishing activities. However, sometimes women and children also help them, especially in the flood season (from September to November). When fishers bring their catch back home, women sort fish according to their size and value prior to selling. Fish trading, however, is the main task for women. Men and children only help women in sorting out the fish.

The full-time fishers often lack food when they cannot fish or work as agricultural labourers especially in January-February. They need capital during the months of May to August to buy fishing gears for the next fishing season. Besides, in February-March, they need money to buy tools for agriculture or small business. Full time fishers have their largest catches of fish and highest incomes from September to November. Full-time fishers are poor and mostly landless. On the basis of income sources, full time fishers can be divided into two groups: the first one relies entirely on fishing and the second one lives on capture fishery and agricultural labour (harvesting rice and carrying stones).

Income sources are the same over the year. However the percentages of income from fishing have declined compared to 1995 (Fig. 2). Their income level also decreased over time (Fig. 3). They said that fish resources are becoming exhausted day by day due to dike construction for growing three rice crops a year and intensive application of pesticide. Moreover, the number of fishers is also increasing day by day and they use modern gears (using electric devices for fishing). Besides having an income from fishing, they manage an extra income from working as agricultural labourers.



2.2 Stakeholder Category: Part Time Fishers

The following tables summarise the livelihood characteristics of parttime fishers. This is the main category of households involved in catching fish in all the PRA sites. Fishing is their secondary occupation, farming is the main source of income. Some so-called subsistence fishers were also identified in some of the PRAs, however in the most part they have similar livelihood strategies to either “full-time” or “part-time” fishers depending on whether they have no agricultural land or own agricultural land respectively.

Table 2.2.1 Poverty/Wealth categorization - PT fisher

	River	Swamp	Canal	Rice/field/Floodplain
Poor	Income 5-10 million VND	Thatched houses with leave build roof, income starts from 500,000VND per month, no assets, no agricultural land, only homestead, illiterate or primary education, main income from fishing and labour	House made of wooden pillar, Income level upto 10 million per year, education upto 5 th grade, have boat and gears, family size between 5-6	Temporary house (weak pillar, straw/tin roof), only homestead, no high value gear or machinery, low level of education, no capital, constantly in debt, main occupation wage labour and fishing, annual income less than 3 million VND, variable family size
Average	10-20 million VND	House constructed with wood, income varies between 500,000 to 1 million per month, education up to primary level, some went to the secondary level.	Brick roof, corrugated tin roof, own 0-1ha land, small boat and no machinery, some low value household assets, 20% children go to secondary school, annual income between 2-3 million VND, main occupation farming and petty trade, medium family size	Brick roof, corrugated tin roof, own 1-2 ha land, small boat and machinery, some low value household assets, 40% children go to secondary school, annual income between 3-5 million VND, main occupation farming and petty trade, medium family size
Better off	20-30 million VND	Concrete house, own high value assets, earn more than 1 million VND per month, have higher education and diverse income sources.		Brick wall and floor, concrete roof, own 1010ha land, big boat, machinery, fishing net and other equipments, high value household assets

Table 2.2.2 Human Capital PT fisher

	River	Swamp	Canal	Rice/field/Floodplain
Health		Average, suffer mostly from water borne diseases	Healthy, have medical facilities	23% suffers from malnutrition
Literacy		Up to primary level, few have secondary education	Up to 5 th grade	Up to 6 th grade
Fishery skill		Traditional	Training by local extension on fish culture	Traditional skill
Skill training	IPM training	On IPM, rich farmers have demonstration farm	On cow rearing, Integrated pest Management and agricultural practices	By government agencies, on rice farming usually
Access to information	Information center, government campaign	Radio, television and newspaper.	Radio, TV and cross visit	Radio, TV and neighbour

Table 2.2.3 Physical Capital PT fisher

	River	Swamp	Canal	Rice/field/Floodplain
Housing		Variable, from thatched to concrete	Thatched house, bamboo/wooden column, wooden floor	Leaf roof, wooden column, cemented floor
Sanitation		Domestic water use from the river, 16% households using groundwater.	Sanitary toilet, dust hole, access to clean water	Drink canal water and drain waste water in the canal again
Gear/Boat		Almost all households have small boats and gears, rich people have electric gears	Own medium engine boat, common traps hook and line	Own simple gears, bigger engine boat
Infrastructure	Hospital, school, information center	Schools, medical center	Medical center, school	School, restaurant and market in the village

Table 2.2.4 Social Capital PT fisher

	River	Swamp	Canal	Rice/field/Floodplain
Cooperatives	Yes	None	None	None
Association	Farmers Union, women Union, Youth Union, Veteran Union, religion group	Farmers Union, women Union, Youth Union, Veteran Union, and Red cross society	Farmers association	Village organization, Farmer's Union, Women's Union
Conflict resolution	By hamlet head and elderly people	By hamlet head and elderly people	By hamlet head and elderly people	By hamlet head and elderly people
Cooperation	High	High	High	Good

Table 2.2.5 Financial Capital PT fisher

	River	Swamp	Canal	Rice/field/Floodplain
Credit	Agricultural bank, private establishment	Agricultural bank, private establishment	Agricultural bank, private establishment	Agricultural bank, private establishment
Savings	Savings with farmer's Union, women union and veteran union	Personal	Personal	Personal

Table 2.2.6 Natural Capital PT fisher

	River	Swamp	Canal	Rice/field/Floodplain
Land Ownership		1.1 ha	1-2 ha	1-2 ha agricultural land
Fishing access	Free	Free	Free	No restriction
High Water level		August-October	October	September-October
High Fish catch/availability	September-November	0.2-0.5 kg/day	September-October	September-November
Fish consumption		Dead and small fish	Consume most of the fish during high flood season.	According to catch-mostly for consumption

Table 2.2.7 Trends PT fisher

	River	Swamp	Canal	Rice/field/Floodplain
Fish resources	Declining	Declining	Declined by 80-95% (by species)	Declined by 70%
Trees	Increasing	Increasing	Increasing	Increasing
Aquatic plants	Decreasing	Decreasing	Decreasing	Decreasing
Grasses	Decreasing	Decreasing	Decreasing	Decreasing

Table 2.2.8 Problems PT fisher

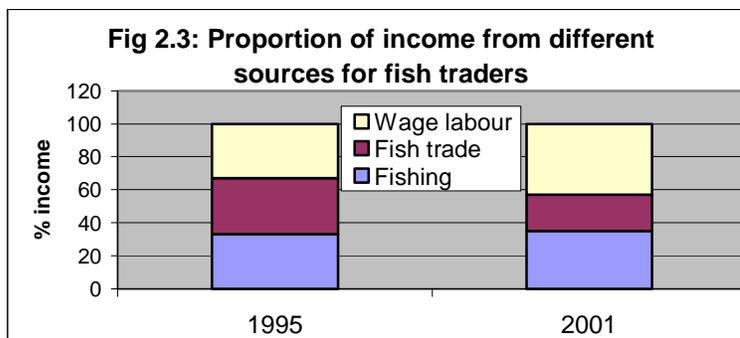
River	Swamp	Canal	Rice/field/Floodplain
Fish declining	Fish declining	Fish decreasing	Lack of Capital
Unemployment	Trapping fish in the private ponds	Harmful gear use	Natural fish declined
Lack of safe drinking water	Lack of capital	Lack of fishing ground	Lack of fishing ground
Low level of education		Lack of capital	Increased number of fishers-more competition
		Low fish price	Use of harmful gears-catching all types of fishes
		Many fishers	Low price of fish

Table 2.2.9 Vulnerability PT fisher

	River	Swamp	Canal	Rice/field/Floodplain
Vulnerability	Insecured livelihoods	Fish declining, high pressure on natural resources	Lack of capital, lack of job opportunity, low fish catch, decreased wild vegetables and flooding	Decreased soil fertility-more production cost, crop pests, Fish availability, water pollution and disease
Coping Strategy	Loan	Alternate income sources	Out migration, seek alternate source of income, loan, aquaculture and dependent on relief	Use own savings, loan

2.3 Stakeholder Category: Fish Traders

Most fish traders are women, these households have three main income sources. Those are fish trading, fish capture and agricultural labour. The income difference among the three sources was not large between 1995 and 2000 (Fig. 2.3). By 2001, income from fish trading had fallen (22% of total family income). In contrast, the income from agriculture labour increased to 43%. The reason given was that fish stocks are becoming exhausted and lands are used for three rice crops. This has reduced fishing grounds gradually. However, due to high demand for rice cultivation, they have more chance to work as agricultural labourers. In general, their income gradually reduced compared with 1995 to 89% in 2000 and 79% in 2001. Even so among the surveyed stakeholder groups, fish traders have the highest income (average income per month reaches 111,905 VND), but still it is below the poor threshold.



For this group, December is the most difficult month, and their income is obviously lowest because in this month farmers begin to grow rice and fishers have no place for fishing, so traders get very little fish for sale. From May to July, they also face similar difficulties when they have to subsidize their income from wage labour. The peak trading time is from October to November. During this period, income is highest. The rest of the months, they have to subsidize their income from agricultural labour.

Traders and part-time fishers are short of food for about 4 months annually, but not in the same period. Meanwhile fulltime fishers say they have three months of starving and for nine months they lack money. Part-time fishers seem to be most busy (only one free month), because most of the year they are busy growing rice. By the contrast, the fulltime fishers have the most leisure time (about 3 months).

The asset structures of this group are similar to those of fishers, but their social capital and institutional linkages differ to some extent. This group considers 9 organizations to be directly related to their livelihoods:

- The cooperators: fishers and other fish traders having equal importance, followed by women's association.
 - The roles of fishers and fish consumers are important because without them they cannot buy and sell their products.
 - The role of hamlet and village administration helps them to certify births, personal history, and thereby formalize their existence and also provide security in village.
 - The women's association helps them get the means to work and support capital.
- The cooperators as well as non-cooperators: two groups were recognized:
 - Wholesalers play an important role in buying fish from the traders when they have excess fishes. Besides, they also help traders by providing loan to buy fish. However, they buy fish at lower price when traders have too many fish or they cannot sell fish otherwise.

- Private lenders play an important role in the fish trader's life. When this group lacks capital or faces any difficulty, they provide loan to overcome problems but the interest rate is high (1% per day).
- Non-cooperators: includes market management board, regional policemen and fish trader
 - Market management board often obstructs them when they are trading products.
 - Besides, policemen also hinder sellers who sell on sidewalk.
 - Outsider traders always buy fish with higher or lower prices than actual price, so this leads to sell at a loss.

Overall from the problem census the fish traders' main problems were landlessness and lack of capital.

3. ENVIRONMENT LIVELIHOOD CHARACTERISATION

3.1 Environment 1: Rice fields/floodplain environment: Thoai Son district

3.1.1 BACKGROUND DATA FROM OFFICIAL SOURCES

Thoai Son district is about 25 km from Long Xuyen city towards the western part of the province. It is an inland district, and like other inland district of the Mekong Delta, covers with a network of primary, secondary and tertiary canal systems. The district has 1 district town and 12 villages. The total population of the district is about 176,525, of which 99,892 are wage labourers (57% of total population), an occupation that provides low income and very little job security. Average household size is 4.7. There are 37,435 households, of which 11,385 are identified as daily wage labor households.

The district has 38,021 ha of agricultural area in which annual crops occupy 37,284 ha, 716 ha of perennial crops, and about 21 ha of other crops. Forestry area is 270 ha, and the total pond area is 147 ha (in 2001), down by 20 ha compared to the same time in 2000.

A total of 18,150 households catch natural fish, an increment of 8,500 households compared to 2001.

Total fishing gears used within this district were 20,170 units, of which 1,635 units were equipped with modern machinery, a total increase of 9,290 units over the year 2000. Annual gross capture reaches 8,924 tons, 275 tons more compared to year 2000.

Due to its typical characteristics, Thoai Son district was selected for the study on “Understanding Livelihoods Dependent on Inland Fisheries” for floodplain ecology/ environment.

Present status of Fishery

1. Pond culture

Total pond area of this district is 147 ha (2001), reduced by 20 ha compared to the same period in last year because of a reduction in aquaculture. Although catfish breeding in the district rapidly developed in recent years as this kind of fish adapts well to local conditions, due to low market price (5 000 – 6 000 VN Dong/kg), fish raisers lost their capital. The annual aquaculture production reached 4,992 tons (mainly snakehead and anabas). The trend of snakehead and anabas fish breeding was recently changed by farmers as more fishponds were used for breeding catfish “Cá Tra”. This year, families mainly feed hydra-snakehead “Cá Lóc Môi Trề” to the catfish or lure natural fish into their fishpond. Especially, there are 4 ha for freshwater spawn breeding in Vinh Chanh and Vinh Khanh villages.

2. Cage aquaculture

Total of fish cage is 18 units, as it tends to increase compared to last year (3.5 times). This type of aquaculture is suitable for poor households having small capital (5 million VND per cage with size 4m dimension). Gross output of fish reaches 132 tons.

3 Rice-fish culture

The total area of rice field fish culture reached about 103 ha, increased 4.3 times compared to 2000. The cause of this increase is due to low price of paddy. Households that have more capital shifted to freshwater prawn breeding. Annual gross output of fish reached 84 tons, of which the gross output of freshwater prawn reached 54 tons.

4. Aquaculture nursery breeding

Total area of aquaculture nursery breeding is 470 m², and the total estimated production is 426,000 fingerlings. This tends to increase in recent years. Main breeds are snakehead fish and climbing perch.

5. Open water capture fishery

A total of 18,150 households/families participated in capture fishery in 2002, an increase of 8,500 households compared to 2000 (total individuals participating in capture fishery as labour is 20,210), of which the main participants in capture fishery are about 1,445 households. The rest catch fish for feeding pond fish or cage fish. Total of fishing gears used were 20,170 units, of which of 1,635 units were mechanised, an overall increase of 9,290 units compared to year 2000. Annual gross output reaches 8,924 tons, an increase of 275 tons compared to year 2000.

3.1.2 LIVELIHOODS BACKGROUND

The livelihood patterns of people living in this environment include agriculture (animal husbandry: pig, cow, duck and chicken; cultivation: rice, vegetables, corn; aquaculture: snakehead fish, fresh water prawn), small industries and handicraft (rice milling, carpentry, forging, weaving, repairing machine), business and services. About 22% of households are landless, they live mainly by working as wage labor, fishing, fish trading and picking wild vegetables.

Table 3.1.1 Percentages of households by economic categories

	Percentages of people
Agriculture	73
Small industry-handicraft	2
Business & services	12
Capture fishery	13

PRA results at Thoai Son identified three different wealth levels: rich, average, and poor based on some indicators (Table 3).

Table 3.1.2 Wealth ranking

	Rich	Average	Poor
House	Wall, having good facilities, brick floor	Brick floor, and corrugated iron roof	Temporary house (bamboo-leaf), Eucalyptus pillar, corrugated iron roof.
Income level	>5 million	3-5 million	<3 million
Land	1-10 ha	1-2ha	0-0.2ha
Assets	boat, machine, fishing-net, equipment, Japanese motorcycle, color TV, cassette, etc	Small boat and machine (Kohler 4 engine), Chinese motorcycle, color TV	No gear, one bicycle, and B/W TV or none.
Educational level	100% children going to school, high education	40% children coming to secondary school	1% children going to school (low level)
Debt	Borrow money to do business	For farming	Cannot pay (private lender)
Capital	High	Some	None
Household size	4-5 people	5-6 people	Depends on family
Job	Facility to get high income	Farming and small business	Wage labor, fishing

Seasonal activities

Table 3.1.3 Seasonal activities of identified stakeholders

Annual events	Traders	Part time	Fulltime
Shortage of food	May-July; Dec. (4	Sep.-Dec.	Dec-Feb (3months)

	months)	(4 months)	
Lack of money	May-July; Dec. (4 months)	Nov- Feb (4 months)	Dec-Aug (9 months)
Diseases	May-July (3 months)	June-July (young) Nov.-Jan (elder)	June-July(2 months)
Capture fishery	-	Sep.-Oct. (2 months)	Jan-Jun (a little) Sep.-Nov (a lot)
Leisure time	May-June (2 months)	June(1 months)	Dec-Feb. (3 months)
Grow rice/agricultural labour	-	Dec-Mar. (crop 1) Apr. -Jul. (crop 2) (7 months)	-
Fish trading	Jul.-Dec. (6 months)	-	-
Small size fish catch	Jun.-Jul. (small)	-	-
High flood	-	Sep.-Nov. (3 months)	June-July (enter field) Sep.-Oct (highest)

- The rainy season begins from April and ends on November, dry season from November to next March.
- Flooding season starts when water begins to run into field about July (the highest flood occurs from September to October) and withdraws in November. The fish at the beginning of the fishing season (about June-July) are small and become bigger towards the end (September to November). High fish capture was observed during September-November.

Seasonality and the Hungry Period

Fish traders

For this group, December is the most difficult month, and their income is obviously lowest because in this month farmers begin to grow rice and fishers have no place for fishing, so traders get very little fish for sale. From May to July, farmers also get similar difficulties.

The traders start their business from July to December but the highest trading month is from October to November. During this period, income is highest. The rest of the months, they have to subsidize their income from agricultural labour.

In May to June, farmers usually remain free; however, they seek other jobs to support their life.

The full-time fishers

The full-time fishers often go without food when they cannot fish or work as agricultural labourers, especially in January to February. They need capital during the months of May to August to buy fish gears to prepare for the next fishing season. Besides, from February to March, they need money to buy tools to support agricultural activities or small business. Full time fishers catch the largest amount of fish from September to November. During this period, their income is the highest in the year.

The part- time fisher group

The busiest time for the part time fishers is during two rice cropping seasons: first crop from December to March; and second crop from April to July. In wet season, farmers often capture fish from August to November. This group remains free only during February.

They need capital from November to February because in those months they do not get income neither from rice harvest nor from fishing. They use all their savings from two rice crops to cope with the shortage. They also need money to support for Winter-Spring rice crop and school fees of their children. At the same time, they are lack food.

There are differences in the three stakeholder categories seasonal activities. Traders and part-time fishers are short of food for about 4 months annually, but not in the same period. Meanwhile fulltime fishers' group has three months of starving period and for 9 months they lack money. Part-time fishers seem to be the most busy (only 1 free month), because most of the time of the year, they are busy for growing rice. In contrast, fulltime fishers have the most leisure time (about 3 months).

General History of surveyed area

Table 3.1.4 Historical events

Timeline	Events	Effect
Before 1975	War	Hardship
1975	Liberation	Change in government system
1977	Brown hopper epidemic	Crop damaged about 95%
1978	Heavy flood	Total loss of crops
1980	School at hamlet	Good opportunity for children to come to school
1983	Transfer from traditional rice variety to high-yield double rice crops	Lacking of capital, technology pesticides and fertilizer
1995	Having electricity	Access to information from TV, entertainment from cassette
1998	Family planning	
2000	Inaugurating hospital	Having health-care-service, good condition for patient treatment
2001	Asphalted road	Convenient moving

3.1.3 Capital Assets

i)

Human Capital

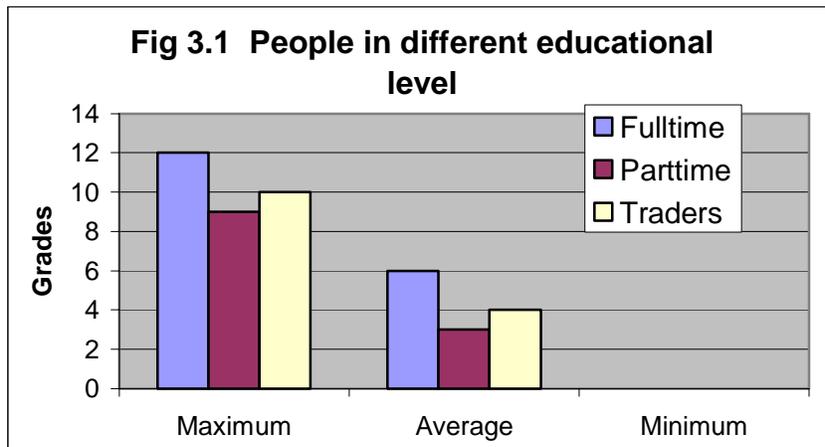
Health

Approximately 23% of the people have malnutrition problem, as most of them belong to poor group). Intestinal and diarrheal diseases often appear among children first when the wet season starts (June-August) because of polluted water. This period is also a suitable time for mosquito breeding and to develop mosquito-borne diseases. Adults as well as children often suffer from fever especially in dyke protected area. Adults suffer from other diseases in November-January (coolest months of year). Overall health condition is not good for any kind of stakeholder group.

The Care and Protection for Mothers and Children organization has opened services for malnourished children such as oral vitamin A for babies, vaccine and vaccination for children.

Education

All stakeholders' education level is low, and some members in all three groups are illiterate (Fig 3.1). Illiteracy is high among fish traders group, their highest educational level is up to grade 3 in average, lowest level among all stakeholders. Part time group's educational level is rather higher than others, about grade 6 in average. There is no high school in this area, but number of elementary (5 schools) and secondary schools (1 school) are said to be sufficient for the whole local community.



Provincial roads are asphalted, town roads are cemented, easy for transport, so access to education is not a problem, but traders group think it is not worth spending money for education as it is not so cost-effective. Fulltime fishers group don't pay attention to education because they only need good health for fishing, and they utilize all human resources in their family for earning money for their livelihood. The part time fishers group is eager to send their children to school, but educational level depends on household ability, members of this group understand that, their children's life will become better if they get higher education.

In summary, all the above three stakeholder groups are the poor and having lots of children and excess labor-force to earn work.

Access to information

Part time and fulltime fishers can get information from radio or TV, meanwhile traders group get information from the women's union. Beside listening to radio or watching TV, part time group also receive agricultural information (rice cultivation, using fertilizers, pesticides and raising fish technology, etc.) from agricultural agencies such as Department of Agriculture and Rural Development, sub-Department of Agriculture and Rural Development, sub-Department of Plant Protection. In addition they also receive information from neighbors.

However for fishery, fishermen have never received any training from any organizations, they just capture fish on the basis of their indigenous knowledge.

Training

The offices for small hand-made industries and agriculture have coordinated with the job-service centre, invalid labour and social affairs office, and women's association of district, people's committee in the village and town to conduct skill development training at no cost. In total 520 people (mostly women) attended skill training in: embroidering, sewing, making incense sticks and fans.

ii) Financial Capital

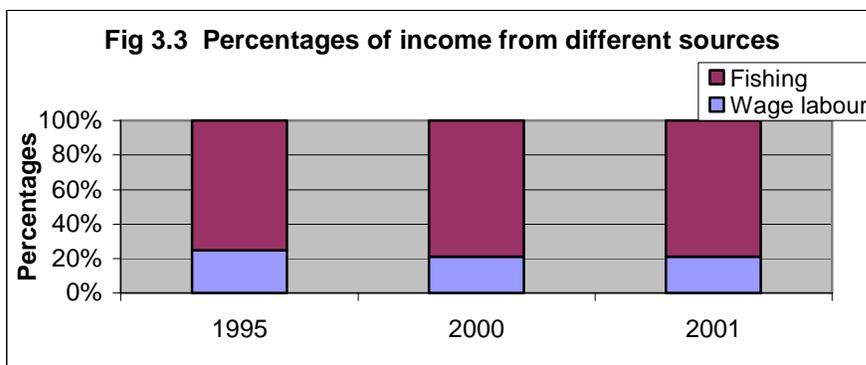
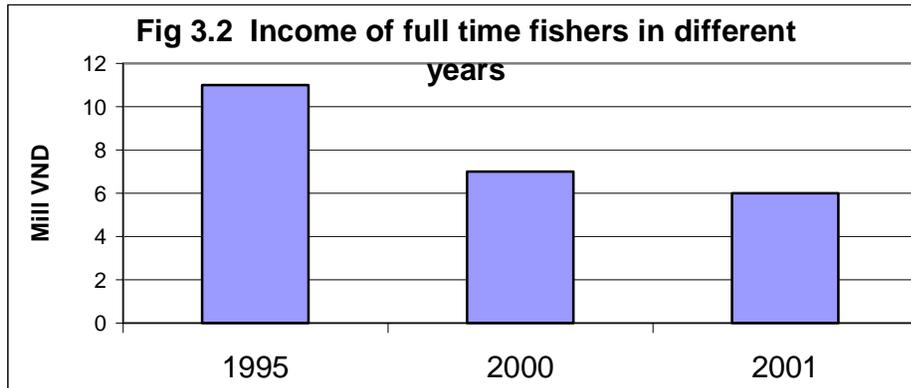
According to people's committee of Thoai Giang's village, an average income of 125,000 VND per person per month is recognized as poor category threshold, and below 100,000 VND per person per month is called the poorest and they have certified book to get subsidy in medical and education.

Income sources and levels

Fulltime fisher group

Full-time fishers are poor group and landless. On the basis of income sources, full time fishers can be divided into two groups: the first one relies entirely on fishing and the second one is living on capture fishery and agricultural labour (harvesting rice and carrying stones).

Their income level decreased over time (Fig 3.2). They said that fish resources are exhausted day by day due to dike construction for three rice crops production and applying intensive pesticide. Moreover, number of fishers are also increasing day by day and they use modern gears (using electric devices for catching). Beside having income from fishing, they have extra income from working as agricultural labour. Income level tends to reduce in 2001 and 2002 compared to 1995 (Fig 3.3).

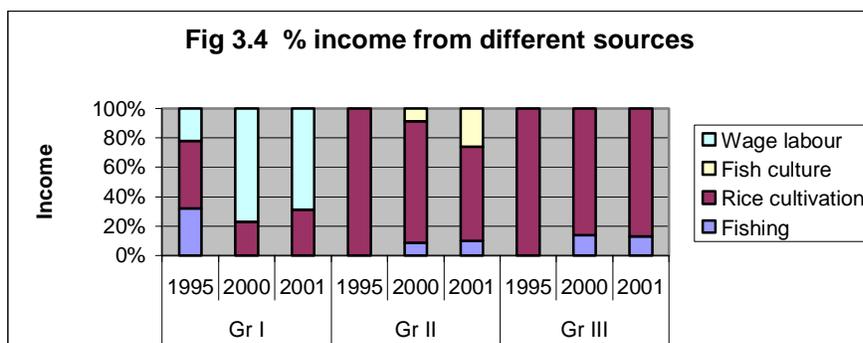


The part-time fishers

Part time fishers can be divided into three categories on the basis of their income sources (Fig 3.4)

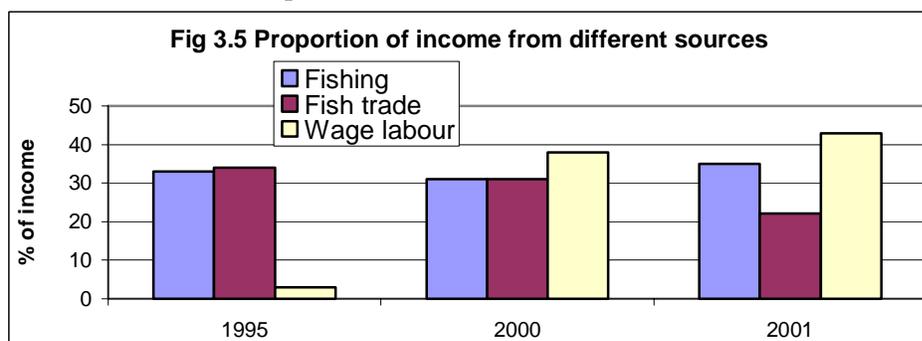
- **Category I:** Part time fishers were earning from three different sources during 1995-capture fishery, agricultural labour and farming in which farming provides the highest income. However, in 2000 two main sources remained: farming and agricultural labour. The shift is due to less availability of fish and shift to three crop cultivation.
- **Category II:** starting from 1995, their income was based mostly on farming. In 2000, they have extra income from fish culture and they catch fish only to feed fish in pond or cages. Within this group, most families have pond culture.
- **Category III:** similar to group 2 and having extra income from the natural fish capture in 2000.

In general, the income level of part time fisher group tends to increase over the time. However, these income sources are not secure, but tend to change according to the household's condition.



Fish Traders

Most fish traders have three main income sources. Those are fish trading, fish capture and agricultural labour. The income difference among three sources was not large between 1995 and 2000 (Fig. 3.5). Particularly in 2001, income from fish trading tended to fall (22% of total family income). In contrast, the income from agriculture labour increased to 43% (Fig. 3.1) because they said that the quantity of fish is exhausted more and more, and lands are used for three rice crops. This has gradually reduced their fishing grounds. However, due to higher demand for rice cultivation, farmers have more chance to work as agricultural labourers (Fig. 3.5). In general, their income is gradually falling: 89% in 2000 and 79% in 2001 as compared to 1995.



All rich, average and poor groups are in debt; however, the purpose of loan, amount of money and ability to repay are different.

- The rich group can get large loan because they have private properties to mortgage. Loans make them more to richer because they can invest in different trades.
- Meanwhile, the average group can lend limited amount and general purpose is to cultivate crops. Sometimes, this group also lends money from private moneylenders because they cannot lend enough money from the bank.
- The poor family, who does not have land, cannot lend money from bank because they do not have any private property to mortgage. Therefore, they can only lend small amounts (200 000 VND) with high interest (1% per day) money from private lenders. They have limited opportunities to repay in time. As a result, their debt becoming more and more day by day and they are becoming poorer.

Among the three surveyed groups, fish traders has highest income (average income per month reaches 111 905 VND), but still below the poor threshold (Table 6). The other two groups have income below poor level of which the average income of fulltime fisher group is lowest (69 444 VND per person per month). They are real poor family.

Table 3.1.5 The income of fishers

Group	Total income/	Members/	Income/person/month
-------	---------------	----------	---------------------

	family/year (VN Dong)	family	(VN Dong)
Fulltime	5 000 000	6	69 444
Part time	6 000 000	6	83 333
Traders	9 400 000	7	111 905

It is apparent from the above result that, fulltime fisher and trader groups have more difficult living condition: low income, lack of capital, reduced fish resources, to many children with low level of knowledge.

(iii) Physical capital

The studied area has only one secondary school with 15 teachers and five primary schools (75 teachers). However, this is sufficient to support 418 children attending secondary school and 2 127 children to come to primary schools. The rate of illiteracy in the whole area is 3%.

Number of families having access to electricity reaches to 85% and access to fresh water to 15%.

Table 3.1.6 Condition of poor groups dependent on inland natural fish

	Traders	Parttime fishers	Fulltime fishers
Housing	Leaf roof , bamboo column	Leaf roof , wood column, cemented floor	Leaf roof , eucalyptus column, earthen floor
Land (ha)	Landless	0-0.2	Landless
Assets	Bicycle	radio, bicycle, black-white TV	Small boat, bicycle, black-white TV
Employment	Wage labor, catch fish, fish trading	Grow rice, raise fish, Wage labor, fish catch	Wage labor, catch fish

In wealth ranking, part time fishers group have better physical assets such as land, high income, stable job and especially sufficient education for their children (60-100% of children study in high school). In contrast, the poor group does not have land to cultivate (fisher trading and fulltime fishing catch groups) or they have small land (part time). Their house is unstable (bamboo, soil, etc.) and their livelihood mainly based on trading (fish trading group), fish capture (fish capture group), farming (part-time fisher group) and agriculture labour (all three groups). In addition, poor fishers assets usually are of low value and old such as: bicycle, small boat, no or black-white TV.

Boats and gears

Both the part time and fulltime fishers use the same gears for fishing (except harvest in pond), such as gillnet, hook, trap, cast net and barrage fence. These gears are very cheap and simple (Table 8) because they cannot buy big and expensive gears. Hence, they capture lesser fish than rich groups (having lift net, draw a net with electric, by hand or boat). There is no difference between fulltime, part time and rich groups in species caught.

Table 3.1.7 Common gears used for fish capture at Thoai son

Common gears for fish capture	Part time fishers	Fulltime fishers	Common captured fish species
Hook	x	XXX	Snake headfish (<i>Ophiocephalus striatus</i>), anabas (<i>Anabas testudineus</i>), hito (<i>Clarias acrocephalus</i>)
Gillnet	x	XXX	Linh (<i>Cirrhinus jullieni</i>), anabas, mè vinh (<i>Puntius gonionotus</i>)
Trap (lờ)	x	xXX	Sặc bướm (<i>Trichogaster trichopterus</i>), anabas (<i>Anabas testudineus</i>), râm (<i>Altigena lemassoni</i>)
Trap (Lộp)	x	xX	Small shrimps

Castnet	xX	XXX	Common species
Harvest in pond	x		Snake headfish, anabas, hito, sặc bươm
Electric gear	xX		Common species
Liftnet	X	XX	Linh (<i>Cirrhinus jullieni</i>), snake head fish, hito.
Barrage fence	xX	x	Common species
Seine net	X		Bigger fishes
Boat	XX (Big)	X (small)	

(iv) Social capital

Although everybody can capture fish from inside or outside the community, there is no conflict among fishers in the area. Only when fish becomes scarce at fishing place, fulltime group tends to move to other places for fishing, they can move to as far as Chau Doc and even Dong Thap province. This problem is similar for the trading group, but to a further extent, they can travel much further to buy marine fish from other places and bring back to the community to sell. Part time fishers, however, frequently capture fish within their locality. Local government does not pay attention to who is catching fish, they only pay attention to how – what catching devices are used, as they penalize fishers who capture fish with electricity or using small mesh net.

There are differences in views among three groups based on their actual benefit from the organizations or persons in the community (Table 9). Part time group have a close relation with agricultural agencies because these agencies provide them information on agricultural technology. Meanwhile, fishers and fish consumers are very important for fish traders group. Natural fish resource is very important on fulltime group because their income is dependent on natural fish so they hate electric gear uses and other harmful gear users.

Table 3.1.8 Ranking the relationship of three groups with institutions in the community

Institutions	Part time	Fulltime	Fish trader
Sub-department of plant protection	1*		
Department of Agricultural and Rural development	3*	5*	
Sub-Department of Agricultural and Rural development	4*	4*	
Hamlet, commune	4*	1*	3*
Women union	5*		2*
Bank	2*	3*	
Charitable organization	6*	2*	
Youth union	7*		
Fish Fellow	2**	1**	
Rice trader	1**		
Private lender	3**	2**	2**
Fishers from other places	1***	3***	
Catch fish by electric		2***	
Fisher who draw a net (with electric gear)		1***	
Fisher			1*
Fish consumers			1*
Fish-depot			1**
Other fish traders			3***
Police			2***
Market board			1***

Note: *: cooperation; ***: conflict and **: both, 1=most important, 7=least important

Part-time fisher group

The part time fisher group thinks there are 12 agencies that have a relationship with them, divided into three groups depending on their role in fisher's livelihoods.

- The main cooperator agencies identified were eight:
 - Sub-department of plant protection: guides farmer to use the pesticides.
 - Bank: supports farmer to lend capital when necessary
 - Agricultural department and service take an important role in technology extension, new cultivation methods and animal culture
 - The role of hamlet and village: besides providing security in the village, these organizations make and implement administrative procedures to help farmer's to take loan from bank.
 - The rest of agencies are less important and only have some communication with the participants.
- The cooperator and non-cooperator agencies: there are three agencies in this category; the participants said that rice-traders are the most important because they buy their rice. However, also they try to pay low prices for paddy which reduces farmer's income. The rest of groups are important as well as harmful for them.
- Harmful: external fishers

Fulltime fishers

The fulltime fishers said that they have relations with 10 agencies which fall into three groups:

- The cooperators: there are 5 agencies in this group, ranking in descending order: village, hamlet, charitable organization, bank, agricultural office and service.
 - Village and hamlet have the most important role.
 - Charitable organization often helps farmer during difficult times such as flood damage and poverty.
 - Bank helps farmer to lend money with low interest.
 - Agricultural office and services have some role in laws and policy implementation against the harmful gear users.
- The cooperator and non-cooperator agencies
 - Fish traders are important because they directly buy their fish. However, in case of excess supply of fish, the price is reduced so they lose income too.
 - The private lenders also play an important role.
- Non cooperators:
 - There is a conflict between the part-time fisher group and a group of people who capture fish by electrical gear in canals and with fishermen who come from other places. These groups directly harm natural fish resource, and in other hand reduce farmer's income from fishing.

Fish traders

This group considers 9 organizations to be directly related to their livelihoods:

- The cooperators: fishermen and fish traders having equal importance, following by women's association.
 - The role of fishermen and fish consumers are rather important because without them they cannot sell their products.
 - The role of hamlet and village: helps them to certify the birth – certificate paper, personal history and protect security in village.
 - The role of women's association: guides means to work and support capital.

- The cooperators as well as non-cooperators: two groups were recognized:
 - Wholesalers play an important role in buying fish from the traders group, when they have excess fishes. Besides, they also help traders by providing loan to buy fish. However, they buy fish at lower price when traders have too many fish or cannot sell fish otherwise.
 - Private lenders play an important role in the fish trader's life. When this group lacks capital or faces any difficulty, they provide loan to overcome problems but the interest rate is rather high (1% per day).
- Non-cooperators: includes a market management board, regional policeman and fish trader
 - Market management board often obstructs them when they are trading products.
 - Besides, policemen also hinder sellers who sell on sidewalk.
 - Outsider traders always buy fish with higher or lower prices than actual price, so this leads to sell at a loss.

3.1.4 Natural Capital

Fishing is from August to December but the peak months for fishing are from October to November. However, they use different gears in different seasons (Table 10). During this period, the fish catch is high, fishermen can capture as much as 50 kg fish per day (many kinds of fish). Depending on available fish gears such as fish-pot, trap (lờ, lộp), hook, lift net, barrage fence and fishing time, catch varies; gillnet can catch about 3.5 kg of climbing perch per day. In the dry season, where fishing is more difficult, fishermen can only catch 1-2 kg per day.

Fulltime group usually catch fish year-round, but main season is from July to November. They begin to capture fish earlier and finish later than part time fishers, because part time fishers usually capture fish when they have free time during rice growing season (from August to November).

Table 3.1.9 The fishing calendar

Ranks	Fishing gears	Part time	Fulltime
1	Hook	Aug-oct	Jul-Nov
2	Gillnet	Aug-oct	Jul-Nov
3	Trap (lờ)	Aug-oct	Jul-Nov
4	Trap (lộp)	Aug-oct	-
5	Castnet	Year-round	-
6	Harvest in pond	Dec-Jan	Year-Round
7	Electric	Year-round	Jun-Dec
8	Draw a net with electric by hand	Aug-oct	Aug-Dec
9	Liftnet	Sep-oct	Oct-Nov
10	Barrage fence	Sep-oct	Jun –Oct
11	Draw a net with electric by boat in canal	Year-round	Sep-Dec

Use of captured fish

- Fulltime and part-time fishers

After capturing fish from field, fishermen bring their catch back home and sell the excess to fish traders. Some others sell directly to the market or their neighbors if anyone in the family has free time. In case there are abundant fish, farmers sell to wholesaler. Sometimes they can sell to traders coming from other places. Trash and dead fish are consumed at home. Fingerlings can be sold to traders coming from Chau Doc, Tan Chau for cage fish culture. The part-time fishers fed small capture fishes to the cultured fishes in the ponds.

- Fish traders

After buying fish from the fishers from the villages, traders bring fish to market to sell to the consumer or fish wholesalers (if they have large quantity). Fish wholesalers transport and sell fish in the bigger markets such as Long Xuyen and sometimes even at Ho Chi Minh (HCM) city.

According to the fish-traders, between each “buying and selling” there is an intermediary or middleman. The price difference between fishers and the middleman varies between 1 000-2 000 VND per kg. If fish is transported from wholesalers to HCM city, the difference is about 4000 VND per kg.

Fisherman’s loss from selling at home or at market varies between 1000 to 2000 VND per kg fish:

- When they sell to fish traders, the fishers lose potential income of about 5 000-6 000 VND per kg.
- When they sell to wholesalers, fishers loss 4 000 VND per kg.

Therefore, the question is whether establishment of an aquatic co-operative will limit the exploitation of middlemen or not. In this proposed paradigm, fishermen and traders could be members of the co-operative who have role in different areas of fishery. The co-operative will have responsibility to fix fair price for both consumer and seller.

3.1.5 Trends in natural resources

Fish

The fish traders do not often understand the trend in availability of fish. However the fulltime and part time fishers have a common view that fish resources are declining remarkably (Table 11).

Popular fish species such as snakeheads, anabas, eel, loach etc. have a declining trend-only about 30-60% remained compared to 1975 and before (Table 11). The main cause of fish reducing is shift from mono-cropping of traditional rice to high yielding variety rice. Fishing ground narrowing down regularly, and intensive use of agricultural pesticides such as Decis, Sherpa, Thiodan, etc used for crop cultivation contributes to fish reduction. Besides, farmers capture larger quantity of fish every year with many modern gears such as electric gears.

Yield of rare species such as fresh water prawn, snake, turtle, cá dầy, cá leo (*Walago attu*), thác lác (*Notopterus notopterus*) also reduced due to above reasons (Table 11). These species have high economic value (export or consumed by restaurant customers at high price). This is one of the causes for high exploitation and the tendency is rapid decline.

Table 3.1.10 Trend in fish resources reported by full time fishers

Fish species/scientific name	Before 1975	75-80	80-85	85-90	90-95	95-2000	Now	Future
Anabas (<i>Anabas testudineus</i>)	100%	90%	↓	↓↓	↓↓↓	↓↓↓↓	30%	Gradually decrease
Snakehead fish	100%	↓	↓↓	↓↓↓	↓↓↓↓	↓↓↓↓↓	30%	Gradually decrease
Hito (<i>Clarias macrocephalus</i>)	100%	↓	↓↓	↓↓↓	↓↓↓↓	↓↓↓↓↓	1%	Gradually decrease
Mê vinh (<i>Puntius gonionotus</i>)	100%	↓	↓↓	↓↓↓	↓↓↓↓	↓↓↓↓↓	50%	Gradually decrease
Linh (<i>Cirrhinus jullieni</i>),	100%	↓	↓↓	↓↓↓	↓↓↓↓	↓↓↓↓↓	60%	Gradually decrease
Loach(<i>Cobitis taenia</i> sp)	100%	↓	↓↓	↓↓↓	↓↓↓↓	↓↓↓↓↓	30%	Gradually decrease
Fresh water prawn	100%	↓	↓↓	↓↓↓	↓↓↓↓	↓↓↓↓↓	Very	

							rare	
Eel	100%	↓	↓↓	↓↓↓	↓↓↓↓	↓↓↓↓↓	30%	Gradually decrease
Small shrimp	100%	↓	↓↓	↓↓↓	↓↓↓↓	↓↓↓↓↓	50%	Gradually decrease
Thác lác (<i>Notopterus</i> <i>Notopterus</i>)	100%	↓	↓↓	50%	↓↓↓	↓↓↓↓	Rare	Extinct
Turtle, snake	100%	↓	↓↓	↓↓↓	↓↓↓↓	↓↓↓↓↓	Rare	Gradually decrease

Other aquatic resources

When farmers were still growing traditional rice (before 1983), wild vegetables such as water spinach, bông điên điển (*Ammania* spp.), lotus, water-lilly etc were important for local people living in the flooded area as food, and the poor people can earn income from that. After 1983, since high yielding variety rice has been introduced, wild vegetables disappeared gradually due to high application of herbicides. This declining is even more dramatic where triple rice crops were introduced.

3.1.6 Problem analysis

- In general, all of three groups consider lack of capital as the most important problem for them. Besides, reduction of fish resources is a major problem for their livelihoods (Table 12).
- Particular problems for each target group are:
 - For the fish-traders: competition among many local and outside
 - The fulltime fisher group: low price of fish because traders always try to control price at low rate. There is also an implicit conflict between fish traders and fulltime fishers group.
 - The part-time fisher group: beside difficulty similar to the fulltime fisher group, this group faces low paddy's price as well as risk of crop damage due to natural disaster.

Table 3.1.11 Ranking problems by three stakeholder groups at Thoai son

Problems	Traders	Part time	Fulltime
Unstable income from wage labor	5	-	-
Landlessness	1	-	-
Diseases	6	-	-
Many children	2	--	-
Unstable income from fish trading	3	-	-
Lack of capital	1	1	1
Increased number of fish traders: competition between fellow fish traders	4	-	-
Fish traders buy fish at lower price	-	-	3
Lack of fishing ground	-	2	2
Increased number of fishers	-	2	2
Use of banned harmful gears	-	3	4
Natural fish decreased	-	1	2
Low fish price	-	4	-
Low rice price	-	5	-

Analysis of causes and effects

Below is an analysis of some problems considered to be important for all types of household in following order:

Table 3.1.12 Cause and effect

Problems	Causes	Effects
Shortage of capital	<ul style="list-style-type: none"> • Sale during low price, unstable price • Many competitors • Many children • Can not lend money due to lack of security (land) 	Low income Poor fishers
Landlessness	<ul style="list-style-type: none"> • Loan with high interest • Money lenders seize lands • No inheritance of land 	No stable income for landless people
Fish declining	<ul style="list-style-type: none"> • Many people catch fish by harmful gears • Cultivation of high yielding variety of paddy with overuse of pesticides • Impacts to environment limits production Not enough fishing ground	Fulltime fishers, fish traders
Unstable paddy price	No tendency for increased rice export	Unstable income of part time fishers

Effects of External forces

- **Opportunity:** support from government organizations such as association, local government and charitable group in the time of disaster such as flooding, disease outbreak etc. Big family labour force. Besides, the fish-traders also get advanced loan from fish wholesalers or neighbors. The part time fishers can lend money from bank because they have some lands (for 1000m² land landowners can get 1 million VND with 1% interest per month). The plant protection agency, agricultural service and department also provide training on agricultural technology.
- **Constraints:** Shortage of food, lack of capital, price controlled by wholesalers (traders), limited job opportunity. They often fell ill because of work overload, unhygienic living condition.

The role of gender

In this research, indoor family activities were not studied, but field activities such as fishing capture, fish trading and farming were interested. Most family members of three and above, aged thirteen and above are involved in all activities such as fish capture, trading and farming according to their ability. Men do the drudgery in field such as capturing fish, farming and agricultural labour (digging, carrying stones, etc.) because they have good health to do such type of heavy works. In contrast, simple jobs are preferred by women, children and elders such as selling fishes, employing (paddy cutting, weeding and straw spreading).

3.1.7 Vulnerability and coping strategy

The studied area has an incremental tendency of dyke protection and every year dikes prevents sediment to enter in rice fields during the flood season, flushing toxic elements in soil and kill pests. Hence, cultivated crops demand more fertilizers and finally increase production cost.

Main crop of the studied area is rice. In 2002, most of the area was protected by dykes. There are two types of dykes in the area. First one is known as the August dyke protection area with the purpose to protect the Summer-Fall rice crop (harvest in August). The total area is about 4,537 ha, where farmers can grow two crops of rice per year. After the harvest, rice field is flooded. The second dyke system, which covers 190 ha of land completely and fully. Farmers grow triple crops of rice per year. In 2003,

the dyked area will cover about 2,825 ha. Furthermore since the whole area will be dyked completely, the water surface area and natural fish will disappear in future. However, three rice crops per year will help poor people to earn money through wage labor, but rice price will further drop.

The dyke construction caused a decrease in of surface water area and prevents natural fish entrance in the field, polluted water cannot be flushed out, leads to the exhaustion of natural fish. In addition, the introduction of new gear (electric and smaller sized mesh net) has as a result made people's livelihoods dependent on fishing uncertain, especially poor people who entirely depend on natural fish catch.

However, stakeholders identified their vulnerabilities and hazards that cause negative impacts on their lives and livelihoods (Table 14).

Table 3.1.13 Vulnerability

Vulnerability	Extent of damage
Decreased soil fertility-increased production cost	Soil fertility decreased gradually because the dyke prevents sediment to accumulate on rice fields in flood seasons. Crops demand high doses of fertilizers increasingly in the area
Crop pests	Due to shift from single to triple crop and mono-crop culture causes high incidence of crop pests. To prevent crop loss farmers have to use high doses of pesticides. Application of high doses of pesticides increases vulnerability to fish loss every year in dike protected area, hence increase in production cost, crop loss and decrease income.
Natural fish declined	Natural fish decreased gradually because of limited surface water area in the dyked area and use of harmful causing declined fish catch as well as less dependency on fishing. More out-migration, change of profession and competition, insecurity and low income and higher rate of unemployment.
Water pollution	Farmers use more and more pesticides and fertilizers, so water is polluted and harms fish. Dyked area has no flushing of water as well as water logging. This condition makes people vulnerable to different diseases and loss of income.
Disease	Yearly outbreak due to unhealthy living condition and polluted water usages

To cope with related problems, they usually take the following measures:

- take loan from moneylenders when they are broken or have diseases,
- do other business,
- buy fertilizers and pesticides in advance,
- move to other places for catching fish,
- raise livestock or culture fish.

3.2 Environment 2: Canal ecology/environment: Chau Phu district

3.2.1 BACKGROUND

Chau Phu district is about 30 km from Long Xuyen city towards the northwestern part of the province. It is an inland district, adjacent to the Hau Giang (Bassac) river and like other inland district of the Mekong Delta, is typical for the rice field/flood plain ecology/environment. The district is made up of 1 district town (Chau Phu) and 12 villages. The total population of the district is about 242,170, of which 49% are male. Hence, Binh Phu village, Chau Phu district is selected for the study on “Understanding Livelihoods Dependent on Inland Fisheries” on rice field/flood plain ecology/environment.

3.2.2 Livelihood background

Most people living in this environment are farmers, some raising pigs, poultry, and some raising fish in the pond and some catch fish. Landless people or some others who do not have field tools of production have to work as wage labor.

Local people living on natural fish inland capture use various kind of gears such as drawing a net, cast net, lift net, drawing a net by boat with machine, hook and line, fishing-rod, gillnet, trap, barrage fence, culture fish in pond.

Wealth/poverty criteria

According to the village authority, the mean monthly income of 125 000 VND per person is recognized as the poor. Below 100 000 VND is classified as “real poor”, and this group of people are given special certification for subsidy for their medical and school fees.

Most well settled family for long time have more children than more recent migrants because during recently years, the government launched family planning, some people have awareness to birth control, but still a number of people did not support that policy, since they believe human resource is very important to effect rural people’s livelihood, specially family grow rice or work as wage labor. PRA study recorded 5-6 members per household in average, where high number can be as many as 7-9 members per family, especially landless families have up to 15 members.

The role of gender

Depending on fishing gear type, family members allocate particular jobs such as using hook and line (fish-rod) which needs one person, installing trap need about 2 workers. Children can select fish, cut and clean fish, etc. However, men still take main responsibility in fishing.

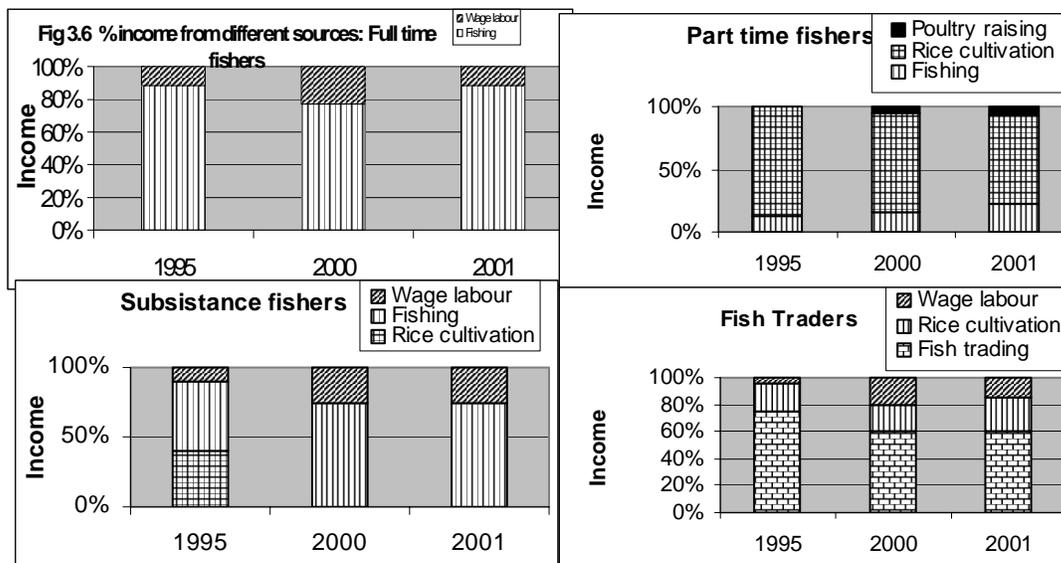
Housework such as cooking, washing, collecting water etc. are done by all family members when they have free time.

Work in agricultural fields is done mainly by adults (both of men and women), such as: rice broadcasting, harvesting, threshing, spraying etc. However, children (about 10-14 age) participate in some fieldwork such as taking care of their parents’ meals.

Livelihood sources/strategies

Stakeholders’ livelihood strategies vary between households, according to the proportion of man and woman in household and number of work force in the household. Besides, the type of society,

neighborhood, variation of physical resources etc also have influence on it. In addition, household property is also important such as: land, pond, capital etc.



The income sources of subsistence fishers (landless) group are variable. Their livelihood relied on three sources in 1995 - rice, fish and wage labor, and among them, income from fish was the highest (Fig 3.6). In 2000, this group relies only on two sources - wage labor and fish capture (they sold their the small pieces of land due to poverty and have no agriculture) and they earned 75% of their income from fish capture. Income sources were same in 2001.

Fish traders only survive from a sole income from fish trade (although a few do part time fishing). The income level tends to decrease from 1995 to 2001, because during recent years, number of other fish traders from other places came to compete for buying fish from the fishermen with higher prices, this group can not buy as much as previous years. The income level of this group in the year 2000 decreased by 66% and 49% in year 2001 as compared to 1995.

Part time fishers have two income sources - rice cultivation and capture fishery in 1995. They get additional income from raising poultry (chicken, duck). However, rice cultivation still remains the main source of income (72-88%). This group captures fish when Summer-Autumn rice crop cultivation is complete (from July-August to November-December). They sell excess fish when they can capture more than needed, so income from fishing is not a large one (12-22% in total of family income). Stakeholder's income has decreased recently: equal to 77% in the year 2000 and 88% during the year 2001 as compared to 1995.

Fulltime fisher's main income comes from fishing, they capture natural fish year round, and sometimes even get additional income from wage labor. Income is variable.

Seasonal activities

This area has "August protection dyke" to protect Autumn-Fall rice season. Therefore, farmers can grow two crops a year-the Winter-Spring rice season starts from November to March, and Autumn-Fall rice season from April to August (Table 3.2.1). Part time group remains busy at that time for preparation of their rice field, whereas landless, fulltime group sell their labor for agricultural works such as sowing, land preparation, weeding, spraying pesticides, harvesting and bringing bag of rice from the field. But fulltime fishers also capture fish at that time, fish trader can sell fish year round.

Table 3.2.1 Seasonal calendars of stakeholders

Activities	Part time	Trader	Fulltime	Subsistence
------------	-----------	--------	----------	-------------

Grow rice or wage labour (Winter-Spring; Autumn-fall)	Nov.-Mar Apr.- Aug.	-	Nov.-Mar Apr.- Aug.	Nov.-Mar Apr.- Aug.
Underfed	-	-	Feb.-Mar.	Mar.-Apr.
Lack of money	May-Jun	-	Feb.-Mar.	Dec.-Feb.
Leisure time	Seldom free	No	Mar-May	-
Flood	Jun.-Nov., highest flood during Aug.-Oct.			
Frequent diseases	Feb-Jun on children; Nov.-Dec on adults			
Rainy/dry season	Rainy season (May-Oct.) ; dry season (Nov.-Apr.)			
Low fish price	Sep.-Nov.			

The fulltime and subsistence fishers groups are usually underfed about two months a year (during the period from February to April). During this time there is no work in the field, land owners only can hire labours to spray pesticides, but this work is taken care by land owners themselves. In addition, water level in the canal is remains shallow so fish are rare at that time. Almost year round, fish trader group has enough income for subsistence, other groups face shortage of money throughout the year, depending on group's financial condition.

Traders and fulltime fishers group have leisure time from March to May, as fish availability is rare during this time and fishers work as wage labor. In the other hand, part time group seems to work hard, besides growing rice, they capture fish for family income in their free time, and sometimes sell excess caught fish, they are free when heavy rains with storms starts. Subsistence fishers group always are stricken by poverty.

The lowest price of fish extends from September to November because many fishermen capture fish in the rice field in this period. In addition, fish catch is also high during this period, and as a result, some families make dry fish or salted fish when they have leftovers.

3.2.3 Capital Asset

(i) Human capital

Health

Diarrhea usually occurs during flood season because water become polluted by dead animals thrown into river. At the beginning of flood season fever usually attacks both of young and adult people. Besides, malarial fever also appears due to the presence of Anopheles mosquito at that time. Elders usually get flu at the end of flood season, skin diseases attack everyone when they come in contact with polluted water for long time, especially polluted water from rice field.

Villages have medical stations where hamlet medical group and official boards jointly come to households to provide medicine, chemicals for treating water and to clear away pigsty along river banks to prevent fever and diarrhea. Within the national medical programme, vaccination is organized. Free supply of Vitamin A for children (100%), vaccination of six kinds of diseases (92%), prevention of tuberculosis for baby (79%), and prevention of women's diseases (79%) was done in previous year in the study area.

Up to date, 13,185 patients were treated including 449 patients in flood season (free). Traditional medicines are also used to treat 21,303 patients, and 36,535 households received traditional recipes.

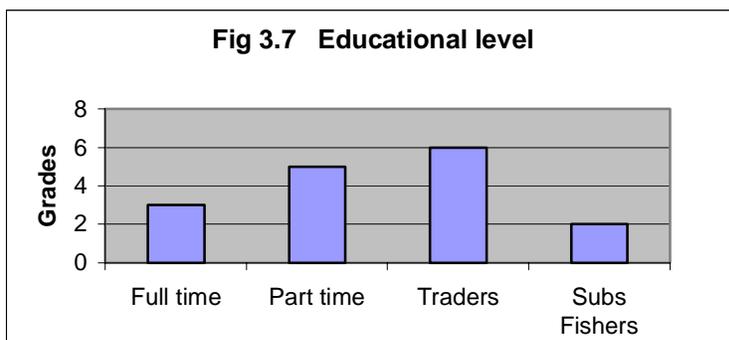
Medical stations have been established in 12 spots to overcome malnutrition on young people, examine and treat 224 children who don't gain weight, arrange training for 118 mothers on scientific methods for child care, and as a result, malnutrition decreased by 1.8% in 2002 as compared to 2001.

Population and family planning: district and commune population board jointly publicize population and family planning. The rate of population increase fell to 1.42% in 2002.

Education/training

The commune people's committee pays attention and encourages and helps children to go to school by creating good environment, helps children go to and from school in the flood season, and supports children from poor households with notebooks, pens, clothes etc. However, about 6% of pupils quit school due to some difficulties during the flooding season.

There are some family members of all stakeholders who are illiterate. Traders group has better literacy level than others, while subsistence fishers group has the lowest literacy level (grade 2-3 in average) (Fig 3.7). Parents' awareness in sending children to school in poor families is limited. Besides, school fees are too high for them and if they send children to school they will lose family labor force.



Fishing skills of all stakeholders are mainly based on their parents' or neighborhood's experiences. They have never been trained in this field.

Local government and extension service pay attention on transferring agricultural technology to farmers such as proper usage of pesticides, IPM, raising cow, fish culture and animal husbandry.

Access to information

Access to information is very limited, because the location is too remote from town. In addition, transportation is difficult. Fulltime fishers and subsistence fishers seldom access to information from TV, because most of them do not have TV set. Radio is the only source to receive their needed information regularly. Since their literacy level is low, type of information need is also limited, they prefer more entertainment based programmes such as traditional folk songs. On the contrary, part time group pay attention to agricultural technology. They get information from radio, TV, neighbors or from cross visits to neighbouring villages. Fishing skills are learnt from neighborhood, friends or relatives.

(ii) Financial capital

Income

Traders and part time fishers have higher income than the average households in the village (223,116 VND and 169,166 VND per person per month respectively, Table 3.2.2). Meanwhile, fulltime fishers group has income below poor level (118,005 VND per individual per month). Subsistence fishers

group gets the lowest income (66,666 VND per individual per month), which is much lower than the certified poor household (below 100,000 VND per individual per month).

Table 3.2.2 Income level of stakeholders

Groups	Total of income/family/year (VND)	A number of person/family	Income/person/month (VND)
Traders	13 387 000	6	223 116
Part time fishers	10 150 000	5	169 116
Fulltime fishers	8 500 000	6	118 055
Subsistence fishers	4 800 000	6	66 666

The “Banks for the Poor” loaned poor families a total of 120,000,000 VND in 2002 to support poor people to raise cow, pig, fish to support poor family to overcome hardship. Besides, the national fund loaned 67,000,000 VND to create jobs for poor people who have unstable livelihoods. In addition, the Red Cross Association also helps to rebuild collapsed houses during the flood seasons.

(iii) Physical capital

Most of the houses in the flood area are built on stilts, as this is typical in highly flooded areas of the Mekong Delta. Depending on economic situation of the households, houses are built with different materials. Traders group built houses with valuable materials such as brick/ tile roof, tile, wood, cement column, wooden floor. Fulltime and subsistence groups built houses with tile or thatched roof, bamboo or eucalyptus column, wood or bamboo floor (Table 3.2.3).

Table 3.2.3 Physical Assets

	Part time fisher	Trader	Fulltime fisher	Subsistence fisher
Housing	Thatched house, bamboo, wood column, wood floor, thatched wall	Brick tile roof, wood, cement column, wood floor,	Tile roof/ thatched roof, bamboo or eucalyptus column, wooden or bamboo floor	Tile roof/thatched roof, bamboo or eucalyptus column, wooden or bamboo floor
Land	1-2ha	None	None	None
Assets	Medium boat, or small boat, small machine	Dream motor, color TV, cassette, big machine, boat	Black and white TV, small machine, small boat	Small boat, radio
Occupation	Rather stable	Stable	Unstable based on fishing and wage labor	Unstable based on fishing and wage labor

Assets in the family reflect the economic status of the household. The traders group has valuable assets, which support them to do business for increasing income such as motor, boat, and machinery. Besides, they also have valuable color TV, cassette for getting information and entertainment. On the contrast, fulltime and subsistence fishers, do not have those assets. Part time fishers obviously have medium value assets.

Occupations of traders and part time fishers are rather stable, because they have essential assets such as agricultural machinery, land, “dream motorbike” (three-wheeler for transport), boat, etc to run their occupation. In addition, their knowledge is better than poor families. Fulltime and subsistence fishers group only rely on their labor force for wage labor and capture fishery by basic tools.

Sanitation

Although health protection campaign for local community was carried out, it cannot satisfy all local people's demand in the area. Rich and medium families can effort to build toilets and rubbish pits, and they have access to clean water. Most poor families lack safe fresh water, as they usually use water from canal in dry season and floodwater during flood season. Sanitation has not been ensured for everyone in this area

Land

Traders, fulltime and subsistence fishers groups have no land for cultivation. However, fulltime and landless groups have large demand for land for cultivation to improve life standard, some of them had some land to cultivate before they became landless, because they had no income sources so they sold land to people to pay back debts. However, traders group does not need land because they are happy with their income through selling fish. Part time group has land (about 1-2 ha) for rice cultivation, so their life is rather stable.

Boats and gears

There are a many gear types for catching natural fishes (Table 3.2.4). Some special gears are only used to capture a certain type of fish such as trap for freshwater crayfish, trap for small shrimp, but there are some other gears such as cast net, electric shock, lo, lop, lift net, brush wood, etc which are used to capture different species of fish.

There are 12 popular gears found in use during the PRA study to capture fish both in the canal and field/floodplain (Table 3.2.2). Fishermen choose best suitable gears depending on the season. The fulltime group use almost all of them (12 gears) because their main income is from fish capture. In addition, they capture fish year round. However, part time group's main income is from rice, while fish catch is their extra income source, so they do not like to invest a lot for gears. Besides, they are busy for rice cultivation and raising poultry. They only use five gears for catching fish.

Table 3.2.4 Ownership of Fishing Gears

Gears	Part time	Fulltime	Landless
Hook and line	+	+	+
Gillnet	+	+	+
Trap(lo)		+	
Trap(lop)	+	+	+
Castnet	+	+	+
Chà		+	+
Harvest in pond	+	+	+
Trap(xa di)		+	
Trap(don)		+	
Electric		+	+
Trap(lu)		+	
Drawing a net		+	

Boats

The boat is popular and useful for everyone in flood area, it used not only for fishing but also to transport people during flood season, carrying goods and raising ducks.

When flood recedes (around November), fish tend to move from fields down to the canal, then boat is even a more important means for fishing with cast net or draw net for fishermen. During the flood season, boat is a means for them to catch fish in the field. Poor households usually use small cheap boats whose lifetime is about one year (made of low quality wood).

(iv) Social capital

There are fifteen organizations related to stakeholders' livelihoods (Table 3.2.5). However, their importance depends on the direct or indirect benefits or dis-benefits to different groups. Some organizations are beneficial to all types of stakeholders such as Red Cross Association, Fatherland Front, Medical station, commune, hamlet People's Committee and school.

Table 3.2.5 Ranking of rganizations/stakeholders according to their role

No	Organizations	Stakeholders			
		Part time	Trader	Fulltime	Landless
1	Red-cross	1+		6+	1+
2	Fish trader	1++		1+	1++
3	Fatherland front	5+			
4	Women union	6+		7+	6+
5	Medical station	3+	4+	3+	2+
6	Private lender	2++	1++	1++	
7	People committee	2+	3+	4+	5+
8	School	4+	4+	2+	3+
9	Fish consumer		1+		
10	Bank		5+		
11	Sub-DARD	7+	6+		
12	Other fishers		2+	1+++	
13	Relief organizations		7+	8+	4+
14	SDARM			5+	5+
15	Others traders		1+++		

*Note: SDARM: Sub-department of aquatic resources management
 +: cooperation; +++:conflict; ++:both; 1 = most important.*

- The People's Committee usually certifies identity card and land certification, and resolves land disputes, etc. as well as guiding some organisations such as Fatherland Front, WU, medical station in subsidizing poor families, helping family for rebuilding houses during natural disaster, vaccination for children, diseases prevention and supplying medicine. Beside, school is rather important for all stakeholders, however they have low literacy. Charitable organizations and Sub-department for aquatic resources management help them indirectly through loan and materials when stakeholders have problems (relief organization) and protecting aquatic resource to maintain natural fish resource for their survival. However, natural fish resource management is still in question as the coordination of local government and Sub-department of aquatic resources management is very low and the law enforcement is not weak.
- Traders have good relation with the fulltime fishers because they provide fish constantly to the traders. Fulltime fishers are dependent on the traders but they complained that they are cheated on fish price. Part time fishers and subsistence fishers have the same complain. When they catch lots of fishes traders fix lower price.
- Most stakeholders say that private lenders are both cooperators and non-cooperators because private lenders lend them some money when they have problems, but with too high interest (10% per month).
- There is a competition between fulltime fishers group and outsiders sometimes lead to conflict. The fishermen coming from other places exploit local fishers catch in this environment. Hence their income declines. Local traders have conflict with external traders from other places as well.

3.2.4 Natural capital

Water (seasonality/hydrology)

The climate of this environment is similar to general climate of the Mekong delta. The rainy season starts from April and ends in November. Recently, however, the climate has changed. The rain tends to distribute throughout year, although still concentrating from July to October. During this time, flood water flows from upstream. The floodwater enters the fields in June and rises gradually, and reaches a maximum in October, then it recedes gradually until November. This is the period of time where farmers prepare Winter-Spring rice crop. The dyked area has been extending every year and affecting natural flow of flood resulting in waterlogging within the dyked area, now water stands for a longer period and recedes slowly. Farmers face difficulty in planting new crop and the fishermen cannot fish with high water level.

Fishing location

Fishers catch fish in two locations:

- Canal: fishing starts when flood recedes and is continued until water level goes down up to the level of flood entry. However, some fishers also catch fish by hook and line or draw a gill net during high flood.
- Field over flown by canal: fishing starts when flood enters field (about May-June) until the beginning of Winter-Spring rice cropping season.

Although the PRA have selected participants who fish in the canal, many of them capture fish both on canal as well as in the field. They also move to other places for fishing where fishes are available. In this environment, when fish become rare, fishermen move to nearby village (Luong An Tra, Tri Ton district) for fishing.

Fish catch

It is difficult to determine stakeholder's time spent for fishing during the year. In general, as shown in Table 3.2.6, full time fishers spend more time for fishing than others, obviously. Part time group spend less time for capturing fish than the subsistence fishers because they spend most of their time for rice cultivation as this is the main income for their family. During the flooding season, part time fishers mainly fish for food.

Table 3.2.6 Seasonality of fishing gear use

Gears	Stakeholder capture time (month)		
	Part time	Fulltime	Landless
Hook	7-10 (4months)	8 -11 (4months)	7-11 (5months)
Gillnet	7-10 (4months)	-	8-11 (4months)
Trap (lo)		7-11 (5months)	
Trap (lop)	8 (1 month)	-	9-11 (3 months)
Cast net	11-12 (2 months)	3-6 (4 months)	1-7; 10-12 (10 months)
Chà	-	1-2; 10-12 (5 months)	1-6; 10-12 (9 months)
Harvest in pond	1-2 (2months)	3-6 (4months)	3-5 (3months)
Trap (Xà di)	-	7-11 (5months)	-
Trap (Dón)	-	7-11 (5months)	-
Electric	Year round	Year round	Year round
Trap (Lú)	-	7-11 (5months)	-
Draw a net (canal)	-	1-2 (2 months); 11-12 (4months)	-
Draw a net (field)	-	8-10 (5months)	-

Note: 1=January,12=December

Fish trade

There are two types of traders. The first type buys fish using motorbike or boat at fishers house, sometime fishers take fish to sell at traders' house or at market. After that, traders re-sell the bought fish at village market (traders usually pay lower rate when they buy fish at home). This group can buy 20-30 kg per day and they can make about 1,000-2,000 VND per kg profit so the total income from fish trading is about 35,000-37,000 VND per day. Traders do business year round. When fish catch reduces they have less fish to sell, but their income still remains stable because they are able to sell fish at high prices. The second trader type comes from other places to buy fish at fishers' house and local traders go to sell to other places.

3.2.5 Trend in natural resources

Access

The Mekong delta in general and particularly in this environment, canal and river system crisscross the area. This is an ideal condition for transportation by boat. Besides, water is an important resource that indirectly affects people's livelihoods dependant on natural fish (fulltime, subsistence, and part time fishers and fish traders). Water is also necessary for irrigation, animal raising, and raising fish in pond and cages. In addition, people use water from canal and river for household activities such as cooking, washing, and even for drinking. Other wetland resources such as birds and wild aquatic vegetables, which were very useful for everyone as food, have become rare now due to over exploitation.

For natural aquatic and water resources, everyone can use them anywhere and anytime whenever they want, but there is a hidden conflict between villagers because poor people think rich villagers should not harvest those resources themselves, but rather that they should buy them.

Fish capture, composition, effort etc.

All types of fishes are declining according to the fishers (Table 3.2.7).

Table 3.2.7 Trend analysis for common fish species at Binh phu, Chau phu (Unit: %)

Fish species	Before 1975	75-80	80-85	85-90	90-95	95-2000	Now	Future
Cirrhinus jullieni	100	60-100	40-80	30-50	20-30	10-20	5-20	↓
Snake head (<i>Ophiocephalus striatus</i>)	100	60-100	40-80	30-50	20-30	10-20	5-20	↓
<i>Anabas testudineus</i>	100	100	50-90	40-50	20-30	10-20	5-20	↓
<i>Puntius gonionotus</i>	100	50-100	40-80	40-70	20-30	10-20	2-5	-
Catfish (wild)	100	60-100	40-80	40-50	20-30	10-20	5-20	↓
M. macracanthus	100	60-100	40-80	40-50	20-30	10-20	5-10	↓
<i>Notopterus notopterus</i>	100	60-100	40-80	40	20	10	2	-
Kryptopterus cheveyi	100	50-100	40-80	40	20	10	5-20	↓
Barbatula sp.	100	90-100	80	40-50	20	5-10	5-10	↓
<i>T. trichopterus</i>	100	40-100	80	40	20	10	5	-
<i>Freshwater prawn</i>	100	50-90	50-80	30-50	25-30	10-15	1-3	-
Eel	100	60-90	40-80	50	30	10	10-30	↓
Hemibagrus elongates	100	60-90	40-80	50	30	10	5-10	↓
Snail, crab	100	60	40	↓	↓↓	↓↓↓	↓↓↓↓	↓↓↓↓↓ ↓
Golden apple snail					↑	↑↑	↑↑↑	↑↑↑↑

Note: ↑: increasing; ↓ decreasing

Bold = species predicted by people to soon become extinct in their areas.

Results from the PRA show that most aquatic animal species have decreased strongly (Table 3.2.8). According to the fishermen the remaining fish resource is estimated to be 10-20% of that in 1995. In general, some valuable species such as freshwater prawn, Thác lác (*Notopterus notopterus*), Mè vinh (*Puntius gonionotus*) and Sặc (*T. trichopterus*) decreased strongly (1-5% compared to 1975).

This situation is similar to natural snails (local species) and crabs. Only the introduced golden apple snail is increasing as an epidemic, which has become a threat for rice farmers because they develop quickly everywhere and attack rice seedling. However, golden apple snail is an attractive feed resource for raising fishes and ducks. Use of golden apple snail as feed saves costs in raising poultry and fish.

Other aquatic resources

Wild vegetables are important food for fisher households. The fishers say they are not only delicious but also healthy (no residue of agricultural chemicals) and can be picked free of charge. Besides, they are available for local people to pick just before cooking. However, wild vegetables are becoming rarer, because of over population and over application of agricultural chemicals kill mass of wild vegetables in the rice field. Only *Sesbania javanica* is still surviving on the edge of river, pond, ditch.

Table 3.2.8 Status of aquatic plants used by people

Wild vegetables	In traditional rice field	In high yielding rice field
Water-lily	Abundant	Rare
Water spinach	Abundant	Rare
<i>Jussiaea repens</i>	Abundant	Rare
<i>Sesbania javanica</i>	Abundant	Common
<i>Monochoria hastata</i>	Common	Rare

During 1990s poor and landless group could also pick wild vegetables from fields to get an income in addition to food when they had free time and need. Some households consider *Sesbania javanica* as an important income source in their livelihood in the flood season. They can sell the flower at a high price and can earn 2,500,000 VND per flood season. Other wild vegetables were used to make fermented sour vegetable (Vietnamese traditional vegetable pickle) to sell in Kien Giang province. At present the wild vegetables are only enough for family consumption.

3.2.6 Problem analysis

The stakeholders identified six main problems that they frequently face in their life in this environment (Table 3.2.9). Almost all these problems are related to natural fish decrease. Fishes tend to decline as a result of over exploitation with many fishermen and many new gears. In addition, the shift from two rice crops to three rice crops per year increased use of high doses of chemicals with the side effect of mass kills of fish in rice fields. Low fish population and increased number of fishers result in conflict between fishers and farmers. For example, dyke protected areas can grow more crops per year and more land can be used for rice cultivation, but this causes fish habitat to be reduced further. Overall the trends so far as fisheries are concerned are negative while those dependent on fish lack the capital to take advantage of opportunities created by agricultural growth (Table 3.2.10).

Table 3.2.9 Problem ranking

Problems	Part time	Trader	Fulltime	Landless
Lack of capital	3	5	5	<i>1</i>
Low fish price	3	4	6	2
Fish decreasing	<i>1</i>	<i>1</i>	3	<i>1</i>
Lack of fishing ground	2	<i>1</i>	4	3
Too many fishermen	3	3	<i>1</i>	<i>1</i>
Too many gears/harmful gears	1	2	<i>1</i>	<i>1</i>
Too many children	-	-	2	-

Table 3.2.10 Causes and effects of problems identified

Problem	Cause	Effects
Lack of capital	-landlessness -illiteracy -low income -unstable income	Always face famine and poverty
Fish decreasing	-Over fishing -harmful gear use -Agricultural activities (use of pesticides)	Stakeholders' income decreasing
Lack of fishing ground	-dyked area increased cultivation of high yielding variety of rice - increased number of people catching fish for income	Low income from natural fish

3.2.7 Vulnerability and coping

- Lack of capital
- Lack of job opportunity
- Low fish catch
- Decreased wild vegetables
- Flooding

To cope with disaster and related problems, they usually take the following measures:

- Changing jobs or move away from the local area to seek alternative jobs
- Aquaculture
- Loan
- Relief

The Mekong Delta has an advantage of its interlaced network of rivers, abundant water, which is convenient for agricultural development, especially wet rice cultivation and aquaculture. There are 145 fish species and 14 shrimp species living in fresh water bodies, of which 13 fish species and three shrimps species are of high value.

3.3 Environment : Swamp (Tan Phuoc Hung village, Phung Hiep district, Can Tho province)

3.3.1 Background

Tan Phuoc Hung is located in the Mekong Delta with a lot of rivers, canals and lakes. This is categorized as a swamp area where aquatic resources play an important role in the livelihoods of the poor and landless local people. They catch fish to supply their daily food and to trade for income. However, with the pressure of high population, modern ways of fishing as well as using pesticide and chemicals in agriculture have considerably affected aquatic resource since 1995. The number of fish and fish species has been decreasing drastically. The amount of fish that people catch daily are not as abundant as they were before. It clearly shows that human activities have a great impact on environment and natural resources. Therefore, sufficient steps should be taken to protect and preserve the natural resources from being exploited.

3.3.2 Livelihoods Background

Wealth/poverty criteria:

Before 1975, during the war, the life of local people were very difficult and unstable. Therefore, they had to migrate and lived in poverty because most of them were jobless. After the war, everyone went back to their village and had a difficult time in restoring their losses. In 1990, the villages had progressed a lot in establishing proper electricity, bridges and local roads for transportation. However, natural disasters were unavoidable, therefore the causes by big floods had damaged and destroyed lives, property, and agricultural activities.

At present, in order to distinguish between the rich and the poor in the village, participants offered several indicators (Table 3.3.1).

Table 3.3.1 Indicators for wealth ranking

Factors	Rich	Average	Poor
Dwelling construction materials	Concrete	Wood	Leaves
Income	> 1 million VND	> 500,000 VND	<500,000 VND
Property	Table, chair, chest	Average	Bed-bamboo
Education	Higher education	Mostly up to primary level but some up to high school	Illiterate or primary school
Job	Variable and some stable	Employed or	Fishing and labor
Land	>1 ha	0.5 ha	0.1-0.3ha

The factors distinguishing between the rich and poor households are not really clear. However, the rich households in this village are those who usually have more land for cultivation. The family members also get stable jobs with relatively high income. Certainly, they have many modern and new furniture and equipment. Rich houses are also cemented. These people are rich due to inheritance or based on their family and relatives who are living abroad.

In contrast, the poor households have very low income and sometimes don't have enough food for their daily lives. These people are jobless and landless due to lack of education. However, their only survival is to depend on their unstable labour jobs.

Livelihood sources/strategies

Livelihoods depend mostly on agriculture, and they cultivate rice, vegetables, sugarcane, and fruit trees. Besides that, the local people have livestock such as pig, chicken, duck and fish to make sub-income or to supply food for their family. The landless groups depend on catching fish or getting hired as labor. Others are small traders.

In 2001, there were 1,073 households (28%) enlisted officially as “excellent farmers” in which 160 households (4%) were at the province level (income above 30 million VND per year), 304 households (8%) were at the district level (income 15-30 million VND per year), and 609 households (16%) were at the village level (income 10-15 millions VND per year).

The main new farm enterprises or production models in the area are:

- Sugarcane cultivation.
- Fruit tree cultivation (mandarin orchard model) which improves income up to 100 million VND per year for a medium sized farm household.
- Shrimp cultivation (natural fingerling) - income can reach up to 10millions VND per year.
- Raising snakehead using mainly yellow-snail for feed. The income is estimated at about 16 million VND per year per crop.
- Raising animals - on average two pigs per household, duck are raised in small scale because there are no fields for their grazing. Local farmers are trained to grow commercial chicken.

Beside that, there are many households raising snakeheads, anabas and others, but the yields are low. At present, the sugarcane fields are being converted to rice fields.

As for the other areas, natural disasters or diseases happen from time to time. In 1978, a big flood destroyed rice-fields, fruit-trees and animals. Ten years later, another flood came by and damaged much more. In 1997, the rice-fields and sugarcane were infected with disease and the estimated loss was about 60% of its value. Unfortunately, in 1999 the disease came back, and the loss was estimated to be even more at about 80-90%. After that, the farmers were trained by the government in integrated pest management (IPM). However, in the year 2001-2002, yellow snails and rat populations were high and they destroyed about 20-30% of the field crops.

Seasonal activities depend on cultivation of rice and sugarcane. Farmers have to prepare the land from November for growing sugarcane. The sugarcane is harvested in late September. There are two rice-crops per year: Winter-Spring crop and Summer-Autumn crop. The peak hours for the labourers are during the preparation and harvest time. Farmers who have land to cultivate in the field or garden don't depend too much in fishing. They only catch fish during their free time or to feed their families. According to them, the fish concentrates from August to November every year. During this time the rainy season arrives followed by the flooding.

Overview of livelihood strategies by stakeholder category

Trader group

Most of fish traders in the area are women. They have to go to the market for trade from early morning. It takes nearly the whole day to sell fish, and trade also depends on the amount of fish they can sell and the types of buyers in the day. They can go back home soon if there is high sale. Men carry fish to the market for women, and they take care their farm rice, sugarcane or orchard.

Most of trader households are landless. Everyday, they go to the market for trading from 5 a.m. until 5 p.m. They buy fish from fishermen directly. They can buy and sell 5-10kg fish per day. The price varies from 8.000 VND to 40.000 VND per kg, depending on species. The profit margin is estimated

at 20.000-30.000 VND per day. They sell fish to local people or other traders. Most of them lend money from the rich moneylenders or wholesalers at interest rate (20% of interests per month). They have to pay 20.000 VND everyday and finish all loan within one month. Fish in this area are rarely used for processing as dry-fish or fish-sauce because they don't have excess fish.

Part-time fishers

The people who have land for cultivation catch fish infrequently. They catch fish in the evening when they have time or after they finish work in the field. The strength of this group is land, they live on the sale of the agricultural products such as rice, sugarcane, fruit-tree and animals. They can use other available resources for raising fish as well as yellow snails and vegetables. However, they lack technical know-how and capitals to improve their production.

Cultivation of Spring-Winter rice crop begins from November and continues up to February next year. After harvesting this crop, they continue to prepare for Autumn-Summer rice-crop (March to June). They have their free time in July, August, September and October. Sugarcane is harvested in September. At that time, the fish catches are highest during the September. During their free time, part-time group catch fish for food. If they catch a lot, they sell those to the local people, and they catch fish about 4-5 days a week. Rod and lines are used mostly from May to December while nets are mostly used from August to November.

Mostly snakehead, catfish and white lady carp fishes are caught. In the peak season, they can get 10.000-20.000VND/day from fish catch after keeping some for their family consumption.

Full time and Subsistence fishers

Most of the people under this group have settled in this area since 1975. This group live on fishing and labor. They mainly cultivate rice and sugarcane. Peak labor hiring period is concentrated from December to March when farmers have to prepare land for broadcasting seed. From April to September, subsistence fishers do any work they can to earn money; if they do not do laboring, they catch fish in the rivers, canals or ponds. Fish are used for family consumption and excess amount is sold to the traders in the village.

Subsistence fishers can earn as much as 20.000 - 25.000 VND per day from wage labour. On average, they work 5 -10 days per month, the rest of the time they go fishing.

Full time fishers said that the fish catch is highest from August to October (Lunar Calendar). They use rod and line and net to catch snakehead, catfish, white lady carp fish, anabas etc. Men usually catch fish while women process fish or sale fish. Children sometimes help their parents

Usually, people use small and dead fish for food; high value fish are sold to the traders and small fishes are sold to the local consumers because the price of big fish is higher than small fish. The local people buy fish for consumption, and trader buy fish to sell in the village market. Sometime they sell to the people in district market.

During 1975 - 1985, natural fish started to decrease. From 1990 to 1995, the number of fishes decreased considerably. At present the fish resource is reduced compared to 1997. People rely on cultured fish to some extent.

The main problem of the full time fishers and subsistence fishers is lack of capital. Most of them are very poor. The full time fishers' income from wage labor and fishing is not enough for day-to-day expenditure. They do not have any savings.

The main cause of fish decrease is over fishing. . They catch fish by different ways including electric shock because they try to catch as much fish as possible even very small fishes.

Although local people know that fishing by illegal and harmful gears is detrimental to natural fishes, they still use those gears to catch fish. They think fish is public property and nobody is not under any

management system, so they can catch fish anytime anywhere with any gear. They also think that if they do not catch fish, other people will do.

Certainly, the catch affects the life of the fishers. They need food but they cannot find work from April to July. Subsistence fishers then go fishing. However, if they cannot fish they have to borrow money from neighbours or from the moneylenders at high interest rate. For catching fish, they usually use small boat which is from 3-4m long. This boat can carry 100-200 kg. Net and line are mainly used to catch snakehead, catfish, white lady carp, anabas etc. Everyday, they can catch 1-3 kg fish earning/valued at 10,000-30,000 VND.

3.3.3 Capital assets

(i) Human capital:

Average family size in this area is about 5-6 people. People living here have a strong labor. The elderly people usually takes care of the children and the house, and the children who have stopped schooling usually help their parents in the field or go fishing. The men are usually the leader in the family. They work in the field and do any strength related jobs. Meanwhile, the wives have to take care of the children, doing housework and cultivating.

Health:

This is a rural area with low infrastructure and lots of difficulties in life. Therefore, health is something to be considered. People use water from the river directly for drinking and cooking after primary treatment. Due to this they usually get intestine disease and diarrhea, and the women usually face gynecological problems. .

Education:

There are 4 schools in the village including 3 primary schools and 1 secondary school. The high schools are away from the villages therefore the children have to stop at primary or secondary level of schooling to work with their parents due to poverty. It is popular in this area that boys are more supported preferentially for studying over girls due to the view of their parents that educating girls won't be sure to benefit them. On the other hand, girls are used as a sub-labor for their family. The parents feel that after marriage their daughters have to follow their husbands and they will have their own responsibilities to take care of their children and do housework. Therefore, women lack education, and their lives are always difficult. Meanwhile, some rich households provide their children with proper education and considered their futures to be brighter with the prospect of a stable and secure job.

Access to information:

Information is very important for these people to improve their skill developments. Therefore, most farmers get information and knowledge from radio broadcasting, television and newspaper. Experiences of raising and cultivating are collected from crowded places such as market, coffee shop or even from parties in the village. Sometimes, the People Committee organizes training courses on techniques of cultivating or raising livestock and breeding cattle for farmers.

Training:

Most of the lands in this area are used mainly for agriculture. Unfortunately, diseases usually tend to destroy the crops. Local committees and unions usually organize training to educate the farmers on preventing diseases, rats and yellow snails. Since 1997, local farmers were trained on IPM for cultivating rice and this has reduced the usage of pesticides. The households with high incomes are usually considered as good examples or motivators for the other farmers in this area.

(ii) Financial capital

The main income of landless group derives from natural fish and labor. The trader groups live on fish trading everyday. Part-time groups have income from rice, sugarcane and raising fish in the canal. After harvest, the farmers keep a part of the rice for their family, and the rest is sold to the trader for income.

To support the farmers the bank lends money with a low interest rate for agricultural development in a long term. This program is called "Agriculture Development" with the total cost of 11,449 billions VND in which agriculture development occupies 8,378 billions VND, small traders up to 568 millions VND and house building with 2,254 billions VND. The interest rates are: for agriculture activities 1.1%, for small trader for poor household 0.7%, and for house building 0.8%. The standards of loans depend on the property and credit solvency. The Unions in the village have responsibility to remind the farmers to pay their interest and capital.

Besides that, villagers sometime have to borrow money from the rich with high interest rate, 10-15% to get 300,000-500,000 VND. The trader and the landless groups borrow more money than the part-time groups because the small traders need money to buy fish everyday. Landless groups especially need money everyday to avoid problems and emergencies as they don't have any savings. Therefore, taking an informal loan can be very beneficial for them as they can receive money immediately and repay the capital whenever they can, but they have to pay the interest on a monthly basis.

(iii) Physical capital

Land:

The area of the village is about 56 km². The land in this village is suitable for agriculture because it has fresh water with high alluvium. 90% of the land area is used for agriculture purposes, with 2,052 ha for rice-fields and 473 ha for sugarcanes. . The average land size of each family is about 1.1 ha including rice-fields, sugarcanes and orchards. Sugarcane gives the yield of 50 tons/household per year. Rice is cultivated in 2 crops per year.

Housing:

The types of houses are usually stable for the well off with concrete walls and unstable houses for the poor with wood or leaves, etc. The types of houses and properties clearly show the vast differences between the rich and the poor. Rich households have beautiful tables and chairs, fridge, fan, gas cooker and electrical appliances, while poor households only have a bamboo bed, old tables and chairs, cooking pots, etc.

Sanitation:

There is a public health station where doctors work permanently. Simple diseases are treated in this station. Usually, farmers directly get domestic water from river and use it for drinking and cooking after primary treatment by alum. Due to this all kinds of diseases are transmitted. This is a common problem in the rural area in Vietnam. There are 16% of household using groundwater in Tan Phuoc Hung village.

Boats:

Almost every household has a small boat for transportation in the village because there are no complete roads. Therefore, boat is the main means of transport. Fisherman usually takes a boat or walks to catch fish by using a line with hook or net in the canal or river. Rich people have a bigger boat with engine for transportation.

Gear:

The tools which local people use to catch fish in this area are mainly net and line with hook. Sometimes, they use illegal ways and tools such as electrocuting, using small mesh size nets to catch

fish and mother snakeheads. Small size nets are used very popularly because people can use small fish for eating or feeding cultured fish. Waterway Management Agency is in charge of managing and solving these illegal actions, but their management is not very effective.

(iv) Social capital

There are 3,828 households and 21,620 people (male: 10,431, female 11,198) in this village of which Kinh people occupies the highest rate, the Chinese includes 14 households (96 persons or about 0.4%) and 98 households are of Khmer race (423 persons, about 1.9% of the population) (Table 3.3.2). Chinese and Khmer groups are small, so they have not affected much on culture as well as customs in the area.

Table 3.3.2 Population in the hamlets of Tan Phuoc Hung village

Hamlet	Households	Population	Male	Female	Khmer
Hoài Hæng	381	2138	1124	1014	9
Tán Thành	495	2921	1404	1517	30
Tán Hæng	265	1620	779	823	7
Tán Phuĩ A1	358	2050	972	1078	6
Tán Phuĩ A2	260	1420	703	717	3
Tán Phuĩ B1	360	1694	825	869	4
Tán Phuĩ B2	263	1539	758	781	2
Myĩ Thâuĩn	439	2671	1128	1543	10
Myĩ Phuĩ	312	1516	737	779	5
Phoĩ Ấn	340	2008	994	1014	7
Thành Viĩn	409	2061	1007	1054	15

In the village, there are Women Union, Farmer Union, Youth Union, Veteran Union, Red-cross Union, etc. and the units who give loan from the bank and programs on hunger elimination and poverty alleviation. People’s Committees at different levels manage these unions.

There are 9 sugar factories where people can sell their sugarcane after harvest and 12 rice-mill factories located along the riverside. The local people can come there easily.

Since 1990, the village has electricity for many activities, at present 80% of households are getting electricity in the area.

From 1998-2000, small roads were built, and the transportation was considerably improved so that motorcycle and bicycle could go on this way to the local market.

3.3.4 Natural capital

Water (seasonality/hydrology):

There is fresh water source around the year. The area is a swamp with three-month flooding per year, so rivers, lakes, canals or ponds retain plenty of water throughout the year. For this reason, this area has good habitats for fish and fish are very abundant in the flooding season. Highest water level is observed from August to October.

Fishing locations:

Fishermen catch fish in their ponds, canals or field etc. They also go to other public places such as rivers, canals in the same village or in the other villages.

People living on the riverside mostly use trap with small net and set them near their house. They can get 0.2 - 0.5kg fish for food for the family everyday. The net has very small mesh size, so it can catch very young or small fishes. They use small fish for feeding pig, duck or chicken.

Fish catch

Besides, fish for food, if they get a lot, they will sell to traders to earn some money; they usually catch fish about 4-5 times per week. Net and line are the two main tools for fishing in the village. They catch species such as snakehead, clarias, anabas, and white fish with their simple tools.

Fish consumption

After keeping fish for food for the family other fish are sold to traders in the village, and they can earn 10.000-20.000 VND/day (1-3kg fish).

Dead fish are kept in ice or used to make dry-fish, fresh fish are kept for food or to sell to trader in Bung Tau village market. Highest fish consumption is commensurate with the high fish catch period - August to October.

3.3.5. Trends in natural resources

According to the local people, natural fishes are decreasing due to over-exploitation by electric shock, pesticide and chemicals.

Fish catches, composition, effort

Local people catch fish everyday, people who have stable jobs and those who belong to the part-time fishers group usually catch fish when they have free time or after they finish their work. The subsistence landless group mainly depend on fishing to get food and income, so they spend a lot of time on catching fish. The popular tools used for catching fish are trap net, line, drop net are used. Some people use boat and net for catching fish; others use chemical, shock electric and dewatering ponds to catch all kinds of fish. Types of species depend on the kind of the tools local people use.

Other aquatic resources

Local people also collect other aquatic resources and sell to the market or the restaurant. Snake and turtles are specialities, so they can be sold at high prices. However, these species are rarer than fish, and it is very difficult to catch those species. Because of the high prices and rarity, lots of people like to capture them.

3.3.6 Problem analysis

In this area, aquatic resources are more abundant than in other places. However, the over population and high demand affect the environment. Especially the use of pesticide and chemical fertilizers in agriculture decreases fish resources day by day. Some households also began raising fish in their ponds to get food and to replace their lost income from natural fish. They need money and technical support to get high yield. They lend money from the rich at high interest rate, and they have to pay every month. If they failure, they have to lose all investment and continue to lack money to improve their livelihoods. The poor group has no stable jobs and income, so they have to depend on the natural resources which are considered public property fort everybody can to explore.

3.3.7 Vulnerability and coping

Subsistence fishers and full time fishers group seemingly have unstable livelihoods because they depend on wage labor and fishing. In the crop season, when fish become scarce, they work as agriculture labourers and get money on daily basis. After the crop season, subsistence fishers have no jobs to do except catching fish. However, as fish are decreasing more and more, they are not enough for full time fishers to maintain their family properly. They always face shortage of cash and food. Neither can they find a stable job due to low education nor can they adopt any trade due to lack of capital. Therefore, they feel insecure and they put pressure on natural resources. .

Lack of capitals is a main problem to all types of stakeholders. The chance for the poor household to improve their livelihoods is very low. They cannot lend money from the bank, because they don't have land property equal to loan money to ensure the payment. Therefore, poor people remain poor and continually their dependence on natural resources is increasing.

3.4 Environment 4: Main River (Phu An village)

3.4.1 Background

The Phu An village belongs to Chau Thanh district in Can Tho Province in the Lower Mekong Delta (covers about 16,095 people and 2,804 ha of land). The population relies on farming, with rice cultivation and fish farming practices being the most important

This region has two distinct seasons: the dry season from November to April and the rainy season from May to October. This type of climate combines considerable number of sunny days, and high rate of rainfall and humidity, which, along with the river network, form good conditions for agricultural activities, especially aquaculture development.

The river system provides access to very diverse aquatic resources which support the livelihood of the community. Ten years ago, due to the subsidized mechanism policy, the farmers' poverty and hunger levels grew, low yield rice crops were produced, and the natural fish populations was becoming exhausted. The quality of life of the farmers was very poor. Nowadays, there exists a more open policy, and the farmers cultivate many new high yielding rice varieties with a resistance to diseases, they apply Integrated Pest Management technique through which they restore high production and protect the environment. The standard of living of the farmers is gradually improving.

There are several economic classes: landless group of course have no land. As households have traditionally split and land is passed on to their children, and these families have no land, the family size averages just three to six people. These are poor and often hungry, with a very low income (1million to 10million per year). Their livelihoods mainly depend on natural resources or on income from wage labour. The other group has farming land or a garden. This group is rather wealthy. They have high levels of combined consciousness, good production management, and they can apply new technologies such as IPM, and rice fish culture.

3.4.2 Livelihood Background

Wealth/poverty criteria

Table 3.4.1 shows the percentage of households under the major poverty classes mentioned by the stakeholder groups during PRA sessions.

Table 3.4.1 Wealth/poverty criteria in Phu An village (Information obtained from Phu An village committee)

Poverty level	Number household	Indicators
Very Wealthy	3%	> 30 million VND per year
Wealthy	55%	20-30 million VND per year
Average	34%	10-20 million VND per year
Poor	6%	5-10 million VND per year
Hungry	2%	< 5 million VND per year

90% of the population relies on farming, gardening and fish farming. Farmers have succeeded to increase rice production in recent years, so as to increase the income for their family. In an attempt to increase the efficiency of the bio-production of rice, farmers often misuse chemical fertilizers. Another serious issue is over use of pesticides, causing a negative effect on the aquatic environment, resulting in declined aquatic resources in this region. The main economic activity in the hamlet is farming, although they can fish for daily subsistence and home consumption during the rainy season.

There are few fish traders in the study area. Most fish traders buy marine fish from the town markets to sell around the village. The fish traders are poor, and usually landless. There are no traditional fishing households because natural fish populations are declining.

In the rainy season, the fishers of the hamlet can catch more than in the dry season, which they can sell to fish traders, who in turn sell to town markets. However, fishing is almost a year round activity (Fig. 3.8).

Fig. 3.8 Seasonal activities

Activities	J	F	M	A	M	J	J	A	S	O	N	D
Spring-winter rice	█									█		
Autumn-summer rice		█										
Autumn-winter rice						█						
Hungry period	█											
Hiring labor	█											
High labour demand period	█										█	
Fishing	█											
High fishing						█						
Gardening	█							█				

3.4.3 Capital assets

(i) Human capital

The study village has one hospital with eight beds, one doctor and four nurses. Annually the hospital treats 21,102 patients. 569 households of the 3161 households had well water.

The village has four elementary schools with 1631 pupils and one high school with 854 pupils. 30 children did not go to school.

The study village has one information room with 350 books. About five times a year, the local government campaigns to the farmers about different issues. The most recent campaign was about river water usage.

There are three IPM training courses with 90 participants in the study site hamlet.

(ii) Financial capital

There is some credit providing organizations in the study area such as: agriculture bank (1.3 million VND for poverty-alleviation movement, 5 million for agriculture produce). About 36 community groups with 1,080 members have savings with farmers' union, women's union, and veterans' unions. There are also programs for promoting cattle and pig, and vegetable and mushroom cultivation.

Fish-traders are mostly landless and poor. They do not have access to institutional credit due to lack of collateral, so they are dependent on private credit from money lenders at a high rate of interest, around 5-8 % per month.

iii) Physical capital

The study area has 3,405 households and 16,095 people, 2804 hectares of natural land area of which 1,487 hectares are used for cultivated of rice. The farmers decided to adopt the intensive farming model: three crops per year, using high amounts of fertilizer and pesticides. However, they grow fruit plants on 796 hectares and have 500 hectares for fish cultivation. 90% of the population relies on farming, gardening and fish farming. In recent years an increase in rice production was observed due to the decision to grow three crops per year. This decision was made to increase the farmers' income.

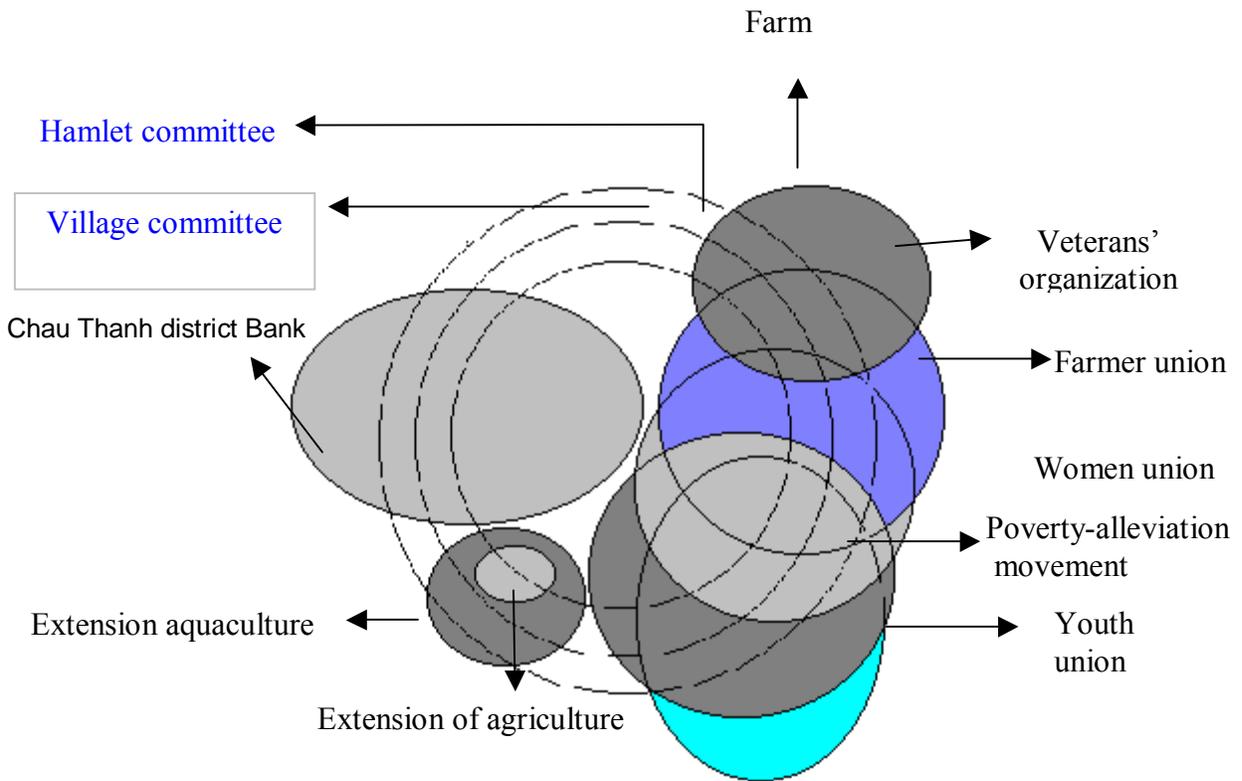
The study area hamlet has one of three cooperatives, which has 137.7 hectares, out of which agriculture takes up to 84.9 hectares, gardening 33.8 hectares, and 19 hectares for aquaculture. The hamlet has 1857 population and 329 households. Like the entire village, 90% of the hamlet's population relies on farming, gardening and fish farming. The number of poor households is 27 (8%), and 17 households (5%) are landless. The hamlet extended to three crops per year, resulting in an increase in income for the farmers' families.

(iv) Social Capital

Religion groups

Besides the traditional religious practices in Vietnam, there are other major religions such as Buddhism, Catholicism, the Cao Dai sect and Hoa Hao sect. In the study village 91% of the population is Buddhist, 7% is Catholic and Hoa Hao and Cao Dai make up 1% each.

Fig. 3.9 Venn diagram of local Power structure



3.4.4 Natural capital

There are two seasons, dry season from December to April and rainy season from May to October. In the rainy season, with flood water fish migrate to the area and become matured. The rainy season is the main season for brood fish reproduction. Small fish also breed during the rainy season. The farmers can catch fish in the river, canal and paddy-field, and gear use reflects the seasonal movement and abundance of fish (Table 3.4.2). Most of them only catch fish for their family consumption

Table 3.4.2 Fishing calendar

Gear	Species	J	F	M	A	M	J	J	A	S	O	N	D
Line	Snake-head, catfish, anabas				x	X	x	x	xx	Xx	xx	x	X
Net*	Anabas, sea anabas, silver carp, Puntius, Snaneskin goumani, Notoperus,	x	x	x	x	X	x	x	xx	Xx	xx	x	X
Traps	Anabas, Puntius, Snackin goumani					X	x	x	xx	Xx	x		
Brush park	Many kinds of fish, mostly: silver carp, tawes	x	x	x	x	X	x	xx	xx	Xx	xx	xx	X
Cast net	Plenty of fish	x	x	x	x	X	x	x	x	X	x	x	X
River drying	Plenty of fish	x											Xx
Electricity	Plenty of fish	xx	xx	xx	xx	xx	x	x	x	X	x	xx	Xx
Push net	Plenty of fish	xx	x	x	x	X	x	x	x	X	x	x	Xx
Duck baiting**	Snake-head breeder fish	xx	xx	xx	xx	X	x	x	x	X	x	x	X

Key: xx: Peak fishing season x: Usual fishing season

*Note that the net has 3 rafts and 2.5-4cm mesh; **Duck baiting is the process of attracting fish by putting a duck in the water. The mother fish attack the dusk as ducks pose threat to the fingerlings. The fishers then catch the mother fish easily. Once caught, the lack of mother fish fingerlings die, and it effects the population of the species.

Table 3.4.3 The amount of fish catch per day in Hung Phu hamlet

Group	%	Fish quantity	Income/day VND)
No fish catch	18.4	0	0
Fishing for sale and for food	81.6	0.5-4kg	5000-15000
Keeps fish for food	77.4	0.5-2kg	

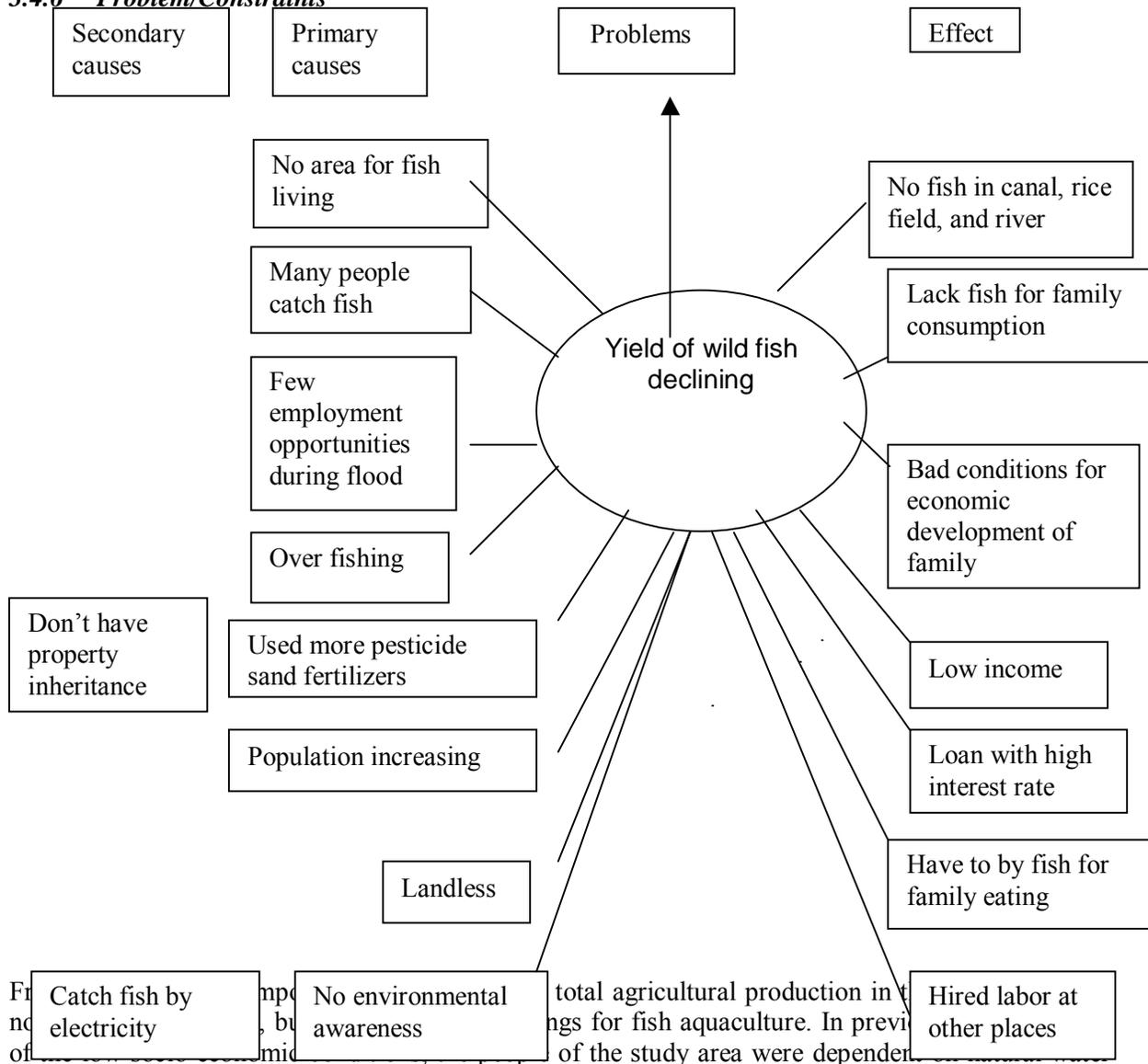
3.4.5 Trend of wild fish

In response to problems over the past decades (Table 3.4.4), in the study area in 1997 farmers built a dam on a ditch around the agricultural field. This not only protected the fruit garden and rice field from flooding, but also improved conditions for the development of fish species. Besides that, the local government promulgated a fish protection law such as: forbidding fishing with electric gear, and duck baiting. These are the reasons for improvement in wild fish in recent years.

Table 3.4.4 Trend in Natural fish

Years	Events
Before 1975	Wild fish are plentiful
1975-1980:	All wild fish decreased by 30%-50% specially Snakeskin goumani
1980-1985	All wild fish decreased specially Snakehead decreased by 80% and hybrid catfish appeared
1985-1997	All wild fish decreased specially Snakehead keep decreasing further, Gray feather back decreased by 99%. O.lucius, O.micropeltes (Ohipcephaliformes) and Clarias catfish are disappearing.
1997-2002	Some initiative for fish conservation

3.4.6 Problem/Constraints



resources for cultivating one rice crop a year, and fishing from canals, rice fields, and flood plains. The fish catch contained many fish and a diversity of species. Nowadays, the situation has changed due to many reasons, but one main reason is that the environment for fish is declining, with natural fish decreasing and many local fish species are in danger or disappearing. Over fishing, the shift from one crop to three crops per year, unsuitable fertilizer and chemical use making algae blooms, the change of waste land into cultivated land, and deteriorating living conditions for fish, are the reasons of natural fish decline. According to the fishers, fish have decreased by 30% -99% depending on species. Some fish species have disappeared, such as: White catfish, yellow catfish, flower snakehead and Gray feather back (ca thac lac).

Problems of the part time fishers and fish traders

The number of professional fishers has decreased, as there are not enough fish for fishing. The fishers can catch only 2-4 kg fish per day. Most of the fish caught is for family consumption, but sometimes if a catch is excess, they can sell. The income from fishing is low, from 5.000-15000 VND per day. Therefore, this amount is not enough for family maintenance. Although most fish traders and fishers are very hard working they still have a hard time to manage enough earning. They have many problems: they are very poor, they don't have land, they don't have capital, and the family doesn't have supplementary work. So they are always vulnerable to unemployment, debts and migration.

Problems of the landowners

The farmers have much success in rice production, but the farmers have to face new problems, such as fluctuating agricultural produce prices, the farmer gets high yield but poverty still occurs despite the green revolution although the objective of green revolution was to cope with and lessen the danger of food scarcity and to allocate natural resources to create better environment for all. But presently, this process itself devastates diversified ecosystem, pollutes natural environment, and contributes to the rapid exhaustion of natural resources. Farmers complained about low price of the agricultural products and high input cost.

The labor force in the study area is easily available with 5-6 persons in a household, who are not only available for production activities of the household, but also can provide hired labor in free-seasons when their labor is redundant at home. This labor force often contributes to higher number of fishers, to increase household benefits. This is another reason for high pressure on natural resources

Lack of safe drinking water is one of the major problems for all in the study area. The reasons for the water pollution are many: high concentration of household organic waste (pig waste, noodle making, rice paper making, etc.), fertilizer use, etc.

Low level of education is another common problem, people of this environment on attended school up to 2-5 grades, limiting their ability to accept technological knowledge.

The study area has an agriculture co-operation, helping the farmers overcome many difficulties such as: sharing water resources, preventing flooding, training on technology, applying new technology, exchanging experiences with each other, increasing the sense of community cooperation and improving their living conditions step by step.

Dykes are big problem for the fishers as the recruitment of brood fish and fish fingerlings is hampered by the dykes. However, dyke construction has secured rice production as well as aquaculture. But at the same time the dyke has aggravated water logging and water pollution. All the household wastes come to the open water as they drain those directly in the water. Water for irrigation during dry season also becomes a problem for the farmers.

The participants in PRA also mentioned that there is a lack of communication between scientists and the farmers for the transfer of new suitable technologies. Lack of demonstration and training are also felt to be acute problems for the people.