

# Final Case Study Report

## **Fish Fights over Fish Rights: Managing Exit from Fisheries and Security Implications for Southeast Asia**



Ford Foundation-World Fish Center Project, Penang, Malaysia

Implemented by DOF/IFReDI in Cambodia

By  
Mr. Keang Seng  
Mr. Srun Lim Song  
Ms. Hap Navy  
Mr. Seng Leang

-December 2004-

## Acknowledgements

## Table of Contents

<b>Acknowledgements</b> .....	<b>I</b>
<b>Table of Contents</b> .....	<b>II</b>
<b>List of Figures</b> .....	<b>IV</b>
<b>List of Tables</b> .....	<b>V</b>
<b>List of Acronyms</b> .....	<b>VI</b>
<b>Summary</b> .....	<b>VII</b>
<b>Part I: Introduction</b>	
1.1 Fishery Situation in Cambodia.....	1
1.2 Major Issues and Problems in the Fishery Sector.....	2
1.2.1 Excess Capacity.....	2
1.2.2 Fisheries Conflict in Cambodia.....	4
1.3 Objectives the Study.....	5
1.4 Research Method.....	5
1.4.1 Study Area.....	5
1.4.2 Survey Design.....	7
<b>Part II: Literature Review</b>	
2.1 Institutional and Legal Framework in Fisheries Management System.....	9
2.1.1 Management Review of Administration.....	9
2.1.2 National Fisheries Policies and Laws.....	9
2.2 Conflict in Fishery.....	11
2.2.1 Background of Fishery Conflicts.....	11
2.2.2 Typology of Conflicts in Fisheries.....	15
2.3 The Fisheries.....	18
2.3.1 Historical Catches and Landings.....	18
2.3.2 Historical Effort Data.....	20
<b>Part III: Result and Discussions</b>	
3.1 Socioeconomic Activities.....	24
3.1.1 Profile of the Household Heads.....	24
3.1.2 Profile of Household Members.....	31
3.1.3 Households Assets.....	33
3.1.4 Households Income.....	35
3.2 Resources and Fishing Ground.....	37
3.2.1 Fishing Ground.....	37
3.2.2 Reasons for fishing on that ground.....	37
3.2.3 Benefit Aside from Fish.....	38
3.3 Affection of Fishery Rules and Regulations.....	39
3.4 Fishing Before 2001.....	40
3.4.1 Fishing Gear Used.....	40
3.4.2 Fish Production Caught.....	41
3.5 Fishing 2003 – 2004.....	42
3.5.1 Fishing Gear Used.....	42
3.5.2 Fish Production Caught.....	42

3.6	Trend in Fishing of 2001 and 2003-2004 .....	43
3.6.1	Fishing Gears .....	43
3.6.2	Fish Production Caught.....	44
3.7	Price of fish .....	45
3.7.1	Freshwater Fish Price .....	45
3.7.2	Marine Fish Price .....	46
3.8	Perception on the Condition of the Fisheries.....	48
3.9	Conflicts and Suggested Resolutions.....	49
3.9.1	Conflicts Arising in the Study Areas .....	49
3.9.2	Level of Serious Related to Conflicts Arising .....	50
3.9.3	Suggested Resolutions to the Conflicts.....	50
3.10	Plan for the Next Five Years.....	51
3.10.1	Committed to Stay.....	51
3.10.2	Reasons for Exit .....	52
3.11	Suggested Exiting Strategies and Reaction.....	53
3.11.1	Suggestion Exiting Strategies (the way of Reducing Fishing Reassure) .....	53
3.11.2	Reaction to the Suggested Strategies for Reduce Fishing Pressure.....	54
3.12	Assistant for Exit from Fishing.....	56
3.13	Conclusion and Recommendation .....	57
3.13.1	Conclusion .....	57
3.13.2	Recommendation .....	60
<b>Part IV: Appendix</b>		
	References.....	62
	Appendix .....	63
	Appendix 1: Common freshwater fish species caught before 2001 to 2003-2004 .....	63
	Appendix 2: Common marine water fish species caught before 2001 to 2003-2004 .....	64
	Appendix 3: Result of the Workshop.....	65
	Appendix 4: Questionnaire for Survey.....	73

## List of Figures

Figure 2.3 Inland Captures Fisheries Production (1994-2003) .....	21
Figure 2.4 Trends of Captures Fisheries in Pursat and Kandal (1994-2003) .....	21
Figure 2.5 Total Marine Captures Fish Production (1994-2003) .....	22
Figure 2.6 Trend of Marine Captures Fish Production in Kampot (1994-2003) .....	23
Figure 3.1 Age Distribution of Respondent from CF Sites .....	24
Figure 3.2 Number of Years Engaged in Fishing.....	26
Figure 3.3 Distribution of Secondary Occupation by Gender Headed Household .....	30
Figure 3.4 Sources of Income by Locations .....	36
Figure 3.5 Reasons for Fishing in those Particular Areas.....	38
Figure 3.6 Effect of Fisheries Rules and Regulation on Fishers .....	39
Figure 3.7 Trend in Common Fishing Gears Used in Before 2001 and 2003-2004.....	44
Figure 3.8 Trend in Fish Production Caught from Before 2001 and 2003-2004.....	44
Figure 3.9 Trend in Fresh and Marine Water Fish price by Value of Species from 1995-2003/04 ..	47
Figure 3.10 Reasons for the Changed.....	48
Figure 3.11 Type of Conflict Arising in the Study Areas .....	49
Figure 3.12 Suggested Resolutions to the Arising Conflicts .....	51

## List of Tables

Table 1.1	Number of, Fishing Population, Fishing Gears and Fishing Boats from 1994-2003.....	3
Table 2.2	Exploitation and Production of Fisheries Resource in Cambodia - Plan and Actual.....	23
Table 3.1	Age Distribution of Respondent from NCF Sites .....	25
Table 3.2	Gender of Respondent .....	25
Table 3.3	Result of T-Test of Paired Samples Correlations .....	26
Table 3.4	Marital Status of Respondent.....	27
Table 3.5	Education Level of Respondent .....	28
Table 3.6	Principle Occupation of Respondents.....	28
Table 3.7	Number of Secondary Occupation .....	29
Table 3.8	Specific Secondary Occupation of Respondent .....	29
Table 3.9	Number of Years Living in Current Village of Respondents .....	31
Table 3.10	Profile of Family Member .....	31
Table 3.11	Number of Household Labour .....	32
Table 3.12	Member People Engaged in Fishing by Genders .....	33
Table 3.13	Household Asset of Respondents in CF.....	34
Table 3.14	Household Asset of Respondent from NCF .....	34
Table 3.15	Annual Income of Respondent in Million Riel.....	35
Table 3.16	Sources of Fishing Ground .....	37
Table 3.17	Benefit from Fishing Ground Aside from Fish.....	39
Table 3.18	Level of Rule and Regulation Effectiveness .....	40
Table 3.19	Fishing Gears Used by the Respondents in 2001 .....	41
Table 3.20	Number of, Times, Fishers, Period and Production Caught (Before 2001) .....	41
Table 3.21	Fishing Gears Used by the Respondents .....	42
Table 3.22	Average Number of Time, Fishers, Period and Production Caught (2003-2004) .....	43
Table 3.23	Common Freshwater Fish Species Caught during 2003-2004 .....	45
Table 3.24	Top-ten Freshwater Fish Price changed from before 2001 to 2003-2004 .....	46
Table 3.25	Top-ten Marine-water Fish Price changed from before 2001 to 2003-2004 .....	47
Table 3.26	Plan to Stay in Next 5 Years for Respondents .....	52

## List of Acronyms

APDO	
ASEAN	Association of South-East Asian Nation
BDASE	Buddhism Development Association and Supporting Environment
CF	Community Fisheries
CFDS-Oxfarm	Cambodia Family Development Services of Oxfarm
DoF	Department of Fisheries
EEZ	Exclusive Economic Zone
FACT	Fisheries Action Coalition Team
FMP	Fisheries Management Plan
GDP	Gross Domestic Product
HRD	Human Resources Development
IFReDI	Inland Fisheries Research and Development Institute
kg	Kilogram
MAFF	Ministry of Agriculture, Forestry and Fisheries
MRC	Mekong River Commission
mt	Metric ton
NCF	No-Community Fisheries
NGO	Non-Governmental Organization
NIS	National Institute of Statistic
PIU	Program Implementation Unit
RGC	Royal Government of Cambodia

## Summary

Fishery has long been part of the staple diet of the people in Cambodia. As Cambodia moves towards a free market economy, the commercial pressure on natural resources has dramatically increased. Privatization of the remaining fishery resources has had a great impact on local livelihoods, leading to an alarming increase in conflict over fisheries. In order to protect people livelihood and natural resources, NGOs, has advocated that government institutions apply more effort to solving fishery problems.

Many boundaries of fishing lots were neglected or the government couldn't afford to re-demarcate during the war, resulting in confrontation between lot owners and the residents. Many fishing lot owners are believed to try to take advantage of the situation. Additionally, violence also happens in the former abandoned fishing grounds controlled by military. Fishing villagers used to customarily access the areas, but later when the war ended in 1999 fishing lot owners wanted to annex these areas to the neighborhood fishing lot area.

Helping to reduce above mentioned conflicts, the study of fish fight over fish rights was started. The intentions of the projects were to develop broad framework for addressing approach for reducing over capacity in Southeast Asia and to examine where fisheries conflicts may arise and provide plans to ameliorate these conflicts and its role in reduction conflicts and enhancing national/regional security.

The method for the research was selected 270 samples from Community Fisheries (CF) and Non-Community Fisheries (NCF) in three provinces of Kandal, Pursat and Kampot. Kandal and Pursat provinces were for fresh water fishers and Kampot was for marine fishers. Besides did individual interview, there were about 12 focus group discussion and 18 institutions were also interviewed. Data was installed in Access file and analyze in Excel program. Duration of the research was about 4months started from May and finished in August 2004. The project ended at January 2005.

The result of this research had summary as follow. Most of the respondents in the study area aged ranged from 40 to 59 years old. Young aged (range from 20 to 39) in CF seems to be higher proportion than in the NCF about 6 percent. Conversely, households headed who aged ranged from 60 to 79 in CF seem to have less proportion than in NCF.

Male headed households are main dominant in both CF and NCF. Female headed household tended to have only 25 percent in CF and about 13 percent in NCF. Female headed household are living in Pursat and Kampot more than in Kandal. However, respondents in Kandal were more number of widowers than the other two provinces. About 54 percent of respondents in both CF and NCF had completed primary school while only about 4 percent had reached secondary school. Illiteracy still comprised about 20 percent in CF and NCF. The means of number of year for male's schooling was about 4 years while female only about 2.2 years.

Fishing is the principle occupation of both CF and NCF sites. Farming is highly present in CF than in NCF. In CF farming was represent about 16 percent while only about 1 percent in NCF. Besides that small business was also implemented by about 2 percent in CF and 1 percent in NCF. In addition to main occupation, 5 secondary occupations were implement in those provinces are fish related activities, small business, farming, laboring and government/NGOs workers. Farming is very popular for respondent in both CF and NCF wile government/NGOs workers are presented very little. Male headed household tends to have more secondary occupation than women headed households.

A larger amount of them had family member from 1 to 5, which contributed to about 41 percent. There was very few household who have member greater than 11. Even the number of people in the households was ranged from 1 to 5 but the man-power in the household had only about 1 to 3. Man-power engaged in fishing was ration from 3 men per woman (3:1) up to 14 men per woman (14:1). But in average of all respondent was 5 men per woman (5:1) are engaged in fishing.

Besides man power in the household, capital asset is an essential element. There are 5 main capital assets were rest up by the respondents. House is a great capital asset which contributed to a very high proportion to household asset. The cost of house was varied from location to location. House price of respondents in CF tended to lower than in NCF. This is because most of the respondents in CF live on water rather than on land. With a small-scale fishing the household who lives on the water are poorer than on land. Furthermore, land holding, boat and electronic appliances were also much worst than in NCF (a comparison in value). Hence, the assets of the household were related mostly on location rather than on other factors. Same as result was showing in student test of statistic at 95 percent confidential level (sig. 0.00).

Income of the household respondent is another importance factor. In CF, income of each province was highly worsted. In average, household income was varied from 5.12 to 5.44 million Riel. Income of the household in CF tended to had higher than in NCF. But this amount of income cannot represent to the population because the STDEV was too high and fluctuated from 5.03 million Riel to 17.06 million Riel. With this STDEV the distributions of household's annual income was making a big gap, which can lead the poor become more worsted. Average income of these two sites was similarity but the STDEV of CF site looked about double if compared to the average annual income. Differently in NCF sites, the STDEV of income just a bit higher than average. Consequently, the condition of people respondents in NCF is better than in CF sites.

Fishing was a main source of household income. It was contributed about 68 percent to total income to the respondents in CF and about 84 percent to the respondents in NCF. Second was fish related activities which included fish trading, fish/seaweed culturing, fish processing etc. This activity was contributed about 23 percent to total income in CF while only 2.4 percent for NCF. Farming was also becomes a great supplementary income to the respondents.

Fishers went to fish mostly in CF sites for CF and open access for NCF. Few of CF fishers (0.7%) went to fish in protected areas while about 6 percent of total NCF respondents. The reasons for going to fish in those areas were because of easy to access for CF and easy to access and no alternative for NCF. Aside from fish those fishing ground were also provides mostly vegetable, water and wood fuel for the fishers. Only some of them mentioned about benefit of medicine and few had mention benefit of housing construction material.

The fisheries rules and regulations which were recognized by the local governor through *prakas* (declaration) in CF were very affected to community members. Further besides affected to community members it was affected to illegal fishers as well.

Before 2001, respondents customarily used gillnet as fishing method for catching fish. Some of them used hooked line and few use seine net. Respondents in CF sites tended to use gillnet less than in NCF while used of hooked line was greater than in NCF. Furthermore, CF respondents had used more fish trap and seine net more than in NCF. Conversely, NCF respondents keened to use samras/krasom, which are illegal fishing methods more than in CF sites.

Through using of these fishing methods, the production caught, number time per week, period went to fish and number of people went to fish were varied from fishers to fishers. Generally fishers in CF went to fish about 5 times per week whilst in NCF fishers went to fish 6 times per week. Number of people went to fish was the same was about 2 persons per time. Fishers in CF tended to fish fewer periods than in NCF was only about 8 hours and 27 minutes and 10 hours and 35 minutes, respectively per time. The reasons to this was because fishers in CF sites, as mentioned earlier, fished only in CF sites even as fishers in NCF went to fish in open access which may far than their living village. Amount of production caught was also depended the areas, respondents in CF sites leaned to had less production caught than in NCF. This was because they fish only with their limited areas. The average production caught per time was about 17.5 kg for CF fishers and about 24.4 kg for NCF fishers per time or about 4.55 tons and 7.6 tons, respectively per annum. However, this production caught of both CF and NCF cannot represent to the whole population because STDEV of these two production caught were very high if compared to the means. The STDEV of production caught for respondents in CF was about 41 kg and in NCF was only about 32.7kg per time. With these two high STDEV, can assumed that the production caught

of these two sites may be able to reach to about 58 kg for CF and about 57 kg for NCF each time or about 15 tons and 17.8 tons per annum, respectively.

The data in 2003-2004 was similar to the data before 2001 but only some were different. Such fishing methods like fish trap had increased about 13 percent followed by cast net increased about 160 percent and gillnet about 4.5 percent. Significantly, seine net had increased about 500 percent or 5 times than in 2001. Conversely, hooked line and other fishing methods had decreased about 13 percent and 53 percent respectively. Likely, number of time and people went to fish were not changed from 2001 while the period of fishing per time was slightly reduced about 8 minutes. Unpredictably, production caught per time was decreased from 21 kg per time to only 4 kg. The change in fish production caught was about 466 percent or about 5 times from 2001. In 2003-2004, the average production caught per time was about 2.7 kg for CF fishers and about 4.7 kg for NCF fishers per time or about 702 kg and 1,466 kg, respectively per annum. However, this production caught of both CF and NCF cannot represent to the whole population because STDEV of these two production caught were very high if compared to the means. The STDEV of production caught for respondents in CF was about 14.7 kg and in NCF was about 20.7kg per time. With these two high STDEV, can assumed that the production caught of these two sites may be able to reach to about 17 kg for CF and about 25 kg for NCF each time or about 4.4 tons and 7.8 tons per annum. Even though, the fish production caught in 2003-2004 is still decreased about 71 percent in CF sites and about 56 percent in NCF sites.

Besides the fish production decreased about 64 percent from 2001, the price of fresh water fish was also increase about 1.2 times for high value fish price and about 1.7 times for medium value species. Unlikely, poor value species, which are mostly using by the poor, was increased about 2.6 times from 2001. Conversely, marine water fish which contribute very little to the livelihood of the people in the country, the price of high values species was increased only about 0.7 times followed by medium value species had increased about 0.6 times and poor value species was about 1.3 times.

Fish production had decreased dramatically from 2001 while the price of fish was increase rapidly. This result was the same to the perceptions, which were rested by respondents in both CF and NCF. Furthermore, they had mentioned that fish production decreased spectacularly because of excess fishing effort and farmers become fisher after fisheries administration had been reformed in the late 2000. In addition to these some of them presented it was because of some people do farming and lotus culturing in the Lake. Some stated that because of fishery less productive, intervention in the upstream river and increased of fish price. When fish price is increased, fishers try to catch fish as much as they can for generate high income for their household. Moreover, the increased of fish prices make many other based daily need are also increased. Hence, to cope with that increasing fisher may try very hard to catch the fish for pay back to high expend.

Because of fisher population increasing and fishing effort is excess make small scale fishers faced many conflicts during fishing. Most of the time they had conflicts with themselves, medium scale and large scale fishers. Some time they faced with illegal fishers, fisheries officers and local authority. These conflicts were sometime serious, sometime somewhat serious and sometime not serious to them. However, all arising conflicts in the areas were never become a violence.

Even though, to solve these critical issues and conflicts, respondents had rested fourteen suggested resolutions were clear fishing boundary between small scale, medium scale and large scale fishers because right now fishers are mostly unclear about their boundary of fishing which make them go to fishing every were. Sometime when the fish closed to the fishing lot, the lot owners are not allowed them to fish. Second was eliminating illegal fishing practices which had set already in the fisheries law. Create a community fishery was stated by the respondents in NCF and eliminate medium and large scale fishing gear in the CF sites was the fourth suggested resolutions to the arising conflicts. The last suggested resolution was eliminate corruption of power-men in both CF and NCF. This suggested strategy was known very few from the fishers.

Though these conflicts and resolutions but about more than 58 percent committed to stay in fishing and about 18 percent not sure while about 19 percent would not stay in fishing any more. The reasons for exit from fishing were because fish production is reducing and they have the other

opportunity to implement the other activities such as farming, seaweed culture (for coastal province) and some will do small business. Further more, some of them would like to exit from fishing as well but they need some assistant such as provides some skill training, farmland for agriculture and create some alternative livelihood activities. Most of the respondents keened to have some farmland for agriculture and some of them would like to get skill training and few of them requested creation of alternative livelihood activities.

Besides requested some exiting strategies, there were some reaction strategies for reduce fishing pressure in both CF and NCF. The highest agreeable for reducing fishing pressure was ban use of some fishing gears and reallocate and find land-based job for marginal fisher was the second agreeable from the respondent. Conversely, set maximum limit on amount catch according to scale of operation and nobody should fish during non-fishing season (for inland water) were highest no agreeable from respondents.

There were about 8 recommendations were rested out during the workshop. One is review effect of land reform to fishers and how land ownership could encourage exit from fishing; two is identify appropriate skills and training needs that are suited to the area; three is information on other existing non-fishing jobs among fishers so that these could be enhanced when relevant as an exit option; four is identify appropriate income-generating activities; five is improve market information to help decision-making among fishers; six is biological studies to support decisions to establish fish conservation areas; seven is further study of fishers perceptions and willingness to exit and eight is integrated (inter-sectoral) and inter-temporal analysis of impact of suggested livelihood options.

# *Part I*

## *Introduction*

Recently, commercial fishing and its impact on local people's livelihood and food security are undertaken by my donors. Fishery has long been part of the staple diet of people in Cambodia, second only to rice in consumption. Fish provides some 75 percent of the total animal protein intake for the population, a well managed fisheries sector is essential for the Royal Government of Cambodia (RGC) to meet her key goals of food security and poverty alleviation in the country.

As Cambodia moves towards a free market economy, the commercial pressure on natural resources has dramatically increased. Privatization of the remaining fishery resources has had a great impact on local livelihoods, leading to an alarming increase in conflicts over fisheries. In order to protect people's livelihoods and natural resources, NGOs have advocated that government institutions apply more effort to solving fishery problems.

Freshwater fisheries in Cambodia are mainly come from the Great Lake and the Mekong River. Freshwater capture fisheries probably contribute more to national food security and the economy than such fisheries do in any other country in the world. The annual catch ranges between 290,000 – 430,000 tons, which is the fourth among the world to fresh water fish producer. Since approximately 90 percent of the total population of Cambodia lives in the Mekong Delta and Great Lake regions of the central plain (80% of them rural agriculturalists and fishers), the wetland resource is under pressure of agricultural land expansion and logging in addition to fishing. As a result about 10 percent of the Great Lake wetland is already converted into agricultural land.

In contrast coastal inhabitants involved in gathering marine products for supplementing their daily diet represented a very small part of the population with the introduction of motorized trawling and purse seining into the Cambodian sea fisheries. Presently, there is not less than ten thousand households involved in marine fishing, especially monofilament gill netting, trawling and crab trapping. The marine fish production about 30,000 ton in 1970s and official record during the period 1982 to 1992 ranged between 30,000 tons and 40,000 tons as rehabilitation of marine fisheries took place in the late 1980s. Today, marine productions have considerable economic and socio-economic importance. Most of the marine fish and sea products were landed directly in Thailand, although a small quantity was supplied to coastal and inland Cambodian markets and to processors to satisfy the inland market demand for processed and preserved products.

In recent years it has been claimed that natural fish stocks of both inland and marine water have declined drastically in either catch tonnage or value, due to over-fishing to fulfill local demand related to population growth and in response to export demand. The general census of 1998 determined that the population of Cambodia was 11.43 million, about double that of the 1962 census, where total population was 5.73 million. Another perspective on population growth is a recent report in the Cambodia Daily (24 Oct 2002) that in 1979, after the invasion by Vietnam, Cambodia's population was approximately 4 million people, which today is estimated at 12.2 million, a threefold increase, and is expected to be over 15 million by 2010. These population growth figures are indicative of the already existing threat of even more intensified exploitation of the riverine and wetland environments in the future.

## **1.1 Fishery Situation in Cambodia**

The plight of the poor can be improved by widening their access to forests, fisheries, water resources and other public goods. Providing access to fisheries and water resources to improve livelihoods of the people living in the Tonle Sap and the Riparian region has been a high priority of the Government. A comprehensive reform of the traditional fishing lot system has been completed in late 2000. The RGC has release some of official fishing lots of 536,302 ha, accounting for some 56.23 percent of the total fishing lots to allow the poor free access to fishing and to earn a living in 12 provinces. Fisheries reform has improved access by poor farmers and fishers to fisheries resources, thus contributing to the implementation of the government's poverty reduction policy.

As states about fish is one of the most important diets throughout the history. In the old days the people enjoy exploiting fisheries resources, which seems to be non-exhaustible. The figures provided recently by the Government indicate that the average per capita consumption rate during 1987-1994 was 10.6 kg per year. This consumption rate was lower than that prior to the internal

conflict period of 1974-79, which was in range of 20-25 kg per year. It is said that the substantially lower post-war per capita consumption rate may be due to high post-harvest losses from marine capture fisheries because of lack of infrastructure, over-fishing in both inland and coastal waters and environmental degradation. The apparent consumption of fish and fishery products during 1991-93 was estimated to be about 10.3 kg per year. The Government authorities have projected the demand for fish in the year 2000-2005, based on the estimated population growth rate, under two scenarios, viz., a constant current fish consumption rate of 10.6 kg per year and a higher consumption rate of 21.5 kg per year. For food fish would be in the range of 120,000 - 245,000 metric tons (mt) by the year 2000 and 137,000 - 277,000 mt by 2005.

The fishing industry of Cambodia is subsistence and small-scale in nature. The total number of fishermen in 1999 was estimated at 139,490 persons, and there were a total of 29,556 fishing vessels employed in both in inland and marine fisheries. Most of the vessels were non-motorized and were small in size (96% were less than 5 gross tons). Of the motorized boats used in inland fisheries, 76% were equipped with engines of less than 10 hp.

Like many Southeast Asians, Cambodians prefer to consume fish fresh, and there is a high degree of utilization of fish production of almost 100 percent. Unlike the majority of the Southeast Asian countries, however, inland fisheries instead of marine fisheries plays a very important role in food security of the country and currently supplies about 70 percent of the total fish production, which average 113,450 mt annually during 1990-92. Whilst the growth of inland capture fisheries during the last decade was registered at an annual average of less than 1 percent, the growth of marine fisheries production was about 92 percent. Aquaculture production increased during the same period by 48 percent per year on the average. Nevertheless, the production from both inland and marine capture fisheries has shown a declining trend since 1990, the Department of Fisheries (DoF) was of the opinion that the declining trend might be due to the increase in the number of fishermen, increased use of destructive fishing methods, environment degradation or reporting errors. This extensive capture fishery is constituted by two main sources namely the Mekong River and the glorious Great Lake.

During the last three decades of internal unrest, the inland fisheries have been and still are being over-exploited. The inundated forests that constitute effective breeding, spawning, nursing and feeding grounds for many of the fish species have been indiscriminately cleared for agriculture purposes. The extensive capture fishery in Cambodia is carried out in the Mekong River and Tonle Sap River with the Great Lake at its upper stretches.

The total annual freshwater production of 127,000 tons was recorded in 1937 and 78,000 tons in 1939. However, this figure considers only the commercial catches with the exclusion of family and rice field fisheries which are considered by many experts as very much important as the commercial fisheries. In this regards, the Mekong-DANIDA sponsored Project for the Management of Freshwater Capture Fisheries in Cambodia currently being implemented since 1994, found that the freshwater fish production is still as high as 400,000 tons per year.

Over 500 fish species inhabit the inland water of Cambodia most of which are captured and used as food. Most fish species in the Mekong are well adapted to a widely fluctuating water level, and have a wide tolerance for environmental parameters. Some species can move over wetland, which enhances survival when habitats dry up. Inland capture fisheries can be subdivided into two main components—Great Lake (Tonle Sap) and the Mekong—on the basis of their location. The Tonle Sap accounts for about 60 percent of the total of country inland production. The inundated forest of the Great Lake and Mekong rivers, are considered to be essential for maintaining the current level of inland fisheries production. About 90 percent of the total freshwater fish stocks follow the inundation-spawning pattern and many of fish species breeds in the inundated forests.

## **1.2 Major Issues and Problems in the Fishery Sector**

### **1.2.1 Excess Capacity**

Most of the people in Cambodia are depend on rice and fish for their daily livelihood. As many researchers know fish and it aquatic resources play a vital role in economic and social life of the

rural population. About 75 percent of protein intake is come from fish. A survey (1995/1996) suggests that the average fish consumption rate of 4.2 million people on central Cambodia is 67 kg per capital per year. Nevertheless, there are about 40 percent of total population of 11.5 million are engage in fishing and fish related activities.

In recent years it has been claimed that natural fish stocks of both inland and marine water have declined dramatically in either catch tonnage or value, due to over fishing to fulfill local demand related to population growth and in response to export demand. Due to increase number of fishers the fishing gears and fishing boat are also dramatically increased as well (Table 1.1).

**Table 1.1 Number of, Fishing Population, Fishing Gears and Fishing Boats from 1994-2003**

Item	Year									
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
<b>1- Fishing population</b>										
- Families	5,768	11,725	11,236	10,993	10,913	15,565	15,732	300,168	357,291	333,456
- Persons	17,622	32,531	31,091	30,020	24,180	33,274	34,089	501,394	812,582	654,955
<b>2- Fishing gears</b>										
- Ro bang thnuos	362	427	403	603	635	599	604	485		384
- Day trey	85	91	42	127	72	72	72	73		32
- Day bang kang	13	13	13	24	13	21	21	34		25
- Nor rut chhoung	28	27	26	21	26	26	26	19		18
- Gillnet (m)	1,217,500	813,610	471,454	1,799,810	2,443,120	2,833,470	963,311	6,004,854		8,367,140
- Seine net	1,323	3,814	331	5,946	327	2,343	451	8,734		677
- Neam	295	317	219	210	152	187	283	199		220
- Chhoun	78	54	61	80	68	85	74	70		81
- Chay Ra	104	118	118	147	113	500	620	644		1,010
- Chhnouk					150			116		127
- Lob nor rav						200	205	63,427		356
<b>3- Fishing boats</b>										
- With engine	29,762	27,401	30,428	23,023	20,783	15,106	18,292	30,129	37,109	24,551
- Without engine	7,766	6,075	7,675	11,213	11,199	14,460	16,888	25,921	28,607	40,600

Source: Department of Fisheries, 2002-2003

The degradation of fisheries resources is related to many factors such as environment, siltation, cutting of inundated and damming etc. The environment degradation is related to increasing pressure on land, deforestation of catchments and the conversion of land to agriculture have increased soil erosion. Mining in catchments of some rivers entering the Great Lake has been degraded through exploitation for various purposes. Canals and other connection between rivers and floodplains have silted over. Such environmental degradation has had negative impacts on fish stocks.

The reported increased in rate of siltation in the Great Lake from 20-40 mm per year is speeding up again process of the lake, with the accompanying symptoms: shallowing and narrowing, and increased water temperature during the lowest water levels. The connection between the Great Lake and the Tonle Sap river, and junction of the Tonle Sap river with the Mekong river in Phnom Penh, have become shallow because of silt deposition has reduced the water flow, especially in during the lower water levels, impeding not only boat transporting but also possibly reduced fish migration and the drift of juvenile fish. The reduction in the water flow in the Tonle Sap River has been considered even to be the reason for mortality of sand goby in cage. High silt loads in the Mekong River after the first rains also cause mortality, closing the gills of the goby. Some of the increase siltation from soil erosion might have resulted from deforestation of inundated forest in catchments of several small rivers entering the lake in the northwest. Mining activities almost certainly aggravate the siltation. Unless better information is available on the significance and

impact of siltation of the Great Lake on fish stocks, dredging of the Great Lake is not yet justified from the fisheries point of view.

The exploitation of inundated forests has accelerated, especially since the 1950s. Inundated forests of floodplains of the Great Lake and the Mekong River system have been under severe pressure for agricultural development, for charcoal and firewood production, and also for the use of branches for brush parks (fish attraction devices). Cutting of inundated forests and wood for the construction of fish traps and for smoking fish has also contributed to the forest destruction. However, it is known that fish breed, spawn and feed in these forests during the high water level. Also because of the absence of the trees and bushes, such areas are not attractive for breeding, as eggs and juvenile stages are vulnerable to wave action. Some fish species require a substrate for attaching their eggs. Finally, fish feeding on algae and small organisms dwelling on surfaces of trees and bushes, will also be absent for lack of food.

The current thinking influencing development strategies makes construction of dams on the main stream of the Mekong River in the future less and less probable.

Another environmental concern of cage/pen culture in Cambodia is its negative effect on natural fish stocks. This may be caused by over-harvesting of wild fish seed resources both for domestic stocking material and for export, or by illegal capture of juveniles in the closed season to feed the culture fish.

The fisheries resources depredated which remains to decreasing supply. The population increases, which relates to increase demand of nutrient and food. Hence, competition among those two is becoming very hard-hitting, especially for small-scale fishing who take a large part of total fishermen in the country. PIU-the Fisheries Component, 2001 reported that there were about 87 percents of fishermen were small-scale (family-scale fishing) and only 9 percent and 1 percent respectively were medium- and large scale fishing.

The conflicts are not only come from small scale fishers who fishing for their daily food and livelihood but also arriving from medium scale who intention to catch more fish and more place for their rich in their business as well. Furthermore, the conflicts are also arriving from large-scale fishermen who use to extending the fishing lot boundary and implement the illegal fishing in the lots.

### **1.2.2 Fisheries Conflict in Cambodia**

Conflicts in fisheries refer to complaints contention or violence among all types of resource users, including powerful armed forces behind any groups or individual stakeholders. One case study from Ly Sina in 2003 mention that in Tonle Sap Rive and Great Lake the most common conflicts are appearing between fishing lot owners (commercial fishermen) and fishing villagers who consist of family fishermen (subsistence) and middle scale fishermen.

Conflicts have often occurred when villagers dig wells for drinking water or store water for irrigation purposes, although fisheries log book stated that people who reside in the fishing lot territory are allowed to use water for the needs in family, agriculture and home gardening, but are prohibited from any activities that lead to a change in water regime which could affect the fishing activities in the lots.

In addition, article also stated that people who reside in the fishing lot territory are allowed to travel and transport any agricultural products or fishing products across the area, but must not damage the fishing activities in the fishing lots. Yet, traveling across fishing lots in rainy season is still problematic, because the fishing lot owners have interpreted the last sentence of this article to defend their abuses (charging money), and this is one example of inadequacies in the existing law, allowing fishing lot owners to find legal justification for their actions.

With the law of the 2 year-auction system, fishing lot owners are unscrupulous to use all means including illegal fishing gear and illegal ways of practice to intensify the catch for their benefit, as it is uncertain whether they will win the next auction.

This has ignited the conflicts with the neighborhood-fishing villagers who share the neighborhood of body water who rushed to fishing lot to catch fish in the lot and confiscate water pumps and were brought to the local authority. To compete for their survival, the fishermen commit similar-illegal practices in the open access areas, where although they will be, punished by fisheries inspectors, if caught red handed.

The use of illegal fishing gears, especially trawling riverbeds, in the fish reserve areas is considered the most lucrative job. Involvement by armed forces in this job is not uncommon, for instance. Brush-park (a big pile of dead trees in the water) is a passive gear easily caught by one's eyes, as it needs to be in place for months to attract fish. Protection rackets for illegal fishing boats are common. The competition between illegal operators and local fishermen trying to survive often leads to violent confrontations. Even the local police, fisheries inspectors, military police and the navy compete for turf.

The incidence of violence happens not only on the body water, but also in the area of inundated forest of the fishing lots, where a lot of interests such as hunting, firewood and agricultural lands are being competed for. In spite of the ban by law, thousands of hectares of inundated forest have been destroyed for rice cultivation and land possession. Until now, law of land possession was not well defined, resulting in confusion between land ownership and possession. In this area, the violence happens especially in open fishing season (October - May), as it is the dry season in which many types of forest products and wildlife can be exploited.

Furthermore, many boundaries of fishing lots were neglected or the government couldn't afford to re-demarcate during the war, resulting in confrontation between lot owners and the residents. Many fishing lot owners are believed to try to take advantage of the situation. Additionally, violence also happens in the former abandoned fishing grounds controlled by military. Fishing villagers used to customarily access the areas, but later when the war ended in 1999 fishing lot owners wanted to annex these areas to the neighborhood fishing lot area, a case of fishing lot No.8 in Battambang province.

One the other hand, NGO forum on Cambodia's fishing conflict in Battambang, mentioned that the fishing lot boundaries are now not clearly defined on the ground. The fishing lot owners collude with fisheries official, policemen, militants and district official in determining the lot boundaries

### **1.3 Objectives the Study**

- To develop broad framework for addressing approach for reducing over capacity in Southeast Asia
- To examine where fisheries conflicts may arise and provide plans to ameliorate these conflicts and its role in reduction conflicts and enhancing national/regional security.

### **1.4 Research Method**

#### **1.4.1 Study Area**

Cambodia is situated in Southeast Asia on the coast of the Gulf of Thailand and has a total of area 181,035 s.q. km. About 85 percent of the total population is employed in agriculture. Most of these people are living in the lowlands. They use not only the fertile soil but they also encroach into the forests for their livelihood. In Battambang province, for example, close to the Tonle Sap Great Lake, people practice agriculture on arable land. Agriculture is the major activity, providing the staple food to the people. However, the agricultural productivity is insufficient to support the people's requirements, because of the population increase, small land holdings and low agricultural production. Consequently, rural poor people encroach into the marginal lands such as the

embankment of rivers and flooded forest areas in order to enlarge paddy rice fields or vegetable gardens. Besides these traditional agricultural activities, farmers have a good alternative in fishing, to generate income and achieve food security.

Pursat province is located along the Tonle Sap River of reach in natural resources, which include forest and fisheries. The natural resources in the province provide a lot of livelihood activities and nutrition to the people. In the late 2000 there are about 45,000 ha of fishing ground which includes fishing lot, inundated forest and farm land was released for 17 community fisheries to manage and to use for their individual income generation. Two locations of Pursat were selected for community and non-community fisheries separately. Anlong Raing is a community fishery which formed in 2001 by one local NGO call CFDS-Oxfam (Cambodia Family Development Services of Oxfam). After formed the community fisheries this organization was called Department of Fisheries (DoF) and many organizations such as APDO, FAC, and BDAS to help in improving of many concerned factors. This community is located in Anlong Raing village, Kampong Pou commune, Krakor district of Pursat province. There are about 431 people of 91 households are living in the village with fishing area of 1,700 ha. Wile, Prek Trabek is a floating fishing village (non-community fisheries), which is located in Kanh Chor commune, Kandieng district of Pursat province. There are 1,378 people of 254 households are living in this village. Rice farming, small-scale fishing and fish culturing are the main occupation.

Kandal is the other province, which located around the capital city of Phnom Penh. There are 1,087 village of 147 commune and 11 district located in the province. In 2000, reported by the governor of Kandal, the population was about 1,075,125 of which slightly equal of man and women. Labor ages of 15 to 64 are dominated mostly in the province. Ta Skor is a village located in Lvie Em district of Kandal. It is a fishing village that formed into fisheries community in 2000 by Mekong River Commission – Reservoir Fisheries Management Project with collaborated with Department of Fisheries. And Peam Ta Ek is another village, which is farming as the main occupation. This village is located in the same commune and district with Ta Skor. There are 1,665 people of 350 households living with agriculture as a main occupation and fishing as a supplementary occupation. No community fishery is formed yet for this village because the people do not keep fishing, as the main occupation and appearing of conflicts seem to be less than others.

Kampot is a coastal province located in the South of the country. This coastal province is combination of 477 villages of 92 communes (8 districts). The population is 528,405 of which 52.1 percent are women. This population is contributed only 4.6 percent to the total population in the country in 1999. Doun Toak is a village of Troeu Kor commune, Kampong Bay District, Kampot province. The main occupation of the people in this village is fishing and farming is a secondary occupation for the rest of the people. Population in this village is about 1,118 of which slightly equal of men and women. Finally, Chan Hoan is another selected village, which is located in Prek Thnoat commune, Kampot district, Kampot province. There are about 3650 households are living in the village with fishing is a main occupation. Besides fishing some of them do rice farming as a main occupation too. Wood fuel collection is implementing by few households in the village (Figure 1.1).



Group discussions were done after the standardize questionnaire and the key informant interviews had been completed.

**Table 3.1: Population and Sample of the Study Credit members Sample**

	Pursat		Kandal		Kampot		Total
	CF	NCF	CF	NCF	CF	NCF	
Individual interview	45	45	45	45	45	45	270
Group discussion	2	2	2	2	2	2	12
Meeting with NGOs and institution involvement	3	3	3	3	3	3	18

*Note: CF: Community Fisheries  
NCF: Non-community fisheries (Fishing villages which are not recognized by the law)*

### **- Data Analysis**

Being assessing conflicts and resolution in the selected location the qualitative analysis was done based on questionnaire surveyed, checklist, personal observation, and informal group discussion. The information furnished from the respondents interview via questionnaire were analyzed quantitatively to the possible extent by using descriptive statistic such as frequency distribution, mean, percentage, and so on and some graphs may illustrated by EXCEL program.

# *Part II*

## *Literature Review*



## **2.1 Institutional and Legal Framework in Fisheries Management System**

### **2.1.1 Management Review of Administration**

Management of fishery administration of Cambodia encompasses of 2 main levels are central, and provincial/municipal administration level. The central administration level is published by Fisheries Department and is approved by Ministry of Agriculture, Forestry and Fisheries (MAFF) and provincial and municipal levels are approved by DoF.

#### **- Central Management Level**

Fisheries management necessitates an intricate and wide-embracing set of tasks. The management is intended for ensuring the optimal benefits and stable fish production for gain the local participation. To achieve this intention Fisheries Department can be taken to comprise of Fisheries Management Policy and Plan, Implementation strategy, Fisheries Law, Human Resources Development (HRD), Data and Information Management, and Monitoring.

#### **- Fisheries Management Policy and Plan**

Since 1979, the DoF had policy to supply sufficient fish to people via exploitation of fisheries resources to meet the need of the country and to care for and conserve the resource for future use, at the same time.

At present time, the national fisheries policy is event now concerning on managing and conserving the natural aquatic resource in order to provide adequate stable diet to people. Furthermore, the RGC has a vision for Fisheries in a future in which Cambodia and its people are able to enjoy sustainable social and economic benefits from the exploitation and farming of living aquatic resource

The department has set up of three term of Fisheries Management Plan (FMP), which is short-term training (1year); medium term planning (5years) and Long term planning (10years). Please note that these planning are approved by the MAFF.

Short-term training of 1 year plan had already implemented since 1999. Medium term management plan (1999 – 2003) started since finished of the short-term training plan. This plan was strongly concerted to the sustainable fishery environment with sufficient supply of a higher protein to the population. The priority program consisted of arrangement and deliverance of fishery resource conservation and management to the fishing communities; revised of the existed fisheries laws, which are fitted to the social and natural environment; strengthened of law compliance and improvement from the people and the prevention of illegal fishing practices. Moreover, the full operated of all Inland Fisheries Research and Development Institute (IFReDI) was also taken in the plan.

With long-term planning are to maintain sustainable natural resources, develop aquaculture, inland and marine fisheries research. These activities would provide the higher fishery outputs to share in the country GDP, improve the living standard of people and national economy as well. The promotion of reforestation and restoration of natural inundated forest and aquaculture activities are also undertaken in this planning.

### **2.1.2 National Fisheries Policies and Laws**

Cambodia Fishery Law divides into 17 chapter and 129 articles.

In first chapter is mentioning about provisions and is containing of 3 articles which including purpose of law, fisheries resources in the country and fishing means catching.

Second chapter is containing of 4 articles, which focuses on fisheries domain. Fisheries domains in Cambodia devised into 2 are marine and freshwater fisheries domains, which own by the state. Inland fisheries domains categorize into 3 categories are fishing areas, preserved fishing areas and

inundated forest areas. Differently in marine fisheries domains are categorizing into 4 categories are coastal fishing areas, offshore fishing areas, reserved fishing areas and inundated forest areas. Please note that these fisheries domains are defined by the sub-degree.

Fisheries administration are stating in Chapter 3. In this chapter have 5 articles, which include administration authority, uniform organization structure, responsibility and functioning of fisheries administration.

Chapter 4 is discussing about sustainability of fisheries management in Cambodia. This chapter divides into 4 articles, which includes fisheries statistic record, fisheries management policy and committee, national fisheries management plan developing, and fishing season divisions.

Furthermore fisheries protection and conservation is mentioning in Chapter 5 of Cambodia's fisheries law. This chapter is a largest chapter in the Law. It is combining of 8 articles which sites about classification of fisheries resources in the country, prohibit and protect the fishing conservation areas, description and prohibition illegal fishing gears/method, fishing activities and import of alliance species in and out the countries and last article in the chapter illegal/un-assessing of building fisheries domains blocked such as dam/dikes across the rivers.

Mangroves and inundated forest management is stating in Chapter 6 which combines of 4 article. First article mentions about establishment of Inundated Forest and Mangrove Fire- Fighters Committees, 2nd article mentions about protection of inundated and mangrove in fishing lot and inundated forest areas, and 3rd and 4th mention about prohibition of cutting and using inundated forest and mangrove in large-scale and ban of using inundated forest land in any purposes.

Chapter 7 is talk about the management of fisheries exploitation country. This chapter divides by 9 articles, which includes definition of fishing scale, fishing location by scale of fishing, fishing permission, fisheries monitoring by using logbook from Fishery Administration and fish trade permission.

Chapter 8 is discussed about Inland Fisheries Exploitation. This chapter is combination of 6 articles, which includes fishing lot operation mechanism, medal scale operation mechanism and family/small-scale operation mechanism.

Chapter 9 is discussed about Marine Fisheries Exploitation. This chapter is combination of 8 articles, which includes medium scale operation and recording in logbook, shipment of fisheries products and permission to do fishing or fisheries resource research in the international marine water registration.

For Aquaculture Management is sited in Chapter 10. This chapter has 6 articles, which include the permission of aquaculture operation, aquaculture statistic book record form Fisheries Administration, fisheries laboratory requirement and other aquaculture seed collection and export-importation.

Chapter 11 is sited about community fisheries in Cambodia. This chapter is combination of 5 articles, which states about nationalist of forming community fisheries, procedure of forming which would determined by sub-degree, fishing boundary, mechanism of community fisheries management, and entitled to abolish the community fisheries for public benefit.

Chapter 12 is also had 6 articles. This chapter is claiming about transportation and trades of fishery products, which includes procedures of transportation of fishery products, process of commercial exporting of fishery products, and exporting, importing, buying, selling, transporting, processing and stocking of endangered fishery products.

Chapter 13 is talk about licensing. It has only 2 articles, which includes licenses authorization and license formation.

Chapter 14 is sited about procedures for solving fisheries offences. It is a large chapter, which combination of 14 articles. First a fishery offence is crime as stipulation in this law, fisheries

administrator uniform, rights of fisheries administrators and duties of fisheries administrators are also stated in the this chapter.

Chapter 15 is talk about penalties to the illegal/informal fish related activities in the country. This chapter is contented 19 articles. The penalties to illegal or informal fish related activities have divided into three classes such as imprison from 3 to 5 years and all evidences is seized for class 1, from 1 to 3 years and subject to a fine from 5 million Riel to 50 million Riels for class 2 and 1 month to 1 year or must be subjected to a fine from 1 million Riel to 5 million Riels for class 3. Please remind that all evidences can be seized for the state property. Furthermore any people who commit fishery offense leading to damage of fisheries system in the fisheries domain must pay the cost to rehabilitation or repair the damage and penalties also do with the person who implements fishing and fish transporting activities without any permission from Fisheries Administration office and contradiction with the law.

Chapter 16 is very short chapter, which is combination of 3 articles and discussed about enforcement of the court judgment. The enforcement of the court judgment is the duty of completion fisheries administration and after the court judgment comes into effect, the confiscated evidence shall be managed following legal procedure.

Final provisions of the law are stated in the last chapter of 17.

The MAFF has drafted a new Fisheries Law, prepared a Fisheries Master Plan, and a sub-decree on Community Fisheries and Fishing Lot Auctions has been issued after extensive consultations with all stakeholders.

## **2.2 Conflict in Fishery**

### **2.2.1 Background of Fishery Conflicts**

Literature on fisheries conflicts can be divided between those that examine site-specific conflicts and those that review the theoretical aspects of conflict. The former provide detailed information on a particular scenario. Although many studies provide useful information on a specific location or issue, the results cannot necessarily be extrapolated with any ease or certainty to a wider context (thereby limiting the utility for policy makers).

The theoretical approach to the study of conflict advances new frameworks that can be used to describe and analyze natural resource conflicts. Since the inception of conflict theory during the immediate post-war period, these approaches have included sociological aspects, economic and econometric aspects, technological aspects and anthropological aspects. In addition there is a large body of literature that sees the emergence of conflict in natural resources as the specific function of rising population and/or a decreasing resource base.

Although both approaches have their merits, there have been few studies of the institutional aspects of fisheries conflicts. Given the increasing recognition of the role of institutions generally, this appears to be an important omission. For example, little attention is paid to the way communities can and do co-operate over natural resource, usage, which might explain why conflicts do not emerge in some situations.

Conflict emerges when the interests of two or more parties clash and at least one of the parties seeks to assert its interests at the expense of another party's interests. Conflict involves one group asserting its interests at the expense of another. This type of conflict is not always negative. Positive conflict highlights incompatible goals or objectives, thus focusing attention on something that needs to change for the benefit of all concerned. Positive conflict has also been described as the means by which communities hold themselves together through establishing consensus within groups, however, both note that only when political and economic elites are prepared to act with marginalized groups is change likely to occur: if the elites' priority is to maintain their position and the status quo, the positive role of conflict may not emerge.

### **- Origins of Conflict**

Conflicts between groups emerge for a variety of reasons. Conflict can arise as a function of social structure (the sociological perspective), as a function of power relations (the political perspective) or as a result of rational decision-making by an individual seeking to maximize their personal utility given a pool of scarce resources (the economic perspective). The issue that often sparks off a conflict is the 'perception' that the one group is gaining (or, in economic terms, maximizing their utility) at the expense of another. The underlying reason why conflict emerges, however, is often more complex. It may transpire that the conflict between two groups over access to a pond is not about access at all, but about ethnicity.

Warner, 2000 identified the emergence of conflicts over natural resources into four issues are 1- demographic change; 2- natural resources competition (increased dependence upon the natural resource can heighten competition for space and resources); 3- developmental pressures (as government policy switches from livelihood protection to food production) and 4- structural injustices (changes in legislation that deny or severely restrict access to a resource by dependent groups in society). In addition to these four reasons, institutional failure has to be considered explicitly. Thus the roles of institutional analysis in general and institutional failure in particular are explored as following section.

### **- Institutions and Conflict**

Two types of institutions are informal and formal. Informal institution refers to markets, communities and social capital that are a set of rules or norms defined and policed by the users. These rules and norms are not written down, but held as a set of accepted practices, which govern behavior and shape society. While, formal institutions such as marriage, the State, the judiciary, the political system -- these also consist of a set of rules and norms, but are defined and policed by a distinct group (not necessarily the users). They are enshrined in regulations and constitutions and are designed to govern behavior and shape society but are not necessarily accepted by all users.

Although the terms are frequently confused and used interchangeably, there is an arguable distinction between institutions and organizations. Organizations are the groups of individuals that are bound by the institutions as described above. Thus, the government is the organization bound by the institution of politics, a Fisherman's Committee is the organization bound by the institution of the local community, property rights, market etc.

Neo-classical economic theory states that institutions emerge through a process of rational choice, whilst New Institutional Economics argues that institutions exist to minimize and internalize transaction costs. Knight, 1992 suggested that institutions evolve to help individuals deal with issues of collective action. They envisage two types of collective action institutions: those that only produce goods for the community and those that produce bad -- in both cases they fulfill the criteria of reduced transaction costs and maximized benefits -- although the bad may produce sub-optimal outcomes. The second group includes slavery, serfdom and sharecropping.

Socioeconomic disciplines allow for the interaction of non-rational actors in institutions. Here it is argued that institutions emerge as the result of a supply and demand effect. A shock creates an institution; demand for subsequent change to the format of that institution results when a gain cannot be captured under existing arrangements. Demand for change may be stimulated by changes in product and factor prices (wages, land etc); technology (new machines and processes) and market size (rise in population). Demand for change can also arise from a perceived need to shift income towards the institution; that is, demand can come from a need to increase supply and alter distribution. Feeny, 1998 shows the same argument explains the institutional choice of serfdom over slavery. He argues that where markets were too limited to warrant the large-scale agricultural production associated with slavery; serfdom emerged as an institution, rather than slavery. In the case of institutions that emerge in fisheries, the community of users demands rules to mediate access, use and allocation of resources. The supply of the institution to mediate access, use and allocation arises from within the community to meet the demands. The form of the

institution then changes as conditions in the fishery (gear use, number of fishers, stock levels etc) change and demands change accordingly.

The above supply and demand thesis, however, fails to account for power dynamics and power asymmetries. In its broadest sense, power in its most general sense is the potential or ability to effect change, to mobilize forces in order to achieve particular results. In his rereading of power, Foucault asserts that power is not merely the power to say "No" or to prohibit illegal or legitimate actions but is also the ability to say, "Yes" to promote certain forms of behavior and activity. In this sense, power in Foucault is not about prohibition but rather about normalization. He understands power as a mobile network of relations rather than as a centralized and stable repressive force; it operates through discipline, surveillance, and regulation (and, quite significantly, self-regulation). This mobile network of relations occurs as a result of small happenings, which gradually form a whole and, significantly, he argued that power (and knowledge) had to be understood from the bottom up rather than as a top down process. Acknowledging the use of power to manipulate actions, Knight, 1992 observes that institutions emerge as a response to 'strategic conflict' over substantive social outcomes and that institutional development is the result of a process of bargaining between actors--each trying to structure outcomes that favor themselves over others. He further notes that the nature of the contest is determined by the actors' relative power differentials and their ability to manipulate the choices of others. In other words, institutional rules do not necessarily emerge as the logical choice for the collective goods, nor because they have agreed with them nor because they evolved as Pareto improvements but because the weaker contestants cannot do better than comply. Thus, the supply and demand for change is rarely a collectively agreed upon action, rather it is the outward manifestation of power asymmetries within the 'Community' of users.

The role of the State in the allocation and use of power in institutional change is important. Irrespective of the demand, the ability of institutions to change or emerge is often dependent upon the state's willingness and ability to allow this to happen. Strong states can control institutional change through a variety of instruments (freedom of speech and movement for example) and weak states often unwittingly control change by allowing special interest groups to dictate the conditions under which change will (or will not) happen. It is thus clear that the role of politics is also a key part of the institutional change process. Political order is able to facilitate change, including the cost of institutional design, knowledge, normative behavior and existing arrangements assert that without state intervention institutional change will probably not be supplied at a socially optimal level because the private return to the political entrepreneur is far greater than the social return.

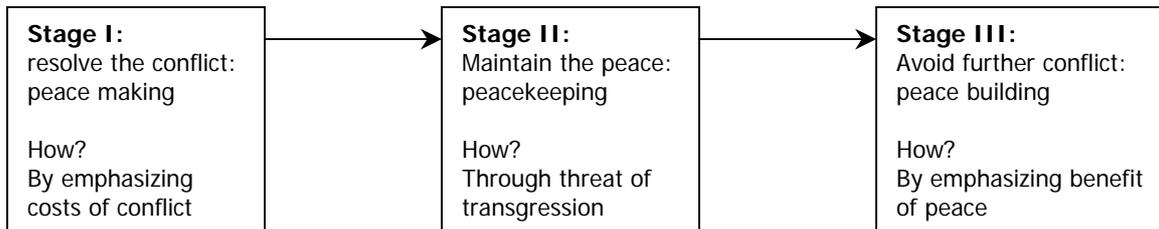
#### **- Conflicts--Containment, Management or Resolution?**

Conflict is an essential part of how society functions, but its positive role can become destructive. A useful indication of how far conflict has become a destructive force within society is to observe to what degree, if any, it is managed.

At the very basic level, conflicts are 'contained' where infractions are policed, rules are written, though not necessarily enforced and the existence of a problem is recognized, though no way forward may be discernible. When civil and state institutions have reached a point that they are able to step in and actively deal with conflict they will at first manage it--platforms for airing grievances will be developed and will be easily accessible for all stakeholders -- particularly including the most disadvantaged. Management should ensure that the positive elements of the conflict are recognized and that the situation does not decline. Resolution takes management one-step further.

Much of the research into conflict resolution started with studies of the Arab-Israeli conflicts in the late 1960s and had a recent resurgence in the rise of European conflicts following the end of the Cold Wars. The principles of conflict resolution have spread into a wide range of other disciplines such as personnel management. Galtung, 1971-1976 identifies 3 key stages of conflict resolution--peace keeping (the dissociate approach) by which the two sides to the conflict withdraw from the arena; peace building (the associative approach) where symbiosis is developed and peacemaking (conflict resolution). The tools for maintaining each stage has to be economic and social

incentives, and some viable threat should the agreement reached in stage one be violated (Figure 2.1).



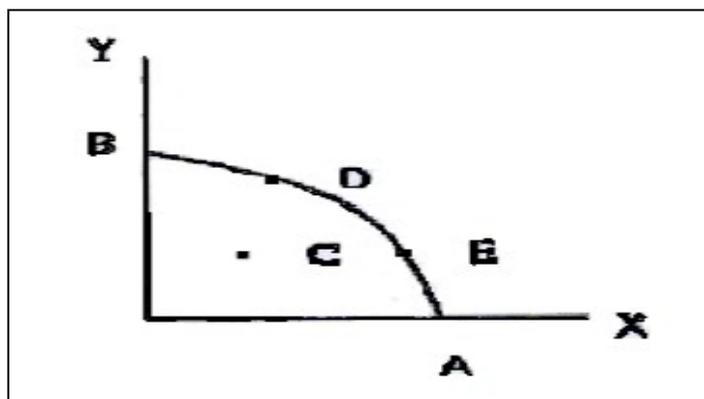
**Figure 2.1: Three Stages of Conflict Management, after Galtung, 1971**

'Tit-for-tat' and 'trigger punishment strategies' also help explain why incentives might be needed to maintain Stage two peace. Under a situation of repeated games, a tit-for-tat strategy indicates that player *A* will chose the same option in the next game-- *IS* chosen by Player *B* in the previous game. If player *B* opts to abide by the rules, so will Player *A* and vice versa. Assuming that one player always chooses to abide by the rules, peace will be kept by the threat of punishment should they not abide? As described by Miall, Ramsbotham and Woodhouse (1999), a tit-for-tat strategy actually involves cooperation, bears no grudges and, crucially, is predictable. They argue that in the first stages of conflict resolution, there has to be an ability to initiate cooperation.

A more dramatic form of punishment for transgressing the peace agreement is the trigger strategy. As soon as player *B* opts to break the agreement, player *A* plays the Nash Equilibrium strategy forever, which results in the breakdown of peace. Ideally, both players should choose the cooperative equilibrium as the rational choice when faced with the possible threat of retaliation by the other side should they fail to abide by the agreements. Thus, strong institutions capable of delivering credible threats are needed to maintain peace and manage conflicts.

Nicholson (1970) and Powelson (1972) use a modified production possibility frontier model to explain conflict resolution. Taking the view that conflict is a result of unequal allocation of resources; it is argued that the optimum resolution has to be on the line *BA*, at points *D* or *E*, for example (Figure 2.2). Any moves beyond the line are not theoretically possible because this would involve allocation of resources that don't exist; any resolution that is inside the line (point *C*) is an inefficient use of resources. Moves towards the line *BA* are thus beneficial to society, those away from it non-beneficial. Just as in economic terms perfect markets would produce production solutions on the line, so in conflict resolution terms perfect institutions would produce resolutions on the line.

A key issue of resolution would appear to be that it has to come from within the community but will almost certainly require an outsider to facilitate the process. Successful conflict resolution is achieved where the solution is perceived to have improved for all stakeholders. The resolution of conflicts does not necessarily change long-term issues -- for this to occurring more active management and resolution techniques are needed. In order to achieve this, full and effective participation of all stakeholders in the process has to be included. By definition this has to include those state structures that would assist change to take place within communities and in other sections of civil and political society.



**Figure 2.2: Conflict and the Possibility Frontier, after Powelson, 1972**

### 2.2.2 Typology of Conflicts in Fisheries

In any bio-socioeconomic system as complex and as dynamic as a fishery, with its many interactions amongst natural resources, humans and institutions, it is hardly surprising that conflict tends to be prevalent. Internal fishery disputes arise regularly over allocation of scarce fish resources, over the division of fishery benefits between fishers and processors, and over short-term management arrangements between fishers and governments. Meanwhile, external conflicts are increasingly common, with competing users--such as aquaculture, forestry, tourism, and ocean mining--vying for access to aquatic space and fish habitats. Underlying these more immediate internal and external conflicts are philosophical debates over ownership, control and overall policy directions in the fisheries.

The diversity of these conflicts seems to conjure up an image of the fishery as being endlessly buffeted by a 'sea' of disjointed, unconnected incidents. There is a risk that the management and policy making process may neglect the overall fishery picture if the focus is too much on 'fire-fighting' these seemingly unrelated conflicts. Furthermore, there is a possibility that a perceived fishery 'chaos' may be used as excuse by governments and donor agencies to abandon fishery development efforts.

It is thus crucial to recognize that 1- there are many examples of fisheries that work well, with little conflict, and 2- when fishery conflict is prevalent, it tends to follow definite patterns, with clearly discernible roots. In particular, conflict can often be best understood as arising from natural tensions between three differing fishery paradigms (or 'worlds views'), each based on a different set of policy objectives. This article attempts to characterize the various forms of fishery conflict, to provide a means of analyzing fishery policy debates within a unified framework of paradigms, and to learn from those fisheries that are relatively free of conflict.

A conflict typology, based on four principal categories—1- philosophical conflict, 2- management/institutional issues, 3- internal allocation, and 4- external issues between the fisheries and outside players. One case study which presented by Anthony T. C., 1992 focused on what is rapidly becoming the key philosophical debate in fisheries, the prevalent form of centralized government management versus two competing 'poverty rights' options, one based on individual harvest quotas and the other on community property rights. This is followed by analyses of two studies involving internal allocation conflicts, in Canada's Pacific salmon fishery and Atlantic ground fish fishery respectively. Finally relationship between fishery conflict analysis, the framework of paradigms presented herein, and the broad policy goal of developing *sustainable fisheries* is discussed.

In most fisheries, there appears to be little room available to increase long-term sustainable fishery benefits simply by increasing production. Thus fishery policy tools are generally limited to 1- increasing efficiency of harvesting and of management, and 2- making allocation (distributive) decisions, particularly determining who has the privilege of access to the fish available for capture.

#### **- Efficiency and Allocation**

The concept of *efficiency* is a source of considerable confusion policy discussions, within the fishery and indeed throughout the economy. Essentially, the concept is a simple one--efficient policies those, which give the 'best', results possible (measured in terms of overall well-being or net social benefits) within the means available, equivalently, those which achieve the desired goals with the least negative effects. Hence, the pursuit of efficiency is desired definition. However, difficulties arise in applying the concept, due to the inherently multi-faceted nature of 'societal well being as a policy goal. There has been a widespread tendency to oversimplify this goal equating social well being with wealth (or rent) maximization, thereby confusing the general idea of efficiency with the narrower idea of economic efficiency. From an overall policy perspective it is

crucial to note that a blind pursuit of 'efficiency' is meaningless without clearly defining what is meant by the 'well-being' of the relevant players.

In the fishery context, the importance of pursuing efficiency is especially great in 'zero-sum' fisheries, where an increase in one group's allocation means less for others. For example, measures to decrease post-harvest losses have the potential simultaneously to improve the well being of all participants. However, in reality, fishery players will probably differ philosophically over objectives to be pursued, and hence over the definition of an efficient fishery. Should the aim be towards efficiency in generating wealth, in providing employment, in maintaining the sustainability of coastal fishing communities, or some other measure of well-being?

**Table 2.1: Typology of Fisheries Conflicts**

<b>Fishery jurisdiction</b>	<b>Management mechanisms</b>	<b>Internal allocation</b>	<b>External allocation</b>
Property rights	Management plans	Gear War conflicts	Domestic vs foreign
The role of government	Enforcement conflicts	User group conflicts	Fishermen vs aquaculture
Inter-governmental conflicts	Fishermen/Government interactions	Fishermen vs processors	Competing ocean users

Given these differences over the goals of efficiency-enhancing policies, it is not surprising that such measures lead to fishery conflicts. In practice such disputes typically revolve around proposals to *re-allocate* limited fish resources to those sectors of the fishery perceived to be most 'efficient'. Accordingly, fishery conflicts tend to be dominated by allocation issues; indeed allocation of fish harvest often represents the only real tool at the disposal of fishery managers.

**- A Typology**

Despite superficial appearances of 'chaos', the wide range of fishery conflicts (of both the efficiency and allocation varieties) can be organized into a relatively small number of categories, under four interrelated headings:

- 1- *Fishery jurisdiction*: involving fundamental conflicts over who 'owns' the fishery, who controls access to it, what is the optimal form of fishery management, and what should be the role played by governments in the fishery system,
- 2- *Management mechanisms*: concerning relatively short-term issues arising in the development and implementation of fishery management plans, typically involving fishers/government conflict over harvest levels, consultative processes and fishery enforcement.
- 3- *Internal allocation*: involving conflicts arising *within* the specific fishery system, between different user groups and gear types, as well as between fishers, processors and other players.
- 4- *External allocation*: incorporating the wide range of conflicts arising between internal fishery players and 'outsiders', including foreign fleets, aquaculturists, non-fish industries (such as tourism and forestry), and indeed the public at large.

These four principal conflict classes are intended to be comprehensive but not necessarily mutually exclusive. Each current fishery dispute appears to fit under at least one of the headings, although certainly some will fall under more than one (for example, in cases where apparently straightforward allocation disputes have roots in philosophical conflicts over jurisdiction). Furthermore, most fishery players are involved in a wide variety of conflicts simultaneously. In any case, the headings are sufficient to allow the formation of a conflict typology, described in the table above. Each of these areas of conflict is described briefly below.

## **- Fishery Jurisdiction**

*Property rights:* Debates over property rights involve major long-term philosophical questions concerning legal, historical and/or *de facto* ownership, access and control in the fishery. A particular focus lies in conflict over the relative desirability of fishery property options, such as open access, centralized management, territorial use rights in fisher, community-based common property management, lased individual quotas, and privatization.

*The role of government:* A major and fundamental conflict is rapid evolving between advocates of 'modern' fishery management, with focus on centralized government regulation of harvesting activity, a challenges by more decentralized alternatives, including the community- and market-based management options noted above well as the development of 'cooperative management'.

*Inter-government conflicts:* Despite new challenges to the dominant root of government in fishery management, the most cases there is still a large government presence, and intergovernmental conflict is common band between nations (as in trans-boundary fisheries) and between jurisdictions within a nation (as in disputes over fishery access between the fisheries provinces on Canada's Atlantic coast).

## **- Management Mechanisms**

*Fishery management plans:* The development of periodic manage plans for determining allowable harvest levels, harvest allocation fishing times, and/or fishing gear represents such a major recurrent source of fishers/government conflict as to deserve a category on own, although these conflicts in fact often reflect fishers' concerns over internal and external allocation issues, as discussed below.

*Enforcement conflicts:* Fishers/government conflicts over enforcement arise in two major forms, the most common involving complaints excessive government enforcement imposed on a particular user group and the reverse based on complaints by one set of users that enforcement is overly-lenient when applied to competing users (as been frequent perception, for example, amongst 'inshore' and offshore fishers on Canada's Atlantic coast).

*Fishers/government interactions:* An omnipresent source of conflict the perception on the part of fishers that government managers and scientists ignore the knowledge and ideas of the fishers; even in fisheries with elaborate and expensive consultative processes, such conflicts a likely to remain as long as the fishers are excluded from the actual decision-making processes.

## **- Internal Allocation**

*Gear wars conflicts:* Conflicts arise within the commercial sector of the fishery, generally focused on allocation between vessel categories typically, this involves differences in fishing gear, but differences in sea (as in traditional artisan all industrial fisheries conflicts) may also fit her for example in cases where such disputes involve technological interaction on the fishing ground.

*User group conflicts:* Major disputes, both short- and long-term, arise between the various broad classes of fishery users, generally representing quite different segments of society (such as artisanal vs industries fishers or commercial vs recreational fishers).

*Fishers vs processors:* Apart from the possibility that vertical integration by processors could increase conflicts between small-scale and industrial fleets (a matter included under user group conflict above), fishers- processor disputes tend to be of a typical labor-management form, involving price and/or wage bargaining.

*External allocation Domestic vs foreign fisheries:* A range of conflicts exists between coastal States and domestic fishers on the one hand, and distant-water fishing nations and their fleets on the other; these include problems of illegal fishing within the coastal State's EEZ, legal fishing just outside the EEZ (as on Canada's Grand Banks), destructive high-seas fishing (as with drift-nets), opposition of domestic fishers to bilateral fishing agreements, etc.

*Fisher's vs aquaculture:* The potential exists in some aquatic environments of developing aquaculture as an economic alternative for those in the fishery sector. However, a variety of

factors -such as poor control and planning of aquaculture development, lack of suitable government training and risk-alleviation programs, and a natural reluctance amongst fishers to abandon capture fisheries for culturing operations - has tended to limit such economic diversification. Conflict has been more common than symbiosis amongst these two fish-based sectors; this conflict focuses on ocean space and quality, fish price and market access, and the possibility of disease transfer.

*The fishery vs competing aquatic uses:* In addition to conflict with aquaculturists and foreign fleets, fishers also face other external disputes, most notably with shipping (particularly involving oil spills), ocean mining (as in Canada, Indonesia, Norway and elsewhere), tourism (as in many Caribbean islands) and forestry (for example, in the rivers of North America's Pacific coast). More generally, this conflict category may be viewed as incorporating the most 'global' of disputes, those involving the nature of, and the priorities for, usage of oceans and other aquatic systems.

As with any categorization of real world complexities, the above typology is of necessity a simplification. However, it does appear consistent with the realities of present-day fishery systems, incorporating most policy debates underway in such fisheries. As noted above, the case studies presented below focus on conflicts arising within the fishery, under the 'Fishery jurisdiction' and 'Internal allocation' headings -the increasingly important 'external allocation' conflicts will be considered in a subsequent article.

## **2.3 The Fisheries**

### **2.3.1 Historical Catches and Landings**

#### **- Inland Fisheries**

The inland fishery was the first natural resource to be commercially exploited in Cambodia for generating national income. The Cambodian inland fishery *industry* was started at the beginning of the French protectorate period in 1864 with the introduction of fishery management practices, such as the lot system (from the French *lot de peche*) and licensing. It is the second largest sector after agriculture in terms of employment. A study in Svay Rieng province indicated that more than 80 percent of the total population engaged in agriculture, and 80-90 percent of the agriculturalists engaged in family or rice-field fisheries.

There was no record of inland fish production figures prior to 1940, even though fishing became an industry in 1864, with the introduction of fishery management practices. The inland fish production figure recorded from the licensed fisheries during the 1940 to 1970 period ranged between 100,000 and 138,000 tons. Surprisingly, official statistics of the DoF within the 1982 to 1992 period varied between 55,000 and 74,000 tons, which if accurate, shows a drastic decline since the 1940 to 1970 period. The market value of the approximately 100,000 tons of fishery production in 1992 was shown to be USD 30 to USD 40 million, based upon an average fishing gate price of USD 0.30 to USD 0.40 per Kg. It was also noted that government revenues amounted to approximately USD 4.8 million in 1991, not including local trading taxes.

A 1998 assessment estimated the economic value of the inland fishery to Cambodia to be between USD 150 and USD 250 million annually.

The best estimates of Cambodia freshwater fish production were from 1940 through 1992. Early data points are from Chevey and Le Poulin, 1940, and Bardach, 1957. Please also note the discontinuity of data during the 1971 through 1979 Khmer Rouge period, when no data was recorded. The remainder is the official statistics of the DoF.

In recent years it has been claimed that natural fish stocks of both inland and marine water have declined drastically in either catch tonnage or value, due to over-fishing to fulfill local demand related to population growth and in response to export demand. The general census of 1998 determined that the population of Cambodia was 11.43 million, about double that of the 1962 census, where total population was 5.73 million. Another perspective on population growth was reported in the Cambodia Daily (24 Oct 2002) that in 1979, after the invasion by Vietnam,

Cambodia's population was approximately 4 million people, which today is estimated at 12.2 million, a threefold increase, and is expected to be over 15 million by 2010. These population growth figures are indicative of the already existing threat of even more intensified exploitation of the riverine and wetland environments in the future.

Since approximately 90 percent of the total population of Cambodia lives in the Mekong Delta and Great Lake regions of the central plain (80% of them rural agriculturalists and fishers), the wetland resource is under pressure of agricultural land expansion and logging in addition to fishing. As a result about 10 percent of the Great Lake wetland is already converted into agricultural land.

Fisheries socio-economic survey conducted in eight inland provinces in 1994-95 showed that among 562 communes there are 328 (58%) fishing-dependant communes. Within the survey's 2.4 million inhabitants in 452,714 households, there were 39 percent, 13 percent, and 9 percent actively involved in fishing, fish marketing and fish processing, respectively, with the rest of the households occasionally fishing.

Most of the Cambodian rural population partly depends upon the inland fisheries for their daily diet and cash incomes. Freshwater fish commodities, including fresh and different types of processed products, are the most preferred foods of Cambodian people, especially rural people. The Mekong River Commission (MRC), in its 1992 review of the Lower Mekong Basin fisheries mentioned that in the Cambodian diet freshwater fish covers about 70 percent of animal protein intake. The MRC also reported in 1992 that the nationwide fish consumption, including marine fish, averaged about 13 Kg per capita. Ahmed et al, 1998, has assumed that in fishing-dependent communities freshwater fish consumption is as much as 75.6 Kg per capita. However, a 1993 study in Svay Rieng province, a fish resource-scarce area in southern Cambodia in proved that protein intake from all kinds of fish commodities from 3 to 4 Kg per capita, which is equivalent to consumption of 35-48 Kg per capita of fresh fish.

#### **- Marine Fishery**

The marine fishery was characterized by one-day trips, selling its catch daily to the market, but with most of the catch 'exported' to Thailand, by transfer on the high seas to Thai vessels.

Cambodia seems to have ignored the importance of the coastal and marine fishery resource until the late 1960s. The relative lack of interest in the marine fishery is due to three main factors:

- 1- Except for some indigenous people located in the coastal region, most Cambodians (>80% of the total population) were rice farmers and fishers whose daily life revolved around inland resources. Therefore, the strong preference of the Cambodian consumer is for inland species. As a result the marine fishery today mainly satisfies the export market, rather than being primarily used for domestic consumption.
- 2- The coastal and marine fisheries are very limited in terms of size, with the jurisdictional seawaters extending from a very limiting 435 Km coastline. Catch volumes are too small to support a large modern fishing fleet, or modern freezing or canning operations.
- 3- The jurisdictional Exclusive Economic Zone (EEZ) is widely overlapped with neighboring countries, i.e. Thailand and Vietnam, resulting in competition for the catch, occasional conflict over fishing rights, and extensive trading of the catch from Cambodia boat to foreign boat on the ocean to avoid export taxes and regulations.

Major commercial species of the seawaters are short mackerel (Trey Pla Thu-*Rastrelliger brachysoma*), torpedo scad (Trey Kantuy Roeung-*Megalaspis cordyla*), shrimp (Bangkiea-*Penaeidae sp.*), and squid (Moeuk-*Loligo sp.*). A new fishery activity targeting the undulated surf clam was introduced to Cambodia in 1999 to satisfy the Thai market, since there is no demand from Cambodian consumers. Popular seafood for inland communities is short mackerel (Trey Pla Thu) in steamed (actually boiled) form, followed by crab, squid and shrimp. However, most of the marine products are exported, through both legal and illegal channels.

In contrast coastal inhabitants involved in gathering marine products for supplementing their daily diet represented a very small part of the population in the past, although the density of coastal population increased gradually since the late 1960s with the introduction of motorized trawling and purse seining into the Cambodian sea fisheries. Presently, there is not less than ten thousand households involved in marine fishing, especially monofilament gill netting, trawling and crab trapping.

The marine fish production figures prior to 1970 averaged about 30,000 tons, annually, but the official record during the period 1982 to 1992 ranged between 30,000 and 40,000 tons as rehabilitation of marine fisheries took place in the late 1980s.

The DoF keepers of marine fishery production statistics could only speculate on the catches of the Thai fishing fleet, licensed to operate in Cambodian jurisdictional seawaters, but which landed directly in Thai territory. Most of the marine fish and sea products were landed directly in Thailand, although a small quantity was supplied to coastal and inland Cambodian markets and to processors to satisfy the inland market demand for processed and preserved products.

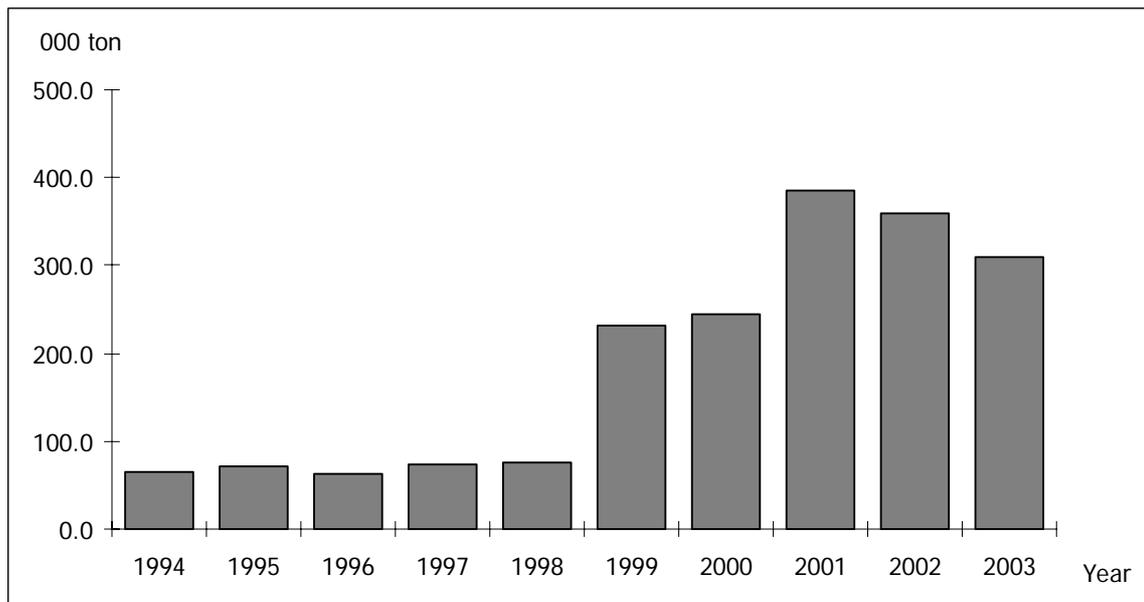
### **2.3.2 Historical Effort Data**

#### **- Inland Capture Fisheries**

Freshwater fish and aquatic products are the single most important protein source for the majority of the population. The domestic demand for fishery products is high in that about 75 percent of the animal protein for about 12 million inhabitants in the country is derived from fisheries resources. The per capita consumption of fish is estimated at about 65 Kg on average. About 60 percent of total fish production comes from the Tonle Sap.

Compared to the pre-Khmer Rouge period, officially recorded inland fisheries production figures showed a drastic decline between 1980 and 1998, then an increase of more than three fold in 1999 to 2001 (Figure 2.3). This was a great surprise for biologists and statisticians, as well as for planners and policy makers. Based on the results of catch assessment research conducted by the MRC, further data included the small-scale fishing production that had never been considered in the earlier statistics. Therefore, the actual figures for inland capture fisheries production became a subject of debate.

DoF (2004) states that total inland capture fisheries production has increased from 231,000 to 385,000 tons during 1999-2001 and decreased after 2001. In 2003, the production has decreased by about 15.5 percent compared to the 2002 catch. The harvesting of fish and fish production from freshwater fisheries in Cambodia takes place through large and medium-scale fisheries, and small-scale and rice-field fisheries. The large and medium-scale fisheries require fishing licenses while small-scale and rice-field fisheries are not required to obtain licenses.

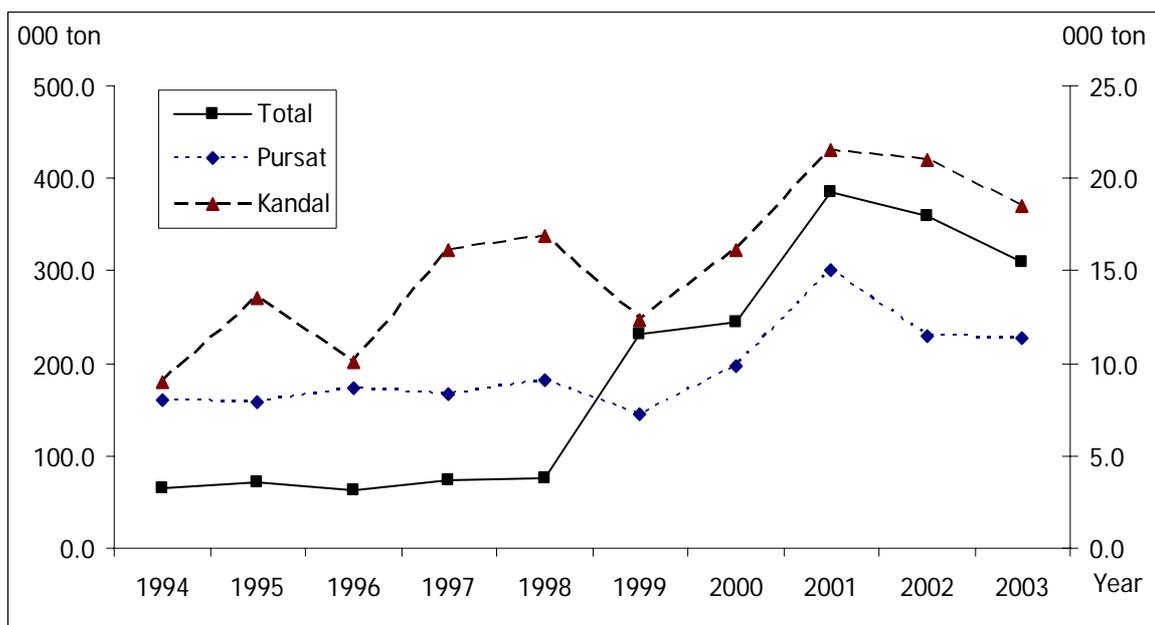


Source: Department of Fisheries 2003-2004

**Figure 2.3 Inland Captures Fisheries Production (1994-2003)**

The Government's gross revenue from freshwater fisheries declined from about USD 2 million in 2000 to only USD 1.7 million in 2003. The decreasing of revenue was due to the transferred in late 2000 of some fishing lots and concession fishing areas to local fishing communities.

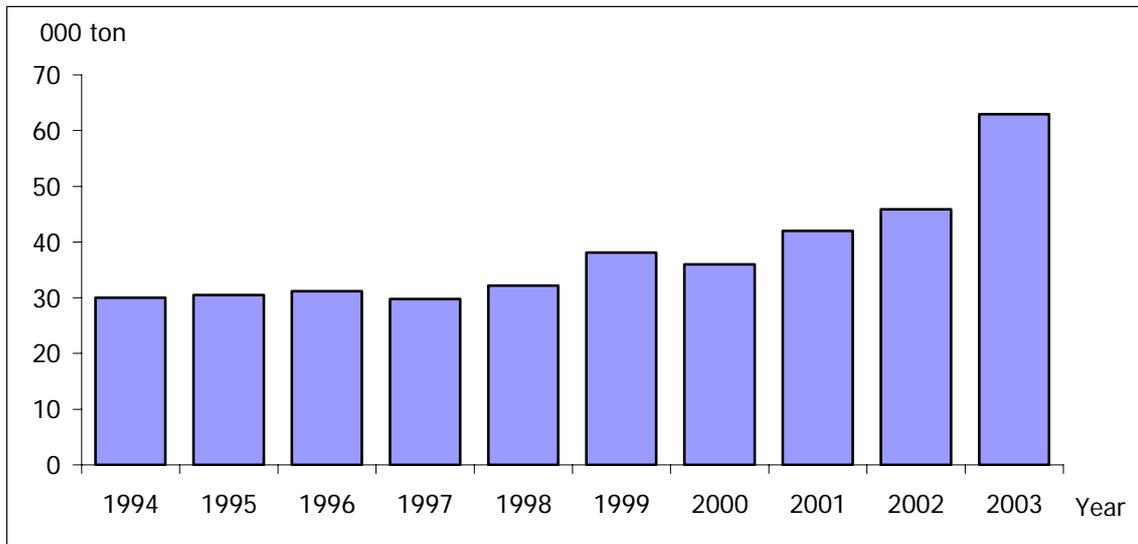
Similarly, capture fish productions in Kandal province were dramatically decreased from 21,500 tons in 2001 to about 18,500 tons in 2003 (decreased about 14%). Furthermore, capture fish production in Pursat was rapidly decreased to about 24 percent from 2001. In 2001, capture fish production in Pursat was about 15,000 ton decreased to about 11,400 ton in 2003 (Figure 2.4). However, contribution of these two provinces was very low (about 9%) since 2001 and a bit high in 2003, which was about 9.7 percent. But in average of 10 years, the contribution of these two major provinces was up to about 20 percent to the total inland captures production.



**Figure 2.4 Trends of Captures Fisheries in Pursat and Kandal (1994-2003)**  
- Marine Capture Fisheries

Compared to freshwater finfish and also in comparison to neighboring countries like Vietnam and Thailand, marine capture fisheries production in Cambodia is very small in terms of production. Marine capture fisheries mainly take place in coastal and inshore sub-sectors. Due to the lack of complete and accurate data collection, information on marine landings is very scanty and fragmented. According to statistical data of DoF (2004), in 2000 the production was 36,000 tons, increasing to 45,850 tons in 2002 and to 54,750 tons in 2003 (Figure 2.5). Nearly 70 percent of this was finfish, namely groupers and snappers, and the remaining 30 percent were cephalopods (squid, cuttlefish, octopus), shellfish such as shrimp and crab, and mollusks.

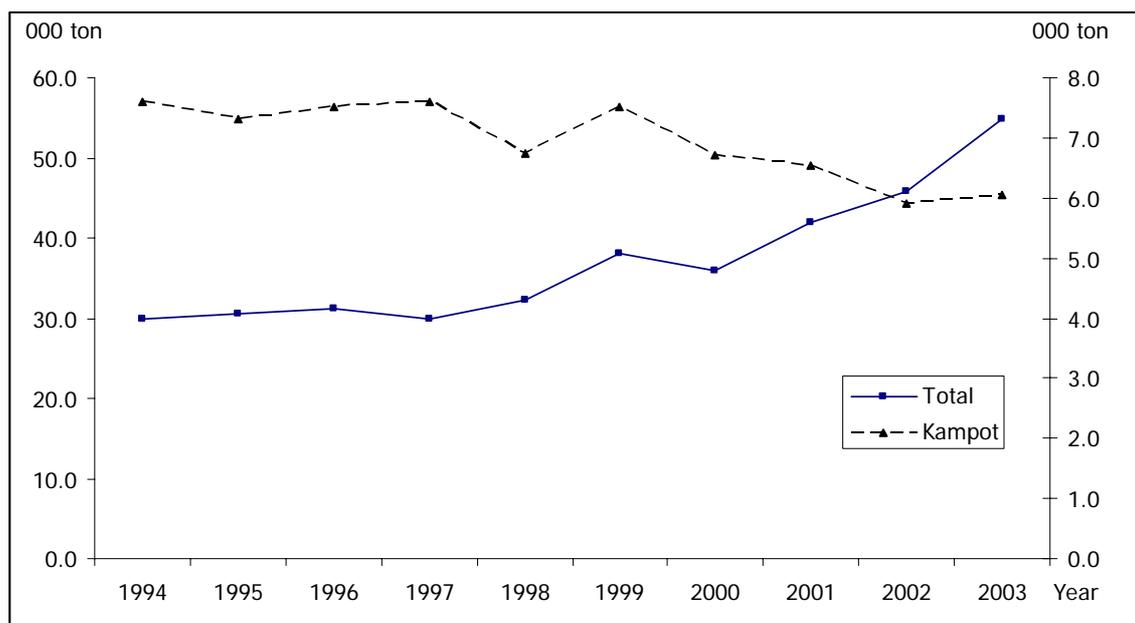
Only about 48 percent of marine capture productions were exported to neighboring countries and to other countries through international seaports in 2003. Conversely, the quantities of processed fish exported were very small compared to fresh fish. About 1,790 tons of processed products were exported during 2003 (based on data extracted from DoF, 2004). The total exports of fresh and processed fish correspond to only about 52 percent of total marine fish production in 2003.



Source: Department of Fisheries 2003-2004

**Figure 2.5 Total Marine Captures Fish Production (1994-2003)**

Marine fish capture fish production from Kampot contributed to about 21 percent in average. The production was decreased dramatically since 1999 while the total production was increased rapidly since 2000 from 36,000 tons to 54,750 tons in 2003 (Figure 2.6).



**Figure 2.6 Trend of Marine Captures Fish Production in Kampot (1994-2003)**  
**- Exploitation of Fisheries Resources**

The inland capture fisheries production has decreased from 385,000 tons in 2001 to 360,300 tons in 2002. Furthermore, in 2003 the production continued to decline by about 14 percent compared to 2002. Based on the Second Five Years Fisheries Sector Development Plan (2001-2005), DoF had projecting that fish exploitation will decrease from 385,000 tons to 273,000 tons in 2005 due to changes of natural conditions (e.g. lakes and canals are shallow, or height of floods), and related to population growth.

Conversely, marine fisheries production had increased from 29,800 tons in 1997 to 38,100 tons in 1999 and decreased in 2000 (36,000 tons). In total there are 3,000 to 4,000 marine fishing boats (with engine and without engine) that can catch between 35,000 and 40,000 tons per annum on average. In 2003, the total caught was 54,750 tons, which was higher than the planned of 40,000 tons. Marine capture fisheries production has increased about 15 percent per year since 2001.

**Table 2.2 Exploitation and Production of Fisheries Resource in Cambodia - Plan and Actual**

Description	Years (tones)							
	2001		2002		2003 <sup>1</sup>		2004	2005
	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Plan
Inland Capture Fisheries	247,000	385,000	255,000	360,300	345,000	308,750	268,000	273,000
Marine Capture Fisheries	37,000	42,000	40,000	45,850	40,000	54,750	47,000	50,000
<b>Total fish production</b>	<b>304,000</b>	<b>444,500</b>	<b>325,000</b>	<b>424,400</b>	<b>385,000</b>	<b>363,500</b>	<b>365,000</b>	<b>383,000</b>
Aquaculture - Fish	20,000	14,000	30,000	15,000	40,000	26,300	50,000	60,000
- Crocodile	22,000	36,000	25,000	50,850	50,000	78,008	32,000	38,000

Source: DoF, 2003 and 2004

<sup>1</sup> Statistics gathered from the Department of Fisheries 2004

# *Part III*

## *Results and Discussions*

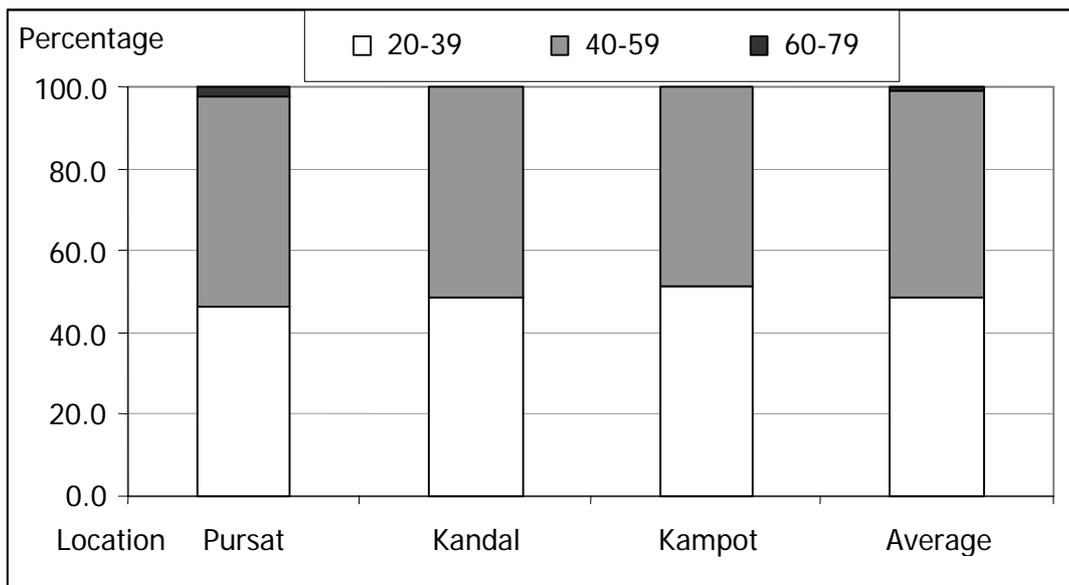
### 3.1 Socioeconomic Activities

#### 3.1.1 Profile of the Household Heads

##### - Age Distribution of Respondents

In Community Fisheries (CF), age distribution of people respondents in the research divided by three categories called young generation group (20 to 39), who know the condition of the country after the Pol Pot regime, middle aged group (40 – 59 years old) who know the condition during Pol Pot and Lon Nol regimes and the elder group (from 59 to 79) who known most of the condition in the country and still participation in fishing.

Aged of household headed from CF participation during the study was varied from 20 to 79 years old. The highest proportion of freshwater fisher community is in aged group range from 40 to 59 years old (51.1%). Elderly people participated very little in fishing activities as well as in community activities. Furthermore, young generation which aged ranged from 20 to 39 years old was also much involved in fishing activities. Conversely, highest proportion of respondent in seawater communities was younger than in freshwater communities. The aged of marine-fisher communities were ranged from 20 to 39 years old only (Figure 6.5). However, there was no significant different between freshwater CF and marine-water CF at 95 percent of confidential level (sig. 0.012 tested in T-test). There were few elderly groups participated in freshwater CF while there was not in marine-water. Nevertheless, middle and young aged group were dominated in CF rather than elderly groups who had more experiences in conflict resolutions. Figure 3.1 discusses about age distribution of respondent from CF sites.



Source: Field Survey August 2004

**Figure 3.1 Age Distribution of Respondent from CF Sites**

Similarly, in non-community fisheries (NCF), people participation in fishing activities and agriculture activities were mostly aged ranged from 40 to 59 years old, which was slightly equal to the people, whose aged between 20 to 39 years old (43.0%). However, in Pursat and Kampot province people participation had greater proportion in aged range from 40 to 59 years old than those aged between 20 to 39 years old and the elderly aged (always less). While farmers in Kandal who aged from 40 to 59 years old had less proportion than the middle aged group (Table 3.1).

**Table 3.1 Age Distribution of Respondent from NCF Sites**

	Age rang		
	20 – 39	40 – 59	60 – 79
Pursat	17 (37.8)	18 (40.0)	10 (22.2)
Kandal	21 (46.7)	20 (44.4)	4 (8.9)
Kampot	20 (44.4)	23 (51.1)	2 (4.4)
<b>Average</b>	<b>19 (43.0)</b>	<b>20 (45.2)</b>	<b>5 (11.9)</b>

*Source: Field Survey August 2004*

Based on figure and table above, show that the participation who involve in the study were aged ranged from 40 to 59 years old. However, there were a bit different between young households headed in CF and NCF. Young aged (range from 20 to 39) in CF seems to be higher proportion than in the NCF which were 48.9 percent and 43.0 percent, respectively. Conversely, households headed who aged ranged from 60 to 79 in CF seem to have less proportion than in NCF (0.7% and 11.9%, respectively). This data was appearing as similar as to the data from National Institute of Statistic (NIS) who did a census in 1998. The census data showed that the population in economic aged (range from 15-64) had about 53.7 percent of total population.

#### **- Gender of Respondents**

Gender of headed household in CF is a main factor, which is related to poverty and deprivation of households. The statuses of women are disadvantage in comparison with men in many developing countries, especially in Cambodia. World Bank, 1997 indicated of gender gap was whether female-headed households were worse off than those headed by males. Moreover, women headed households are less likely to be poor than male headed households. However in the study areas of CF in Pursat, Kandal and Kampot, the distribution of gender headed households seems to be a bit differences. In Pursat, male-headed households appeared to be about 64 percent and female-headed households was only about 36 percent. Similarly, in coastal province of Kampot, male-headed households taken place about 60 percent and female about 40 percent. Differently, in Kandal, men-headed household in the selected sample was dominated to 100 percent. This figure was not meaning that, there was no female-headed household in the province. Howsoever, male-headed households were still appeared in a greater proportion than those female-headed households about triple times.

Further, NIS, 1998 dedicated that men-headed household dominated about 74 percent in the country of Cambodia which was similarly to the selected of CF sites.

In NCF of Pursat, Kandal and Kampot, men-headed household still dominated a highest proportion of 87 percent even as women headed-households were very less if compared to those men (12.6%). In Pursat, women-headed households seemed to be greater proportion than in Kandal and coastal province of Kampot.

**Table 3.2 Gender of Respondent**

	Male		Female		Total	
	CF	NCF	CF	NCF	CF	NCF
Pursat	29 (64.4)	33 (73.3)	16 (35.6)	12 (26.7)	45 (100.0)	45 (100.0)
Kandal	45 (100.0)	44 (97.8)	0 (00.0)	1 (2.2)	45 (100.0)	45 (100.0)
Kampot	27 (60.0)	41 (91.1)	18 (40.0)	4 (8.9)	45 (100.0)	45 (100.0)
<b>Average</b>	<b>34 (74.8)</b>	<b>39 (87.4)</b>	<b>11 (25.2)</b>	<b>6 (12.6)</b>	<b>45 (100.0)</b>	<b>45 (100.0)</b>

Source: Field Survey August 2004

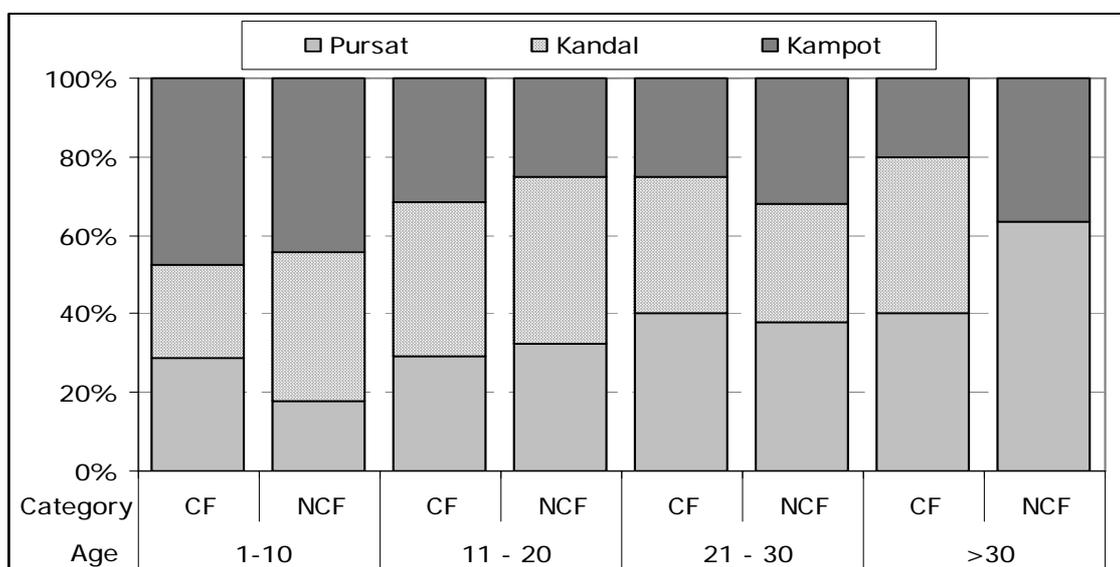
### - Number of Years in Fishing of Respondents

Generally, respondents in CF were participated in fishing as a main occupation for long-time which ranged from 3 to 49 years. However, they are fishing mostly from about 11 to 20 years (37.8%) long. Number of years participating in fishing of household headed respondent is also related to the aged, for instance, in Pursat, participants were mostly aged ranged from 40 to 59 years old and the number of years that they do fishing was also highest ranged of 21 to 30 years. Similarly, in Kandal number of years participated in fishing was highest ranged from 11 to 20 years (44.4%) and the aged was also ranged from 40 to 59 years old. As well as in Kampot, number of years fishing was highest proportion in 1 to 10 years and the aged was ranged from 20 to 39 years old. Moreover, number of years participating in fishing was also related as well to household migration. Statistical method of paired-samples T-Test has showing that the number of years participation in fishing are rated mostly to the aged and number of years staying in their present residential at 95 percent confidential level (Table 3.3).

**Table 3.3 Result of T-Test of Paired Samples Correlations**

	N	Correlation	Sig.
Number of year in fishing vs Number of years staying in current village	135	0.465	0.000
Age of respondent vs Number of year in fishing	135	0.612	0.000

Household headed who are not formed as a community or so called NCF, participating in fishing and agriculture activities mostly aged ranged from 40 to 59 years old (Figure 3.2). Hence, the proportion of headed households engaged in fishing from 21 to 30 years was also highest. For instance, in Pursat, the proportion of headed household engaged in fishing were mostly aged ranged from 40 to 59 years old and number of years participating in fishing which was also highest in 21 to 30 years. Age of households headed in NCF of Kandal were mainly ranged from 20 to 59 years old, which make the number of years engaging in fishing were also depending on their aged.



Source: Field Survey August 2004

**Figure3.2 Number of Years Engaged in Fishing**

### - Marital Status of Respondents

About 81 percent of the headed households' interviewed are married, 16.3 percent are widow/ers and only 3 percent are single. However, the higher proportion of widow/ers was found in

freshwater CF rather than in the marine CF. Headed household who are single was presented very little in CF. Chi-square tested shows that the distribution of headed household participation in CF by marital status is not significantly difference at 95 percent confidence level.

Similarly in NCF the proportion of married headed households was 92 percent and the slightly equal of single and widows. Representation of headed households who are single was present higher in marine water rather than in freshwater provinces. Widow/ers participating in coastal fishing seem to be less than in inland fishing. However, there were no significant different between provinces as well as within CF and NCF at 95 percent confidential level (Table 3.4).

**Table3.4 Marital Status of Respondent**

	Single		Married		Widow/ers	
	CF	NCF	CF	NCF	CF	NCF
Pursat	1 (2.2)	0 (0.0)	38 (84.4)	41 (91.1)	6 (13.3)	4 (8.9)
Kandal	2 (4.4)	2 (4.4)	29 (64.4)	41 (91.1)	14 (31.1)	2 (4.4)
Kampot	1 (2.2)	2 (4.4)	42 (93.3)	42 (93.3)	2 (4.4)	1 (2.2)
<b>Average</b>	<b>1 (3.0)</b>	<b>1 (3.0)</b>	<b>36 (80.7)</b>	<b>41 (91.9)</b>	<b>7 (16.3)</b>	<b>2 (5.2)</b>

*Source: Field Survey August 2004*

In assumption to the above paragraphs, the proportion of household heads that got married was present in a highest in both CF and NCF and in coastal and inland provinces. The lowest proportion of participants was single. Coastal areas seemed to be more marriage household headed than in inland sites. Nonetheless, in statistical analysis there were no significant different between CF and NCF as well as between provinces at 95 percent confidential level.

#### **- Education of Respondents**

The education levels of household heads and spouses are important indicators of household human resources. The quality of human resources in a household can have an important impact on extension to which they are able to meet the needs for food and income. The low educations people can be make more conflicts than educated people. World Bank, 1999 had using poverty head count index by reported literacy of the household heads shows that poverty was lower among the literate (34%) than among the illiterate (42%).

An analysis of the educational level of the household heads in CF areas was showing that 54 percent of total participation had finished primary education (1 to 5 years schooling) while about 24 percent did not attended any education levels (illiterate). About 20 percent had finished secondary school and only about 5 percent had finished high school level. However, the household heads participation in costal CF tended to met high school education rather than in fresh water CF which (did not have even one), whilst the coastal province had also a highest proportion of illiterate household heads. Headed household of Kandal provinces tended to have highest secondary schooling than the others in the selected provinces. Again, there was no any significant different between education level in the study sites at 95 percent confidential level (sig. 0.4.31).

Similar to the CF, among the household head participants in NCF, the illiterate comprised about 20 percent of the total samples. Those who had achieved primary and secondary levels of education were about 53 percent and 23 percent, respectively (Table 3.5). The proportion of participants who had completed beyond the secondary level of education (high school) seemed to be higher than the NIS figures at 1.1 percent. Household heads in Kandal CF tends to have higher education than the other selected CF. This may be because of the location of the province, which is more closed to the capital city of Phnom Penh. Conversely, the participations in Kampot had a highest proportion of illiterate.

**Table 3.5 Education Level of Respondent**

	Illiterate		Primary		Secondary		High school		Higher	
	CF	NCF	CF	NCF	CF	NCF	CF	NCF	CF	NCF
Pursat	10 (22.2)	13 (28.9)	27 (60.0)	24 (53.3)	8 (17.8)	6 (13.3)	0 (0.0)	2 (4.4)	0 (0.0)	0 (0.0)
Kandal	7 (15.6)	2 (4.4)	24 (53.3)	27 (60.0)	14 (31.1)	15 (33.3)	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.2)
Kampot	16 (35.6)	12 (26.7)	22 (48.9)	21 (46.7)	5 (11.1)	10 (22.2)	2 (4.4)	2 (4.4)	0 (0.0)	0 (0.0)
<b>Average</b>	<b>11 (24.4)</b>	<b>9 (20.0)</b>	<b>24 (54.1)</b>	<b>24 (53.3)</b>	<b>9 (20.0)</b>	<b>10 (23.0)</b>	<b>2 (4.4)</b>	<b>2 (4.4)</b>	<b>0 (0.0)</b>	<b>1 (1.1)</b>

*Source: Field Survey August 2004*

However, there was not significant different between CF and NCF nor between the selected provinces at 95 percent of confidential level. Hence, it means that the education level, which was showing in above tables was not depended upon to the location or community. Furthermore, education level was also not depended on aged of the respondents. However, the education levels of headed household were closely linked to the gender of headed household means that the male-headed household tended to have higher education than the women (sig. 0.008). The means of number of male's schooling was about 4 years while female was about 2.2 years. This data was not surprising because it was similar to statistic from NIS, which stated that literacy of adult female was much lower than for males.

#### - Principal Occupation of Respondents

Fishing is a main occupation of many people participated in CF. Table below shows that about 88 percent of the interviewers were engaging in fishing as a main occupation. All participants of CF in Kandal were doing fishing as a main occupation while there were only 71 percents of respondents in Pursat (Table 3.6). Besides fishing, farming was also contributed as a second ranked in Pursat and small business contributed as third ranked.

Conversely to the CF, in NCF fishing was only a main occupation for Kandal and Kampot province (100%) while only 2.2 percent of respondent who did farming and small business in Pursat province. These may be because they had not available land for agriculture (lands are owned by lot owners in Kandal province and by government at Kampot national park).

**Table 3.6 Principle Occupations of Respondents**

Location	Fishing		Farming		Small Business	
	CF	NCF	CF	NCF	CF	NCF
Pursat	32 (71.1)	43 (95.6)	12 (26.7)	1 (2.2)	1 (2.2)	1 (2.2)
Kandal	45 (100.0)	45 (100.0)	0 (0.0)	0(0.0)	0(0.0)	0(0.0)
Kampot	42 (93.3)	45 (100.0)	2 (4.4)	0(0.0)	1 (2.2)	0(0.0)
<b>Average</b>	<b>40 (88.1)</b>	<b>44 (98.5)</b>	<b>7 (15.6)</b>	<b>0 (1.0)</b>	<b>1 (2.2)</b>	<b>0 (1.0)</b>

*Source: Field Survey August 2004*

#### - Secondary Occupation of Respondents

Secondary occupation is contributing as supplementary income to the households. There were about 42 percent of CF respondents from Kampot did not have any secondary occupation while there were only about 11 percent in Kandal. About 53 percent of respondent in Pursat had one secondary occupation and about 44 percent in Kandal. About 29 percent of Kandal's respondent had two secondary occupations and about 13 percent had three. Furthermore, about 2 percent of respondent in Kandal had four secondary occupations. Conversely, respondents in Kampot tended

to have only 1 to 2 secondary occupations and in Pursat had 1 to 3. However, in average, there was about 75 percent of respondents had secondary occupation ranged from 1 to 4 while about 25 percent did not have.

Differently in NCF, there were about 35 percent of total respondents of NCF did not have any secondary occupation. About 45 percent of them had one, about 19 percent had two and only about 1.5 percent has three secondary occupations. There was no one have more than three. About 56 percent of respondent in Kampot tended to have one, about only 4 percent had two and no one had three secondary occupations. These data presented likewise to the respondents in Kampot who were about 56 percent has one secondary occupation. Differently in Kandal, respondent be liable to have highly proportion in two secondary occupations rather than one and three (Table 3.7).

**Table 3.7 Number of Secondary Occupation**

	Non		One		Two		Three		Four	
	CF	NCF	CF	NCF	CF	NCF	CF	NCF	CF	NCF
Pursat	9 (20.0)	24 (53.3)	24 (53.3)	21 (46.7)	8 (17.8)	1 (2.2)	4 (8.9)	0 (0.0)	0 (0.0)	0 (0.0)
Kandal	5 (11.1)	5 (11.1)	20 (44.4)	15 (33.3)	13 (28.9)	22 (48.9)	6 (13.3)	2 (4.4)	1 (2.2)	0 (0.0)
Kampot	19 (42.2)	18 (40.0)	24 (53.3)	25 (55.6)	2 (4.4)	2 (4.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
<b>Average</b>	<b>11 (24.4)</b>	<b>16 (34.8)</b>	<b>23 (50.4)</b>	<b>20 (45.2)</b>	<b>8 (17.0)</b>	<b>8 (18.5)</b>	<b>3 (11.1)</b>	<b>1 (1.48)</b>	<b>0 (0.7)</b>	<b>0 (0.0)</b>

*Source: Field Survey August 2004*

There were several secondary occupations which were generating by the respondents such as fishing (for respondent who do farming as primary occupation), fish processing, fish trading, motor taxi/car/engine boat driving etc. Related to the information gartered from the field were very small so the analysis was combined the secondary occupation in to five mains activities are fishing and fish related activities, small business, farming, laboring and government/NGOs workers. About 62 percent of respondent in CF Pursat did fish related activities such as fish processing, and fish culturing etc as their secondary occupation while there were only about 5 percent in Kampot. Even though, Pursat still a main domination of small business which were appeared a highest proportion if compared to other two provinces. Respondents in Kandal involved mostly (71 percent) in farming rather than others. Beside highly involved with farming about 42 percent of them also sold their labors to the city markets. Laboring and farming were very likely for respondent in Kampot (about 54%) while small business and fish related activities presented in a very low proportion (9%). However, in average, farming was a first secondary occupation for rest of the respondents and fish related activities did as a second ranked (Table 3.8).

Similarly to the CF sites, first rank of secondary occupation for NCF was farming. There were about 80 percent in Kandal, 51 percent in Kampot and about 31 percent in Pursat involved in farming. Laboring was also contribution as supplementary income to the respondents in Kandal while it was marginal in Pursat and Kampot. Small business was implementing as supplementary income to the respondents only about 5 percent and government officers and NGOs workers were only 3 percents.

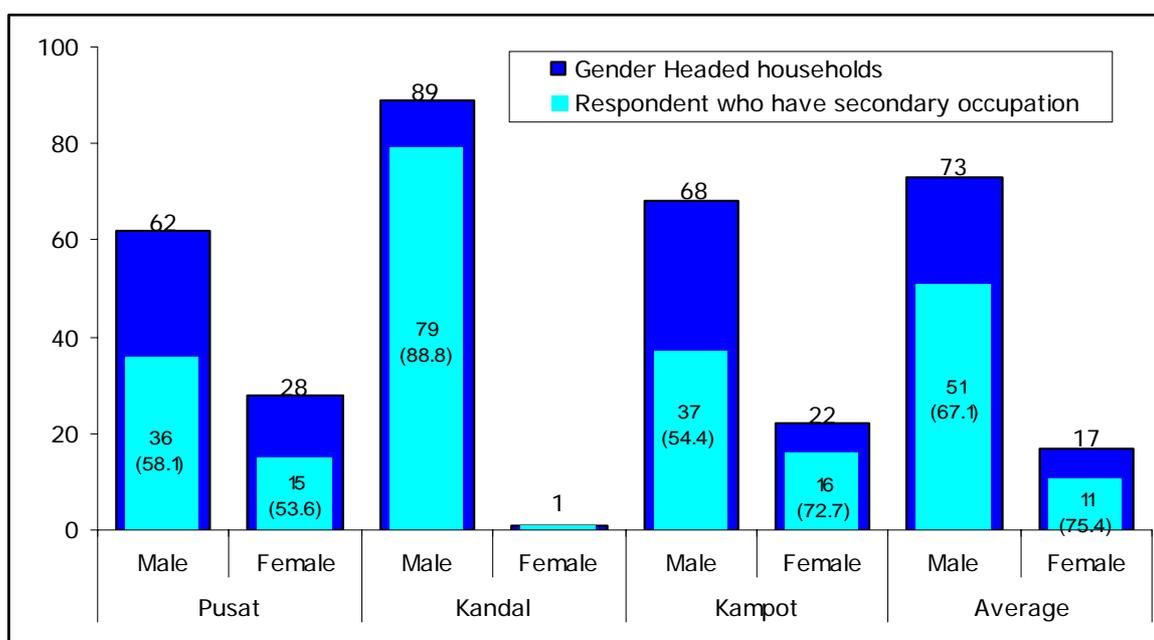
**Table 3.8 Specific Secondary Occupation of Respondent**

	Fish related activities		Small business		Farming		Laboring		Government /NGOs worker	
	CF	NCF	CF	NCF	CF	NCF	CF	NCF	CF	NCF
Pursat	28 (62.2)	4 (8.9)	7 (15.6)	2 (4.4)	12 (26.7)	14 (31.1)	3 (6.7)	2 (4.4)	3 (6.7)	1 (2.2)
Kandal	14 (31.1)	8 (17.8)	1 (2.2)	2 (4.4)	32 (71.1)	36 (80.0)	19 (42.2)	16 (35.6)	2 (4.4)	3 (6.7)
Kampot	2 (4.4)	3 (6.7)	2 (4.4)	2 (4.4)	12 (26.7)	23 (51.1)	12 (26.7)	1 (2.2)	0 (0.0)	0 (0.0)
<b>Average</b>	<b>15 (32.6)</b>	<b>5 (11.1)</b>	<b>3 (7.4)</b>	<b>2 (4.4)</b>	<b>19 (41.5)</b>	<b>24 (54.1)</b>	<b>11 (25.2)</b>	<b>6 (14.1)</b>	<b>2 (3.7)</b>	<b>1 (3.0)</b>

Source: Field Survey August 2004

Respondents in NCF tended to have no secondary occupation in a higher proportion than in CF. CF respondent was liable to have a high proportion in one secondary occupation than NCF. Auxiliary, three secondary occupations occurred in a higher proportion in CF rather than in NCF and four secondary occupations were also appeared in those CF locations. However, NCF respondents were apt to have higher proportion in two secondary occupations.

Fish related activities presented very marginal in Kampot in both CF and NCF sites. This is because it was keeping as a main occupation for rest of the respondents. Small business was highest proportion in CF of Pursat province while it was very little in Kandal and Kampot. Faming which depending on land was presented very large for respondent in Kandal whereas less in Pursat because respondent in Pursat (both CF and NCF). This is because respondents in Pursat are living on and very closed to the water. The laboring presented very high in only Kandal province. For reason to that, Kandal is located very close to the capital city, which workload is very productive. In a norm, government/NGO workers were presented very rare in both sites. Through Chi-square test was shown that, secondary occupation of the respondent was significantly difference between provinces but not between communities. Furthermore, it was also related to marital status of headed household. Women headed households tended to have secondary occupation greater than men headed household have. Figure 3.3 shows that only about 75 percent of women headed household respondents had secondary occupation whereas about only 67 percent of men headed household.



Source: Field Survey August 2004

**Figure 3.3 Distribution of Secondary Occupation by Gender Headed Household**

**- Number of Years Living in the Current Locations**

Number of years living in the current locations is very important for identify conflicts arising in the areas. Many migrates people in the world faces a lot of conflicts. However, the conflicts also present more in old villages rather than in new villages. About 38 percent of rest respondent in CF was located in home villages more than 30 years, 31 percent were living from 21 to 30 years, 21 percent from 11 to 20 year and less than 9 percent from 1 to 10 years. Respondents in Kampot and Pursat province were mostly new entranced (after Pol Pot regime) while about 67 percent in Kandal respondents was old residential. However, there was very small percentage (11 percent) of total respondent live less than 10 years.

Similarly to the CF, NCF respondents leaned to live more than 20 years (about 71 percent) whilst only about 29 percent live less than 20 year in their current villages. About 80 percent of respondents in Kandal province were living mostly from more than 20 years in the current villages and about 64 percent and 69 percent of respondent in Pursat and Kandal, respectively (Table 3.9).

**Table 3.9 Numbers of Years Living in Current Village of Respondents**

	1 – 10 years		11 – 20 years		21 – 30 years		>30 years	
	CF	NCF	CF	NCF	CF	NCF	CF	NCF
Pursat	6 (13.3)	5 (11.1)	8 (17.8)	11 (24.4)	18 (40.0)	24 (53.3)	13 (28.9)	5 (11.1)
Kandal	3 (6.7)	3 (6.7)	6 (13.3)	6 (13.3)	6 (13.3)	8 (17.8)	30 (67.7)	28 (62.2)
Kampot	6 (13.3)	3 (6.7)	13 (28.9)	11 (24.4)	18 (40.0)	14 (31.1)	8 917.8)	17 (37.8)
<b>Average</b>	<b>5 (11.1)</b>	<b>4 (8.2)</b>	<b>9 (20.0)</b>	<b>9 (20.7)</b>	<b>14 (31.1)</b>	<b>15 (34.1)</b>	<b>17 (37.8)</b>	<b>17 (37.0)</b>

*Source: Field Survey August 2004*

Table above is showing that about 69 percent of respondent in both CF and NCF were living in the current villages more than 20 years and only about 31 percent were living less than 21 years. Number of years living in the current locations was related closely to age, occupations and ethnicity. As result T-test was showing that number of year living in current location related mostly to age and occupation at 95 percent confidential level. In the real condition and as well as to the statistic test, aged of respondent was a main key factor provided to number of years living in current villages. All respondents aged ranged from 20 to 79 years old. Furthermore, most of them (88.1 percent) engaged in fishing as a main occupation, which was harmonized with the current village.

### 3.1.2 Profile of Household Members

#### - Household Members

In CF, number of household members ranged from a minimum of 2 to a maximum of 14. Average family size was 6.4, which were higher than the average of 5.1 in rural areas of Cambodia. In the CF of Pursat, highest proportion of households (46.7 percent) had between 1 to 5 family members, which were similar to Kampot provinces. Family member of 6 to 8 was presented a highest proportion of family in Kandal while in Kampot, 20 percent of household respondent had member of 9 to 11. However, most of the family had member ranged from 1 to 5 and very little had more than 11. Nevertheless, the results from a Chi-square test shown that, there was no significant difference in family size between selected provinces at 95 percent confidence level.

Similarly to the CF, a highest proportion of family member in NCF ranged from 1 to 5 (40%). The lowest proportion was big family, which had member more than 11. However, the family of participants in coastal province tended to have more member than in the inland areas. More than 66 percent of interviewed households had members more than 6. While more than 50 percent of household in Pursat had only 1 to 5 family members (Table 3.10).

**Table 3.10 Profile of Family Member**

Number of member	1 – 5		6 - 8		9 - 11		>11	
	CF	NCF	CF	NCF	CF	NCF	CF	NCF
Pursat	21 (46.7)	23 (51.1)	17 (37.8)	15 (33.3)	7(15.6)	6 (13.3)	0 (0.0)	1 (2.2)
Kandal	17 (37.8)	16 (35.6)	21 (46.7)	17 (37.8)	7(15.6)	11 (24.4)	0 (0.0)	1 (2.2)
Kampot	18 (40.0)	15 (33.3)	17 (37.8)	19 (42.2)	9(20.0)	7 (15.6)	1 (2.2)	4 (8.9)
<b>Average</b>	<b>19 (41.5)</b>	<b>18 (40.0)</b>	<b>18 (40.7)</b>	<b>17 (37.0)</b>	<b>8 (17.0)</b>	<b>8 (17.8)</b>	<b>1 (2.2)</b>	<b>2 (4.4)</b>

*Source: Field Survey August 2004*

In assumption to this, CF household participation tended to have fewer members than NCF in both coastal and inland waters. Moreover, about 60 percent of CF households and about 66 percent of NCF households in coastal province had member more than 6. However, there was no significantly different between household participation at different selected provinces at 95 percent of confidential level (Chi-square test).

#### - Number of Men-Power in the Households

Number laborers in the households are very important which relates to income and poverty of fishermen as well of farmers. Table above was mentioning about family members in the household of inland and coastal selected provinces upon to this the labor in the CF household seemed to be high in ranged from 1 – 3 (70%). Inland CF tended to have more proportion of labor member in ranged from 4 - 9 rather than in coastal CF (Table 3.11).

Similarly to the CF, in NCF the highest proportion of labor member ranged from 1 – 3 (74%) and the less proportion was for household who have labor member more than 6. Household participation in Kandal seemed to have more labor member than the others. There were about 51 percent of total NCF interviewed have labor more than 6 (7 ->9).

**Table 3.11 Number of Household Labour**

	1-3		4 – 6		7-9		>9
	CF	NCF	CF	NCF	CF	NCF	NCF
Pursat	31 (68.9)	31 (68.9)	13 (28.9)	14 (31.1)	1 (2.2)	0 (0.0)	0 (0.0)
Kandal	24 (53.3)	0 (0.0)	16 (35.6)	22 (48.9)	5 (11.1)	19 (42.2)	4 (8.9)
Kampot	40 (88.9)	36 (80.0)	4 (8.9)	8 (17.8)	1 (2.2)	1 (2.2)	0 (0.0)
<b>Average</b>	<b>32 (70.4)</b>	<b>34 (74.4)</b>	<b>15 (32.6)</b>	<b>11 (24.4)</b>	<b>2 (4.4)</b>	<b>7 (14.8)</b>	<b>4 (8.9)</b>

*Source: Field Survey August 2004*

Household participation in CF and NCF tended to have labor in the family varied from 1 – 3. Inland water provinces of Kandal and Pursat tended to have more labor than in the coastal province of Kampot. However, there was no significantly different between CF and NCF nor between locations. It means that the number of labors in the household was not depended upon locations or communities. Nevertheless, number of labor in the family was much depended on amount of family member rather than other factors at 95 percent of confidential level.

#### - Household Member Engage in Fishing

Household member engaged in fishing is very important for household who remain fishing as main occupation. Without labor fishermen cannot do fishing. In CF of Pursat and Kampot respondent liked to go to fishing by two people while only one in Kandal. Highest proportion of women participation in fishing was in Pursat (23%), which contributed to a highest ration of 3 men per 1 woman (3:1). Conversely, proportion of women was very low in Kandal (only about 7%) and the ration was 14 men per 1 woman (14:1). Somehow, in Kampot, women engaged in fishing about 12.5 percent, which mad the ration to 7:1. However, in CF there were about 15 percent of women engaging in fishing practices.

Differently, ration of men per woman was a bit lower in NCF was about 4:1. In Pursat, the ration of men per woman was relatively lower than average (only 2:1). This means that, women ware more involving in fishing activities rather than the men. Woman participation in fishing of Pursat reached up to 34 percent of total respondents of that province. Other hands, there were very small percentage of women in Kandal (3%) and a bit higher in Kampot which up to about 11 percent. In average, women participation in fishing of NCF was about 16 percent with a ratio of 4:1 (Table 3.12).

**Table 3.12 Member People Engaged in Fishing by Genders**

	Male		Female		Average		Ratio M/F	
	CF	NCF	CF	NCF	CF	NCF	CF	NCF
Pursat	56 (76.7)	69 (66.3)	17 (23.3)	35 (33.7)	2	2	3:1	2:1
Kandal	55 (93.2)	58 (96.7)	4 (6.8)	2 (3.3)	1	1	14:1	29:1
Kampot	70 (87.5)	74 (89.2)	10 (12.5)	9 (10.8)	2	2	7:1	8:1
<b>Average</b>	<b>60 (85.4)</b>	<b>67 (84.1)</b>	<b>10 (14.6)</b>	<b>15 (15.9)</b>			<b>6:1</b>	<b>4:1</b>

*Source: Field Survey August 2004*

In view to the about mentioned can found that in Pursat family member engaged in fishing more than in the other two provinces of Kandal and Kampot. Ration of rest respondent was about 5 men per woman (5:1). Nonetheless, women participating in fishing were not related to head-household condition but strongly related to number of people in each household. The households who had more female member tended to have more women engaged in fishing practices.

### 3.1.3 Households Assets

Cost of housing of CF respondents in Kandal looked very contradiction between poor and medium households. Isolated respondents who were living in their huts with cost only 60,000 Riel (USD 15) and the medium respondents were living in houses, which cost up to 30 million Riel (USD 7,500). Kampot and Pursat respondents looked very similar of poor and medium households. The poor households of these two provinces were living in their huts cost about 120,000 Riel (USD30) and the medium households live with houses cost varied from 11 to 20 million Riel (USD 2,750 to USD 5,000). However, in average the housing cost of the rest households tended to have about 3.31 million Riel (USD 827).

Furthermore, land is the other asset, which contributes to people livelihood. The cost of land was up to 16 million Riel. Respondent in Kandal inclined to have high value of land than in Pursat and Kampot provinces. This is because the province located around Phnom Penh city.

Besides housing and land most of them had boats, which were using as means for transportation and for fishing. The boat cost was up to 25 million Riel (boat for marine community) while only about 3 million Riel in maximum for boat in inland-water. However, in average the cost was about 1.18 million Riel (USD 295). The respondents in Kampot tended to have boat, which higher value than in Kandal and Pursat.

Household appliances such as furniture, beds, tables, closets etc looked very extraordinary for respondent in these three provinces. It was contributing to very small amount which only about 40,000 Riel (USD10) for respondents in Pursat and about 290,000 Riel for respondents in Kampot. Hence, Kampot's respondents were liable to have more value of household appliances than the other provinces.

Electronic appliance such as fans, batteries, radios, televisions etc in the house seemed to be more elevated than household appliances. Pursat respondents were inclined to have more electronic appliances than the other two. About only 70,000 Riel of electronic appliance cost for Kampot's respondents, about 180,000 Riel for respondent in Kandal and about 330,000 Riel for Pursat's respondents. However, there were only about 190,000 Riel of electronic appliances appeared in the rest of respondents in average.

In review to household asset, the respondent located in Kandal tends to have highest value (up to 1.70 million Riel) and the lowest are in Pursat only 1.08 million Riel. Hence, the asset of the household is related mostly on location rather than the other factors. Same result is showing in student test of statistic at 95 percent confidential level (Table 3.13).

**Table 3.13 Household Asset of Respondents in CF**

	Household asset in Million of Riel					
	House	Land	Boat	Housing appliances	Electronic appliances	Average
Pursat	3.08	1.40	0.54	0.04	0.33	1.08
Kandal	3.69	3.69	0.94	0.02	0.18	1.70
Kampot	2.32	1.55	2.06	0.29	0.07	1.26
<b>Average</b>	<b>3.31</b>	<b>2.21</b>	<b>1.18</b>	<b>0.11</b>	<b>0.19</b>	<b>1.35</b>

*Source: Field Survey August 2004*

Housing in NCF seemed to be better than in CF. Value of house is varying from locations to locations and from provinces to provinces. In Kandal, value of house was up to 28 million Riel, which was higher than the other two provinces. In Pursat and Kampot, the value of houses was about 24 and 16 million Riel respectively. However, in average the value of house seemed to be highest in coastal province than in inland provinces. Average cost of house in Pursat was about 3.31 million Riel, in Kandal was about 3.63 million Riel and up to 4.78 million Riel in Kampot. In the rest, value of house was about 3.91 million Riel.

Land is other asset of the household. Cost of land asset in Pursat was about 0.23 million Riel which was lower than in Kandal (3.70 million Riel) and in Kampot (4.14 million Riel). Average cost of land asset of each family in NCF was about 2.69 million Riel.

Boat value is also contribution to household asset. Respondent in Kampot tended to have high-value boat (4.76 million Riel) than in Kandal and Pursat. There were about 1.45 million Riel of boat-value in Pursat while only about 0.72 million Riel in Kandal. However, the average value of boat asset of each respondent was about 2.31 million Riel.

Household appliances had value about 90,000 Riel for respondent in Pursat, about 20,000 Riel in Kandal and about 190,000 Riel in Kampot. In average, cost of household appliances was about 100,000 Riel.

There were about 0.55 million Riel cost of electronic appliances of respondent in Pursat, about 0.24 million Riel in Kandal and about 0.17 million Riel in Kampot. Hence, the respondent in Pursat tended to have high cost of electronic appliance than in the other two provinces. However, there were only about 0.32 million Riel cost of electronic appliances in average.

Nevertheless, household asset of respondents in NCF was liable to have about 1.87 million Riel. Cost of household assets in Kampot tended to have greater than in Kandal and Pursat. Kampot's respondents had household asset cost about 2.81 million Riel whereas about 1.13 million Riel for respondent in Pursat and about 1.66 million Riel in Kandal. In average in NCF there was about 1.8 million Riel (Table 3.14).

**Table 3.14 Household Asset of Respondent from NCF**

	Household asset in Million of CR					
	House	Land	Boat	Household Appliances	Electronic Appliances	Average
Pursat	3.31	0.23	1.45	0.09	0.55	1.13
Kandal	3.63	3.70	0.72	0.02	0.24	1.66
Kampot	4.78	4.14	4.76	0.19	0.17	2.81
<b>Average</b>	<b>3.91</b>	<b>2.69</b>	<b>2.31</b>	<b>0.10</b>	<b>0.32</b>	<b>1.87</b>

*Source: Field Survey August 2004*

The housing condition of respondent in CF seemed to be less value than in NCF. Furthermore, land holding, boat and electronic appliances were also much worsted than in NCF (a comparison of value). Conversely, household appliances values in NCF appeared to be higher than in CF. However, the cost of household assets of NCF were greater than in CF. Hence, the assets of the household were related mostly on location rather than on other factors. Same as result was showing in student test of statistic at 95 percent confidential level (sig. 0.00). Table below is showing the level of correlation between value of assets with marital status, with CF and NCF, and with ethnicity of the household. This correlation table shows that value of household asset highly significant correlation between community fisheries at 95 percent of confidential level.

### Paired Samples Correlations

	Value of household asset with	Number of sample	Correlation	Sig.
Pair 1	Marital status	270	0.001	0.978
Pair 2	Community	270	0.082	0.003
Pair 3	Ethnicity	270	0.036	0.182

*Note: the small number in sig. column on or high value in correlation column means high correlation.*

### 3.1.4 Households Income

Annual income of each household is varying from locations to locations or even from families to families as in Pursat, the income of respondents was varied from about 0.11 million Riel to 34.80 million Riel while in Kandal and Kampot were varied from 0.05 million Riel to 120.00 million Riel and from 0.10 million Riel to 50.40 million Riel, respectively. However, average income of all CF was about 5.44 million Riel. Respondents of CF in Kandal seemed to have highest annual income than in Pursat and Kandal. Average annual income of Kandal's respondent was about 8.30 million Riel while only 3.79 million Riel in Pursat and 4.24 million Riel in Kampot. The annual income of between respondents in each community looked much variation. Standard deviation of the means of income of Kandal CF looked very high which made the variation of annual income also very divergence. In CF of Pursat, annual income seemed to be a bit lower than the other two locations while it still higher than minimum of some households. Furthermore, standard deviations of the mean were also higher than averages of all locations.

In NCF, the annual income was varying from 0.13 million Riel to 31.52 million Riel with standard deviation of the mean 6.21 million Riel. The highest income of 6.24 million Riel was appearing in Pursat while the lowest one (4.22 million Riel) was emerging in Kandal. With highest income, Pursat was also faced with highest standard deviation of the mean too. In average income of the rest provinces was about 5.12 million Riel with standard deviation of the mean 6.21 million Riel (Table 3.15).

**Table3.15 Annual Income of Respondent in Million Riel**

	Minimum		Maximum		Mean		Std. Deviation	
	CF	NCF	CF	NCF	CF	NCF	CF	NCF
Pursat	0.11	0.17	34.80	46.80	3.79	6.24	5.03	8.07
Kandal	0.05	0.10	120.00	17.76	8.30	4.22	17.06	4.77
Kampot	0.10	0.12	50.40	30.00	4.24	4.88	6.70	5.80
<b>Average</b>	<b>0.09</b>	<b>0.13</b>	<b>68.40</b>	<b>31.52</b>	<b>5.44</b>	<b>5.12</b>	<b>9.60</b>	<b>6.21</b>

*Source: Field Survey August 2004*

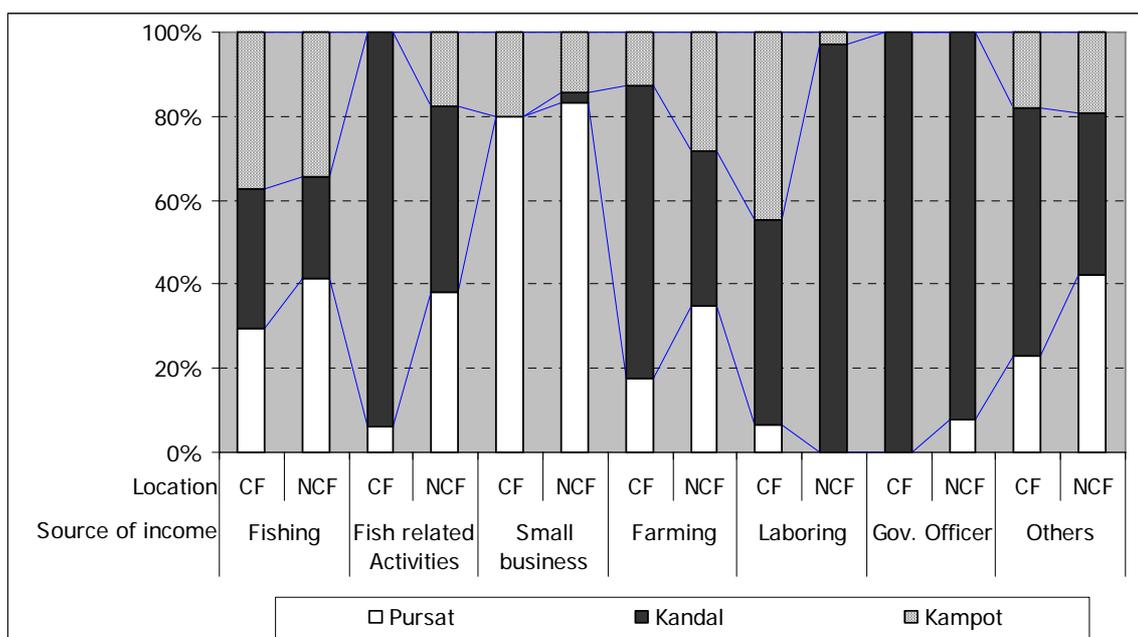
In an overview, in CF the average income of each province was highly worsted. With this variety of average income, the standard deviation of the mean was also fluctuated from 5.03 million Riel to

17.06 million Riel. Hence, an assumption was that, the distributions of household's annual income was making a big gap, which can lead the poor become more worsted. In CF, Kandal province was the highest annual income together with highest standard deviation while in NCF highest annual income was appearing in Pursat rather than in Kandal and the standard deviation of the mean of Pursat was also the highest. Minimum annual income of three provinces looked similarity whilst maximum income was highly worsted. Distribution of average annual income of these three provinces looked inferiority whereas a bit smooth in NCF. Moreover, minimum, maximum and standard deviation were also similar condition to the situation of average annual income distribution. However, the average income of these two sites was similarity but the standard deviation of CF site looked about double if compared to the average annual income. Differently in NCF sites, the standard deviation of income just a bit higher than average. Consequently, the condition of people respondent in NCF is better than in CF sites.

**- Source of Income**

There were many sources of income but time was very limited hence, this research was selected only few most significant sources which contributed very high to household income. Fishing was a main source of household income. It was contributed about 68 percent to total income of the CF. Second was fish related activities which included fish trading, fish/seaweed culturing, fish processing etc. Fish related activities were contributed about 23 percent to total income. Farming was a third ranked of contribution to the household income. It contributed about 8 percent to the total income. Trading or small business and others activities were contributed only about 6 percent. Government or NGOs working activities contributed very little, which was about 0.3 percent. Income from fishing in Kampot looked very high contribution, which was about 87 percent while about 40 percent in Kandal. Income from fish related activities contributed up to about 41 percent of total income in Kandal. Furthermore, income from farming was also highest among the provinces.

Similarly, fishing was a main contribution to annual income in NCF, which consumed about 85 percent of total income in Pursat, 75 percent in Kandal and about 91 percent in Kampot. Besides fishing, farming was as a supplementary income to the household respondents of rest NCF. About 5 percent of household income of Kandal respondent was come from farming and about 8 percent come from laboring. Kampot's respondent inclined to have about 6 percent of annual income from small business while there was only 0.2 percent in Kandal and 1.4 percent in Kampot (Figure 3.4).



Source: Field Survey August 2004

**Figure3.4 Sources of Income by Locations**

Via the above two circumstances fishing was a main source of household income of the respondents. Fish related activities become a second ranked for CF, which contributed to about 23 percent while only 2.4 percent for NCF. Farming was also becomes a great supplementary income to the respondents.

## 3.2 Resources and Fishing Ground

### 3.2.1 Fishing Ground

Community fisheries members are preferred to fish in their fishing grown rather than in others areas. About 93 percent of CF in Pursat did fishing inside community while there was about 20 percent do in open access? However, there was about 2 percent do in fishing lots. In Kandal, about 64 percent of fishers did fishing inside the community site and about 51 percent did in open access while about 7 percent and 9 percent, respectively, did outside the community and fishing lots. Differently in Kampot, which had no fishing lots, few of them did fishing in protected areas whereas about 60 percent of them did inside the community slots and about 33 percent did in open access. In average, there was about 73 percent did fishing inside the community and about 35 percent did in open access only few, especially in freshwater areas did in fishing lots.

Conversely, in NCF, respondent who had no community fishing areas they were mostly go fishing in open access and about 6 percent go fishing inside the CF sites. There was 18 percent of respondents in Pursat did fishing in protected areas while about 16 percent of respondent from Kandal did in fishing lots areas (Table 3.16).

**Table 3.16 Sources of Fishing Ground**

	Inside the community		Outside the community		Open access		Protected Areas		In fishing lots	
	CF	NCF	CF	NCF	CF	NCF	CF	NCF	CF	NCF
Pursat	42 (93.3)	3 (6.7)	0 (0.0)	2 (4.4)	9 (20.0)	44 (97.8)	0 (0.0)	8 (17.8)	1 (2.2)	0 (0.0)
Kandal	29 (64.4)	1 (2.2)	3 (6.7)	0 (0.0)	23 (51.1)	44 (97.8)	0 (0.0)	0 (0.0)	4 (8.9)	7 (15.6)
Kampot	27 (60.0)	4 (8.9)	3 (6.7)	0 (0.0)	15 (33.3)	42 (93.3)	1 (2.2)	0 (0.0)	---2	---
<b>Average</b>	<b>33 (72.6)</b>	<b>3 (5.9)</b>	<b>2 (4.4)</b>	<b>1 (1.5)</b>	<b>16 (34.8)</b>	<b>43 (96.3)</b>	<b>0 (0.7)</b>	<b>3 (5.9)</b>	<b>3 (5.6)</b>	<b>4 (7.8)</b>

*Source: Field Survey August 2004*

An overview of the above table found that the respondents in CF favored to fish in their CF sites while in NCF, which had no authorized fishing areas, did fishing in open access. Few of them in Pursat and Kandal did fishing in fishing lots. There were no one do in protected areas for CF in Pursat and Kandal while in NCF, fishers did. Distribution of respondents did fishing outside the community was appearing in NCF of Pursat rather than in CF organization places. However, fishing grounds, which fishermen go to fishing, did not related to the sites of communities.

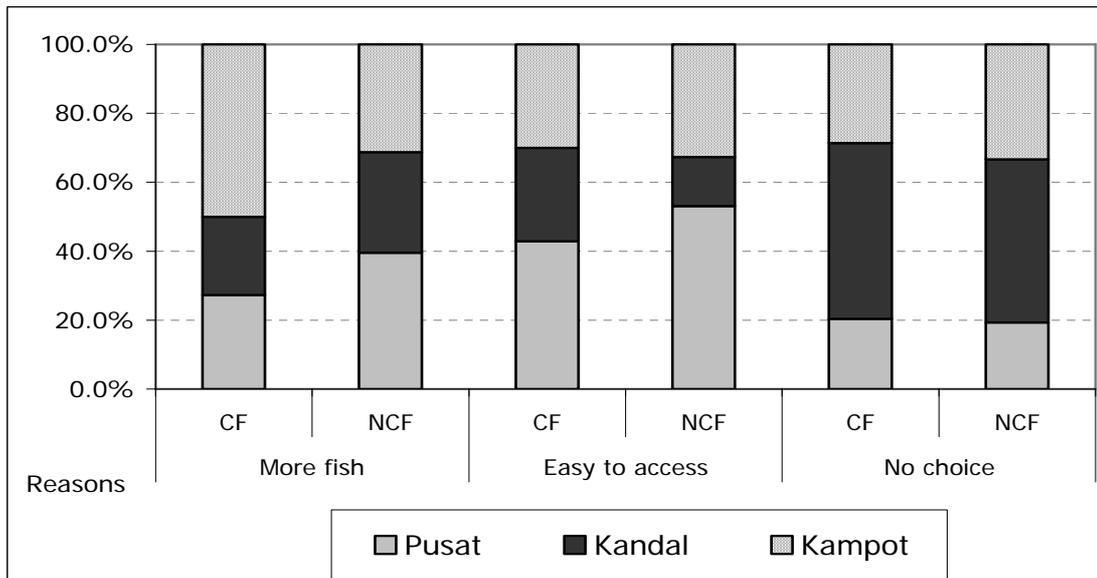
### 3.2.2 Reasons for fishing on that ground

There were three reasons for fishing in those particular areas, which were stated by CF. These reasons are more fish, easy to access and no alternative. Easy to access was a greatest reason for fishers in Pursat and Kampot while only about 42 percent mentioned by fishers in Kandal. No choice was the main reason for respondents in Kandal. Furthermore, it was also the second ranked, which was chosen by about 38 percent in average. However, about 18 percent of fishers in the three locations were mentions about more fish in those fishing ground.

Differently, in NCF, fishers traveled to fishing in those locations because of no choice (means no alternative) place for fishing). However, in Pursat about 60 percent of respondents mentioned about easy to access rather than no choice and more fish. While about 60 percent and 41 percent

<sup>2</sup> Data is not available because coastal areas did not have any fishing lots

of respondent in Kandal and Kampot, respectively, mentioned of no alternative rather than more fish and easy to access (Figure 3.5).



Source: Field Survey August 2004

**Figure 3.5 Reasons for Fishing in those Particular Areas**

Figure above is showing that, respondents in CF fishing inside CF grounds because of easy to access rather than no alternative places. Differently, fishers in NCF were mostly fishing in open access because of no alternative and easy to access too. Conversely, there were only about 18 percent of CF and 32 percent of NCF mentioned that they did fishing in those particular areas because of more fish. In addition, there were no any relations of reasons for fishing in those areas to CF sites as well to the provinces.

### 3.2.3 Benefit Aside from Fish

Aside from fish fishers could also generate some benefit from their fishing ground. Respondents in CF of Kandal mostly (80 percent) collected vegetable and about 64 percent collected firewood from their fishing ground while there were about 38 percent used water for drinking and cooking and about 22 percent collected medicine. Differently, CF in Pursat, about 96 percent collected firewood and about 64 percent used water for drinking and cooking whilst about 32 percent and 33 percent, respectively, collected vegetable and medicine. About 47 percent of CF in Kampot collected vegetable from their fishing ground while about 13 percent collected medicine and firewood, equally. However, aside from fish respondents in those areas about 70 percent collected vegetable, about 58 percent benefited firewood and about 51 percent used water for drinking and cooking while only about 7 percent collected some wood and pool from the fishing grounds for house construction material and about 23 percent collected medicine.

Conversely, respondent in NCF about 58 percent collected firewood, about 49 percent collected vegetable and about 42 percent used water for drinking and cooking while only 2 percent collected some housing construction material and about 22 percent collected medicine. Separately, NCF in Pursat, about 98 percent collected firewood and about 91 percent used water from the fishing grounds for drinking and cooking even as about 58 percent collected vegetable and 42 percent collected medicine. Differently, about 69 percent of NCF in Kandal gathered vegetable and about 53 percent collected firewood whereas about 36 percent used water for drinking and cooking and 20 percent gathered medicine. However, all respondent in NCF of Pursat and Kandal did not collect any housing construction material from their fishing grounds. Worthlessness, about only 47 percent of respondents in Kampot had mention about benefit of some additional value to the fishing grounds and other 53 percent was not mentioned. In addition, about 20 percent had collect

vegetable and about 22 percent collected firewood while about 4 percent collected some medicine? Nevertheless, about 2 percent collected firewood, which was not mentioned by the other two locations (Table 3.17).

**Table 3.17 Benefit from Fishing Ground Aside from Fish**

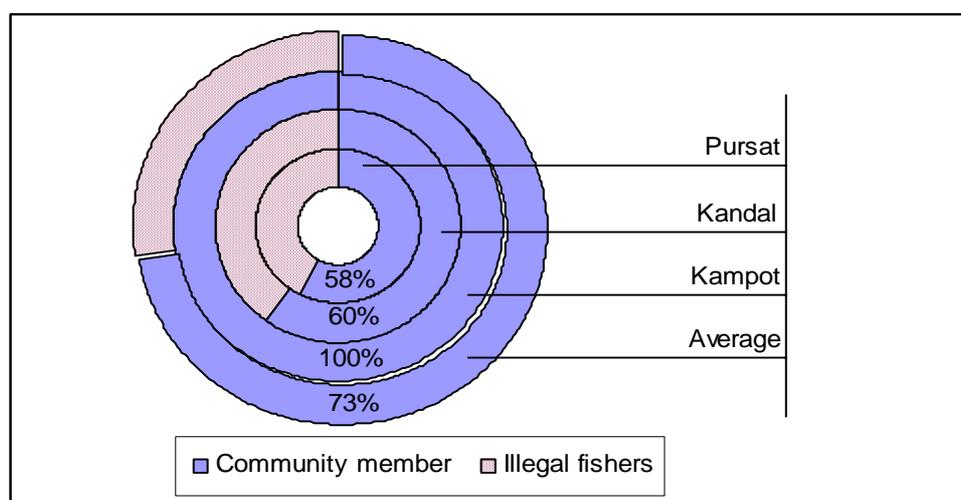
	Vegetable		Medicine		Fire wood		Housing		Water	
Pursat	37 (32.2)	26 (57.8)	15 (33.3)	19 (42.2)	43 (95.6)	44 (97.8)	0 (0.0)	0 (0.0)	29 (64.4)	41 (91.1)
Kandal	36 (80.0)	31 (68.9)	10 (22.2)	9 (20.0)	29 (64.4)	24 (53.3)	5 (11.1)	0 (0.0)	17 (37.8)	16 (35.6)
Kampot	21 (46.7)	9 (20.0)	6 (13.3)	2 (4.4)	6 (13.3)	10 (22.2)	1 (2.2)	1 (2.2)	--	--
<b>Average</b>	<b>31 (69.6)</b>	<b>22 (48.9)</b>	<b>10 (23.0)</b>	<b>10 (22.2)</b>	<b>26 (57.8)</b>	<b>26 (57.8)</b>	<b>3 (6.7)</b>	<b>1 (2.2)</b>	<b>23 (51.1)</b>	<b>19 (42.2)</b>

Source: Field Survey August 2004

In a view to the above table, respondent in CF seemed to be benefited more additional thing than in NCF, which included vegetable, medicine, firewood and housing construction material. However, water for drinking and cooking still a main source for people in CF rather than in NCF.

### 3.3 Affection of Fishery Rules and Regulations

Community fisheries in Pursat, Kandal and Kampot had recognized by local governor through *prakas*. This *prakas* is very affected to community member, which stated about 73 percent of total respondents. Furthermore, 100 percent of respondents in Kampot mentioned about the effectiveness of the *prakas* to the community members, while about 60 percent and 58 percent of respondents in Kandal and Pursat, respectively, mentioned. About 40 percent of respondent in Pursat was mentioned about it effected to illegal fishermen and about 40 percent in Kandal was mentioned the same (Figure 3.6).



Source: Field Survey August 2004

**Figure 3.6 Effects of Fisheries Rules and Regulation on Fishers**

#### - Effectiveness

There were three levels of effectiveness of rule and regulation (*prakas*) on CF member and on illegal fishers. First was very effectiveness, second was effectiveness and third was not effectiveness. Based on the result from the field shown that about 49 percent of respondents in Pursat and about 51 percent in Kampot said that *prakas* was not effected to CF members as well as to the illegal fishers while only about 7 percent had mentioned of its effectiveness. Conversely, about 53 percent in Kandal mentioned that *prakas* was very effectiveness on community member and illegal fishers and about 18 percent in Pursat had mentioned the same. While there was not mentioned by the respondent in Kampot. Just effectiveness was stated from various respondents,

especially respondents in Kampot, which were mentioned about 49 percent, 40 percent from Kandal and about 33 percent from Pursat.

In average, there was about 24 percent said that *prakas* was very effectiveness, about 41 percent was mentioned about just effectiveness and about 37 percent mentioned not effectiveness (Table 3.18).

**Table 3.18 Level of Rule and Regulation Effectiveness**

	Level of effectiveness		
	Very effective	Effective	Not effective
Pursat	8 (17.8)	15 (33.3)	22 (48.9)
Kandal	24 (53.3)	18 (40.0)	3 (6.7)
Kampot	--	22 (48.9)	23 (51.1)
<b>Average</b>	<b>16 (23.7)</b>	<b>18 (40.7)</b>	<b>16 (35.6)</b>

Source: Field Survey August 2004

Even the variation of answers was very different from locations to locations but the entire respondents had mentioned that government officers should be the first implementer to the rule and regulation. Furthermore, respondents had claimed that the rule and regulation, which stated in the *parkas* was not highly effective to the fishers as well as to the community members.

### 3.4 Fishing Before 2001

#### 3.4.1 Fishing Gear Used

In CF of Pursat, about 87 percent used gillnet, 44 percent used hooked line and about 20 percent used fish trap. Few of them used sine net and only about 7 percent used others fishing methods, which included scooping net and spear. However, there was about 11 percent put *Samras* in the water for collection fish. Differently, about only 4 percent of respondents in Kandal used fish trap and no one used cast net while 80 percent used gillnet. There was no one use *Samras* and other fishing methods in Kandal too. However, respondents in Kampot tended to use fish trap about 42 percent, gillnet about 69 percent and others. Some fishing methods were not using by any fishers in Kampot such as cast net, hooked line, *samras* and seine net. For the rest, gillnet is the first ranked, which was likely use by many respondents in CF, hooked line and fish trap were the second and third ranked, correspondently.

In NCF site, about 93 percent of fishers from Pursat used gill net, about 58 percent used *Krasom/Samras* and about 33 percent used fish trap while about 13 percent used cast net and about 9 percent used hook line. There was not any respondent in the selected provinces used seine net for fishing. Differently, respondents in Kandal about 80 percent used gillnet and about 50 percent used hooked line. While there was about only 7 percent used fish trap and 9 percent used other fishing gears such as spear and scooping net. Respond in Kampot about 89 percent used gillnet while 11 percent and 16 percent, respectively used fish/shrimp trap and other fishing methods. In average there was about 87 percent used gill net while only 19 percent used hooked line (Table 3.19).

**Table 3.19 Fishing Gears Used by the Respondents in 2001**

	Fish Trap		Cast Net		Gill Net		Hooked Line		Samras/Krasom		Seine Net		Others	
	CF	NCF	CF	NCF	CF	NCF	CF	NCF	CF	NCF	CF	NCF	CF	NCF
Pursat	9 (20.0)	15 (33.3)	9 (20.0)	6 (13.3)	39 (86.7)	42 (93.3)	20 (44.4)	4 (8.9)	5 (11.1)	26 (58.7)	1 (2.2)	0 (0.0)	3 (6.7)	3 (6.7)
Kandal	2 (4.4)	3 (6.7)	0 (0.0)	0 (0.0)	36 (80.0)	36 (80.0)	23 (51.1)	22 (48.9)	0 (0.0)	0 (0.0)	1 (2.2)	1 (2.2)	0 (0.0)	4 (8.9)
Kampot	19 (42.2)	5 (11.1)	0 (0.0)	0 (0.0)	31 (68.9)	40 (88.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	12 (26.7)	7 (15.6)
<b>Average</b>	<b>10 (22.2)</b>	<b>8 (17.0)</b>	<b>3 (6.7)</b>	<b>2 (4.4)</b>	<b>35 (78.5)</b>	<b>39 (87.4)</b>	<b>14 (31.9)</b>	<b>9 (19.3)</b>	<b>2 (3.7)</b>	<b>9 (19.3)</b>	<b>1 (1.5)</b>	<b>0 (0.7)</b>	<b>5 (11.1)</b>	<b>5 (11.1)</b>

Source: Field Survey August 2004

Synopses to the above figure, fishers in NCF was likely to used gillnet rather than the others. Hooked line was the second using and fish/shrimp/crab trap was the third using. Respondents in Pursat tended to use *samras/krasom*, which was not using by fishers in Kandal and Kampot. Conversely, respondents in Kandal were likely to used seine net and other such electro fishing (interview during field survey). The reasons to these were because seine net can collect more fish and electro fishing is very easy to use and cheap which can get them to everywhere within the province.

### 3.4.2 Fish Production Caught

Fishers in CF of Pursat tended to go to fish about 5 times per week with 2 persons each time and spent about 6 hour per time. The average production caught was about 2.3 kg per time accompany with standard deviation of 26 kg. Respondents in CF of Kandal leaned to spend about 13 hours 40 minute for fishing each time and 5 times per week. Number of fisher per-time was 1 and the production caught was about 2 kg with 4 kg of standard deviation. Conversely, respondents in CF of Kampot spend about 6 times per week with 2 persons in a period of 6 hours 10 minutes. The average production caught of CF Kampot was about 3.9 kg while standard deviation was about 14 kg per time. In average, the respondents went to fish about 5 times per week with 2 persons in about 8 hours and 20 minutes each time. Fishers can catch bout 2.7 kg per time followed by minimum 1 kg, maximum of 53.3 kg and standard deviation of 41 kg.

In NCF of Pursat's respondents leaned to spend 7 time per week with 2 fishers in about 7 hour and 30 minutes. Average production caught of respondent in Pursat was about 4.1 kg accompany by about 35 kg of STDEV per time. Unlikely, fishers in Kandal went to fish only about 5 times per week with 1 fisher in 13 hour and 10 minutes per time. Fish production caught per time was about 2.2 kg (STDEV 6 kg). Non-community fisheries in Kampot seemed to fish by 3 fishers in a period of 10 hours and 30 minutes. They usually go to fish 5 times per week. Average fish production caught for respondents in Kampot was about 7.7 kg escorts by about 21.1 kg of standard deviation per time. In rest of samples in NCF, respondents were inclined to spend about 6 times per week with 2 fishers in 10 hours and 20 minute each time in average. Product caught was about 4.7 kg in average followed by minimum of 1.2 kg, maximum of 80 kg and 20.7 kg of STDEV (Table 3.20).

**Table 3.20 Numbers of, Times, Fishers, Period and Production Caught (Before 2001)**

	Time/week		Person/time		Period/time (h)		Amount caught (kg/time)			
	CF	NCF	CF	NCF	CF	NCF	CF		NCF	
							Ave	STDEV	Ave	STDEV
Pursat	5	7	2	2	5h51	7h40	23.1	88.1	29.1	46.8
Kandal	5	5	1	1	13h17	13h30	11.3	8.9	10.5	9.9
Kampot	6	5	2	3	6h12	10h40	18.0	26.0	33.6	41.3
<b>Average</b>	<b>5</b>	<b>6</b>	<b>2</b>	<b>2</b>	<b>8h27</b>	<b>10h35</b>	<b>17.5</b>	<b>41.0</b>	<b>24.4</b>	<b>32.7</b>

Source: Field Survey August 2004

In assumption to the above, the respondents in CF of Pursat are inclined to travel for fishing less than in NCF with the same number of fishers. However, respondents in CF had spent longer period than in NCF and the production caught were also higher which accompany by a higher standard deviation of the means.

### 3.5 Fishing 2003 – 2004

#### 3.5.1 Fishing Gear Used

Fishing gears uses by the respondents are very different from respondents in coastal province and inland provinces. About 89 percent of respondents in CF of Pursat used gillnet for fishing with accompany by about 82 percent in Kandal and about 73 percent in Kampot. Hooked line was the second ranked which used by about 42 percent of respondents in Pursat and about 44 percent in Kandal while there was not used in coastal province. Cast net was also very popular for some respondents in Pursat and about 11 percent of respondents in Kampot while only about 2 percent of respondents in Kandal. *Samras*, even it is an illegal fishing method but it was practicing by about 16 percent of respondents in Pursat. Seine net and other fishing methods such as electro fishing, scooping basket etc were implementing by few fishers (Table 3.21).

Similarly, respondents in NCF, about 92 percent used gillnet for fishing while about 18 percent used fish trap and about 16 percent used cast net. There was very small amount of respondents used *samras/krasom*, seine net and other fishing methods to fish. The respondents in Pursat and Kampot tends to use gillnet more than respondents in Kandal. Furthermore, fish trap was using by about 38 percent of respondents in Pursat, about 11 percent in Kampot and only about 7 percent in Kandal. Nevertheless, respondents in Kandal did not using any cast net while they were using by about 22 percent of respondents in Pursat and about 9 percent by respondents in Kampot. About 36 percent of respondents in Kandal used hooked line while there was about 11 percent in Pursat and was not using by respondents in Kampot. *Samras* is an illegal fishing method but it was used by about 65 percent of respondents in Pursat. Seine net is a medium scale fishing gear was used by on respondents in Kandal.

**Table 3.21 Fishing Gears Used by the Respondents**

	Fish Trap		Cast Net		Gill Net		Hooked Line		Samras/Krasom		Seine Net		Others	
	CF	NCF	CF	NCF	CF	NCF	CF	NCF	CF	NCF	CF	NCF	CF	NCF
Pursat	10 (22.2)	17 (37.8)	12 (26.7)	10 (22.2)	40 (88.9)	42 (93.3)	19 (42.2)	5 (11.1)	7 (15.6)	29 (64.4)	1 (2.2)	0 (0.0)	2 (4.4)	0 (0.0)
Kandal	1 (2.2)	3 (6.7)	1 (2.2)	0 (0.0)	37 (82.2)	40 (88.9)	20 (44.4)	16 (35.6)	0 (0.0)	0 (0.0)	1 (2.2)	5 (11.1)	0 (0.0)	1 (2.2)
Kampot	24 (53.3)	5 (11.1)	5 (11.1)	4 (8.9)	33 (73.3)	42 (93.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (6.7)	3 (6.7)
<b>Average</b>	<b>12</b> <b>(25.9)</b>	<b>8</b> <b>(18.5)</b>	<b>6</b> <b>(13.3)</b>	<b>4.7</b> <b>(10.4)</b>	<b>37</b> <b>(81.5)</b>	<b>41</b> <b>(91.8)</b>	<b>20</b> <b>(28.9)</b>	<b>7</b> <b>(15.6)</b>	<b>2.3</b> <b>(5.2)</b>	<b>10</b> <b>(21.5)</b>	<b>1</b> <b>(1.5)</b>	<b>2</b> <b>(3.7)</b>	<b>2</b> <b>(3.7)</b>	<b>1</b> <b>(3.0)</b>

Source: Field Survey August 2004

View from the above table is showing that, rest of respondent included both CF and NCF sites offered to use gillnet rather than the others. *Samras/krasom* was implemented mainly in Pursat of both CF and NCF while *seine net* mainly used in Kandal. Fishers in Kampot did not use hooked line as a main source of fishing, while it was very comment for fishers in Pursat and Kandal (inland water areas). Respondents in Kandal tended to use illegal fishing such as *electro fishing* and *mosquito net* much more than other areas (focus group discussion).

#### 3.5.2 Fish Production Caught

Respondents in Pursat went to fish about 5 times per week with about 5 hours and 21 minutes per time. The minimum production caught was about 0.5 kg and the average was about 2.3 kg with a high standard deviation of 26 kg. Two people in the household traveled for fishing 5 times per week. In Kandal, the number of time went to fish was the same to Pursat but the number of

fishers was only less than. With only one person going to fish, respondent tended to fished longer period, which up to 13 hours and 42 minute per time. The average production caught in Kandal was about 2 kg, which accompany by minimum of 1 kg, maximum of 15 kg and standard deviation of 4 kg. Differently, respondent in Kampot leaned to fish more time than the others, which up to 6 times per week with 2 fishers and 6 hour per time. The average fish production caught was bout 4 kg, which follow by 1 kg minimum, 45 kg maximum and 14 kg standard deviation. However in average, respondent in CF went to fish about 5 times per week with 2 fishers per time and period of 8 hours and 23 minutes. The average production caught was about 2.7 kg per time accompany by 1 kg minimum, 53.3 kg maximum and 14.7 kg standard deviation.

Conversely, fishers in NCF from Pursat leaned to fish for whole week of 7 times with 2 fishers and about 7 hour and 30 minutes each time. The average production caught about 4.1 kg per time (STDEV 35 kg). Respondents in Kandal tended to fish less time than in Pursat, which were only 5 times per week with only 1 fisher and about 13 hour and 11 minutes per time. The average amount of caught was about 2.2 kg per time accompanied by only about 6 kg of standard deviation. NCF in Kampot fished about the same time to Kandal (5 times per week) with 3 people and the average period was about 10 hour and 30 minutes. In Kampot, the average amount of caught was about 7.7 kg with minimum of 0.5 kg and maximum of 70 kg. The standard deviation of fish production caught was about 21 kg. In the rest the average amount of caught was about 4.7 kg accompanied by about 21 kg of standard deviation (Table 3.22).

**Table 3.22 Average Number of Time, Fishers, Period and Production Caught (2003-2004)**

	Time/week		Person/time		Period/time (h)		Amount caught (kg/time)			
	CF	NCF	CF	NCF	CF	NCF	CF		NCF	
							Ave	STDEV	Ave	STDEV
Pursat	5	7	2	2	5h20	7h30	2.3	26	4.1	35
Kandal	5	5	1	1	13h40	13h10	2	4	2.2	6
Kampot	6	5	2	3	6h10	10h30	3.9	14	7.7	21.1
<b>Average</b>	<b>5</b>	<b>6</b>	<b>2</b>	<b>2</b>	<b>8h20</b>	<b>10h20</b>	<b>2.7</b>	<b>14.7</b>	<b>4.7</b>	<b>20.7</b>

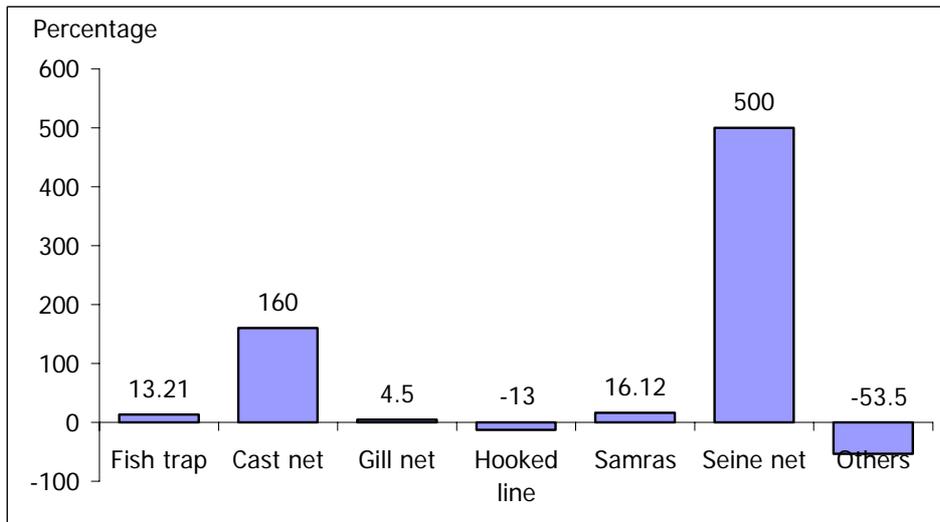
*Source: Field Survey August 2004*

In a overview of above table is showing that respondents in NCF leaned to spend about 6 times per week for fishing while period of fishing seemed to be lesser than in CF which about 10 hours and 20 minute. Fish production caught per time was greater in NCF accompanied by a high standard deviation. ANOVA testing shows that there was significantly different between CF and NCF in term of production caught at 95 percent confidential level (sig 0.000). However, this production caught was not related to other factor such gender headed household and aged of respondents.

### 3.6 Trend in Fishing of 2001 and 2003-2004

#### 3.6.1 Fishing Gears

Fish trap using was increase about 13 percent if compared to before 2001 period. Cast net, which was using by few people in 2001, had increase up to 160 percent in 2003-2004 while gill net, which commonly used was increase so little (about 4.5 percent). Further more, Seine net, which used by few people (1.1%) in before 2001 had increased about 500 percents. Even as *krasom/samras*, which used by about 5.2 percent in 2001 had increase only about 16 percent in recent year. Conversely, hooked line and others fishing methods had decreased about 13 percent and 53 percent, respectively from 2001 (Figure 3.7).



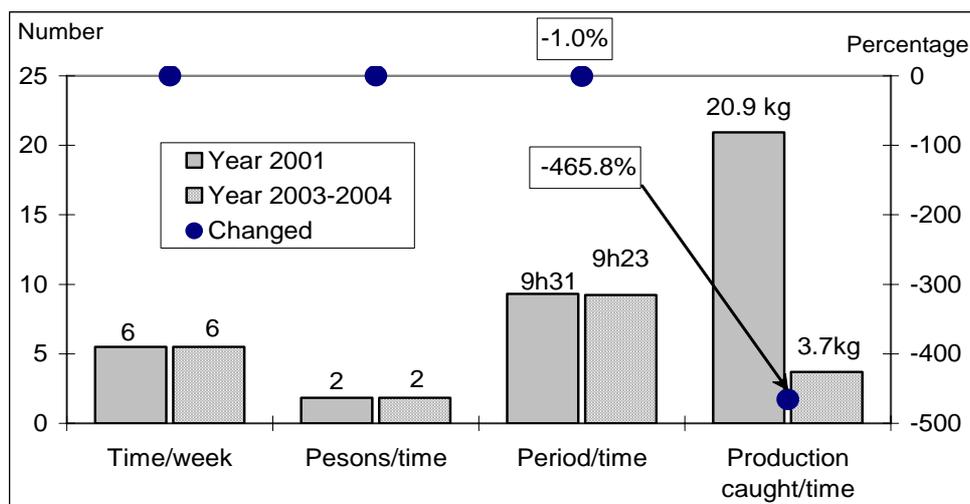
Source: Field Survey August 2004

**Figure3.7 Trend in Common Fishing Gears Used in Before 2001 and 2003-2004**

Though the above figure can assuming that seine net which dedicated as medium scale fishing practices had increased using much more than others. Cast net, which is also medium scale fishing practiced had increase about 160 percent from 2001. Moreover, *samras*, which is illegal fishing method, is more practicing in recent period than before fisheries administration reformed? Unlikely, hooked line, which is for small-scale fishers used, had decreased dramatically from 26 percent in before 2001 to 22 percent in 2003-2004 (decreased 13%).

### 3.6.2 Fish Production Caught

Number of time per week and number of people traveled for fishing were not changed from 2001 to 2003-2004 while period of fishing per time was increased about 7 minutes. Commonly, production caught per time of respondents was decreased dramatically from about 21 kg in 2001 to about 4 kg in 2003-2004 (decreased about 17 times). Furthermore, standard deviation of the mean of production caught was also increase 76 times if compared to 2001. It was only about 37kg in 2001 to a means of 21 kg and nowadays it was increase to about 18 kg to a mean of about 4 kg (Figure 3.8).



Source: Field Survey August 2004

**Figure3.8 Trend in Fish Production Caught from Before 2001 and 2003-2004**

## 3.7 Price of fish

### 3.7.1 Freshwater Fish Price

Fish price is varying upon fish species and size. There three value group of fish species were dividing in Cambodia. High value species, which is high price in both local and international markets. The high values species is using by rich people and for export. The size of fish for this value is also big and more meat than bone. Medium value species is not too high price and usually used by the medium families with some exportations. Poor value species of small fish or bonny fish, which use by the poor in both rural and pre-urban areas. It has low price and easy to catch. Some species of these fishes are using for fish paste (call *Prahok*), which is very likely by Cambodian. Table 3.23 illustrates of some common fish species caught by the fishers during 2003-2004.

**Table 3.23 Common Freshwater Fish Species Caught during 2003-2004**

High value species		Medium value species		Poor value species	
Scientific Name	Khmer Name	Scientific Name	Khmer Name	Scientific Name	Khmer Name
<i>Scleropages formosus</i>	Trey Kraport	<i>Helostoma temmincki</i>	Trey Kantrawb	<i>Pseudambasis notatus</i>	Trey Kanhchanh Chras
<i>Ompok bimaculatus</i>	Trey Kramam	<i>Parambassis wolffi</i>	Trye Kantrang Preng	<i>Mystus sp.</i>	Trey Kanh Chos
<i>Chitala ornate</i>	Trey Kray	<i>Borbodes altus</i>	Trey Krahe	<i>Biota sp.</i>	Trey Kanh Chhrouk
<i>Channa micropeltes</i>	Trey Chhdor	<i>Kryptopterus moorei</i>	Trey Kampleav	<i>Trochogaster microlepis</i>	Trey Kampleanh
<i>Oxyeleotris marmorata</i>	Trey Damrey	<i>Cirrhinus mrigala</i>	Trey Krawlang	<i>Amblyrhynchthys truncatus</i>	Trey Kambot Chramos
<i>Ompok hypophthalmus</i>	Trey Ta Oan	<i>Anabas testudineus</i>	Trey Kranh sre	<i>Osteochilus hasseltii</i>	Trey Kros
<i>Boesemania microlepis</i>	Trey Prama	<i>Morulus chrysophekadion</i>	Trey Kaek	<i>Pangasius conchophilus</i>	Trey Pra Ker
<i>Channa striata</i>	Trey Ros	<i>Hampala macrolepidota</i>	Trey Khman	<i>Dangila lineata</i>	Trey Khnang Veng
<i>Wallago attu</i>	Trey Sanday	<i>Osteochilus melanopleurus</i>	Trey Krum	<i>Rasbora myersi</i>	Changva
<i>Micronema apogon</i>	Trey Kes	<i>Puntioplites proctozysron</i>	Trey Chrakeng	<i>Carcharinus leuca</i>	Trey Chhlam
		<i>Setipinna melanochir</i>	Trey Chmar	<i>Coilia lindmani</i>	Trey Chanluonh mann
		<i>Macrognathus siamensis</i>	Trey Chhlonh	<i>Pangasius pleurotaenia</i>	Trey Chhviet
		<i>Hypsibarbus pierrei</i>	Trey Chhpin	<i>Pengasianodon hypophthalmus</i>	Trey Pra
		<i>Mystus nemurus</i>	Trey Chhlang	<i>Xenentodon cancila</i>	Trey Phthoung
		<i>Cyclocheilichthys enoplos</i>	Trey Chhkok	<i>pangasius larnaudiei</i>	Trey Pou
		<i>Macrochirichthys macrochirus</i>	Trey Dang Khleung	<i>Henicorhynchus caudimaculatus</i>	Trey Riel
		<i>Mystus filamentus</i>	Trey Tanel	<i>Thynnichthys thynnoides</i>	Trey Linh
		<i>Leptobarbus hoeveni</i>	Trey Proloungthom	<i>Cyclocheilichthys apogon</i>	Trey Sroka Khdam
		<i>Notopterus notopterus</i>	Trey Slat	<i>Langiculter siahi</i>	Trey Sloeuk Russei
		<i>Claria macrocephalus</i>	Trey Andeng Tun	<i>Dangila spilopleura</i>	Trey Ach Kok
				<i>Macrobrachium lanchesteri</i>	Kampoeus

Because of time was very limited, hence, here the calculation was focusing on average price of two provinces for fresh water fish and other one province was for marine fish species. The most appeared fish species during surveyed were Trey Riel (*Henicorhynchus caudimaculatus*) which stated by about 96 percent of respondent and followed by Trey Kros (*Osteochilus hasselti*) about 94 percent and Trey Chhpin (*Hypsibarbus pierreii*) about 89 percent. The high values species such as Trey Kes (*Micronema apogon*) and Trey Ta-Oan (*Ompok hypophthalmus*) were presenting in a very little of about 12 percent (Appendix 1). Only one high value species of Trey Ros (*channa striata*) were caught by fishers and followed by some medium value species and most of them were poor value species.

Price of a high value species (Trey Ros) was about 2,100 Riel in 1995 and increased to about 4,500 Riel (1.1 times increased) in 2003-2004. The medium value species such as Try Slat (*Notopterus notopterus*) and Trey Chhpin the price were increased from 1,700 Riel to 4,250 Riel (1 and half time increased) and from 1,100 Riel to 2,900 Riel (1.6 times increased), respectively (Table 3.22). The poor value species such as Trey Kanh Chos (*Mystus sp.*) and Trey Riel were increased about 3 times if compared with 1995 constant price. Furthermore, some common fish such as Trey Kampleanh (*Trochogaster microlepis*), the price was increased from 300 Riel to 1,300 Riel (about 3.3 times increased). However, poor value species, which are using by poor fishers, the price are increased than the high value species (Table 3.24).

**Table 3.24 Top-ten Freshwater Fish Price changed from before 2001 to 2003-2004**

No.	Scientific name	Khmer name	Respondent		Price (Riel/Kg)		Increased	
			No	%	before 2001	2003/2004	Riel	Time
1	<i>Channa striata</i>	Trey Ros	53	58.9	2,100	4,500	2,400	1.1
2	<i>Channa micropeltes</i>	Trey Chhdor	24	26.7	1,700	3,900	2,200	1.3
3	<i>Notopterus notopterus</i>	Trey Slat	45	50.0	1,700	4,250	2,550	1.5
4	<i>Helostoma temmincki</i>	Trey Kantrawb	48	53.3	1,050	3,000	1,950	1.9
5	<i>Anabas testudineus</i>	Trey Kranh sre	70	77.8	850	2,500	1,650	1.9
6	<i>Puntiplites proctozysron</i>	Trey Chrakeng	75	83.3	1,050	3,000	1,950	1.9
7	<i>Hypsibarbus pierreii</i>	Trey Chhpin	79	87.8	1,100	2,900	1,800	1.6
8	<i>Claria macrocephalus</i>	Trey Andeng Tun	21	23.3	2,000	4,600	2,600	1.3
9	<i>Mystus sp.</i>	Trey Kanh Chos	46	51.1	600	2,400	1,800	3.0
10	<i>Osteochilus hasselti</i>	Trey Kros	85	94.4	400	1,500	1,100	2.8
11	<i>Henicorhynchus caudimaculatus</i>	Trey Riel	86	95.6	400	1,600	1,200	3.0
12	<i>Trochogaster microlepis</i>	Trey Kampleanh	47	52.2	300	1,300	1,000	3.3
13	<i>Macrobrachium lanchesteri</i>	Kampoeus	31	34.4	700	1,500	800	1.1

Note: time is referred to trip

Source: Field Survey, August 2004

### 3.7.2 Marine Fish Price

Highest value species of marine fish was found in shrimp. The shrimp price was about 11,700 Riel in 2003/04, which was increased about 0.7 times if compared to 1995 constant price. Medium value species was for fish, which called Trey Kamoy (*Anodontostoma chacunda*). Similarly, crab and other shrimp and lobsters the price in 2003/04 was increased about 0.7 times from 1995. Conversely, high demand fish from the poor fishermen as well as poor people in coastal area was increased higher which up to about 1.3 times (Table 3.25).

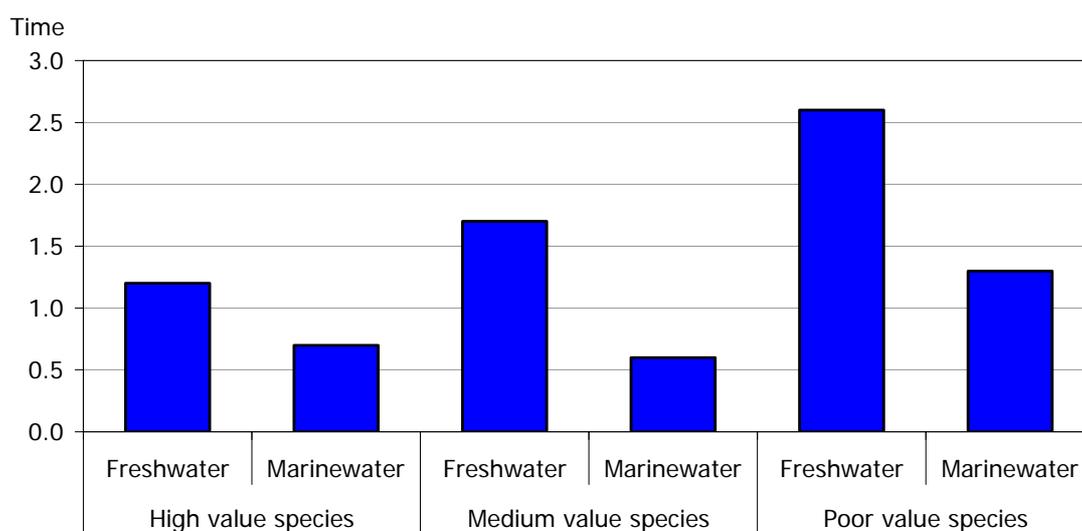
**Table 3.25 Top-ten Marine-water Fish Price changed from before 2001 to 2003-2004**

No.	Scientific name	Khmer name	Respondent		Price (Riel/Kg)		Increase	
			No	%	before 2001	2003/2004	Riel	Time
1.	<i>Penaeus setiferus</i>	Bangkear Chhebuoy	31	34.4	7,000	11,700	4,700	0.7
2.	<i>Eriphia sebana</i>	Khdam Phkorlan	27	30.0	4,950	8,400	3,450	0.7
3.	<i>Penaeus latisulcatus</i>	Bangkear Nilong	20	22.2	2,750	4,850	2,100	0.8
4.	<i>Octopus dollfusi</i>	Moeuk Ping Peang	24	26.7	2,600	4,350	1,750	0.7
5.	<i>Scellicdon walbeehmi</i>	Trey Chhlam Pruy Khmao	9	10.0	2,300	3,600	1,300	0.6
6.	<i>Siganus canaliculatus</i>	Trey Kantang Ploeng	43	47.8	1,700	2,600	900	0.5
7.	<i>Plotosus anguillaris</i>	Trey Andeng Pouy	9	10.0	1,500	2,200	700	0.5
8.	<i>Liza vaigiensis</i>	Trey Kabak Khmok	9	10.0	1,300	2,200	900	0.7
9.	<i>Hemirhamphus far</i>	Trey Pthoung Phkar	13	14.4	1,300	2,150	850	0.7
10.	<i>Lethrinus nebulosus</i>	Trey Krab Khnol	13	14.4	1,250	2,100	850	0.7
11.	<i>Rastrelliger brachysoma</i>	Trey Kamong	37	41.1	800	1,850	1,050	1.3
12.	<i>Anodontostoma chacunda</i>	Trey Kamoy	24	26.7	800	1,800	1,000	1.3

Note: time is referred to trip

Source: Field Survey, August 2004

Look at to the above two tables which given that price of freshwater fish is highly fluctuated than in marine water fish. For instant, high value species of *chevron snakehead* was increased about 1.1 times while high value of shrimp had increased about only 0.7 times. Similarly, medium value species of fresh waster had increasing about 1.3 times to about 2 times whilst only about 0.5 times to 0.8 times for marine fish. Furthermore, the price of poor value species such as siprinidae in freshwater was also increased higher than in marine water. The price of Trey Kampleanh, Trey Kros and Trey Riel, which are very high demand from the poor were increased about 3 times while about only 1.3 times of poor value species of marine fish (Figure 3.9).



Source: Field Survey August 2004

**Figure 3.9 Trend in Fresh and Marine Water Fish price by Value of Species from before 2001 -2003/04**

### 3.8 Perception on the Condition of the Fisheries

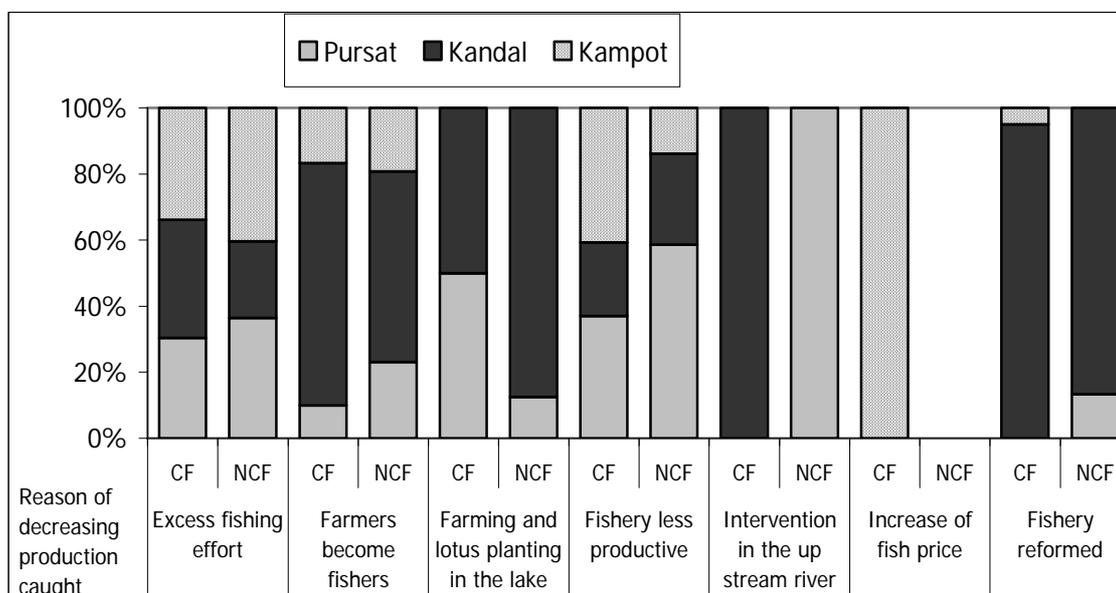
In CF sites, all respondents (100%) of inland water provinces had mentioned about decreased in volume of caught while only 93 percent from coastal province. Other 2 percent and 5 percent, respectively, pointed out about increase and stable of fish production caught.

Conversely, in NCF sites, there was 100 percent of respondents from Pursat had mentioned about decreased of fish production caught and only about 98 percent of Kandal and 91 percent of Kampot. The other 2 percent of Kandal's respondents and about 9 percent of Kampot stated that volume caught was increased if compared to the last year.

#### - Reasons for the Changed

Seven reasons which were claimed by the respondents during surveyed were 1-excess fishing effort, 2-farmers becoming fishing, 3-farming and lotus planting in the lake areas, 4-fishery less productive, 5-intervention in the upstream river system, 6-increase of fish price, 7-fisheries reformed. The most stated reasons from the respondent related to the decreasing of production caught was excess fishing effort in each area. This reason was mentioned of about 91 percent and 87 percent, respectively from respondent in Kandal and Kampot. The second highest mentioned reason was number 2 (farmers becoming fishers) which stated by about 49 percent of respondent from Kandal and the third highest reason was offered to number 4 (fishery less productive) which mentioned by about 22 percent and 24 percent, respectively, from respondent in Pursat and in Kampot. While about 42 percent of respondent from Kandal affirmed to number 7 (fisheries reform effected).

Similarly, in NCF site, the reason for decreased in fish production caught was presenting a highest percentage in number 1 (excess fishing effort in the areas) followed by second highest of number 4 and number 2. The highly impacted of excess fishing effort in the areas was in Kampot and Pursat while the fisheries reform was highly impact to the respondents in Kandal which stated from about 58 percent of respondent in that province (Figure 3.10).



Source: Field Survey August 2004

**Figure 3.10 Reasons for the Changed of Production Caught**

Summing up to the above figures is showing that excess of fishing effort in the areas was critical reason for decreased of fish production caught and farmers become fishers was the second one.

However, some respondents in Kandal, especially, mentioned that fishery administrative reformed was also an important factor related to decrease of volume caught.

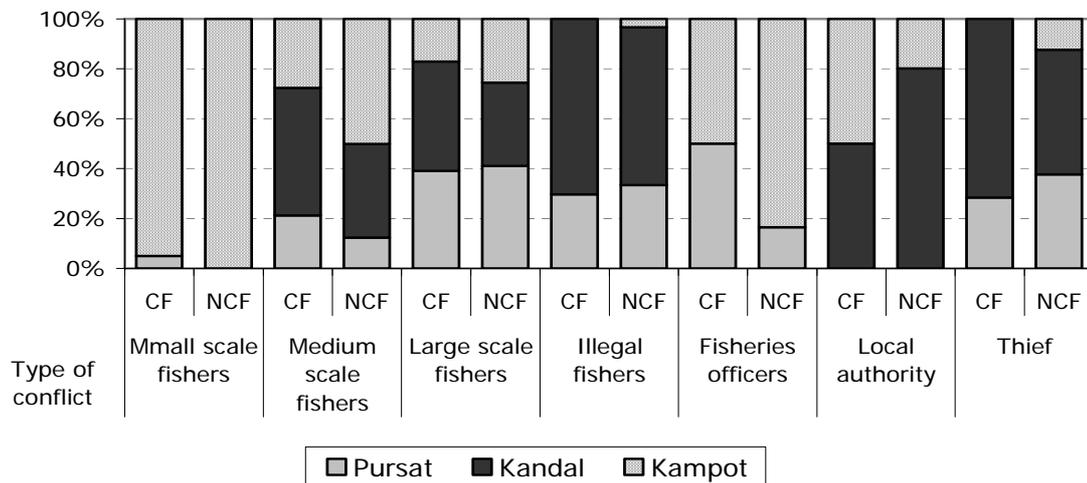
In supporting to the above statements, there was about 87 percent of respondent in CF site stated that number of fishermen in the areas are also increased day by day with related mostly to population increased and lack of alternative livelihood performances. Furthermore, fisher population increased is also related some to the migration and fisheries administration reformed too. As stated in above paragraph, the decreased of fish production caught was mostly because of farmers becoming fisher (stated about 49 percent of respondent from Kandal). Nevertheless, migration of farmers was also the main reason for increased of fishers in some locations.

### 3.9 Conflicts and Suggested Resolutions

#### 3.9.1 Conflicts Arising in the Study Areas

Seven types of conflicts were arising in the study areas such as conflict with 1-small-scale fishers, 2-medium-scale fisher, 3- Large-scale fishers, 4-Illegal fishers, 5-Fisheries officers, 6-Local authority, and 7- Thief. However, the conflict arriving was different from locations to locations. Respondent in CF of Pursat tended to faced the conflict with large-scale fishers (fishing lot owners) and medium scale fishers which similar to respondent from Kandal. Differently, conflict in CF of Kampot was usually arising between small-scale fishers and lesser with large and medium scale fishers. The conflict with provincial fisheries officer was appearing in Pursat and Kampot CFs but not in Kandal CF. Thief was very much happen in CF of Kandal rather than in CF of Pursat whilst did not happen in CF of Kampot.

Similarly in NCF, the conflict with mostly from large-scale fishers and illegal fishers were mostly arrival. In NCF of Pursat about 82 percent of respondents faced conflicts with large-scale and illegal fishers rather than with medium-scale fishers and local fisheries officers (Figure 3.12). This figure is similar to respondent in NCF of Kandal but different to the respondents from Kampot. Significantly, respondents from Kampot were mostly confronted with medium and large-scale fisher. Furthermore, respondents from Kandal tended to face also with local authority (Figure 3.11).



Source: Field Survey August 2004

Figure 3.11 Type of Conflict Arising in the Study Areas

Further more, fourteen type of conflicts in fishery sector which were stated by fisheries officers and participants during National Workshop on "Fish Fight over Fish Rights—Managing Exit from the Fisheries and Security Implication for Southeast Asia" were 1- fishers and fishers; 2- fishers and local authority; 3- fishers and lot owners; 4- provincial fisheries office and local power-men; 5- community members and community committee members; 6- local fishers and outside fishers; 7-

local fishers and foreign fishers; 8- fishers and seaweed culture; 9- fishers and fish culturist; 10- farmers and lotus farmers; 11- institutional conflicts; 12- flooded forest and inundated forest cutting; 13- environment conflicts between countries; and 14- ethnic group conflicts. These conflicts were broader than from the surveyed. The conflict between fishers and fishers, fishers and local authority, fishers and lot owner fishery, fishers and fisheries officers and fisher with lotus planter were already stated in the above paragraphs. Here, the discussion would do with some conflicts interests, which were not cited by the interviewers.

The main conflict, which was arising from Kandal and Pursat, was community member and community committee on selling fishing ground including deep fishing areas. Second highlight conflict was local fishers and outsiders (migrants) by competition of resources using. Generally outsider used illegal-fishing practices in community fishing areas or even in non-community areas as well which appeared especially in Pursat. Local fishers and foreign fisher conflicts which usually arising in coastal areas was because of foreign fishers do poaching fishing and use mostly modern fishing gears. Poaching purposes were only for high profit oriented, which never have intention for sustain the resources. Besides conflicting with foreigners, small-scale fishers also have some conflicting with seaweed culturist. The conflict is because seaweed culturist consume some places for their culture that these areas which are fishing grounds. Further more fishers are also conflicts with aquaculturist who collect fish seed and feed from natural. The collection of fish seed and feed make fish stock degradation.

The cause of conflicts between fishers and lotus farming was areas for fishing and increase of sedimentations. Planting of lotus may need some specific inundated areas. The areas requirement for lotus may reduce the areas for fishing, which are using by fishers. Besides the conflict with lotus planters, there were some conflicts with flooded forest cutter for shrimp farming, charcoal producing; fuel wood, construction, farming, samras and poaching wild animal etc. These implemented activities had destroyed fish habitat, especially breeding and spooning ground and also environmental degradation as well. Lately, fishers were also had some conflicts with ethnic fishers group who competing fishing ground.

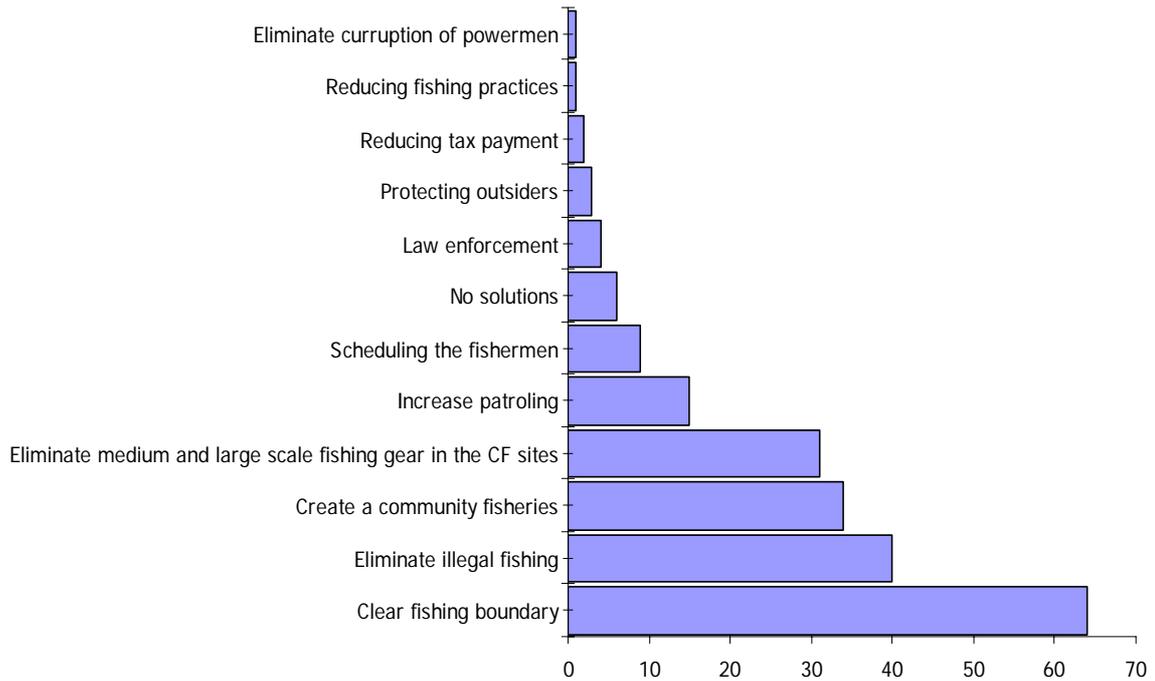
Environmental, degradation caused by hydropower dam construction at up stream areas were also very dangers to fish habitat and fishers livelihood. Lastly, the institutional conflict between fisheries institution and Ministry of Environment and Ministry of Land Titles were also making a jargon threat to fisheries resources management and improvement.

### **3.9.2 Level of Serious Related to Conflicts Arising**

The conflict of between small-scale fishers in Pursat seemed to be very serious while in Kampot seemed to be somewhat serious. With related to conflict with medium-scale fishers, the level of serious was ranged from violent to somewhat serious. About 22 percent of respondent from Pursat tended to site that conflict with those fishers was very serious and about 53 of respondent from Kandal mentioned that the conflict was violent. Differently, about 29 of respondent in Kampot claimed that the conflict with medium scale fishers was just serious. Conflict with large-scale fishers or lot owners in Pursat looked as a violent while in Kampot it looked very serious. Furthermore, in Kandal, the conflict with local authority and thief were also making very seriously to the fishermen in both CF and NCF sites.

### **3.9.3 Suggested Resolutions to the Conflicts**

About 14 suggested resolutions were resting out by the fishers in both CF and NCF as well as in inland and coastal provinces. Highest appropriated solution was clearing fishing boundary for small, medium and large-scale fishers and second was eliminating illegal fishing practices. Third likely solution was creating community fisheries at NCF sites and the fourth solution was eliminating medium and large-scale fishing gears in CF sites. This was because in the law the CF sites are not allowed for medium and large-scale fishing. Furthermore, increasing of patrolling in CF sites, scheduling the fishers to fish in different time (nigh time and day time) law enforcement and protecting of outsider fishermen were also ranked in the solution as well. Conversely, few respondents did not want to provide any suggested solution (Figure 3.12).



Source: Field Survey August 2004

**Figure 3.12 Suggested Resolutions to the Arising Conflicts**

Level of serious for additional conflict was varied from 1 to 4. One is serious effect to security; two is moderately effect; three is medium effect and four slightly effect to security. The conflict between fishers and local authority, fishers and lot owners, provincial fisheries office and powermen, local fishers and foreign fishers and environmental conflict between countries were very serious effect to fish securities in the county as well as to the livelihood of the fishers. Moderately effect to fish security and livelihood of the fishers was appeared when the conflicts are happen between fishers and fish culturist, institutional conflicts, lost of inundated and mangrove forest and ethnic group conflicts. Conflicts between community members and committer member related to selling the fishing ground; and fishers with outsider (migrants) were medium effect to fisheries security and livelihood of the fishers. Slightly effect was happening when the conflict appeared between fishers and fishers, fishers and seaweed culturist and fishers and lotus planters.

### 3.10 Plan for the Next Five Years

#### 3.10.1 Committed to Stay

About 60 percent and 56 percent of respondents from CF of Pursat and Kandal, respectively, had willing to continue fishing because most of them did not have other alternative job besides fishing and few of them have no choices. Furthermore, some of them stay because of supplementary incomes intention and about 58 percent from Kampot keened to fish because of no alternative job and few because of no farmland. Even though about 18 percent and 20 percent of respondents from Pursat, Kandal, respectively and 22 percent Kampot ware not sure because fisheries resources are degraded and it is only a supplementary income. However, about 24 percent, 22 percent, and 20 percent, orderly, of respondents from Kandal, Pursat and Kampot would not continue to fish any more. For reasons to that, most of them mentioned about fisheries resources degradation and few of them are getting old which have no more manpower to fish. Besides these some who preferred not fish at the further because they have other alternative jobs such as agriculture activities and small business. Table 3.26 describes about future plan of respondent related to fishing practices.

Similarly, respondent in NCF about 70 percent, 62 percent and 71 percent, respectively, had willing to continue their fishing occupation because they have no other alternative job and some have no choices (especially respondent in Kandal and Kampot). Furthermore, few of respondents who keened to fish were because of no capital to invest in other jobs and it was as a supplementary income. Nevertheless, about 13 percent, 22 percent and 18 percent, correspondently, did not make any decisions. The respondents, who were not sure because of fisheries resources degradation, which make them not easy to decide. Besides these, about 15 percent of respondents from NCF had decided to not continue to fish at all. This because, they had knowing that fisheries resources degradation, which makes them, cannot earn enough money for their livelihood.

**Table 3.26 Plan to Stay in Next 5 Years for Respondents**

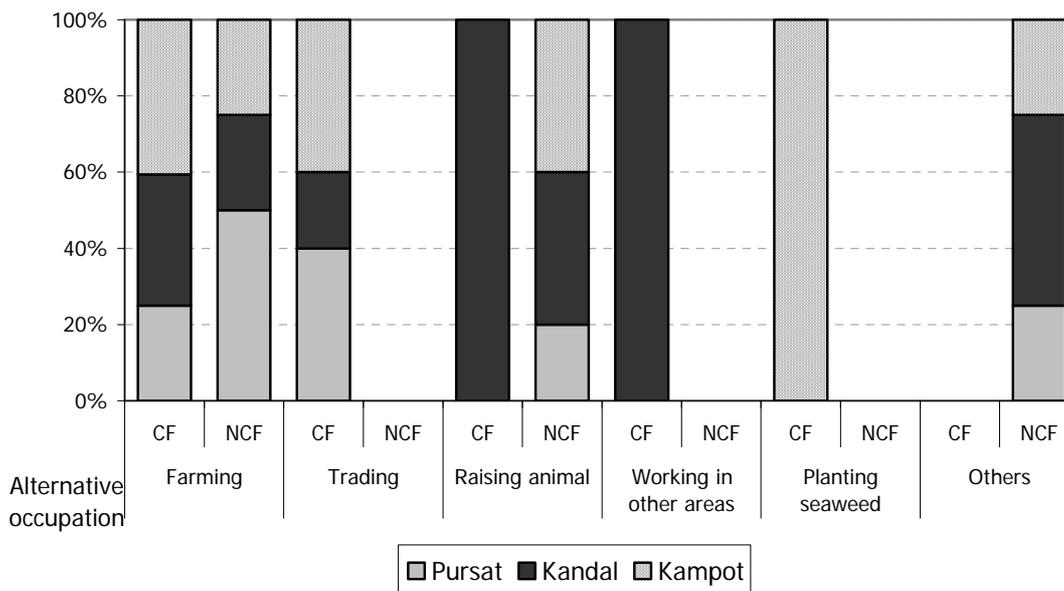
	Stay		Not sure		No	
	CF	NCF	CF	NCF	CF	NCF
Pursat	27 (60.0)	31 (68.9)	8 (17.8)	8 (17.8)	10 (22.2)	6 (13.3)
Kandal	25 (55.6)	28 (62.2)	9 (20.0)	7 (15.6)	11 (24.4)	10 (22.2)
Kampot	26 (57.8)	32 (71.1)	10 (22.2)	5 (11.1)	9 (20.0)	8 (17.8)
<b>Average</b>	<b>26 (57.8)</b>	<b>30 (67.4)</b>	<b>9 (20.0)</b>	<b>7 (14.8)</b>	<b>10 (22.2)</b>	<b>8 (17.8)</b>

*Source: Field Survey August 2004*

### 3.10.2 Reasons for Exit

In CF, the respondents who had no intention to continue fishing they have planned do farming, small business, and raising animal, working at the other available areas and do seaweed cultivation (for marine respondents only). With related to the above statements, about 80 percent and 67 percent of respondents from Pursat and Kampot, respectively willing to do farming with followed by about 20 percent want to start small business. About 11 percent of respondents in Kampot intended to plant seaweed whilst about 55 percent of respondents in Kandal wanted to do farming. Besides farming and seaweed culturing some of them (27 percent) were willing to work in other areas for income and only 9 percent who keened to do small business. Figure 3.13 states about intention of respondents who will not continue to fish in the next five years.

Conversely, only three reasons of farming, raising animal and others activities were stating by NCF to exit from fishing in the next five years (Figure 3.14). Via the figure below, there were about 75 percent of respondent who willing to exit form fishing in Pursat preferred to do farming followed by about 12 percent who keened to raising animal. Some other 13 percent of them wanted to work in other areas for income generations. Differently, about 43 percent of planning to exit from fishing in Kandal had willing to do farming while other 12 percent wanted to raising animal and other 13 percent preferred to work in other areas for earn the income. Forty percent of respondent from who plan to non fishing in Kampot had willing to do farming followed by 40 percent wanted to raising animal and only 20 percent intended to work in other areas.



Source: Field Survey August 2004

**Figure 3.13 Alternative Livelihood Activities for Exit from Fishing**

Via above figure we assume that, most of respondents who have willing to exit from fishing wanted mostly to implement farming activities than other occupations. There was very small amount of them have intended to feed animal and culture seaweed.

### 3.11 Suggested Exiting Strategies and Reaction

#### 3.11.1 Suggestion Exiting Strategies (the way of Reducing Fishing Reassurance)

Five suggested exit strategies which discussed during surveyed were 1-establish community fisheries; 2-provide some training; 3-provide land for agriculture activities; 4-find some alternative occupations and 5-others (open for respondents).

Respondents in CF of Pursat tended to request some piece of land for agriculture practices rather than call for training courses. This data was likely the same as in CF of Kandal and Kampot. However, the strategy of find some alternative job was claimed by a very little (only respondents in Kandal). Fisheries community creation was contributed to a very little in reducing fishing pressure in the areas. Providing of some training is a key development, which was rested out by only about 44 percent and 56 percent of respondents in Pursat and Kandal, respectively while there was only about 27 percent from respondent in Kampot.

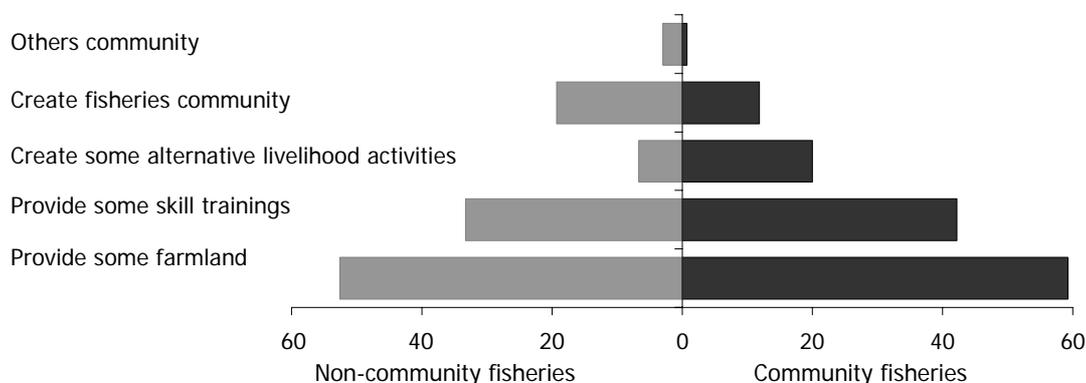
So far, NCF, respondents tended to request some farmlands for agriculture, which was the same as in CF. About 38 percent of respondents in Pursat had willing to get some skill training and about 29 percent asked for farmland while only about 4 percent preferred community fisheries creation. Differently, about 69 percent and 60 person, correspondently, of respondent from Kandal and Kampot preferred to have some farmland and 40 percent and 22 percent, respectively, requested for some skill training whilst only about 4 percent and 11 percent required some alternative livelihood activities (Table 3.27).

**Table 3.27 Suggestions Strategies for Reducing Fishing Pressure**

	Establish community fisheries		Provide some skill training		Provide some farmland for agriculture		Create some alternative livelihoods activities		Others	
	CF	NCF	CF	NCF	CF	NCF	CF	NCF	CF	NCF
Pursat	1 (2.2)	2 (4.4)	20 (44.4)	17 (37.8)	24 (53.3)	13 (28.9)	4 (8.9)	2 (4.4)	0 (0.0)	4 (8.9)
Kandal	9 (20.0)	14 (31.1)	25 (55.6)	18 (40.0)	37 (82.2)	31 (68.9)	5 (11.1)	2 (4.4)	1 (2.2)	0 (0.0)
Kampot	6 (13.3)	10 (22.2)	12 (26.7)	10 (22.2)	19 (42.2)	27 (60.0)	18 (40.0)	5 (11.1)	0 (0.0)	0 (0.0)
<b>Average</b>	<b>5 (11.9)</b>	<b>9 (19.3)</b>	<b>19 (42.2)</b>	<b>15 (33.3)</b>	<b>27 (59.3)</b>	<b>24 (52.6)</b>	<b>9 (20.0)</b>	<b>3 (6.7)</b>	<b>0 (0.7)</b>	<b>1 (3.0)</b>

Source: Field Survey August 2004

In assumption to above table is giving that respondents in both CF and NCF sites tended to have farmland for agriculture practices rather than others. However, skill training, which is very useful for improve human capital, was also stated by many respondents in both sites. Creative some alternative livelihood activities were known by some respondents from CF site while it was very little from NCF. Nevertheless, respondent from NCF site had some willing in creation of community fisheries which they think it may can reduced some fishing pressure whilst it was not much mentioned by the CF sites. Furthermore, respondents from CF not are liable to make any other suggestions beside the above four (Figure 3.14).



Source: Field Survey August 2004

**Figure 3.14 Suggested Strategies for Reducing Fishing Pressure**

### 3.11.2 Reaction to the Suggested Strategies for Reduce Fishing Pressure

Five suggested strategies were asked for rated during surveyed as follow 1-ban use of some fishing gears; 2-set maximum limit on amount of catch according to scale of operation; 3-nobody should fish during non-fishing season (for inland water only); 4-reduce number of all types of fishing lots for inland water or large-scale fishing ground for marine water site; and 5-reallocate and find land-based jobs for marginal fishers.

#### -In Community Fisheries

There was strongly agreed from most of respondents in Pursat and Kandal on *ban use of some fishing gears*, whilst only moderately agree from respondents in Kampot. The reason for agreed on

that suggested strategy was because some gears used are destroyed fish stock (mentioned by about 93% of respondents).

*Set maximum limit on amount catch according to scale of operation* (strategy number 2) was slightly disagreed from various respondents because the limitation of amount caught according to scale make them could not get enough food for eating. Some of them mentioned that if the strategy is implemented they would die because such current condition they are very dependent on fishing.

Strategy number 3 of *nobody should fish during non-fishing season* (for inland water) was strongly disagreed from both CF and NCF sites because if it was not allowed even small-scale fishers to fish in the whole season most of them will have no food for eat (stated by about 63% of respondents).

*Reduced number, of all types of fishing lots* (in fresh water areas) *and of large-scale fishing ground in marine water and converted them to as conservation areas*, was strongly and moderately agreed from most respondents in all three provinces. As reason to this, respondents had mentioned that lot owners have destroyed fish stock and fishing lot areas contain too large. Furthermore, lot owners caught too much fish which using illegal fishing practices in the lots.

Strategy number 5 of *reallocate and find land-based jobs for marginal fishers* was strongly agreed by many respondents because in the current condition, fishing is more difficult than farming. Lately, fish production is also decreasing dramatically day by day which make them very difficult to catch and earn a living.

#### **-In Non-Community Fisheries**

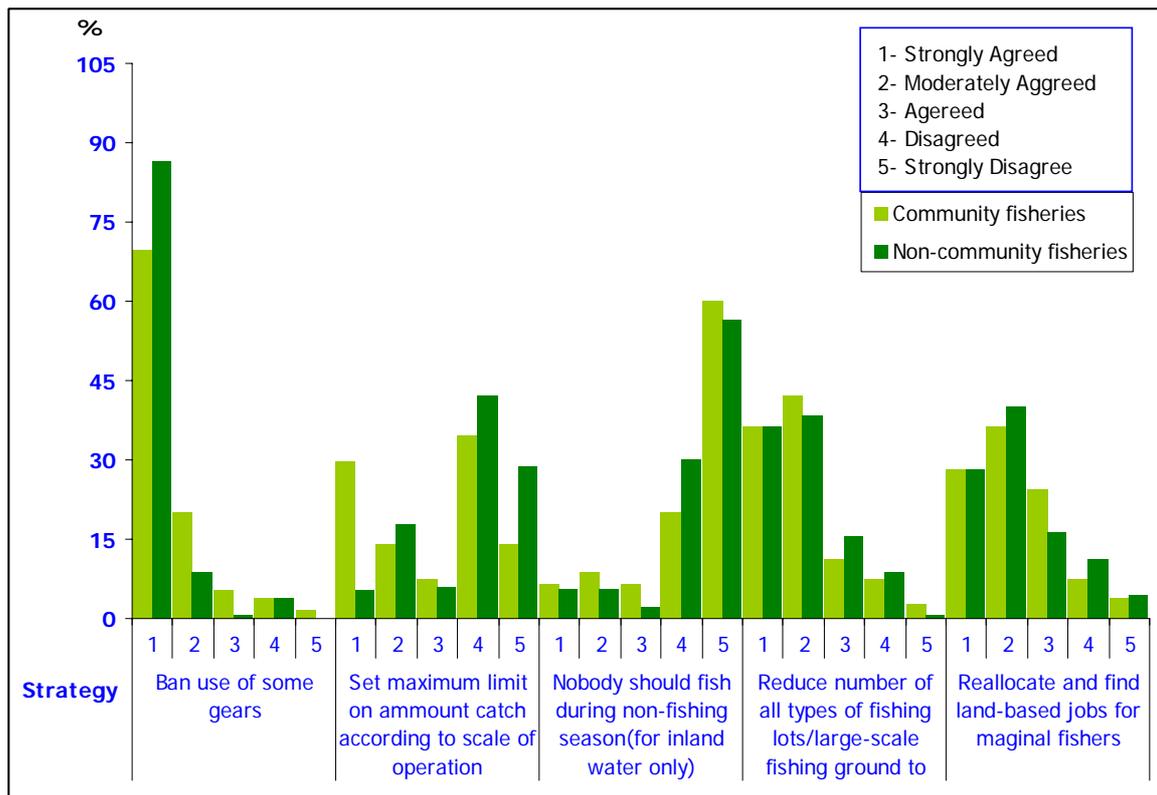
Similarly to the CF, most of the respondents from NCF tended to strongly agreed in *ban some fishing gears* because the practicing of some fishing gears in their small water body are destroyed fish stock (stated by about 96% of respondents).

Conversely, respondent had willing to disagreed and strongly disagreed to set maximum limit on amount caught according to scale of operation. This is because most of them would not have enough food for day consumption and some may cannot caught of some surplus for repay back the dept. Hence this strategy would make them become poor and poorer than before.

Furthermore, they were also strongly disagreed and disagreed on not allowing somebody to fish during closed season even small-scale fishers. Reason to this is they are living based on fishing so if it closed how they would live. Nevertheless, the closed period for small-scale fisher was also not stated in the law.

However, they were strongly agreed and moderately agreed on converting of some fishing lots and fishing ground to conservation areas. Reasons to this were because lot owners as well as large-scale fishers had destroyed fish habitat and fish stock. Further, large-scale fishers and lot owners catch too much fish.

Moreover, reallocated and find land based for marginal fishers was strongly agreed and moderately agreed by most of them because right now fisheries resources are degraded and fishing activities was also could not earned enough money to buy food for their family consumption. Nevertheless, fish stock is also decreasing day by day and some of them willing to planting rice rather than do fishing (Figure 3.15).



Source: Field Survey August 2004

Figure 3.15 Reaction to the Suggested Strategies for Reduce Fishing Pressure

### 3.12 Assistant for Exit from Fishing

Seven activities were requested for exits from fishing of the respondent in both CF and NCF. In CF, about 36 percent of respondents in Pursat had willing to have technical training assistant followed by about 33 percent in Kampot. While only about 7 percent of respondents in Kandal was requested technical assistant for exit from fishing. Most of them (53%) had willing to get land for farming. Some respondents requested for micro credit providing and few, especially respondents in Pursat and Kandal, wanted to get some skill training. Nevertheless only about 11 percent of respondents in Kampot keened to providing children education. Market information requirement was wanted from a very few respondent in Pursat.

Similarly, in NCF about 13 percent and 16 percent of respondents in Pursat and Kampot, respectively, had willing to have some technical training assistant. Greater more, about 27 percent of respondent in Kandal had also willing to gather some technical training assistant for exit from fishing. Moreover, about 53 percent and 51 percent of respondents in Pursat and Kampot, consequently, eager to have land for agriculture practices whilst some of them had willing to providing education to their children. However, about 24 percent and 22 percent of respondent in Kandal and Kampot, respectively, wanted to get credit. Market information was need from only about 7 percent and 2 percent, correspondently, of respondent in Pursat and Kandal (Table 3.28).

**Table 3.28 Assistant for Exit from Fishing**

	Pursat		Kandal		Kampot		Average	
	CF	NCF	CF	NCF	CF	NCF	CF	NCF
Technical training assistant	16 (35.6)	6 (13.3)	3 (6.7)	12 (26.7)	15 (33.3)	7 (15.6)	11 (25.2)	8 (18.5)
Land for farming	18 (40.0)	24 (53.3)	35 (77.8)	19 (42.2)	18 (40.0)	23 (51.1)	24 (52.6)	22 (48.9)
Provide credit	9 (20.0)	5 (11.1)	5 (11.1)	11 (24.4)	6 (13.3)	10 (22.2)	7 (14.8)	9 (19.3)
Skill for people	3 (6.7)	5 (11.1)	2 (4.4)	0 (0.0)	0 (0.0)	6 (13.3)	2 (3.7)	4 (8.1)
Children education	0 (0.0)	0 (0.0)	0 (0.0)	3 (6.7)	5 (11.1)	15 (33.3)	2 (3.7)	6 (13.3)
Market information	1 (2.2)	3 (6.7)	0 (0.0)	1 (2.2)	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.0)
Others	1 (2.2)	2 (4.4)	0 (0.0)	0 (0.0)	1 (2.2)	0 (0.0)	1 (1.5)	1 (1.5)

*Source: Field Survey August 2004*

Assumption to the above table shows that in CF about 53 percent of respondents had willing to have land for agriculture while about 25 percent wanted to have technical training assistant and about 15 percent keened to get credit services. Few of them wanted to have skill for people, education for children and accessed to market information. Differently, respondents in NCF only about 49 percent eager to have land for agriculture while only about 19 percent had willing to have technical training assistant and up to about 20 percent prefer to get credit. Child education was wanted from NCF seemed to be higher than in CF which was up to about 13 percent. Furthermore, provided skill for people was keened from NCF higher than in CF as well which was up to 8 percent.

### 3.13 Conclusion and Recommendation

#### 3.13.1 Conclusion

Most of the respondents in the study area aged ranged from 40 to 59 years old. Young aged (range from 20 to 39) in CF seems to be higher proportion than in the NCF about 6 percent. Conversely, households headed who aged ranged from 60 to 79 in CF seem to have less proportion than in NCF. This data was appearing as similar as to the data from National Institute of Statistic (NIS) who did a census in 1998.

Male headed households are main dominant in both CF and NCF. Female headed household tended to have only 25 percent in CF and about 13 percent in NCF. Female headed household are living in Pursat and Kampot more than in Kandal. However, respondent in Kandal were more number of widowers than the other two provinces.

About 54 percent of respondents in both CF and NCF had completed primary school while only about 4 percent had reached secondary school. Illiteracy still comprised about 20 percent in CF and NCF. The education levels of headed household were closely linked to the gender of headed household means that the male-headed household tended to have higher education than the women (sig. 0.008). The means of number of male's schooling was about 4 years while female was about 2.2 years. This data was not surprising because it was similar to statistic from NIS, which stated that literacy of adult female was much lower than for males.

Fishing is the principle occupation of both CF and NCF sites. Farming is highly present in CF than in NCF. In CF farming was represent about 16 percent while only about 1 percent in NCF. Besides that small business was also implemented by about 2 percent in CF and 1 percent in NCF. In addition to main occupation, 5 secondary occupations were implement in those provinces are fish related activities, small business, farming, laboring and government/NGOs workers. Farming is very popular for respondent in both CF and NCF wile government/NGOs workers are presented

very little. Male headed household tended to have more secondary occupation than women headed households.

Most of respondents live in the current village more than 10 years and some are living more than 30 years. About only 9 percent of total respondents in CF and NCF were living less than 10 years in their current villages. With long time living in their current villages, a larger amount of them had family member from 1 to 5, which contributed to about 41 percent. There was very few household who have member greater than 11. Even the number of people in the households was ranged from 1 to 5 but the man-power in the household had only about 1 to 3. Man-power engage in fishing was ration from 3 men per woman (3:1) up to 14 men per woman (14:1). But in average of all respondent was 5 men per woman (5:1) are engaged in fishing.

Besides man power in the household, capital asset is an essential element. There are 5 main capital assets were rest up by the respondents. House is a great capital asset which contributed to a very high proportion to household asset. The cost of house was varied from location to location. House price of respondents in CF tended to lower than in NCF. This is because most of the respondents in CF live on water rather than on land. With a small-scale fishing the household who live on the water tended to poorer than on land. Furthermore, land holding, boat and electronic appliances were also much worsted than in NCF (a comparison of value). Hence, the assets of the household were related mostly on location rather than on other factors. Same as result was showing in student test of statistic at 95 percent confidential level (sig. 0.00).

Income of the household respondent is other importance factor. In CF, income of each province was highly worsted. In average, household income was varied from 5.12 to 5.44 million Riel. Income of the household in CF tended to had higher than in NCF. But this amount of income cannot represent to the population because the standard deviation of the mean was too high and fluctuated from 5.03 million Riel to 17.06 million Riel. With this STDEV the distributions of household's annual income was making a big gap, which can lead the poor become more worsted. In CF, Kandal province was the highest annual income together with highest standard deviation while in NCF highest annual income was appearing in Pursat rather than in Kandal and the standard deviation of the mean of Pursat was also the highest. Distribution of average annual income of these three provinces looked inferiority whereas a bit smooth in NCF. However, the average income of these two sites was similarity but the standard deviation of CF site looked about double if compared to the average annual income. Differently in NCF sites, the standard deviation of income just a bit higher than average. Consequently, the condition of people respondent in NCF is better than in CF sites.

There were many sources of income but this research was selected only few most significant sources which contributed very high to household income. Fishing was a main source of household income. It was contributed about 68 percent to total income to the respondents in CF and about 84 percent to the respondents in NCF. Second was fish related activities which included fish trading, fish/seaweed culturing, fish processing etc. This activity was contributed about 23 percent to total income in CF while only 2.4 percent for NCF. Farming was also becomes a great supplementary income to the respondents.

Fishers were fishing mostly in CF sites for CF and open access for NCF. Few of CF fishers (0.7%) went to fish in protected areas while about 6 percent of total NCF respondents. The reasons for going to fish in those areas were because of easy to access for CF and easy to access and no alternative for NCF. Aside from fish those fishing ground were also provides mostly vegetable, water and wood fuel for the fishers. Only some of them mentioned about benefit of medicine and few had mention benefit of housing construction material.

The fisheries rules and regulations which were recognized by the local governor through *parkas* (declaration) in CF were very affected to community members. Further besides affected to community members it was affected to illegal fishers as well.

Before 2001, respondents customarily used gillnet as fishing method for catching fish. Some of them used hooked line and few use seine net. Respondents in CF sites tended to use gillnet less than in NCF wile used of hooked line was greater than in NCF. Furthermore, CF respondents had

used more fish trap and seine net more than in NCF. Conversely, NCF respondents keened to use samras/krasom, which are illegal fishing methods more than in CF sites.

Through using of these fishing methods, the production caught, number time per week, period went to fish and number of people went to fish were varied from fishers to fishers. Generally fishers in CF went to fish about 5 times per week whilst in NCF fishers went to fish 6 times per week. Number of people went to fish was the same was about 2 persons per time. Fishers in CF tended to fish fewer periods than in NCF was only about 8 hours and 27 minutes and 10 hours and 35 minutes, respectively per time. The reasons to this was because fishers in CF sites, as mentioned earlier, fished only in CF sites even as fishers in NCF went to fish in open access which may far than their living village. Amount of production caught was also depended the areas, respondents in CF sites leaned to had less production caught than in NCF. This was because they fish only with their limited areas. The average production caught per time was about 17.5 kg for CF fishers and about 24.4 kg for NCF fishers per time or about 4.55 tons and 7.6 tons, respectively per annum. However, this production caught of both CF and NCF cannot represent to the whole population because standard deviation of the mean (STDEV) of these two production caught were very high if compared to the means. The STDEV of production caught for respondents in CF was about 41 kg and in NCF was only about 32.7kg per time. With these two high STDEV, can assumed that the production caught of these two sites may be able to reach to about 58 kg for CF and about 57 kg for NCF each time or about 15 tons and 17.8 tons per annum, respectively.

The data in 2003-2004 was similar to the data before 2001 but only some were different. Such fishing methods like fish trap had increased about 13 percent followed by cast net increased about 160 percent and gillnet about 4.5 percent. Significantly, seine net had increased about 500 percent or 5 times than in 2001. Conversely, hooked line and other fishing methods had decreased about 13 percent and 53 percent respectively. Likely, number of time and people went to fish were not changed from 2001 while the period of fishing per time was slightly reduced about 8 minutes. Unpredictably, production caught per time was decreased from 21 kg per time to only 4 kg. The changed in fish production caught was about 466 percent or about 5 times from 2001. In 2003-2004, the average production caught per time was about 2.7 kg for CF fishers and about 4.7 kg for NCF fishers per time or about 702 kg and 1,466 kg, respectively per annum. However, this production caught of both CF and NCF cannot represent to the whole population because standard deviation of the mean (STDEV) of these two production caught were very high if compared to the means. The STDEV of production caught for respondents in CF was about 14.7 kg and in NCF was about 20.7kg per time. With these two high STDEV, can assumed that the production caught of these two sites may be able to reach to about 17 kg for CF and about 25 kg for NCF each time or about 4.4 tons and 7.8 tons per annum. Even though, the fish production caught in 2003-2004 is still decreased about 71 percent in CF sites and about 56 percent in NCF sites.

Besides the fish production decreased about 64 percent from 2001, the price of fresh water fish was also increase about 1.2 times for high value fish price and about 1.7 times for medium value species. Unlikely, poor value species, which are mostly using by the poor, was increased about 2.6 times from 2001. Conversely, marine water fish which contribute very little to the livelihood of the people in the country, the price of high values species was increased only about 0.7 times followed by medium value species had increased about 0.6 times and poor value species was about 1.3 times.

Through the above result can assume that fish production had decreased dramatically from 2001 while the price of fish was increase rapidly. This result was the same to the perceptions, which were rested by respondents in both CF and NCF. Furthermore, they had mentioned that fish production decreased spectacularly because mainly of excess fishing effort and farmers becomes fisher after fisheries administration had been reformed in the late 2000. In addition to these some of them presented it were because of some people do farming and lotus culturing in the lake. Some stated that because of fishery less productive, intervention in the upstream river and increased of fish price. When fish price is increased, fishers try to catch fish as much as they can for generate high income for their household. Moreover, the increased of fish prices make many other based daily need are also increased. Hence, to cope with those increasing fishers may try very hard to catch the fish for pay back to high expend.

Because of fisher population increasing and fishing effort is excess make small scale fishers faced may conflicts during fishing. Most of the time they had conflict with themselves, medium scale and large scale fishers. Some time they faced with illegal fishers, fisheries officers and local authority. These conflicts were sometime serious, sometime somewhat serious and sometime not serious to them. However, all arising conflicts in the areas were never become a violence.

Even though, to solve these critical issues and conflicts, respondents had rested fourteen suggested resolutions were clear fishing boundary between small scale, medium scale and large scale fishers because right now fishers are mostly unclear about their boundary of fishing which make them go to fishing every were. Sometime when the fish closed to the fishing lot, the lot owners are not allowed them to fish. Second was eliminating illegal fishing practices, which had set already in the fisheries law. Create a community fishery was stated by the respondents in NCF and eliminate medium and large scale fishing gear in the CF sites was the fourth suggested resolutions to the arising conflicts. The last suggested resolution was eliminate corruption of power-men in both CF and NCF. This suggested strategy was known very few from the fishers.

Though these conflicts and resolutions but about more than 58 percent committed to stay in fishing and about 18 percent not sure while about 19 percent would not stay in fishing any more. The reasons for exit from fishing were because fish production is reducing and they have the other opportunity to implement the other activities such as farming, seaweed culture (for coastal province) and some will do small business. Further more, some of them would like to exit from fishing as well but they need some assistant such as provides some skill training, farmland for agriculture and create some alternative livelihood activities. Most of the respondents keened to have some farmland for agriculture and some of them would like to get skill training and few of them requested creation of alternative livelihood activities.

Besides requested some exiting strategies, there were some reaction strategies for reduce fishing pressure in both CF and NCF. The highest agreeable for reducing fishing pressure was ban use of some fishing gears and reallocate and find land-based job for marginal fisher was the second agreeable from the respondent. Conversely, set maximum limit on amount catch according to scale of operation and nobody should fish during non-fishing season (for inland water) were highest no agreeable from respondents.

### **3.13.2 Recommendation**

There were about 8 recommendations were rested out during the workshop. One is review effect of land reform to fishers and how land ownership could encourage exit from fishing; two is identify appropriate skills and training needs that are suited to the area; three is information on other existing non-fishing jobs among fishers so that these could be enhanced when relevant as an exit option; four is identify appropriate income-generating activities; five is improve market information to help decision-making among fishers; six is biological studies to support decisions to establish fish conservation areas; seven is further study of fishers perceptions and willingness to exit and eight is integrated (inter-sectoral) and inter-temporal analysis of impact of suggested livelihood options.

# *Part IV*

## *Appendix*

## References

- Ahmed, Mahfuzuddin, Hap Navy, Ly Vuthy and Marites Tiongco, 1998. Socio-Economic Assessment of Freshwater Capture Fisheries in Cambodia.
- Ahmed, Navy, Vuthy and Tiongco, 1998. Socioeconomic Assessment of Freshwater Capture Fisheries of Cambodia. Report on a Household Survey. 185 p, MRC/DOF/DANIDA.
- Anthony T. C., 1992. Fisheries Conflicts—A unified framework. Butterworth-Heinemann Ltd.
- CDC, May 2002: Socioeconomic development priorities and the official development assistance needs)
- Chevey and Le Poulin, 1939, cited by Thouk N., 1997
- Cochrane J., 2002
- Community Information Web Portal Cambodia, 30 November 2994.  
<http://www.cambodiatic.org/catdetail.asp>
- Department of Fisheries (DoF), June 2001. Second Five- Year Fisheries Sector Development Plan (2001-2005).
- Department of Fisheries (DoF), Feb 2003. Fisheries Statistic from 19980 – 2002. Khmer language.
- Doulman, 1994 as cited in APFIC, 1997
- FAO, 1997
- FAO, 1998:199
- Fantima Ferdouse, December 2000. The Potential of Cambodia Fishery Products in the International Market - A market Study - INFOFISH.
- Feeny D. 1988. The demand for and supply of institutional arrangement in: Ostrom V, Feeny D, Picht H. Rethinking institutional analysis and development. California: International Center for Economic Growth, 1988: 159-209. In The Management of Conflict in Tropical Fisheries (Final Technical Report). Center for the Economics and Management of Aquatic Resources (CEMARE). Year 2003
- Fisheries. Even presentations given at the annual meeting of the Department of Fisheries. Ministry of Agriculture, Forestry and Fisheries (MAFF); 27-28 January 2000.p10
- Interim Mekong Committee, 1992
- Keang Seng, 2002. Primary Assessment of Micro-Credit as a Mechanism for Alternative Livelihood Strategies in Aquatic Resources Management in Siem Reap Province, Cambodia. Phathum Thani, Thailand.
- Keang Seng, 2004a. Fish Export and the Livelihood of the Poor. Paper submitted to Cambodia Post-Harvest Fisheries Livelihood Project. Department of Fisheries. Phnom Penh. Cambodia.
- Lagler, 1976 as cited in APFIC, 1997
- Long Korn, January 2003. A Preliminary Study to Identify Gaps in Exports of Fish and Fisheries Products from Cambodia. A Thesis Present to Faculty of the Graduate School of Norton University Phnom Penh, Cambodia.
- Ly Sina, 2002. The Socioeconomic Issue of Cambodia's Freshwater Fisheries. Journal of Regional Fisheries.
- Ly Sina, 2003. Cambodia Fisheries Conflicts in the Post War Era and the Creation of Fishing Communities: A case of fishing lot conflicts around Tonle Sap River and the Great Lake. Journal of Regional Fisheries.
- Magnus Torell and Albert M Slamanca, 2001. Institutional Issues and Perspectives in the Management of Fisheries and Coastal Resources in Southeast Asia
- Mekong River Commission, 1999
- Miall H, Ramsbotham O, Woodhouse T. 1999. Contemporary Conflict Resolution. Oxford: Policy Press.
- Nao Thuok and N.V. Zalinge, 2000: Management Aspects of Cambodia's Freshwater Capture  
**National Mekong Committee, NMC, 1998**
- Nature and Life, 2000
- Nicholson M, 1970. Conflict Analysis. Vol. ed. Edited by. London: The English Universities Press Ltd. in the Management of Conflict in Tropical Fisheries (Final Technical Report). Center for the Economics and Management of Aquatic Resources (CEMARE). Year 2003
- Powelson JP, 1972. Institutes of Economic Growth: A theory of conflict management in developing countries. Princeton, NJ: Princeton University Press. In The Management of Conflict in

- Tropical Fisheries (Final Technical Report). Center for the Economics and Management of Aquatic Resources (CEMARE). Year 2003
- NIS, 1998. General Population Census of Cambodia 1998—Provisional Population Totals. Funded by United Nation Population Fund
- PIU-the Fisheries Component, 2001. Social and Economic Framework Review. Technical Paper No. 8. Department of Fisheries, Phnom Penh, Cambodia. p9.
- Rabinow, P (ed), 1984. The Foucault Reader, Hammondspport: Penguin
- Sithirith M., 2000. The Tonle Sap and Its Fisheries Management: A Case in Cambodia. Fisheries Action Coalition Team (FACT)
- Sivmy; 1998
- Touch Seang Thana, 2001. The Inland and Marine Fisheries Trade of Cambodia. Published by Oxfam America. p9.
- Van Zalinge et al, 1999
- Wallace, 1993

## Appendix

### Appendix 1: Common freshwater fish species caught before 2001 to 2003-2004

Code	Commercial name	Scientific name	Khmer name	No	%	Price in Riel per kg Before 2001	Price in Riel per kg 2003/2004
1	Siamese Glassfish	<i>Pseudambassis notatus</i>	Trey Kanh Chanh Chras Touch	5	5.6	180	1,000
2	Mystus	<i>Mystus sp.</i>	Trey Kanh Chos	46	51.1	600	2,400
3	Chameleon Botia	<i>Biota sp.</i>	Trey Kanh Chhrouk	3	3.3	850	1,700
4	Kissing gourami	<i>Helostoma temmincki</i>	Trey Kantrawb	48	53.3	1,050	3,000
5	Duskyfin glassy perchlet	<i>Parambassis wolffi</i>	Trey Kantrang Preng	2	2.2	550	1,900
6	Malayan bonytongue	<i>Scleropages formosus</i>	Trey Kraport	1	1.1	1,500	3,000
7	Rain tail tinfoil barb	<i>Borbodes altus</i>	Trey Krahe	5	5.6	980	2,900
8	Moonlight gourami	<i>Trochogaster microlepis</i>	Trey Kampleanh	47	52.2	300	1,300
9	Kryptopterus	<i>Kryptopterus moorei</i>	Trey Kampleav	3	3.3	1,200	2,700
10	Amplyrhynchthys	<i>Amplyrhynchthys truncatus</i>	Trey Kambot Chramos	4	4.4	800	2,400
11	Butter catfish	<i>Ompok bimaculatus</i>	Trey Kramam	5	5.6	1,900	3,600
12	Cirrhinus	<i>Cirrhinus mrigala</i> Cirr	Trey Krawlang	3	3.3	750	3,200
13	Climbing Perch	<i>Anabas testudineus</i>	Trey Kranh sre	70	77.8	850	2,400
14	Royal featherback	<i>Chitala ornata</i>	Trey Kray	3	3.3	1,500	3,800
15	Silver sharkminnow	<i>Osteochilus hassetti</i>	Trey Kros	85	94.4	400	1,500
16	Pangasius	<i>Pangasius conchophilus</i>	Trey Pra Ker	1	1.1	2,500	5,500
17	Black Sharkminnow	<i>Morulus chrysophekadion</i>	Trey Kaek	10	11.1	500	1,900
18	Eye spot barb	<i>Hampala macrolepidota</i>	Trey Khman	3	3.3	700	1,600
19	Dangila	<i>Dangila lineata</i>	Trey Khnang Veng	22	24.4	300	1,300
20	Greater bony lipped barb	<i>Osteochilus melanopleurus</i>	Krum	6	6.7	1,350	2,750
21	Rasbora	<i>Rasbora myersi</i>	Changva	12	13.3	400	1,500
22	Smith barb	<i>Puntioplites proctozysron</i>	Trey Chrakeng	75	83.3	1,050	3,000
23	Dusky hairfin anchovy	<i>Setipinna melanochir</i>	Trey Chmar	1	1.1	2,500	7,000
24	Bull shark	<i>Carcharinus leuca</i>	Trey Chhlam	1	1.1	2,500	5,000
25	Peacock eel	<i>Macrognathus siamensis</i>	Trey Chhlonh	11	12.2	1,300	2,900
26	Goldfin tinfoil barb	<i>Hypsibarbus pierrei</i>	Trey Chhpin	79	87.8	1,100	2,900
27	Yellow mystus	<i>Mystus nemurus</i>	Trey Chhlang	13	14.4	1,200	2,600
28	Giant snakehead	<i>Channa micropeltes</i>	Trey Chhdor	24	26.7	1,700	3,900
29	Soldier river barb	<i>Cyclocheilichthys enoplos</i>	Trey Chhkok	17	18.9	700	2,100
30	Longjaw grenadier anchovy	<i>Coilia lindmani</i>	Trey Chanluonh mann	5	5.6	200	640
31	Pangasius	<i>Pangasius pleurotaenia</i>	Trey Chhviet	1	1.1	1,500	5,000
32	Macrochirichthys	<i>Macrochirichthys macrochirus</i>	Trey Dang Khleng	1	1.1	1,000	5,500
33	Marbled sleeper	<i>Oxyeleotris marmorata</i>	Trey Damrey	12	13.3	8,000	1,300
34	Truncated estuarine catfish	<i>Mystus filamentus</i>	Trey Tanel	1	1.1	600	5,000
35	Whisker sheatfish	<i>Ompok hypophthalmus</i>	Trey Ta Oan	11	12.2	2,000	4,400
36	Smallscale croaker	<i>Boesemania microlepis</i>	Trey Prama	5	5.6	1,600	4,300
37	Iridescent shark-catfish	<i>Pengasianodon hypophthalmus</i>	Trey Pra	10	11.1	800	2,300
38	Round-tail garfish	<i>Xenentodon cancila</i>	Trey Phthoung	1	1.1	400	1,000
39	Mad barb	<i>Leptobarbus hoeveni</i>	Trey Proloungthom	8	8.9	1,800	2,750
40	Black ear	<i>pangasius larnaudiei</i>	Trey Pou	7	7.8	1,200	2,400
41	Chevron snakehead	<i>Channa striata</i>	Trey Ros	53	58.9	2,100	4,500
42	Henicorhynchus	<i>Henicorhynchus caudimaculatus</i>	Trey Riel	86	95.6	400	1,600
43	White lady carp	<i>Thynnichthys thynnoides</i>	Trey Linh	17	18.9	500	1,600
44	Great white sheatfish	<i>Wallago attu</i>	Trey Sanday	1	1.1	3,000	6,000
45	Broneze featherback	<i>Notopterus notopterus</i>	Trey Slat	45	50.0	1,700	4,200

Code	Commercial name	Scientific name	Khmer name	No	%	Price in Riel per kg Before 2001	2003/2004
46	Beardless barb	<i>Cyclocheilichthys apogon</i>	Trey Sroka Khdam	12	13.3	400	1,350
47	Langiculter	<i>Langiculter siahi</i>	Trey Sloeuk Russei	1	1.1	800	1,500
48	Broadhead catfish	<i>Claria macrocephalus</i>	Trey Andeng Tun	21	23.3	2,000	4,600
49	Dangila	<i>Dangila spilopleura</i>	Trey Ach Kok	5	5.6	400	2,160
50	Lanchester's freshwater prawn	<i>Macrobrachium lanchesteri</i>	Kampoeus	31	34.4	700	1,500

## Appendix 2: Common marine water fish species caught before 2001 to 2003-2004

No.	Commercial name	Scientific name	Khmer name	No	%	Price Riel/ kg	
						Before 2001	2003/2004
1	John's snapper	<i>Lutjanus johni</i>	Ang Koeu Kraham	1	1.1	500	2,000
2	Notched threadfin bream	<i>Nemipterus hexodon</i>	Kalam Kraham	2	2.2	1,500	2,250
3	Shoftfin lizardfish	<i>Saurida micropectoralis</i>	Kdar Chen	4	4.4	500	800
4	Fourtinger threadfin	<i>Eleutheronema tetradactylum</i>	Krav Sor	2	2.2	5,250	6,500
5	Tiger-toothed croaker	<i>Otolthes ruber</i>	Changkom Bei	3	3.3	1,000	2,050
6	Toother poriyfish	<i>Gazza minuta</i>	Sambor Hear	2	2.2	400	1,250
7	Spotted hearbeak	<i>Hemirhamphus far</i>	Pthoung Phkar	13	14.4	1,300	2,150
8	Narrow-barred Spanish mackerel	<i>Seemerbomorus commerson</i>	Peka Ouch Khmao	1	1.1	1,000	2,000
9	Short-bodied mackerel	<i>Rastrelliger brachysoma</i>	Kamong	37	41.1	800	1,850
10	Painted sweetlip	<i>Plectorhynchus pictus</i>	Kachi	4	4.4	700	1,050
11	Walbeehm's sharp-nosed shark	<i>Scellicodon walbeehmi</i>	Chhlam Pruy Khmao	9	10.0	2,300	3,600
12	Stiped sea catfish	<i>Plotosus anguillaris</i>	Andeng Pouy	9	10.0	1,500	2,200
13	Giant catfish	<i>Arius thalassinus</i>	Ka-ouk	7	7.8	550	800
14	Yellow pike-conger	<i>Congresex talabon</i>	Khching	1	1.1	1,700	2,600
15	Dorab wolf-herring	<i>Chirocentrus dorab</i>	Sroam Dav	7	7.8	1,500	2,150
16	Whitespotted spinefoot	<i>Siganus canaliculatus</i>	Kantang Ploeung	43	47.8	1,700	2,600
17	Diamond-scaled grey mullet	<i>Liza vaigiensis</i>	Kabak Khmok	9	10.0	1,300	2,200
18	Starry emperor	<i>Lethrinus nebulosus</i>	Krab Khnol	13	14.4	1,250	2,100
19	Spotted flathead	<i>Thysanophrys crocodilus</i>	Kantuy krabei Khbal Sruoch	2	2.2	500	600
20	Greasy grouper	<i>Epinephelus tauvina</i>	Toke thnoat	4	4.4	4,250	8,500
22	Chacunda gizzard-shad	<i>Anodontostoma chacunda</i>	Kamoy	24	26.7	790	8,800
23	Spotted sichlefish	<i>Drepane punctata</i>	Ambeng Bek	2	2.2	2,500	4,100
24	Banded crevalle	<i>Atule mate</i>	Koun Kam	1	1.1	1,000	2,150
25	Roundbelly sadinella	<i>Amblygaster clupeioides</i>	Koun	2	2.2	750	1,400
26	Largescale tongue sale	<i>Cynoglossus macrolepidotus</i>	Andat Chhke	5	5.6	350	500
27	Spotted eagle ray	<i>Aetobatus marinari</i>	Borbel Khleung	6	6.7	1,900	2,850
28	Dolfus' octopus	<i>Octopus dollfusi</i>	Moeuk Ping Peang	24	26.7	2,600	4,350
29	Hairy rock crab	<i>Eriphia sebana</i>	Khdam Phkorian	27	30.0	4,950	8,400
30	Serrated mud crab	<i>Scylla serrata</i>	Khdam Thmor Kheav	3	3.3	9,000	9,000
31	Blue swimming crab	<i>Portunus pelagicus</i>	Khdam Ses	7	7.8	5,400	10,300
32	Common knobby spindle shell	<i>Turbo petholatus</i>	Khchang Phnek Proeus	4	4.4	1,000	2,250
33	Oriental flashead lobster	<i>Thenus orientalis</i>	Bangkang Pak	1	1.1	30,000	35,000
34	Blue tail yellow shrimp	<i>Penaeus latisulcatus</i>	Bangkear Nilong	20	22.2	2,750	4,850
35	Northern white shrimp	<i>Penaeus setiferus</i>	Bangkear Chhebuoy	31	34.4	7,000	11,700
36	Black sea cucumber	<i>Helotgeria actra</i>	Chhloeuung Chor	3	3.3	1,750	3,300

### Appendix 3: Result of the Workshop

**Fish Fights Over Fish Rights: Managing Exit from the Fisheries and Security  
Implications for Southeast Asia**

**11-12 November 2004  
IFReDI Conference Room, Department of Fisheries  
Phnom Penh, Cambodia  
\*\*\*\*\***

The workshop on Fish Fights Over Fish Rights: Managing Exit from the Fisheries and Security Implications for Southeast Asia was organized by Inland Fisheries Research and Development Institute (IFReDI) in collaboration with WorldFish Center which was held at IFReDI, Department of Fisheries (DoF), Phnom Penh, Cambodia, during 11-12 November 2004. This workshop is under the project namely Fish Fights Over Fish Rights, which funded by Ford Foundation.

#### **Day 1: Thursday 11 November 2004**

First of all, **Mrs. Hap Navy**, master of ceremony of the workshop welcome to all the participants, and brief the objectives of the workshop are 1- to discuss the conflicts in aquatic resources arising from overcapacity in the fisheries and those that may lead to security problems in Cambodia and consequently in the Mekong Region; and 2- to develop approaches and guidelines for managing fishing capacity and conflicts brought about by access to declining aquatic resources and in so doing, address national and regional security. Furthermore the workshop will active as 1- Presentation of the research results by national project team; 2- Group discussions to understand the policy-making protocols affecting fisheries and identify approaches for national governments for managing fishing capacity and conflicts arising from access to declining aquatic resources and 3- Discussion on research and management implications for research results and recommendations. Finally the expected out put were 1- feedback from stakeholders, preliminary synthesis of the level of fishing capacity and the impact on conflicts in the case study areas; 2- a country-specific theoretical framework and procedural guidelines for managing fishing capacity and conflicts arising from access to declining aquatic resources; and 3- recommendation for follow-up activities (e.g. management and research areas).

After Ms Navy provides the objectives and expected out put than **Mr. Nao Thuok**, Director General of DoF, has been invited to make a welcome speech and following **Dr. Blake Ratner**, Regional Director, Great Mekong Sub-Region, WorldFish Center has been invited to give a short keynote speech on behalf of the WorldFish Center.

#### **Session 1: Presentation**

This session was chaired by **Mr. Srun Lim Song**. Following presentation was by **Dr. Narissa D. Salayo**, Project Leader, WorldFish Center related to project overview and highlights. This presentation shown mostly to the objective of the project which are develop broad framework for addressing approaches for reducing over capacity in SE Asia; examine where fisheries conflicts may arise; and provide plans to ameliorate these conflicts and its role in reducing conflicts and enhancing national/regional security. Furthermore she also explained about the meaning of Fish Fights over Fish Rights-- Fights (disputes) over fishing 'Rights' (a legal, equitable, or moral title or claim to the possession of property or authority, the enjoyment of privileges or immunities that which justly accrues or falls to any one). Methodology and site of the study also was described.

After Dr. Nerissa, there were messages from the three selected provinces of Kandal by Mr. Klaing Vanthol; Pursat by Mr. Ban San and Mr. Pen Phannarith; and Kampot by Mr. King Sophany. These three key messages were addressed on situation of fisheries resources and conflicts arising in individual area.

Later **Mr. Seng Lieng** and **Mr. Keang Seng**, national project team given a presentation of case study research. The further of presentation was about the important of fisheries resources to the

people diet in the country and the trends in freshwater fish production caught in the country and the rapid increasing in marine fish production caught. From this perspective they were also given some importance reasons for decision in selection of sites and samples. Nevertheless, **Mr. Keang Seng** had express some interested points which related to major issues and problems in fisheries sector by including a significant increasing in number of boat engaged in Cambodia fisheries. Beside that environment degradation through increased soil erosion, mining in catchments of some rivers, silted etc. has had negative impact on fish stock. Population increases, which relates to increase demand of nutrient and food. Hence, the competition among those is become very hard hitting, especially for small-scale fishing who take a large part of total fishermen in the country. (For more information about his presentation are presenting in this full report or can contact directly to him through mail of [keangseng@yahoo.com](mailto:keangseng@yahoo.com)).

After both of them given an interesting presentation one NGO name FACT (Fisheries Action Coalition Team) had also contribution a small presentation on some experiences and lesson leans from Community Fisheries in Anlong Raing and Tamoul Leu of Pursat province. This study is focused on socio-economic profile of the study areas and infrastructure information in these remote villages. Moreover, this presentation was also discussed a bit about institutional and legal framework of DoF; and fisheries conflicts, type of conflicts; stakeholders involved in fishing conflicts and highlighting about the communication strategies for fisheries conflicts management from an international workshop.

### **Session 2: Group Discussion**

This section was chaired by **Mr. Lieng Sopha**, Deputy Director of IFRaDI. During this section **Dr. Narissa D. Salayo** had given a presentation on the Guideline Question "Fish Fights and Security Issues in Fisheries in Southeast Asia" before the group discussion. There were 5 core question was given for discussion are 1-Who/what is made insecure? 2-What core values are threatened? 3-Types of threats & nature of problem? 4-How to manage insecurity? 5-How to attain security? With these core questions, some guide questions are following:

1. What are the major conflicts affecting Cambodian fisheries in general? Are these conflicts similar with those identified in the case studies? Could we generalize that these conflicts from our case studies are representative of the national scenario? Why? Which of these conflicts could evolve into security issues affecting the fisheries sector? What are these security threats?
2. Considering the conflicts identified above, should we securitize these fisheries conflicts? Should we categorize fisheries conflicts into non-traditional security (NTS) issues and apply NTS measures to attempt to solve them? What agencies and groups of stakeholders should be involved and what are the roles of each?
3. Do we all agree on the common premise that there is overcapacity in fisheries in Cambodia? How do we arrive at a consensus on the status of fishing capacity in Cambodia? What is/are our common/acceptable indicator/s of overcapacity in lieu of reliable scientific data? How do we structure the theoretical framework to ensure exit of excess capacity?

After the guideline presentation the all participants have been divided into two groups for the group discussion. And later each group representative shows the output of discussion and following with plenary discussion with summary results as shown in the table below:

	<b>Type of conflict</b>	<b>Cause of conflicts</b>	<b>Security Threat</b>
1	Fishermen and fishermen	Competition access of the resources	4 (small vs Medium scale, Fishing ground)
2	Local authority and fishermen	Stand for other Sell fishing ground	1 (Loss of fishing ground as they are converted for non-fishing use- loss of refuge for juvenile fish)
3	Farmer and lot owners	Extract land for agriculture Water using	1 (Loss of fishing ground as they are converted for agricultural use)
4	PFO and power men	Power men stand for others who illegal fishers	1 (fishery resources are at threat as they use illegal destructive gears)
5	Community Member and Community committee member	Selling the fishing ground including deep fishing areas	3 (threat to food security of CF members mainly in Pursat & Kandal only)
6	Fishermen and outsider (migrants)	Competition of resources use Outsider used illegal fishing gears	3 (threat to fishery resources as they pump out water including fish stocks)
7	Local fishermen and foreign fishermen	Poaching fishing Foreign fishermen use modern fishing gears	1 (threat to fishery resources as migrants use modern gears in shallow areas including mangroves; threat to livelihood of local fishermen)
8	Seaweed culture and fishermen	seaweed fishermen conserve the areas from fishermen	4 (threat to fishing ground – reduced fishing area)
9	Fish culturist and fishermen	Collect fingerling from wild Fish feed collection	2 (threat in terms of loss of fish stocks and potentially loss of natural/wild species)
10	Lotus farming and fishermen	Areas Increase sedimentation	4 (loss of fishing area and sedimentation)
11	Institutional conflict	Unclear responsibility (eg. DoF vs MOE vs M of Land Titles)	2 (loss of fishing ground that are converted for other non-fishing use eg. agric.
12	Flooded forest and inundated forest cutting	Shrimp farming Charcoal producing Wood fuel Construction material Farming Bunched for fish refuge (samras) Poaching wild animal	2 (loss of flooded forest)
13	Environment conflicts between countries	Dam building from other country	1 (environmental threat)
14	Ethnic group conflicts	Competition for fishing ground	2 (threat to livelihood of local fishers as foreign fishers often have better fishing skills & gears)

*\* Threats are scaled from 1 to 5, where 1 is serious effect to security; 2 is moderate effect; 3 medium effect; 4 is slight effect; 5 no effect.*

## **Day 2: Friday 12 November 2004**

### **Session 3: Group Discussion**

This session was chaired by **Mr. Srun Lim Song**, Director of IFRDI. During this session **Mr. Len R. Garces**, WorldFish Center, has been invited to give a presentation on the Guideline Question "Review of Approaches for Managing Capacity and Conflicts that Lead to Insecurity in Southeast Asia". After the guideline presentation by **Mr. Len R. Garces**, all the participants have been split into two groups for the group discussion. Later, each group representative shows the results of discussion and following with plenary discussion with summary output as shown below:

- 1- Do we all agree on the common premise that there is overcapacity in fisheries in Cambodia? Answer: Yes
- 2- How do we arrive at a consensus on the status of fishing capacity in Cambodia? Answer:
  - Low/ Weak of Law Enforcement
  - Environmental changing (Shallow water, high temperature, water quality)
  - Fishermen have no choice
  - Fishing gear (Mesh size)
  - Increase of illegal fishing activities
  - Increase of Modern Fishing Technique
  - Increase of Fishermen
- 3- What is/are our common/acceptable indicator/s of overcapacity in lieu of reliable scientific data? Answer:
  - Decrease of fish production, CPUE (Quantities & qualities eg. small size fish)
  - Catch composition
  - Biomass
- 4- How do we structure the theoretical framework to ensure exit of excess capacity? Answer:
  - Promotion Aquaculture (non-carnivorous)
  - Suggestion to fishing lot owner for breeding to release the Lot site
  - Promotion of economic opportunities out site fisheries
  - Recognize of fisheries Law information & education campaigns, clarify
  - Closing some areas/brood stocks exportation
- 5- What research gaps should be filled –in to support the proposal exit strategies and measure for managing excess? Answer:
  - Review effect of land reform to fishers and how land ownership could encourage exit from fishing
  - Identify appropriate skills & training needs that are suited to the area
  - Information on other existing non-fishing jobs among fishers so that these could be enhanced when relevant as an exit option
  - Identify appropriate income-generating activities
  - Improve market information to help decision-making among fishers
  - Biological studies to support decisions to establish fish conservation areas
  - Further study of fishers perceptions and willingness to exit
  - Integrated (inter-sectoral) and inter-temporal analysis of impact of suggested livelihood options

Before the end of workshop **Dr. Narissa D. Salayo**, has briefed the information regarding the project outputs from various locations in Southeast Asia and make the comparison of the result from the project. She also made an acknowledgment to all the participants who have actively share their ideas and information during the 2 days workshop to lead the meeting reach an excellent goal. At this opportunity, **Dr. Narissa** on behalf of WorldFish Center and the Ford Foundation express a few to thank all the participants who has spent valuable times for the

meeting in here and I would like to thank to IFReDI for co-organizing the workshop successfully and fruitfully.

At last, **Mr. Srun Lim Song** has made a summary and closing remark as following: I would like to make a short summary of the two-day's workshop in here. After opening speech made by **Mr. Nao Thuok** and keynote by **Dr. Blake Ratner** at the beginning **Dr. Narissa** has made a presentation to point out: Fish fights over fish rights, managing exit from fisheries and security implications for SEA. And then shows the objectives of the studies to develop broad framework for addressing approaches for reducing overcapacity in SEA. And also the Methodology of the studies, Research partners, Main project activities, and Expected output and impacts.

Later the 03 provincial fisheries officers has expressed some key information about general fisheries sectors in each of their locations which including problem among fisheries stakeholders itself, management systems and list down a number of conflicts happening so far.

**Mr. Keang Seng** and **Mr. Seng Lieng** have mentioned the major issues and problems in fisheries sector, the excess capacity, the increasing number of boat engaged in fisheries and fishermen. The case study in Tonle Sap and Mekong River including:

- Conflicts on access rights and operation in large fishing lots, medium and small-scale community fishery.
- Use of military to enforce claims of large fishing lot owners
- Rivalry between ethnic groups
- Conflicts between farmers and fishers over access to water, land and forest
- Weak institutional structure and lack of proper management and enforcement

And also showed a lot of figures and data analysis from the case study which has been conducted almost one year in 3 provinces which are Kandal, Kampot and Pursat.

At the afternoon session started with **Mrs. Kaing Kim's** presentation about the community fisheries (CF) situation in Cambodia which including the management system, the procedure of establishment of CF and some problems and conflicts facing by the stakeholders in fisheries sector.

**Dr. Magnus Torrel** has express something about the SEAFDEC including the code of conduct to fisheries responsible, decentralization and rights base fisheries etc.

**Mr. Van Piseth** has stated a detail about community Fisheries situation in Cambodia including problems, conflicts happen so far and also management system applying by stakeholder.

**Dr. Narissa** has made a presentation on the purpose of workshop in order to understand the linkages between conflict and security issue to provide the basis for proposing theoretical framework for managing fishing capacity and conflicts arising from access to declining aquatic resources and also the procedural guideline for managing fishing capacity and conflicts and also pointed out that today is main issues in fisheries in SEA are:

- Increasing population
  - Ineffective property rights
  - Increasing stress on aquatic resources
- which including
- New technologies and increasing efficiency
  - Too many fishers chasing few fish and
  - Excess fishing capacity

All these factors that lead to the conflicts among fisheries stakeholders.

Group discussion: 2 groups discussion has been split for a while and later come out with a list of issues and conflicts in fisheries sector in Cambodia.

**Mr. Len Garces** presented the review of approaches for managing capacity and fisheries conflicts that lead to insecurity in SEA, which includes the key problems in coastal areas, goals/issues/intervention in Asia, Internal consensus/instruments highlights, Typologies of fisheries

management, System of Aquatic protected areas, Fisheries Resource Management program and Responsible fisheries Monitoring Network/program etc.

So that I would like conclude that our workshop is fruitful and successful since we have different fisheries stakeholders which is representing from Government sector (DoF, IFRaDI, etc.) NGOs (SEAFDEC, GTZ, NGO forum, FACT...) farmers/fishers that share a lot of ideas and information regarding the conflict in fisheries sector, which is fitting into our workshop's purpose days.

So, on behalf of all the participations today I would like to be grateful to all of you who have spent a lot of valuable times and effort to lead the workshop successfully and fruitfully and with very satisfied outputs. I also would like expressing my deepest gratitude to thank the WorldFish Center and Ford Foundation to support the project so far.

Finally, I wish you all the best and I would like to declare that the workshop is closed! Thank you!

## Group Discussion List

### Group 1

**Facilitator:** Dr. Nerissa and Mr. Keang Seng

No.	Name	No	Name
1	Mr. Chouk Borin (Chair Person)	11	Mr. Touch Bunthang
2	Mr. Chap Piseth (Reporter)	12	Dr. Eric Baran
3	Mr. Leang Saroeun	13	Dr. Magnus Torell
4	Mr. Sen Ratha	14	Mr. Pen Phanarith
5	Mr. Ou Sary	16	Mrs. Kaing Khim
6	Mrs. Hing Sophaevy	17	Mr. Eric Meusch
7	Mr. Deap Loeung	18	Mr. Pheun Phean
8	Mr. Eng Tong	19	Mr. Tosten Munsther
9	Mrs. Chin Det	20	Mr. Him Bunthay
10	Mr. Chea Tharith	21	Mr. Sok Samphors Pheak

### Group 2

**Facilitator:** Mr. Len Garces and Mrs. Hap Navy

No.	Name	No.	Name
1	Mr. Bun Racy (Chair Person)	11	Dr. Kent Hortle
2	Mr. Hort Sitha (Reporter)	12	Mr. Meas Vichit
3	Mr. Choup Sokhan	13	Dr, Theo Ebbers
4	Mr. Soeun Norng	14	Mr. Klaing Vanthul
5	Mrs. Roeun Kunthea	15	Mr. Teak Seng
6	Mr. Vann Piseth	16	Mr. King Sophany
7	Mr. Change Phen	17	Mr. Norng Sary
8	Mrs. Kim Sopheap	18	Mr. Ban San
9	Mr. Lim NgounKruy	19	Mrs. Sim Thavary
10	Mr. Ek Heng	20	Mr. Te Sokkhoeun

## List of Participant

No.	Name	Institution
1	Mr. Nao Thouk	Director of DOF
2	Mr. Srun Lim Song	Director of IFReDI
3	Mr. Lieng Sopha	Deputy Director of IFReDI
4	Mr. Chouk Borin	Dean of Fisheries Faculty, RUA
5	Mr. Chap Piseth	IFReDI
6	Mr. Leang Saroeun	IFReDI
7	Mr. Sen Ratha	IFReDI
8	Mr. Ou Sary	IFReDI
9	Mrs. Hing Sophaevy	IFReDI
10	Mr. Deap Loeung	IFReDI
11	Mr. Eng Tong	IFReDI
12	Mrs. Chin Det	IFReDI
13	Mr. Chea Tharith	IFReDI
14	Mr. Touch Bunthang	IFReDI
16	Dr. Eric Baran	WorldFish Center
17	Dr. Magnus Torell	SEAFDEC
18	Mr. Pen Phanarith	Pursat province
19	Mrs. Kaing Khim	CFDO
20	Mr. Eric Meusch	WWF
21	Mr. Pheun Phean	DOF
22	Mr. Tosten Munsther	GTZ
23	Mr. Him Bunthay	IFReDI
24	Mr. Sok Samphors Pheak	DOF
25	Mr. Bun Racy	IFReDI
26	Mr. Hort Sitha	IFReDI
27	Mr. Choup Sokhan	IFReDI
28	Mr. Soeun Norng	IFReDI
29	Mrs. Roeun Kunthea	IFReDI
30	Mr. Vann Piseth	FACT
31	Mr. Cheng Phen	IFReDI
32	Mrs. Kim Sopheap	IFReDI
33	Mr. Lim Ngoun Kruy	Kampot province
34	Mr. Ek Heng	DOF
35	Dr. Kent Hortle	MRC
36	Mr. Meas Vichit	IFReDI
37	Dr, Theo Ebbers	GTZ
38	Mr. Klaing Vanthul	Kandal province
39	Mr. Teak Seng	NGO Forum
40	Mr. King Sophany	CF Pursat province
41	Mr. Norng Sary	Pursat province
42	Mr. Ban San	CF Kampot province
43	Mrs. Sim Thavary	IFReDI
44	Mr. Te Sokkhoeun	FACT-NGO

## Program of the Workshop

### Day 1: Thursday 11, November

- 08:00 – 08:30 Registration
- 08:30 – 08:40 Introduction to Workshop, **Mrs. Hap Navy**, WorldFish
- 8:40 – 9:00 Welcome Address, **Mr. Nao Thuok**, Director General of DOF
- 9:00 – 9:20 Opening Remarks, **Dr Blake Ratner**, Regional Director, Greater Mekong Sub-Region, WorldFish
- 9:20 – 9:40 Project Overview, **Dr Nerissa D. Salayo**, Project Leader, WorldFish
- 9:40 – 10:25 Messages from representative speakers from selected provinces hosting the case study sites
- Kandal Province, **Mr. Khleang Vanthol**
  - Pursat Province, **Mr. Ban San**
  - Kampot Province, **Mr. King Sophany**
- 10:25 – 10:40 **Photo session and Coffee Break**

### Session I

- 10:40 – 11:40 Presentation of Case Study Results by National Project Team
- 1) Overview of Fisheries in the Study Areas, **Mr. Seng Leang**
  - 2) Results of the survey, **Mr. Keang Seng**
- 11:40 – 12:00 Questions and answers session
- 12:00 – 02:00 **WELCOME LUNCH** at Molop Chre located about 1 Km from the Chba Ampov bridge

### Session II

- 2:00 – 3:30 Contributed presentations (CFDO and NGO Forum, SEAFDEC, WWF)
- 3:30 – 4:00 WorldFish presentation and Session II Guide Questions. "Fish Fights and Security Issues in Fisheries in Southeast Asia", **Dr Nerissa D. Salayo**, WorldFish
- 4:00 – 5:00 Group Discussions
- 5:00 – 5:30 Plenary Presentation of group outputs & discussions
- 6:30 **DINNER** at Molop Chre located about 1 Km from the Chba Ampov bridge (Sponsor by WorldFish)

### Day 2: Friday 12, November

#### Session III

- 8:30 – 9:00 WorldFish Presentation & Session II Guide Questions "Review of Approaches for Managing Capacity & Conflicts that Lead to Insecurity in Southeast Asia", **Mr. Len R. Garces**, WorldFish
- 9:00 – 10:30 Group Discussions
- 10:30 – 11:00 Plenary Presentation of group outputs & discussions
- 11:00 – 11:30 Summary of Workshop Results, **Mr. Srun Lim Song**, Director of IFRoDI
- 11:30 – 12:00 Closing Remarks, **Dr Nerissa D. Salayo**, WorldFish

## Appendix 4: Questionnaire for Survey

### Fish Fights over Fish Rights: Managing Exit from Fisheries and Security Implications for Southeast Asia

Ford Foundation-WorldFish Center Project  
Implemented by the DOF/IFReDI in Cambodia

Date: \_\_\_\_\_ 2004

#### Questionnaire for community/fishing households

(Please collect or draw a map of the commune and locate the selected village with the fishing ground/water area).

Village \_\_\_\_\_ Commune \_\_\_\_\_ District \_\_\_\_\_ Province \_\_\_\_\_

Name of the Community Fishery Organization (if there is any) \_\_\_\_\_

#### Profile of the household head/respondent

1. Name \_\_\_\_\_ 2. Gender:  Male;  Female 3. Age: \_\_\_\_\_
4. Number of years fishing \_\_\_\_\_
5. Marital Status:  1. Single,  2. Married,  3. Divorced,  4. Widow/er,  5. Other \_\_\_\_\_
6. Number of years in school \_\_\_\_\_
7. Ethnicity:  1. Khmer,  2. Chinese,  3. Vietnamese,  4. Cham
8. Religion:  1. Buddhist,  2. Christian,  3. Muslim,  4. Hindu
9. Primary Occupation of the household head/respondent:  
 1-Fishing,  2-Fish processing  3-Fish trading,  
 4-Motor taxi/car/engine boat driving  5-Net/gear making,  
 6-Farming,  7-Laborer  8-Small business  
 9-Money lending  10-Fuel wood collection  11- Fish culture,  
 12-Government/NGO job  13-House keeping  
 14-Teaching  15-Other \_\_\_\_\_
10. Number of years in the principal occupation \_\_\_\_\_
11. Secondary occupation of the household head/respondent:  
 1-Fishing,  2-Fish processing  3-Fish trading,  
 4-Motor taxi/car/engine boat driving  5-Net/gear making,  
 6-Farming,  7-Laborer  8-Small business  
 9-Money lending  10-Fuel wood collection  11- Fish culture,  
 12-Government/NGO job  13-House keeping  
 14-Teaching  15-Other \_\_\_\_\_
12. Number of years of stay in current village \_\_\_\_\_
13. Place of birth:  
 1. Same village and commune;  2. Difference village but same commune  
 3. Difference commune but same province;  4. Difference provinces  
 5. Difference countries

#### Profile of the household members

14. Number of household members: Male \_\_\_\_\_ Female \_\_\_\_\_
15. Number of eligible household members (Age >10 who can read and write): \_\_\_\_\_

16. Number of working age members in the household (Age >10): Male: \_\_\_\_ Female: \_\_\_\_  
 17. Number of household members engaged in fishing: Male \_\_\_\_ Female: \_\_\_\_  
 18. Value of household assets (Riel):

- 1- House..... \_\_\_\_\_  
 2- Boat..... \_\_\_\_\_  
 3- Land..... \_\_\_\_\_  
 4- Household appliances (furniture)..... \_\_\_\_\_  
 5- Electronic appliances (TV, Radio, fan, battery)..... \_\_\_\_\_

19. Monthly household income by source (Riel)

No.	Source of income	Close season (2004) (R/month)	Open season (2003) (Riel/month)
1.	Fishing		
2.	Fish trading		
3.	Fish processing		
4.	Cage culture		
5.	Farming		
6.	Trading		
7.	NGO/Govt job		
8.	Wage income		
9.	Remittance income		
10.	Other (specify): _____		

### Resources and Fishing Ground

20. Describe your category as a fisherman: (check one category): \_\_\_\_\_

***Closed Season (2004)***                      ***Open Season (2003)***

1. Small scale          
 2. Medium-scale          
 3. Commercial

21. Do you pay any tax or license fee for fishing right or gear use?       Yes,                       No

22. If yes, how much (riel) \_\_\_\_\_ Period(month) \_\_\_\_\_

23. Are you a member of the fisheries community organization?       Yes,                       No

24. If yes, what is your role? \_\_\_\_\_

25. Where do you normally go for fishing? (Multiple answers are acceptable)

1. Inside community fishing     2. Outside community fishing  
 3. Open fishing ground     4. Protected fishing ground  
 5. Inside fishing lots     6. Others \_\_\_\_\_

26. Please explain why do you fish in that/those area/s?

1. More fish     2. Easy to access  
 3. No alternative     4. Others \_\_\_\_\_

27. Aside from fish, what other uses or benefits do you/your family gets from the fishing area?

1. Vegetable                       2. Medicine                       3. Fire wood  
 4. House construction material                       5. Water (drinking, using, cooking)  
 6. Others \_\_\_\_\_

28. What fishery rules and regulations are enforced in your community?

Rules and regulations	Who implements the rules?	Who are affected?	Effectiveness*	Comments

\* 1=Very effective; 2=Effective; 3=Not effective

### Indicators of Over-Capacity

29. Please recall your fishing activities by type of gear used in the following periods.

#### Present (2003/2004)

No.	Gear type	No. of trips per week	No. of members per trip	Number of hours per trip	Average catch per trip (kg)	Period of using (from - to)
1						
2						
3						
4						
5						
6						
7						

#### Before fisheries reform of 2001

No.	Gear type	No. of trips per week	No. of members per trip	Number of hours per trip	Average catch per trip (kg)	Period of using (from - to)
1						
2						
3						
4						
5						
6						
7						

30. Do you think, on the average, size of fish has been changing (declining/increasing) over the years? If yes, please name some of the important species that declined most?

No.	Species	Size of fish compare to before fisheries reformed		
		smaller	bigger	No change
1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
---	--	--------------------------	--------------------------	--------------------------

31. Do you think, on the average, price of fish has been changing (increasing/decreasing) over the years?

- Yes       No

32. If yes, please name some of the important species that increased in value most?

No.	Species	Average price in riel/kg	
		Before 2001	2003-2004
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

**Perceptions on the Condition of the Fishery**

33. Based on your fishing experience, what is your perception in the volume of your catch over time?

- Increasing       Decreasing       No change

34. What could be the reason for the changes in the volume of catch over time?

- 1.Excess fishing effort       2.Farmers becoming fishers  
 3.Farming and lotus planting in the lake area       4.Fishery is less productive  
 5.Intervention in the upstream river system       6.Prices of fish  
 7.Fishery reform       8. Other

(specify\_\_\_\_\_)

35. What is your opinion about changes in the number of fishermen in your community over time?

1. Increasing       2. Decreasing       3.No change

36. What is the reason/s for the change in the number of fishermen in your community?

- 1.Migration       2.Population increase in the fishing community  
 3.Lack of alternative livelihoods       4.Fishery reform  
 5.Other reason (specify\_\_\_\_\_)

**Conflicts and expected solution**

37. What fishery conflicts exist in your community? How serious it is? How much it affected? Who are involved in each conflict?

No.	Type of conflict	Level of serious <sup>a</sup>	Affected <sup>b</sup>	Involvement <sup>c</sup>
1				
2				

3				
4				

- <sup>a</sup> 1. Violent, 2. Very serious, 3. Serious, 4. Somewhat serious, 5. Not serious  
<sup>b</sup> 1. Most affected, 2. Very affected, 3. Affected, 4. Somewhat affected 5. Not affected  
<sup>c</sup> 1. Community, 2. Your individual, 3. Others \_\_\_\_\_

No	What was the cause of the conflicts?	In your opinion, what could be the solution?
1		
2		
3		

### VII. Plans and Aspirations

38. Knowing the problems in the fishery, do you still see yourself fishing in the next five years?

- Yes       No       Undecided

39. Why? \_\_\_\_\_

40. If answer to Question 38 above is yes - Do you still see yourself fishing forever?

- Yes       No       Undecided

41. Why? \_\_\_\_\_

42. If answer to Question 38 above is no - What are your plans?

\_\_\_\_\_

—

### VIII. Reactions to Exit Strategies

43. What are your suggestion(s) for ways in reducing fishing pressure?

1. Establish community fisheries       2. Improving skill  
 3. Provide land for agriculture activities       4. Finding the possibility occupation  
 5. Others \_\_\_\_\_

44. What is your opinion or reaction to the following ways to reduce fishing pressure and sustain the fishery? Please **rate** your answer as follows:

- 1=Highly agree      2=Moderately agree      3=Agree 4=Disagree      5=Strongly disagree

Strategy	Rate	Why?
1. Ban use of some gears	_____	_____ _____
2. Set maximum limit on amount of catch according to scale of operation	_____	_____ _____ _____
3. Nobody should fish during non-fishing season	_____	_____ _____ _____
4. Reduce number of all types of fishing lots to increase	_____	_____ _____ _____

conservation area		_____
5. Relocate and find land-based jobs for marginal fishers	_____	_____ _____ _____

**IX. Needs and Assistance for Exit**

45. What are the alternative skills you and your household members have that you may pursue today or in the future?

Relationship with the household head	Gender (M/F)	Age (Years)	Schooling (Yes/no)	Skills aside from fishing

46. What kind of assistance do you need, or expect to enable you to leave the fishery?

- 1. Technical training on\_\_\_\_\_
- 2. Provides land for agriculture activities
- 3. Livestock raising
- 4. Skill for\_\_\_\_\_
- 5. Other\_\_\_\_\_

Name of the Interviewer: \_\_\_\_\_ Verified by: \_\_\_\_\_