



NAFRI
Living Aquatic Resources
Research Center
LARReC

MRC Fisheries Program
Assessment of Mekong
Fisheries Component
AMFC

Vientiane, Lao PDR
October 2000



Foreword

This survey report was produced by the Mekong River Commission Fisheries Program - Assessment of Mekong Fisheries Component (AMFC) and staff of the Living Aquatic Resources Research Institute - LARReC, Vientiane, Lao PDR and staff of the Provincial Fisheries Department in Luangprabang Province as well as several District Officers. When the survey was started in May, 1999 it was under the Department of Livestock and Fisheries, but in June, 1999 it came under the newly established LARReC.

The Assessment of Mekong Fisheries component (project) of the MRC Fisheries Program is funded by Danish International Development Assistance - Danida. The duration of AMFC is six years from September 1997 to September 2003.

The AMFC is a regional component (project) that assess the inland fisheries in the Lower Mekong Basin and thus works together with the national fisheries departments in Cambodia, Lao PDR, Thailand and Viet Nam. AMFC has offices in each of the countries.

The objective of AMFC is that

“improved quantitative and qualitative information on fisheries related ecology and socio-economics is provided and (a) taken into account in fisheries management practices, and (b) incorporated into planning of water management projects in order to sustain and optimise fisheries productivity and socio-economic benefits from potentially affected water bodies.”

The database that goes together with this report is made available for verification of the conclusions drawn here, and for further analyses and interpretation. The database is included with the cd-ROM version of this report, in English and Lao languages, which is the official report.

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For bibliographic purposes this report should be referred to as:

- Sjorslev, J.G. (Ed.), Luangprabang Fisheries Survey, AMFC/MRC and LARReC/NAFRI; Vientiane, 2000
- Sjorsley, J.G. (Ed.), Luangprabang Fisheries Survey, LARReC Technical Report No.0001, Vientiane, 2000.

Executive Summary

The Fisheries Survey was carried out in a random sample of 27 villages in Luangprabang Province, which is situated in Northern Lao PDR, between May and August 1999. 5 LARReC staff and 9 provincial and district staff did it, with technical support from the AMFC. The survey is one of a number to be implemented by LARReC in selected areas in the Mekong River Basin of Lao PDR, with the assistance of the Assessment of Mekong Fisheries Component AMFC (1997-2003) under the Mekong River Commission Fisheries Program, in conjunction with relevant government agencies.

The objective of the survey is to provide mainly quantitative and also qualitative information on fisheries (including the collection of aquatic animals) in Northern Lao PDR exemplified by Luangprabang Province. Basic fisheries related information at village, household and individual level has been collected. The information includes the degree of participation by people in, and their dependence on, fisheries and collection of aquatic animals, the absolute and relative economic importance of fishing in rural people's livelihoods, and information on fishing gears, fishing activities, fishing grounds and fish consumption. This report presents analysis of the main features of the data; for further analysis the full data set is available on CD-ROM.

The methodology applied is a questionnaire-based survey of a random sample of villages, households and individuals in Luangprabang Province. The sample comprises 27 villages, 179 households and 500 individuals. Though not a goal in itself, this sample size is believed to have sufficient power to make relevant assessments of the total fisheries in the whole province with due consideration to the statistical uncertainties involved in extrapolation.

Though a mountainous region, Luangprabang Province is rich in aquatic resources with 1053 km of riverbanks to major rivers, 7284 km length of medium rivers, and 17,722 km of small rivers and streams (according to GIS analysis of stream data provided by Watershed Classification Project, MRC). There are few floodplain areas but rice fields are habitats for fish and aquatic animals that are extensively exploited.

In 63% of the surveyed villages more than 95% of the households are reported to be dependent on fishing and collection of aquatic animals for subsistence. In another 22% of villages, between 75% and 25% of the households are likewise dependent.

Fishing and collection is overall ranked as the third most important activity after rice farming and livestock rearing. In general, in rural Lao the economy is largely non-monetary and fishing, in common with most activities, does not appear to be important for income. Two surveyed villages (7.5%) have professional (commercial) fishermen and in those 10% of the households get their main income from fishery related activities.

Overall, 83% of the households report to fish and collect aquatic animals and in these households, on average, 41% of the household members, of whom 20% are children, are actively involved. A large variety of gears are used.



Data set and methods

Luangprabang province is rich in aquatic resources

72 % of all the households in all the surveyed villages are engaged in fishing and collection of aquatic animals which is the 3rd most important economic activity

The most important fishing grounds (habitats) are rivers and streams of varying sizes followed by rice fields.

April and May are the most important fishing months followed by March and June, July. However, fishing activities are reported throughout the year.

Aquaculture in this area is not as important as capture fisheries. Only 4 households (2%) ranked it at all as important for food, and only 1 (0.5%) household for income. The average yearly production per household from aquaculture ponds was the same as the average catch of the much larger number of households fishing in rivers.

Community-based management systems for living aquatic resources are widespread. 52% of the villages report that they have some form of local management system for their resources. These include conservation zones and restrictions on seasons, gears and fishing certain species. They often apply to migratory species and relate to specific spawning sites. Some of these fish stocks are very likely trans-boundary in nature, that is, they migrate to and from different countries. However, the current management activities appear to relate only to fishing effort and access.



Most of the fish and aquatic animals caught is consumed in the household of the fisher. However, a sizeable amount is given away to other households or villages, sold or used in barter-trade.

The average yearly per capita consumption of all fish and aquatic animal products is estimated to be 29 kg per person per year, with fresh fish accounting for between 16 and 22 kg (at 95% confidence level). Fish and aquatic animals account for 43% of the total animal product consumption, but for between 55% to 59% of the total animal protein intake if standard conversion rates are applied in order to correct for differences in protein content of various foods. These figures correspond well to comparable survey data.

Per capita consumption per year of fish and aquatic animals is 29 kg. In terms of protein fish and aquatic animals contribute at least 55%

The survey includes information on the fishing practices of 500 individuals in all age groups. 55% of the 500 individuals interviewed reported that they fish or collect aquatic animals. The individual yearly catches show a mean of 54 kg with a range within 30 kg to 78 kg. The median is 10 kg, meaning that half of the fishing respondents catch less than 10 kg per year.

Fishing individuals catch on average between 30 kg and 78 kg per year. Half of the fishing persons catch less than 10 kg.

Various methods of calculating total catches of fish (and other aquatic animals) for the whole of Luangprabang Province, based on extrapolations from the data, are discussed. The relatively small sample combined with the significant standard deviations in catches provides for estimates for the population totals with an error margin of about 5000 tons.

However, a very good fit between the extrapolated household consumption figures and the extrapolated individual catches is found.

The extrapolated data on consumption of fresh fish corresponds well with the consumption data from the Lao Expenditure and Consumption Survey (LECS) 1997/98 for Luangprabang and the Northern region. It should be mentioned that the LECS was not available when the present survey was designed.

With a value of 1 kg of fresh fish in 1997 in Luangprabang rural areas set at around 1400 Kip (or about 50% of the market price in Luangprabang town), the results of this survey are in line with the latest official data available on production of fish and aquatic animals as presented in the Lao Expenditure and Consumption Survey 1997/98.

Thus, the estimated total production of Luangprabang Province is between 10,000 – 15,000 Tons per year, of which about half is fish and aquatic animals that are processed, primarily dried, after catch.

The survey also confirms the findings of the recent Agricultural Census, 1998/99 and the Lao Expenditure and Consumption Survey, 1997/98 that fishing and collection of aquatic animals is very important for subsistence and is integrated with all aspects of people's livelihood strategies. According to the Agricultural Census 35,100 households, or 56%, of the total 62,546 households in the province are engaged in capture fisheries.

The report ends with an estimate for all of Lao PDR based on the Lao Expenditure and Consumption Survey that gives a yearly production of 205,000 Tons of fish and aquatic animals. However, the estimate for Lao PDR based on these data is the subject for a separate report.

The above estimates, combined with the recent Agricultural Census data, which shows that 70% of farming households in Lao PDR are engaged in fisheries, define Lao PDR as a fisheries nation.

The total production of fish and aquatic animals per year in Luangprabang is estimated at 10,000 – 15,000 tons.

The survey confirms Agricultural Census that more than half of the population are engaged in capture fisheries

The production of fish and aquatic animals for Lao PDR per year is estimated at 205,000 tons

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1 Objectives of the survey

The objective of the Assessment of Mekong Fisheries Component (AMFC), of the MRC Fisheries Program, is to generate improved information on fisheries in the lower Mekong Basin which will ultimately help to improve the management of fisheries and especially the planning of water resources management projects (such as dams, flood control, drainage of aquatic habitats, etc.). Before management can be improved, a better understanding of how the fisheries work and their importance is required. The AMFC is assisting all four countries of the lower Mekong River Basin to obtain improved information on their fisheries.

Whilst the ultimate objective of AMFC is to improve regional aspects of fisheries management, the type of information required to address regional management issues is broadly the same as that required by national governments to begin to manage their resources in a narrower “national” context.

AMFC has a regional emphasis on promoting regional co-operation on joint management of fishery resources. Joint-management is required for a number of reasons including:

- where water resources management projects are concerned, activities in one country can have an impact on fisheries in another country (especially downstream).
- much of the fishery exploits migratory species that move from one country to another (i.e., they are “transboundary” species), a fact that in the longer-term requires joint management of the stocks in order to sustain the fisheries for the mutual benefit of all concerned.

Thus, the regional value of the present survey is that it contributes to the regional ‘mapping’ of Mekong fisheries. All three other countries in the lower Mekong Basin, i.e., Thailand, Cambodia and Vietnam, have areas thought to have comparable fisheries to those in Luangprabang Province, and there is only limited information from these. These areas include Northern Thailand, Central Highlands of Vietnam and the Northeastern part of Cambodia.

- Transboundary stocks, e.g., the pangasids and *Probarbus* sp., are fished in Luangprabang Province. The status of these stocks, and especially the existence of community-based management measures, is of regional interest.
- Improved information on “highland” fisheries in Lao PDR (and Cambodia, Thailand, and Viet Nam) is crucial information for the siting of future dam projects (in both a national and regional context).
- Funding agencies for major water resources schemes are becoming increasingly strict on the need to consider regional issues, especially for fisheries, as part of adequate feasibility studies. The involvement of Lao PDR in regional initiatives, such as the AMFC and the current study, verifies the country’s contributions to such approaches and will, hopefully, stand it in good stead for the future.



Fisheries depend on two basic things (i) the natural resource base (e.g., rivers, lakes, and swamps etc., which support fish stocks that are then available to be fished) and (ii) the socio-economic setting of the communities using those resources.

Existing information on capture fisheries in Lao PDR relates to previous studies and on-going projects in southern Lao PDR (especially Savannakhet and Champassak Provinces) and around Nam Ngum Reservoir (Vientiane Province). Northern Lao has been largely overlooked in a fisheries context until now. Thus, this study aims to provide a picture of the fisheries in Northern Lao PDR in general, and furthermore of fisheries in similar resource and socio-economic settings elsewhere in the basin.

Luangprabang Province was chosen as the overall sample frame, partly for logistic reasons. The province is easily accessible from Vientiane; it has a relatively good local infrastructure and is reasonably representative of the northern Lao environment.

The approach taken was to obtain as much relevant information on fisheries as cost-effectively as possible (that is, in a reasonably short period of time over a large area). Naturally, a compromise must be reached between the need for basic information, obtained quickly, and more detailed information that can only be effectively gathered over a longer period. These two information needs require different methods. The present survey provide basic information but does not claim to provide the level of detail that is required e.g. to set up local fisheries management systems.

2 Luangprabang Province - Topography and Resources

The province of Luangprabang is the second largest province in northern Lao PDR. It borders Oudomxay, Phongsalee, Xieng Khouang, Vientiane, Xayaboulee and Seum Neua provinces and is also a gateway to China. Luangprabang province consists of 11 districts: Luangprabang district, Xiengngeun, Pakxeng, Chomphet, Pakou, Phonxay, Phoukhoun, Viengkham, Ngoi, Nambak and Nan districts.

According to the “The Households of Lao PDR, Social and economic indicators 1997/98”, there are 62,545 households with 395,968 people, of which 200,055 are females. There are 1,207 villages. The population density is 20.6 people per square kilometer. There are many ethnic groups that are divided into three main groups according to the government system: Lao Loum (lowland Lao), Lao Theung (upland Lao) and Lao Soung (highland Lao). According to the 1996 census, 39% of the inhabitants of the province were Lao Loum, 45% Lao Theung and 16% Lao Soung.

Luangprabang is mountainous, the minimum elevation is approximately 247 m at Pak Khan (Namkhan mouth) near the capital (Luangprabang) and the maximum is 1,600 m at Phou Soi (Soi means mountain). The daytime temperature in Luangprabang varies from 14 degrees Celsius in November and December to 40 degree Celsius in April. The total land area is 19,150 km². Agricultural land accounts for 87,500 ha, of which 59,200 ha are temporary crops and 28,400 ha is fallow land.

The most common farming systems are swidden farming in various forms, such as subsistence swidden farming, double cropping swidden farming and annual/perennial swidden farming (Chazee, 1999). Hunting, gathering, and also as this report shows, fishing, are the second most important activities.

According to the Fishery Division statistics, in 1996 the indigenous fishery production was 700 tons per year. This figure is probably only accounting for a few larger type fisheries operations and cannot in any way account for the consumption data published in the Lao Expenditure and Consumption Survey (LECS), 1997/98 (ref. Section 5). The present survey re-estimates the fishery production to be between 13 to 20 times higher (ref. Section 5).

Also according to the Fishery Division statistics, the area of rivers in Luangprabang province is 13,000 ha.

However, using the latest GIS data available (Watershed Classification Project, MRC) it can be calculated that Luangprabang Province has large aquatic resources with 1053 km of riverbanks to major rivers, 7284 km of medium rivers, and 17,722 km of small rivers and streams. The major rivers are all tributaries of the Mekong River, including the Nam Ou, Nam Khan and Nam Seung and others.

Table 1-1 Basic Statistics

Luangprabang basic statistics (Agricultural Census 1998)	Nos		
Nos HHs	62545		
Nos persons	395968		
Av HH size	6		
Profile of fisheries		% of holdings	% of HHs
Nos agricultural holdings	55700	100%	89%
Nos with squaculture	3200	6%	5%
Nos with rice-cum-fish culture	200	0%	0%
Nos with pond fish culture	3000	5%	5%
Area of aquaculture ponds	288 HA		
Nos holdings capture fishing	35100	63%	56%
		% of nos fishing HHs	% of total nos HHs
Nos fishing in river	22200	63%	35%
Nos fishing in lake, reservoir	14800	42%	24%
Nos fishing in swamp, floodplain	400	1%	1%
Nos fishing in rice field	600	2%	1%
Nos fishing in other	200	1%	0%

Luangprabang province is rich in aquatic resources

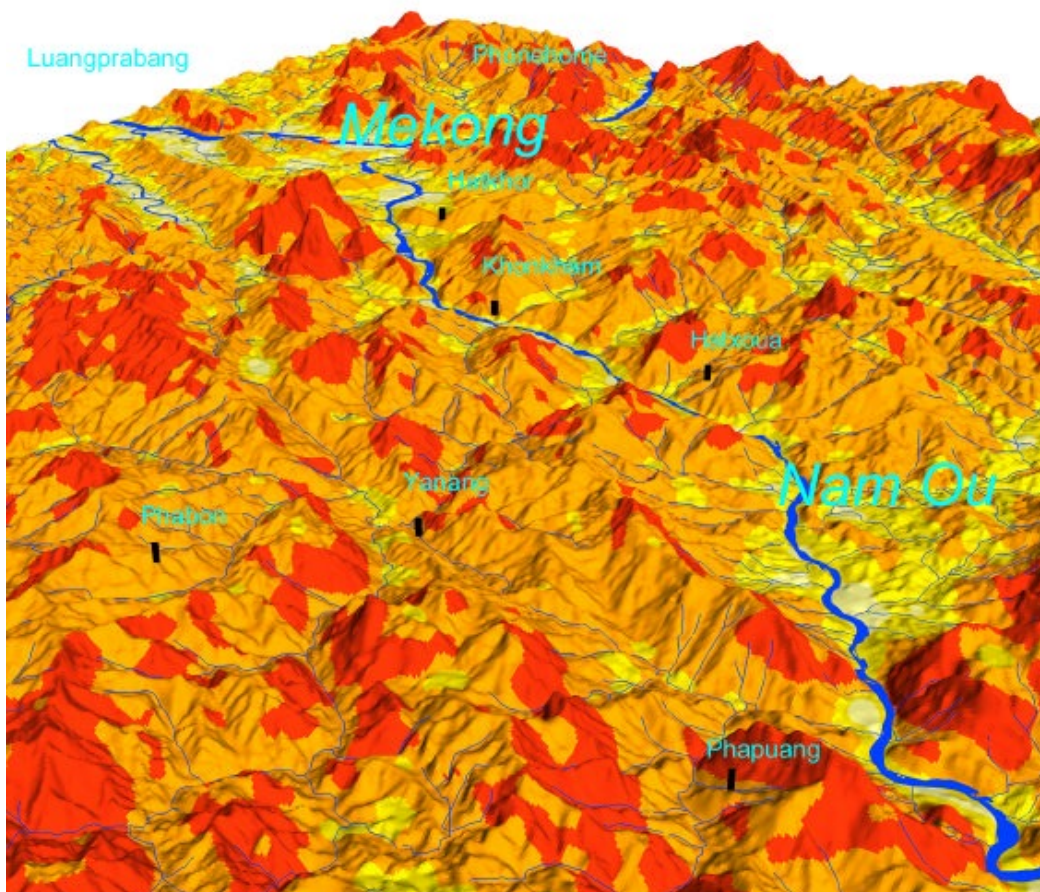
There are few floodplain areas but the 8,800 ha of wet season lowland rice fields, and parts of the 40,700 ha wet season upland rice fields are habitats for fish and aquatic animals that are extensively exploited.

A recent watershed classification by the Watershed Classification Project (MRCS) has identified that 80% of the area in the province comprises critical watersheds in the sense that they are steep, without trees and thus are prone to serious soil erosion. Though not quantified at present, it can be assumed that the water quality in rivers and streams is changing rapidly due to soil erosion. This is also indicated by local anecdotal evidence, according to which the most serious problem for the fishery in Luangprabang is a declining fish population compared to 5-10 years ago, the reasons being:

- Slash and burn practices causes soil erosion that reduces the volume of water in the rivers and streams,
- Erosion of the soil during the wet season destroys aquatic habitats and aquatic animal,
- Use of dynamite, chemicals and poisoning of fish.

Soil erosion in critical watersheds probably changes in water quality in rivers and streams

3D Map showing a view from the Northeast towards Luangprabang town (courtesy of the Watershed Classification Project/MRC). The dark red and darker colors show erosion hazard zones.



3 Methods

The survey was designed mainly as a quantitative study. The survey sample was based on random sampling of villages, random sampling of households within these villages, and randomly sampled individuals within the sampled households. Random sampling was chosen in view of the fact that no relevant information was available that could be used as a basis for dividing villages into groups.

3.1 Village sampling

The only existing database containing village names, population sizes and village locations was developed by the UXO (Unexploded Ordinances) project in Lao PDR on the basis of extensive field surveys of villages during 1994-97. That database lists 1207 villages in Luangprabang Province. A computer program randomly selected 27 of these villages.

The survey was planned in April 1999, just before the rainy season, and was carried out in two stages during the rainy season in May – June and in July - August. In each stage, a group of the pre-determined random sample villages was selected on logistical considerations. At the end of the second stage of fieldwork in mid August, the 27 villages had been surveyed, and in these 179 households and 500 individuals. The location of the villages is shown in Figure 3.1 (ref. to Annex Sampling for more on sampling).

Thus, the sample comprises 2.2% of the villages in Luangprabang province, 0.3% of the households, and 0.13% of the population. This is the largest survey of its kind on fisheries and collection of aquatic animals ever carried out in a single province in Lao PDR.

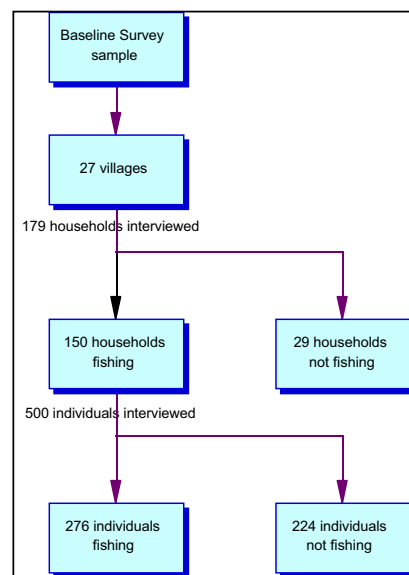
3.2 Household and individual sampling

In the sample villages, 10% of the households were randomly selected. The individuals interviewed were of both sexes and all age groups. The survey team according to their perception of who needed to be represented and according to who was home selected them. This method resulted in a larger than probable number of household level respondents (that is, those being interviewed for the household survey) was also interviewed as individuals (i.e., for the individual survey).

In terms of age and sex distribution, however, the sample is very wide spread and appears to be representative of the population as a whole.

The overall distribution of samples is indicated in Figure 3.1. Note that the people reporting that they “did not fish” were still interviewed (that is, this category is based on a completed individual questionnaire - not on reports from third parties).

Figure 3.1: Sample numbers



How households were selected

Each village has a list of households kept by the village headman. The lists are not ordered in any systematic way, households are numbered according to what the village headman remembers or by coincidence. Larger villages are most often divided into 'units' of 10 to 15 households. The households of each 'unit' are listed on separate lists. In these cases, random sampling was done from each list by the 'closed eyes' method according to the number of samples required. If 5 households were to be sampled, i.e., in a village of 50 households, and there were 5 'units', one household from each 'unit' was selected. If there were only 3 'units' in such a case, counting starting from a randomly picked 'unit' list was carried over to the next list. However, the 'unit headman' is mostly placed at the top of the list. Therefore counting started at different numbers, e.g., 2, 3 or 4. Often smaller villages do not have 'units' and here sampling was done by counting from the main household list in a similar manner. In case nobody was present in a selected household, the survey team waited until somebody came home and often did the interviews at night.

3.3 Questionnaires

The questionnaires used were developed by the team with assistance from two consultants and were tested in the field prior to implementation of the survey. Copies of these questionnaires are provided in Annex 1.

The survey used 3 questionnaire formats:

(1) a **Village Profile**, filled out with information provided by the village headman and confirmed to the degree possible by observation; questions in this form relate to the composition of the village, the range of village resources, fishery resources, fishing activities and fisheries management strategies at community level.

(2) a **Household form**, with information typically provided by the household head or another adult; and,

(3) an **Individual form**, with information from individuals in the households selected for survey.

Questions in the **household** and the **individual** survey refer to the composition of household, household resources, household fisheries activity, seasonally of household activities, and livelihood strategies. Furthermore, they contain questions on consumption of various foods and the importance of food sources in different seasons, fishing gears people use, seasonally of gear use, fishing habitats, species caught and total catch.



3.4 Terminology

In the preparation and testing of the survey forms considerable attention was given to terminology (what people call things locally). In particular, the term “fishing” is often interpreted as “commercial fishing” and respondents may not include casual or small-scale fishing as “fishing”. Throughout the survey, the term “fishing or collecting aquatic animals” was used where necessary. Usually, whether somebody went “fishing” was defined by whether they ever used fishing gears of any kind or ever “collected” aquatic animals. Therefore, throughout this report the term “fishing” includes all activities that involve catching, chasing or collecting aquatic animals (even if none are actually caught or collected at the time in question).

Likewise, during the survey and throughout this report the term “fish” means “fish (i.e., animals with fins) and any other kind of aquatic animal (including crustaceans, aquatic molluscs and amphibians)” - unless otherwise stated.

3.5 Data entry and analysis

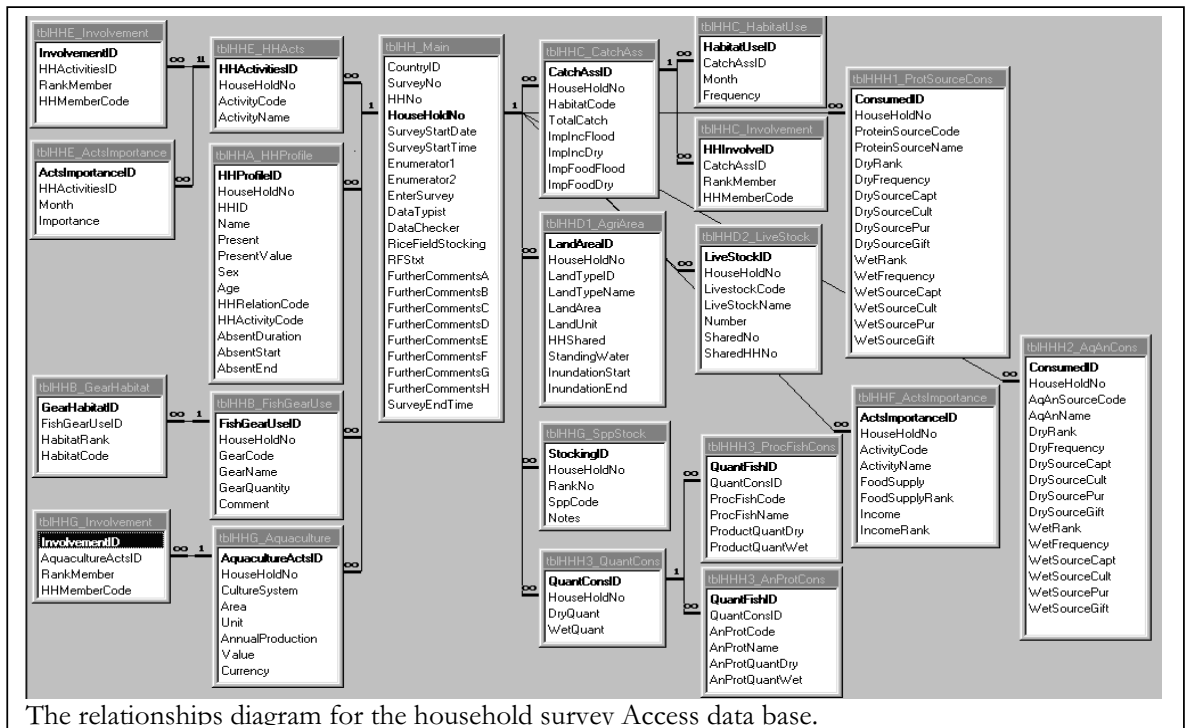
Data were entered into Excel and Access software for storage.

Analysis has mainly been done using JMP Statistical software.

The survey team members did data entry with data checking done concurrently by another survey team member.

Data entry was done in two stages: after the first stage of fieldwork the collected village profile and household data were entered into a interim Excel for immediate analysis and data check. In between the

two rounds of fieldwork, a universal Baseline Survey Access database became available. The data from the second round survey was entered into the interim Excel in case of village and household forms – to save time; and into the Access database in case of the individual forms. The survey team also did this. Another survey team member did data check concurrently. Finally, all data were converted into the format used in the Access database, and various tables used for analysis were made in JMP software. These are all available on the CD-ROM.



The relationships diagram for the household survey Access data base.

Aquaculture in Luangprabang is not well developed. There is only one Government fish farm, namely Na Luang fish farm, just near to Luangprabang town, which covers an area of 2.32 ha of which 1.06 are fishponds. Nine species have been cultured such as common carp (*Cyprinus carpio*), tilapia (*Oreochromis* sp.), maligan (*Cirrhinus mrigal*), roru (*Labeo rohita*), catla (*Catla catla*), bighead (*Hypophthalmichthys nobilis*), grass carp (*Ctenopharyngodon idellus*), and two indigenous fish - “pa keng” (*Cirrhinus* sp.), and the silver barb (*Barbodes gonionotus*).

The province is linked to other provinces by a quite good road system with road Number 13 north; the road from Oudomxay to Nambak and to Xieng Khouang; road Number 7 from Phoukhoun district to Xieng Khouang and road Number 13B from Luangprabang to Xayabouree province as the main. Besides the roads, there are many rivers used for navigation; mainly the Mekong River, which previously played a more important role as, means of transportation.



4 Results

The presentation of results follow the structure of the survey data, i.e., first presenting the findings from the Village Profile, then the Household data followed by the Individual survey data. The report concludes with a discussion on extrapolations for the whole of Luangprabang Province.

The sections focus on the main findings and discussion. For statistical details of the analysis that has led to the findings please refer to the Annexes for each sub-section.



4.1 Village profiles

4.1.1 Sections of questionnaire not applying to the surveyed villages

None of the villages reported they had standing water in agricultural areas (section b-4 of the Village Profile form, see Annex 1); stocked rice fields with fish (section b-4); used any of the large scale gears listed (section c-1); had migratory fishers in the area (section c-2); undertook business activities related to middle and large scale fisheries (section d-1); or undertook fish marketing in neighbouring countries (section d-2).

Almost all villages have access to some aquatic resources within one km

4.1.2 Village resources

Information was gathered on the common resources of the villages. It is clear that all villages except one have some aquatic resources within one kilometer. However, the size of the streams and rivers varies of course a lot.

Village	Nos HH	Nos survey HHs	Nos survey Individuals	Nearest river/stream	Distance to nearest, km	Status	Altitude feet	Distance to Centre Luang-prabang, km
Dornkeo	38	4	11	Nam Khan	0.01	river	800	4.5
Hatkhor	97	10	30	Nam Ou	0.2	river	1000	35
Habkhoua	53	5	13	Nam Ou	0.15	river	1000	50
Houayhao	44	4	12	Nam Nan/Ming	0.02	small river	1000	142
Houaysathanh	34	3	9	Nam Khan	0.03	river	1000	35
Khonkham	86	9	23	Nam Ou	0.005	river	800	42
Nadeuy	54	4	11	Nam Dong	0.2	stream	1000	5
Nammok	53	2	13	H. Step	1	stream	4000	81
						small		
Napho	76	7	18	H. Mon/Sing	0.1	stream	1000	12
Nong-di	24	2	6	Nam Khan	0.15	river	2000	60
Nong-onh	96	10	28	Nam Xa	2	stream	4000	84
Phabon	57	3	18	H. Then	1.3	stream	3500	60
Phakengnoi	122	8	37	Nam Soy/Xaia	0.7	stream	4000	17
Phakhom	57	6	15	Mekong	0.1	river	800	6
Phangeun	43	2	13	Nam Soy/Chi	2	stream	3000	8
Phapuang	38	4	9	Nam Houat	0.1	stream	1800	73
Phonehome	58	5	17	H. Eno	0.5	stream	1500	35
Phonekham	21	2	6	Nam Tee	1.6	stream	2000	96
Phonhouang	103	3	33	Mekong	0.1	river	800	1
Phouyang	46	4	16	Nam Sont	0.7	stream	4000	14
Saleuan	74	8	20	Mekong	0.1	river	800	10
Thine	52	5	15	Nam Khan	0.1	river	1500	37
Tinpha	37	2	10	Nam Fence	2.2	stream	2800	54
Vangmuang	74	9	28	Nam Hang	0.05	stream	1500	56
Xiangmaen	225	21	65	Mekong	0.1	river	800	2
Xiangthong	39	3	11	Nam Theung	0.03	stream	1500	96
Yanang	45	5	13	Nam Chek	0.02	stream	1800	52

The data on distance to rivers and streams have been obtained from 1:100.000 scale maps, produced by Service Geographique D'Etat, edition 1985, based on aerial photography from 1982. The inserted reference section contains details of each village as well as its location on these maps.

The village profiles also contain data on the distribution of agricultural land (Table 4.1.2). This information was collected to be able to identify factors that might influence the level or type of fisheries occurring in villages. However, no significant relationships between availability of agricultural land and fisheries activities could be found in the data.

Village Name	Nos HHs	Paddy rice ha*	Irriga-ted rice ha*	Upland rice ha*	Pond m2	Vege-table ha	Or-chards ha	Cash crop ha	Com-mon forest ha	Com-mon grass-land ha	Total cultiva-ted area	Total com-mons	Total cultiva-ted area per HH	Total com-mon area per hh
Dornkeo	38	14.7		1.9	0.5			2.4	18.0		19.4	18.0	0.5	0.5
Hatkhor	97	22.3	2.9	88.6	0.0	1.0					114.8		1.2	
Hatsoua	53	4.2	0.8	40.8		2.0	1.0	13.8	10.0		62.6	10.0	1.2	0.2
Houaybao	44			39.0			3.0		1000.0	20.0	42.0	1020.0	1.0	23.2
Houaysathanh	34			49.0			2.0	7.0	20.0		58.0	20.0	1.7	0.6
Khonkham	86	32.2	10.0	68.0		0.5	1.5	4.0	10.0		116.2	10.0	1.4	0.1
Nadeuy	54	23.1	4.7		64.0						91.8		1.7	
Nammok	53			53.0		8.0		13.0	8.0		74.0	8.0	1.4	0.2
Napbo	76	38.5	15.0	29.0		28.6	4.0	36.0	848.0		151.0	848.0	2.0	11.2
Nong-di	24			16.4				10.0			26.4		1.1	
Nong-onh	96			150.2		2.0		74.6	14000.0	4000.0	226.8	18000.0	2.4	187.5
Phabon	57			50.0				20.0	12.0		70.0	12.0	1.2	0.2
Phakengnoi	122			75.9	2.0	22.2		214.9	12.0	15.5	314.9	27.5	2.6	0.2
Phakhom	57	9.7			3.3		99.5				112.6		2.0	
Phangeun	43	3.2		36.3	0.1	1.0	3.2	14.7	357.0		58.5	357.0	1.4	8.3
Phapuang	38			145.0		1.5	2.5	2.0	20.0		151.0	20.0	4.0	0.5
Phonehome	58	11.7	9.0	58.0	128.0	0.2	0.5	7.5	5.0		214.9	5.0	3.7	0.1
Phonekham	21			18.2			10.0	27.0		30.0	55.2	30.0	2.6	1.4
Phonhouang	103	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phouyang	46	7.5		56.3	0.4			22.9			87.1		1.9	
Saleuan	74	35.1	2.0	4.0		2.0	1.0	25.0			69.1		0.9	
Thine	52			57.6		2.0	3.0	29.1	1000.0		91.7	1000.0	1.8	19.2
Tinpha	37			29.5		3.0	7.0	28.0		2.0	39.5	30.0	1.1	0.8
Vangmuang	74	1.7	1.7	49.0		0.5	0.1	26.0	4.0		79.0	4.0	1.1	0.1
Xiengmaen	225	85.8	17.8		85.0	5.0	166.5		75.0		360.1	75.0	1.6	0.3
Xiengthong	39			93.0				6.0			99.0		2.5	
Yanang	45	1.5		35.9	0.7		1.0	7.4	12.0	100.0	46.5	112.0	1.0	2.5

4.1.3 Involvement in economic activities

Table 4.1.3 shows the percentage of households involved in various activities according to the interviewed person (usually the head of the village).

Overall, involvement in capture fisheries is very high with an average of 72% of households involved in this activity. In 16 (60%) of the villages, 95% or more households are dependent on fishing and collection of aquatic animals for subsistence. In 20 villages (75%) more than 50% of households were reported to be dependent on capture fisheries. In one village, all households are reported to be dependent on fishing for both food and income.

On average 72% of households in a village are engaged in capture fisheries

In all of the villages, involvement in aquaculture is either relatively low or none. Further analysis of the data is required to investigate why there are these differences in the extent of aquaculture between villages and the relationships between involvement in capture fisheries and aquaculture.

Figure 4.1.2 (map) shows some summarized data on the degree of involvement of the villages in capture fisheries.

Table 4.1.3 Percent households involved in economic activities

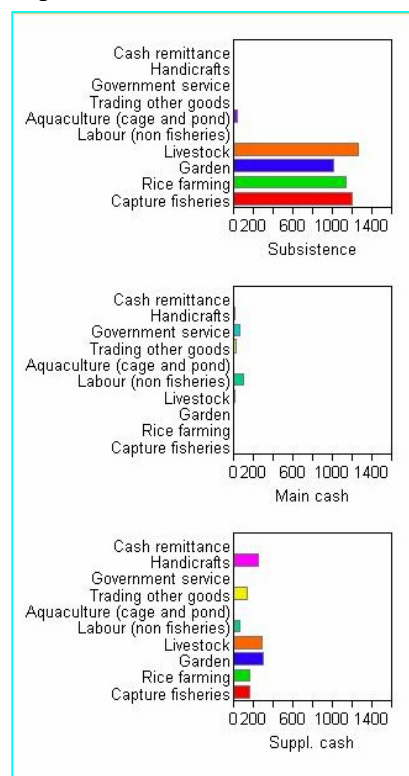
Village	Nos. House holds	Popula-tion	% HH involved in Capture fisheries	% HH involved in Rice farming	% HH involved in Gar-den	% HH involved in Live-stock	% HH involved in Aqua-culture
Domkeo	38	230	95%	63%	53%	100%	11%
Harkhor	97	653	100%	100%	100%	100%	1%
Hatxoua	53	259	100%	100%	100%	100%	
Houayhao	44	258	100%	100%	39%	91%	
Houaysathanh	34	220	100%	97%	41%	100%	
Khonkham	86	458	100%	100%	100%	100%	
Nadeuy	54	299	28%	48%	100%	93%	4%
Nammok	53	342	57%	100%	100%	100%	
Napho	76	431	100%	26%	100%	100%	
Nong-di	24	170	100%	100%		88%	
Nong-onh	96	565	100%	100%	26%	100%	
Phabon	57	366	14%	100%		95%	
Phakengnoi	122	774	70%	71%	1%	57%	7%
Phakhom	57	307	14%	9%	35%	100%	5%
Phangeun	43	311	14%	100%	100%	100%	7%
Phapuang	38	185	100%	100%	100%	100%	
Phonehome	58	319	69%	97%	97%	97%	14%
Phonekham	21	222	100%	100%	100%	100%	
Phonhouang	103	538	17%	11%	10%	49%	7%
Phouyang	46	318	11%	96%	0%	52%	20%
Saluan	74	439	81%	46%	95%	100%	
Thinc	52	309	100%	100%	100%	100%	
Tinpha	37	290	41%		100%	95%	
Vangmuang	74	410	100%	3%	5%	5%	
Xiengmaen	225	1390	67%	47%	100%	33%	8%
Xiengthong	39	265	95%	100%	0%	100%	
Yanang	45	232	100%	100%	42%	100%	18%
Total	1746	10560					

Note: Phakhom is mainly a trading town, therefore few HHs involved in fishing

A typical 'farming system' is a mix of rice farming, livestock and gardening with capture fisheries generally playing an important role in the livelihood of people.

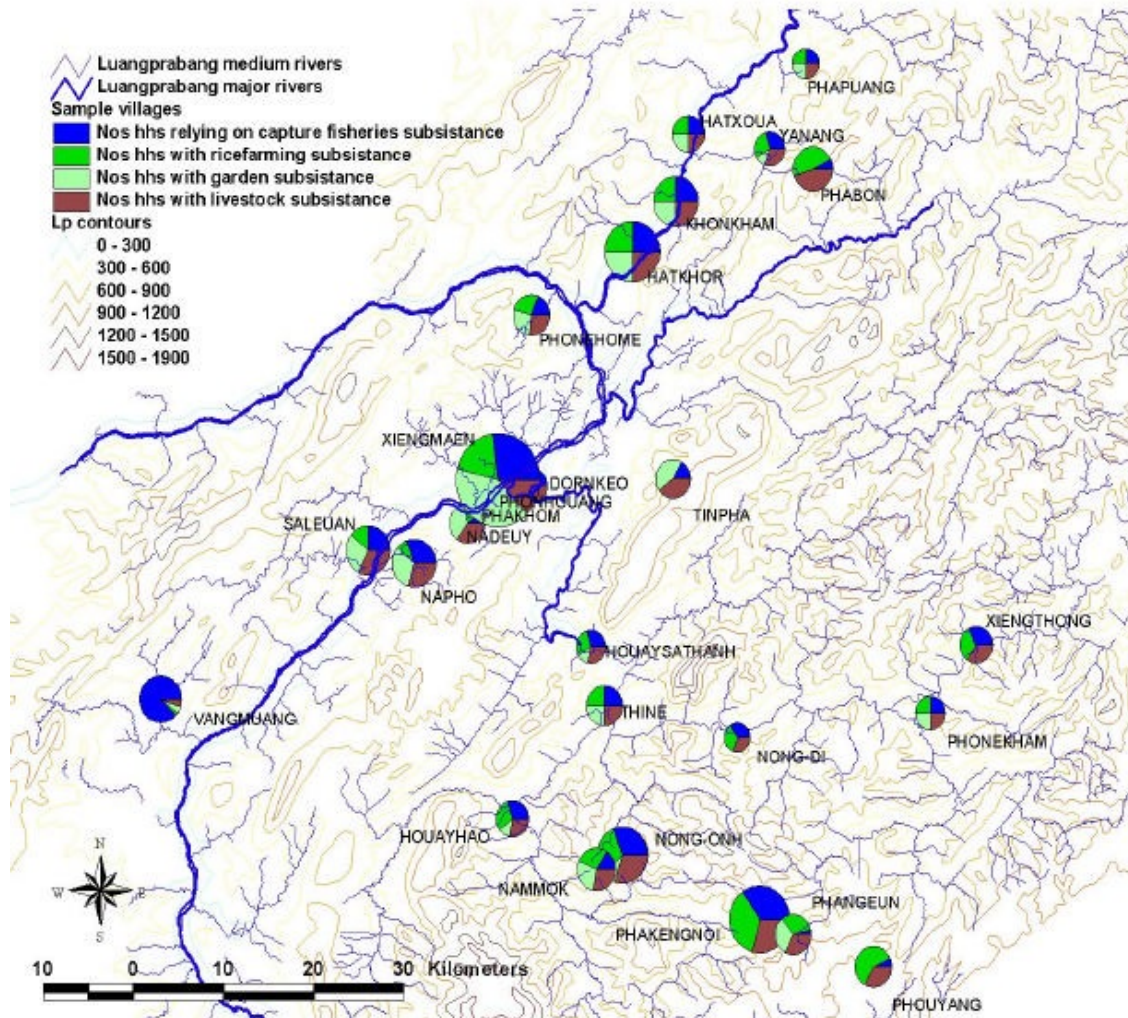
The findings on the importance and the widespread distribution of fisheries in the highlands of Lao PDR calls for a new view on the highland farming systems. Up to now fisheries has not been considered an integrated part of the farming systems, but it is evident from the Agricultural Census 1998/99 and supported by the present survey that fisheries play a role on par with livestock, gardening and hunting in the economy of the rural population not only in the lowlands but also in the highlands.

Figure 4.1.1 Households' involvement



Fisheries is an integrated part of the highland farming systems

Figure 4.1.2 Nos. households engaged in economic activities



On the map the circle sizes indicate the total number of households in the villages. The portions of the circles with different shadings indicate the relative number of households that are engaged in various economic activities for subsistence. For example, a circle that is divided into four equal parts with different shadings indicate that all the households are engaged in these four activities, typically capture fisheries, rice farming, gardening and livestock.

4.1.4 Community based aquatic resource management

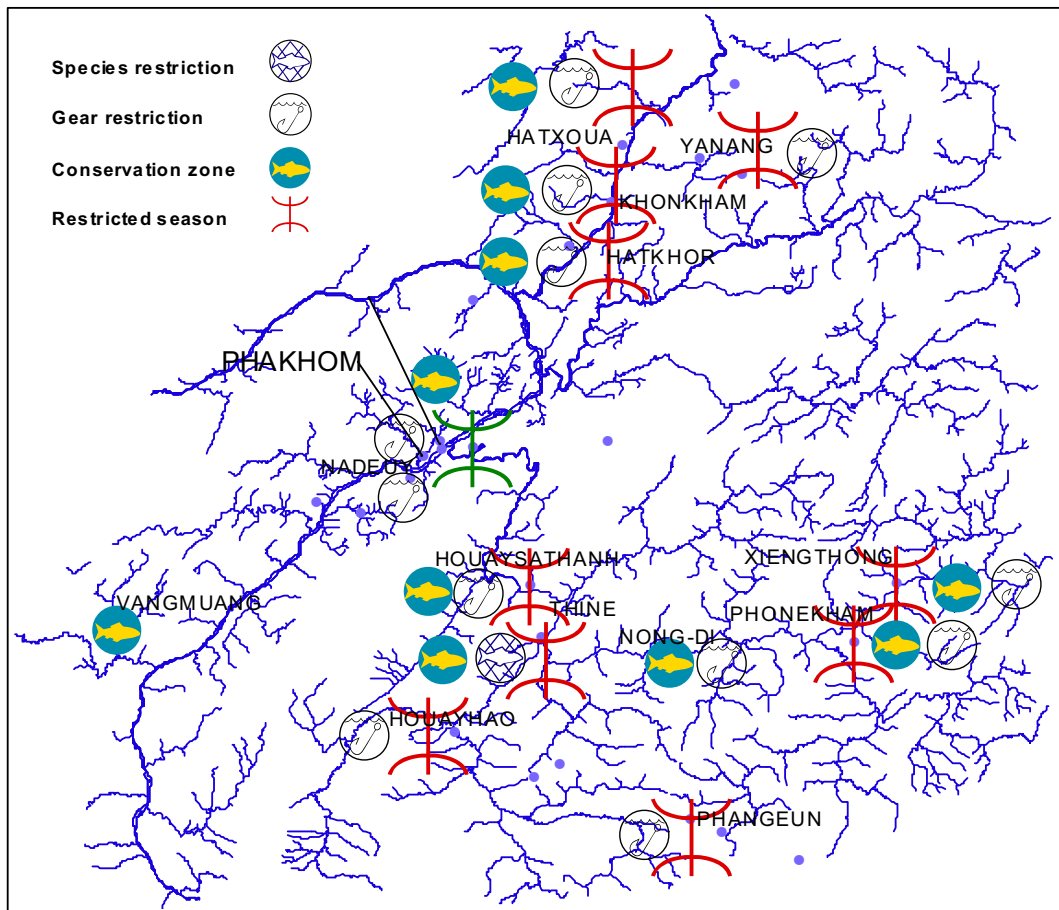
Community-based management systems for living aquatic resources are widespread in Luangprabang (Fig. 4.1.3). A total of 14 villages, out of the 27 (52 %) report that they have some form of local management system for their resources. These can be roughly categorised as:

Half of the villages surveyed have their own fisheries management system

Conservation zones:

Ten villages (37%) reported that they have a conservation zone. The other villages were normally those further away from larger rivers and did not have these zones. According to all of the village headmen, the conservation zone can only be fished when there is special event like a Buddhist ceremony, an important person visiting the village etc.. The main purpose of a conservation zone was invariably to save the area as a breeding ground for fish. Conservation zones have been defined by villagers as, for example, a big pool with deeper water, which is near to the village where they can take care and control access easily. Normally the village headman suggests making a conservation zone and seeks approval from all villagers.

Figure 4.1.3 Community based management initiatives in the sampled villages



Restricted season:

Eleven villages (41%) reported that they were implementing restricted fishing seasons especially during the spawning season (June - July and November - December). In general, the advice on appropriate seasons comes partly from the Department of Forestry, but in some villages they have made their own regulations.

Restrictions on gear:

Twelve villages (44%) reported to have banned using dynamite, electricity and poison to catch fish. Some villages are considering to prohibit using certain gears that kill a lot of fish during fish migrations, for example "big trap" (tong or lee trap), but there is still no official decree to this effect. The survey did not obtain data on whether these measures were considered effective.

Restrictions on species:

Only one village (4%) - Thine - reported to have banned catching a species in the spawning season, namely "Pa Pouath" (the identity of the species is uncertain, it could possibly be *Bangana* sp.) Thine village is located near to a rapid where this species has a spawning ground. The village headman has banned catching it during the spawning season November-December.

4.1.5 The significance of community-based management

In one sense, the existence of such widespread community based management initiatives bodes well for prospects for fisheries management in the region. The results suggest that communities are already managing the resources based, largely, on their own initiatives. This is consistent with modern thinking on fisheries management, which places importance on management by the resource users, if necessary in conjunction with official (government) agencies.

The local fisheries management systems in the region are extremely important assets, not least because they save the government the expense of trying (usually in vain) to manage the resource at the local level itself. Such systems should be nurtured and encouraged. Unfortunately, this current survey only obtained limited information on such management systems. The subject deserves a much more detailed study.

The main drawback of the current community-based management systems is that they appear to focus only on management of problems arising within the fishery, i.e., managing fishing effort etc.. However, notably, villages were almost unanimous in their assertions that major threats to their fishery resources arise from "outside" influences and especially environmental degradation such as changes in water quantity and quality in rivers due to activities in other sectors. There are local initiatives to address some of these problems in other sectors, but cross-sectoral approaches to environmental management for fisheries is likely a weak point.

Therefore, unless communities can control influences from other sectors, these important fisheries can be considered as highly vulnerable, if not doomed. The biggest challenge to local agencies will be to incorporate fisheries considerations into management activities in other sectors; in particular, how to empower the communities dependent upon fisheries (that is, almost everyone in this region) to have influence on activities in related sectors.



The existence of such widespread community-based management systems is of considerable relevance regionally. It is noted that most, if not all, the management initiatives are for migratory species. Therefore, sound local management initiatives will have benefits beyond the local area including in other countries, in the case of transboundary stocks. However, for this management to be successful it must be supported by reciprocal management measures in the other areas to which the species migrate.

4.1.6 Analysis of differences between villages

The results were analysed with respect to possible differences between the 27 villages in their overall dependence on fisheries and the collection of aquatic animals. There is quite a variation between villages in terms of involvement and dependency upon fisheries (Table 4.1.3). Statistical tests showed that the three villages appear to be significantly different from the rest: Dornkeo, Vangmuang and Xiengmaen.

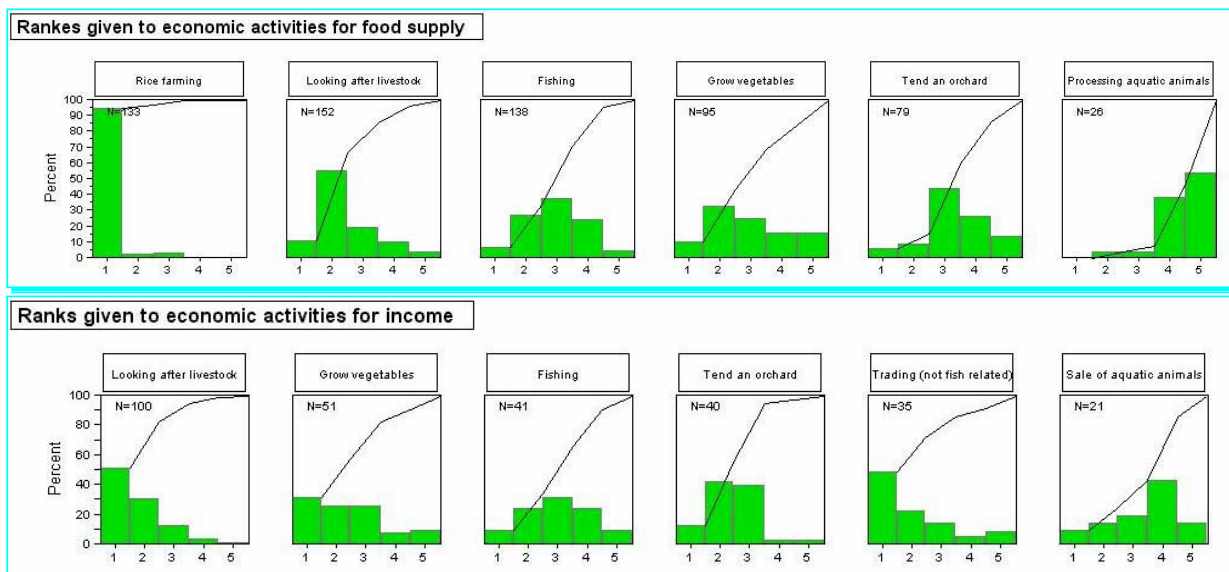
Dornkeo and Xiengmaen are the only villages that reported to have professional fishers. About 10% of the households in both villages get their main income from fishing. The presence of professional fishing households sets them apart. Both these villages are very close to Luangprabang town and the access to a larger market could be a factor influencing their choice of livelihood. With regard to Vangmuang, all households are reported to be dependent on fishing for both subsistence and supplementary income.

In the 5 villages of Phabon, Phakom, Phangeun, Phonhouang and Phouyang only few or none of the households are reported to be dependent on fisheries.

Statistical analysis has been carried out on factors such as agricultural land distribution, access to land, occupational patterns etc., to try to find significant relationships in the data that can help to explain the variation in dependencies on fisheries. The only statistically significant effect found is the distance of the village to flowing water, be it a smaller or larger stream or river.

Aquaculture is reported to be not important for either food or income in most households. Only 4 households ranked it (at all) as important for food, and only 1 household for income.

Figure 4.2.2 Economic activities ranked by households according to their importance



Note: The ranks given mean rank 1, most important, rank 2 second most important etc.. The line in each figure shows the cumulative percent.

The seasonal variation in importance of fishing and collection of aquatic animals is shown in Table 4.2.2. Most households report fisheries to be important either in the wet or dry seasons or both.

In conclusion, the responses from households show that fishing and collection of aquatic animals is perceived to be, and must be considered, a fully integrated and very important activity in the livelihoods of the sample households, albeit in the context of a largely non-monetary household economy.

4.2.3 Households fishing and doing fishing related activities

Out of the 179 households interviewed, 150 households reported some fish or aquatic animal catches. 148 Households gave specifications on which household members are involved in fishing in the various habitats. In these 148 households an average of 42% of the household members are active fishers and collectors of aquatic animals. Both men and women are involved in fishing with men dominating. Approximately 20% are children below 15 years of age.

A National perspective

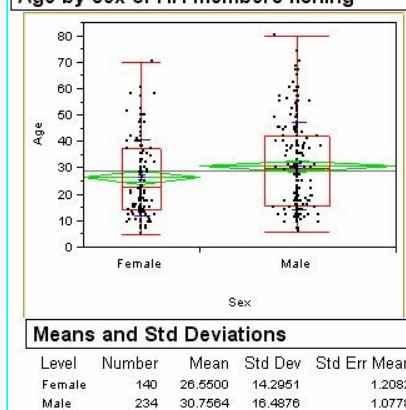
According to the "Lao Expenditure and Consumption Survey 1997/98", fishing and hunting is the second time consuming activity for households in the province after agricultural work. On average 1.5 hours per day is spent on fishing and hunting. In the whole of Lao PDR fishing and hunting accounts for 19% of the time spent on income generating activities. Though fishing and hunting

Table 4.2.2 Percent of HHs giving seasonal importance to fishing and collection of aquatic animals for food

	Dry Season		Wet Season		Na	Nos.
	Very Important	Important	Very Important	Important		
Wet season very important	6.0	24.0	4.4	1.6		66
Wet season important	26.2	7.7	4.4	2.7		75
Wet season less important	3.8	8.7	6.0	0.5		35
NA	1.6	1.1	0.0	1.1		7

Note: reports on 183 habitats used by 149 households.

Age by sex of HH members fishing



are often combined, fishing alone accounts for on average 0.9 hours per day per adult male, 0.3 hours for adult females, 0.6 for boys and 0.3 for girls in Lao PDR. The time use for fishing is double in rural areas without access to roads. Very poor people spent more time fishing than less poor and non-poor people. However, measuring the time spent on fishing is extremely difficult since most gears are passive, i.e., they operate for long periods without human effort.

4.2.4 Types of fishing gear used by households

The types of gear used, and the habitats in which they are used, are shown in Table 4.2.3. The most common gears are cast nets, gillnets, scoop nets, hooks followed by collection and small traps.

Table 4.2.3 Gears used by households in various habitats

Gear	Perennial river		Small stream		River/small stream		Wet rice rain-fed		Wet rice rain-fed		River/wet rice		Small stream/wet rice		Small stream/wet rice		AQ pond		AQ pond/small stream		Floodplain grassland		River/wet rice/small stream		River/wet rice/small stream	
	Gear	HH	Gear	HH	Gear	HH	Gear	HH	Gear	HH	Gear	HH	Gear	HH	Gear	HH	Gear	HH	Gear	HH	Gear	HH	Gear	HH	Gear	HH
Big traps	5	1	1	1					15	1																
Cast-net	104	64	31	28	5	3					2	1						1	1							
Collection	18	22	15	27	2	3			14					4	2	1										
Gill-net	142	58	37	25														1	1							
Hooks	1532	48	538	23	75	2								16	1	3	1							100	1	
Lift nets	1	1																								
Other	9	3	1	1				1	1																	
Scoop nets	63	50	24	22	2	2	1	1	2	1				2	2							1	1			
Small traps	239	14	5	1																						
Spears	7	6						1	1																	

N: 152 households

Hooks are used mainly in small streams whereas gillnets and small traps are used mainly in larger rivers. Note that a few households which did not report any catches have reported using gears.

4.2.5 Fishing grounds used by households

It is clear that rivers and small streams are by far the most important habitats for fishing in Luangprabang province with wet rainfed rice fields as the third most important habitat.

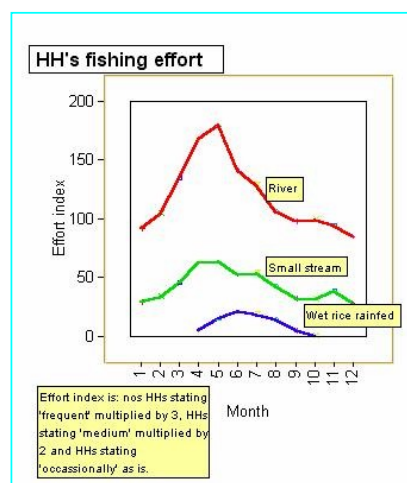
Table 4.2.4 Catches by habitat - Kg

Habitat	Nos Hhs	Total yearly catch by HHs	Mean	Std. dev.
Manmade Aquaculture Pond	4	178	44.5	50.92
Perennial River	89	3852	43.28	49.03
Small Stream	68	1021	15.01	25.87
Wet Rice Rainfed	22	357	16.22	22.00

4.2.6 Fishing seasons

Household respondents were asked how often they go fishing or collection aquatic animals, frequently, medium, or occasionally as a rough measure of effort.

The fishing and collection effort varies over the year with March to August being the busiest fishing months of the year, peaking in April and May when the water levels are the lowest.



4.2.7 Household catches as reported by household heads

Household heads were asked to assess the yearly catches of the household for each habitat fished.

The average catch reported in this fashion was 30.04 kg per household per year (including households that do not go fishing). For only households that are involved in fishing the average catch was 35.81 kg per household per year (6.6 kg per person per year). With the distribution of responses the yearly catches are within 28,2 and 43,3 kg with a 95% confidence level. However, these household catch reports are probably underestimates since the respondents, often the household heads, does not know enough about other family members fishing activities. (ref. Annex for details on distribution).

4.2.8 The total catch from various habitats

Catches by households from rivers account for 71% of the total yearly catches reported by households. Small streams account for 19%, wet rice rain fed for 7% and aquaculture ponds for 3% of the total reported catches (ref. Annex).

Rivers and small streams are clearly the most important and widely used habitats, used by 89 and 66 households respectively. The average yearly catch in rivers is 43 kg per household/year, but there is a large variation between households in the catches from rivers (standard deviation 49 kg). The mean yearly catch from small streams is 15.4 per household/year (standard deviation 26 kg) and for wet rain fed rice fields 16.8 kg per household/year (standard deviation 22kg). Only 4 households report catches in aquaculture ponds.

4.2.9 Gender and fishing effort

Men fish and collect more aquatic animals than women (Table 4.2.6). About two thirds of the fishing activities are carried out by men, one third by women. The women who fish and collect aquatic animals do so a little more occasionally than men. There are also differences between men and women (and children) in the gears used and where they are used.

4.2.10 Household food consumption data

Results for reports by households on consumption of fresh fish and various processed fish products, including other aquatic animals, are summarized in Table 4.2.7 and reports of consumption of other kinds of protein are summarized in Table 4.2.8. "Other aquatic animals" include frogs, snails, reptiles, mollusks, and insects.

The mean per capita per year consumption of fresh fish, the fresh fish equivalent of processed fish, and other aquatic animals is 39 kg (Table 4.2.7).

Mean	35.81457
Std Dev	46.980053
Std Err Mean	3.8231825
upper 95% Mean	43.368889
lower 95% Mean	28.26025
N	151
Sum Wgts	151
Sum	5408
Variance	2207.1254
Skewness	1.9095403
Kurtosis	3.7064862
CV	131.17581

	Frequent-ly fishing	Moderately fishing	Occasionally fishing	Total of sample
Women				
% of total	9%	12%	15%	36%
% of women	26%	33%	41%	
% of column	32%	35%	41%	
Men				
% of total	20%	22%	21%	64%
% of men	31%	35%	34%	
% of column	68%	65%	59%	
Grand Total	29%	34%	36%	100%

Table 4.2.7 Per capita consumption of fish and aquatic animal products and proteins reported from the survey of households.

	Cap/year/ kg	Conver- sion rate/fresh fish	Fresh fish equivalent kg	Protein content conver- sion rate	Protein kg
Fresh fish	19.38	1	19	0.21	4.1
Fermented fish	2.85	0.8	2	0.15	0.3
Fish paste	0.38	0.8	0	0.15	0.0
Fish sauce litre	0.88	0.1	0	0.02	0.0
Smoked fish	0.33	2.5	1	0.3	0.2
Dried fish	5.25	3	16	0.4	6.3
Total fresh fish/aquatic animals equivalent	29.06		39		11.0

Note: *Fish* include aquatic animals. Excluding 2 outliers with very high consumption. Conversion rates were obtained from publications by the Ministry of Health, Thailand (1992) and Phiakpol (1995).

The mean per capita yearly consumption of all fish and aquatic products is 29.06 kg. The fresh fish equivalent of this is 39 kg.

As with catch figures, the households' reports on consumption of fish and aquatic animals and of other animal products shows some variance, with the yearly per capita consumption of fresh fish within a range of 16.3 kg to 22.3 kg at a confidence level of 95%. For the other items, the confidence intervals are: for fermented fish 3.6 – 2.1 kg; for fish paste 0.54 – 0.23 kg; for fish sauce 1.4 – 0.6 l; for smoked fish 0.55 – 0.11 kg; and for dried fish 6.5 – 3.9 kg.

There is a significant relationship between distance to major rivers and consumption of all fish products, especially fresh fish and fermented fish - consumption going down as distance increases. Reasons for this might include (i) reduced catches away from major rivers leave little surplus catch to ferment, and (ii) economic factors limit the purchase of fermented fish further from rivers or the product is less readily available there.

For the consumption of other animal products the mean consumption per person per year of other animals is 38 kg, without eggs (Table 4.2.8).

Table 4.2.8 Per capita consumption of other animal products and proteins reported from the survey of households.

Other animal products	Cap/year kg	Protein content conversion rate	Other animal protein
Beef	12.85	0.2	2.6
Pork	12.06	0.2	2.4
Goat	0.55	0.2	0.1
Poultry	8.56	0.18	1.5
Hens eggs nos.	45.46	0.006	0.3
Wildlife	3.96	0.15	0.6
Insects	0.18	0.2	NA
Total (excl. eggs)	38.2		7.5
Eggs = 50 g a piece	2.3	NA	
Total with eggs	40.4		App. 9.0

N 175 Conversion rates were obtained from publications by the Ministry of Health, Thailand (1992) and Phiakpol (1995).

Confidence Intervals for fresh fish/capita/year

Parameter	Estimate	Lower CI	Upper CI	1-Alpha
Mean	19.37986	16.38	22.37	0.950
Std Dev	19.86894	17.96	22.22	

Confidence Intervals for beef/cap/year

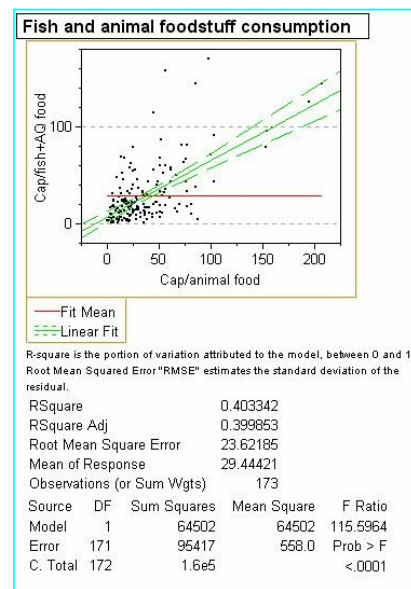
Parameter	Estimate	Lower CI	Upper CI	1-Alpha
Mean	12.84596	10.33	15.35	0.950
Std Dev	16.80789	15.21	18.78	

Therefore, total animal foodstuff consumption for the survey households is estimated at approximately 70 kg per year per person, of which fish and other aquatic animals account for 29 kg or 43%.

However, different foods have different protein contents and they are not all of equivalent value in the diet based upon fresh food weight. In this respect, fish is a very good source of protein with protein per kg relatively high. Calculating the actual protein content of the various foods (excluding eggs) it appears that fish and aquatic animals account for approximately 55% - 59% of the actual animal protein consumption.

An important question is whether fish and aquatic animals is a substitute for other animal protein. The analysis shows that high fish consumption goes together with a high consumption of other animal products (Figure 'Fish and animal foodstuff consumption'). Quite possibly, this may be because total protein consumption is related to economic status with better off people eating more protein. However, there is no evidence to suggest that as total protein intake increases the relative proportion of fish consumed decreases.

It is found that those households with the highest per capita consumption of protein get their fresh fish and aquatic animals from both their own capture fisheries (accounting for about 68%) and from purchases (accounting for about 26%) (Table 4.2.9).



Comparisons of this survey's consumption figures with similar studies are shown in Table 4.2.10. The figures obtained are in broad agreement with those for other studies. In particular, the figures for this study and the survey done by FAO project LAO/97/007 are remarkably similar for total aquatic animal consumption and fermented/pickled/salted fish, although the latter survey estimated a slightly higher figure for the consumption of other animal products. The figures for consumption around Nam Ngum reservoir are higher for both fish and other animal products. This is entirely plausible since those people have better access to fish stocks, better agriculture and are likely, overall, to be economically better off than those in the current study area due to the proximity to the capital and its markets. Hence, higher protein consumption would be expected.

Source	Total yearly consumption of fresh fish by sample households	Percent of total
Captured	16726	68.89
From Aquaculture	417	1.72
Purchased	6425	26.46
Received as gift	710	2.93

Table 4.2.10 Comparison of consumption data with other surveys. Units are in kg unless otherwise stated.

	1997	1999	1999
Source data/comments	LAO/97/007 survey of fish pond owners, Xieng Khouang, Sayaboury, Oudomxay, Sekong, Savannakhet	MRC Management of Reservoirs Fisheries component	This present study
Province	Average 5 Provinces	11 Nam Ngum Reservoir villages	Luang Prabang Province - 27 randomly selected Villages, 179 households*
Aquatic products as estimate of total animal protein	37.9%	56.3%	55 - 59%
Total animal products, raw	60.6	94.2	70.0
Total aquatic products, raw	23.0	57.1	29.6
Rice	379		na
Corn / Tuber	32		na
Vegetable	20		na
Fresh fish	10	35.0	19.38
Dried fish	2.5	7.0	5.25
Fermented / pickled fish / salted/smoked/fish paste	3.2	15.1	5.96
Canned fish	0.5		na
Aquatic animals	3.8		see fresh fish
Amphibious animals	3.0		na
Chicken	5.7	5.5	8.56 (all poultry)
Ducks	3.1	5.2	
Fowl other (turkey)	3.7	5.1	
Birds	1.5		na
Eggs	0.9	1.8	2.3
Pork	5.1		12.06
Beef	4.2	4.6	12.85 (incl. buffalo)
Buffalo	4.2	4.7	
Goat/Sheep	1.4		0.55
Dried meat	1.9		na
Oil	2.8		na
Veg./animal oils	2.3		na
Reptiles / grubs	2.2		na
Forest game	2.6		3.96
Winged insects	1.1		0.18
Other foods	1.2		na
Comments	Survey type questionnaire, responses converted using estimates from local prices, local measures or assumed weights for small items (birds, eggs, chickens)	Other aquatic products not specified were included in survey (frogs amphibians etc.) and form part of overall total.	Averages are made excluding 2 households with bad data

4.2.11 Comparison with consumption data from Lao Expenditure and Consumption Survey 1997/98.

For Northern Lao, fisheries related data on household expenditure and consumption measured in Kip per month have been published recently in the Lao Expenditure and Consumption Survey 1997/98 (LECS). The survey presents the consumption of various items by households measured in Kip per month. With regard to fish only the fresh fish consumption was considered in the LECS. Thus, consumption of processed fish and aquatic animals is not included in the LECS.

With an average value of 1389 Kip per kg of fresh fish (ref. Section 5 for full explanation of this figure) the LECS gives an average per capita yearly consumption of fresh fish in Luangprabang of 10.7 kg. (The exchange rate was around 1400 Kip to 1 US\$ at the time the LECS was implemented).

Table 4.2.11 Expenditure survey data on fresh fish consumption

	Average monthly expenditure on purchased fish in Kip	Average monthly consumption of own produced fish in Kip	Average total expenditure/ consumption /HH/month in Kip	Yearly consumption per HH In Kip	Yearly HH consumption in kg at 1389 Kip/kg fresh fish (1997 prices)	Mean HH size persons	Per capita yearly consumption of fresh fish kg
North	1986	5948	7934	95208	68.8	6.4	10.76

The per capita yearly consumption of fresh fish of 10.7 kg compares extremely well with the figure of 10 kg/capita/year of fresh fish reported in the average of 5 Provinces in "LAO/97/007 survey of fish pond owners, Xieng Khouang, Sayaboury, Oudomxay, Sekong, Savannakhet" shown in table 4.2.10. However, to further compare the LECS and the 5 Provinces survey of fish pond owners, with the present survey of Luangprabang, one has to add the categories of aquatic animals (3.8 kg/capita/year), amphibious animals (3.0 kg/capita/year) and reptiles/grubs (2.2 kg/capita/year) in the 5 Provinces survey since these food items are included in the present survey's data on fresh fish and aquatic animals consumption. This results in a per capita/year consumption of fresh fish and aquatic animals of 19.0 kg, which compares extremely well with the 19.38 kg of fresh fish and aquatic animals/capita/year found in the present survey.

To conclude, there is very good agreement between the "Lao Expenditure and Consumption Survey 1997/98", the "LAO/97/007 survey of fish pond owners, Xieng Khouang, Sayaboury, Oudomxay, Sekong, Savannakhet" 5 Provinces average and the present Fisheries Survey of Luangprabang.

In Section 5 of this report an assessment of the total production of fish and aquatic animals in Luangprabang is discussed based on the expenditure and consumption data.

4.3 Individuals

4.3.1 Profile of individual respondents

With respect to age and sex distribution a broad range of people were interviewed. More than 50% of the individual respondents were household heads and, therefore, also respondents to the household survey questions. The age distribution of fishers is the same as the age distribution of non fishers.

Of the 500 interviewed individuals, 285 responded that they use fishing gears for catching fish and other aquatic animals, i.e., they are "fishers". However, 9 individuals did not report any catches, leaving 276 individuals, or 55% of the sample to be considered as being engaged in fishing and collection of aquatic animals. Ninety percent of the fishing individuals had been fishing within the last 3 months, and 50% had been fishing within the last 10 days.

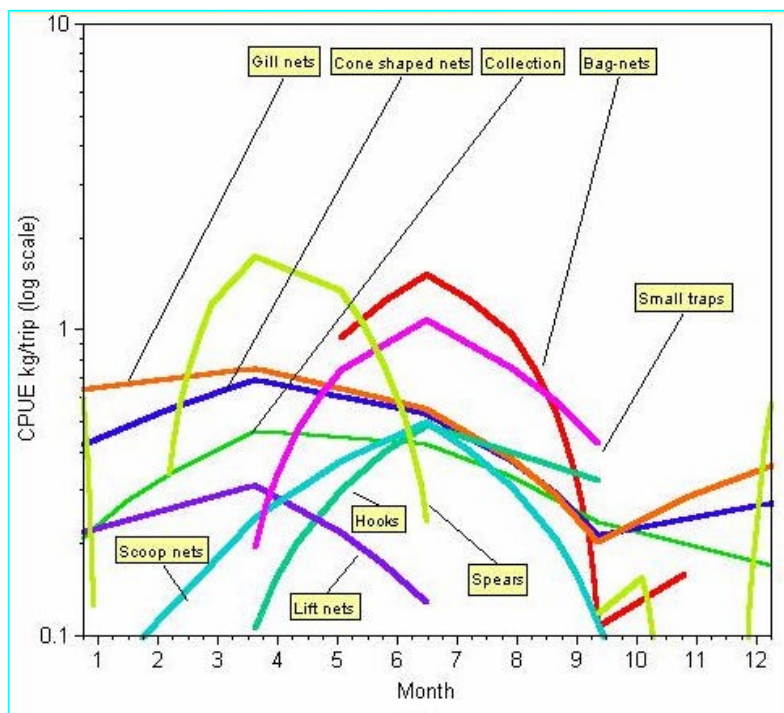
4.3.2 Individuals' use of fishing gears

Collection by hand is done by more respondents than any other means of catching fish and aquatic animals, followed by small scoop nets and cast nets. However, the latter gear accounts for the largest proportion of the total catches reported by the respondents, followed by stationary gillnets. It appears that spear guns and wedge cone traps have the highest Catch Per Unit of Effort (CPUE). However, there are very few reported uses of these gears. Of the gears that are more commonly used, stationary gillnets and cast nets have the highest CPUE with average catches around 0.4 kg per fishing event. For comparison, collection by hand yields on the average 0.2 kg per fishing trip (Figure 4.3.1).

Table 4.3.1 Gears, use and average catches per year

Gear	Nos using	Total yearly catch	Mean yearly catch of individual
Cast net	100	3486	35
Collection by hand	158	2168	14
Stationary gillnets	51	2083	41
Basket Eel Trap	4	1152	288
Pole with single hook and line	63	1017	16
Small scoop net	115	839	7
Long line, bottom set	23	699	30
Set hook with float	25	586	23
Mong Ty	17	488	29
Long-handled dip net	4	474	119
Drifting, at surface	17	434	26
Spear gun	4	375	94
Triangular scoop net	12	371	31
Two funnel trap	7	206	29
Drifting, at bottom	15	205	14
Drop door traps	2	168	84
Upright Basket Trap	6	156	26
Long line, surface set	1	150	150
Unknown	8	85	11
Beach seine without brush park	6	69	11
Bow and arrow	5	28	6
Spear	4	19	5
Small lift-net	3	18	6
Wedge Cone Trap	1	10	10
Collection with plunge basket	2	9	4
Drifting hook with float	4	5	1
Poison	1	3	3
Mong peng	2	2	1

Figure 4.3.1 CPUE of various fishing gears



4.3.3 Individual catches

The questionnaire recorded the catches of individuals in three different ways:

- an estimate made by the individual of the catches for the whole year for each gear type used,
- an estimate for a typical catch for each fishing event/activity (trip) for each month for each gear type used combined with an estimate of the number of fishing events/activities undertaken in that month, and
- an estimate of the most recent catch and how typical that catch was for the month in which it occurred (the answer could then be related to other information on reported seasonal differences in fishing intensity and catches).

Table 4.3.2 Comparison of different recall times of all catch reports (all individuals and all gears and habitats)

	Monthly catch based upon		Catch per fishing event/trip based upon		
	Yearly recall	Recent recall*	Yearly recall (for the month of most recent catch)	Recent catch typical	Recent catch actual
Mean	8.05	7.75	1.18	1.77	1.12
Median	2	1	0.5	0.6	0.5
Standard deviation	25.83	19.02	1.87	3.15	1.78

*calculated as recent catch x percent of typical catch x average number of fishing days for that month

Table 4.3.2 compares means of catches of individuals obtained by the three different approaches used in the questionnaire as mentioned above. The comparison is done regardless of gears and habitats in which the gears are used. The variation in the data reduces as the length of recall time (i.e., reliance on longer memory) decreases. That is, more specific questions, such as “what was your most recent catch” provide a more consistent answer from respondents compared to, for example, “what would be a typical catch for a particular month”.

A comparison (Figure 4.3.2) of the reports of yearly catches based upon the number of fishing events reported per month multiplied by average catches (what is called yearly catch by monthly recall) and the yearly catch as estimated for the whole year by the respondent, show a mean difference of 30.9 kg. That is, the catch estimate for the year based on monthly recall is 30.9 kg higher on average than the catch estimate based on the yearly recall (ref. Annex on individual catches).

It is considered that the high estimate based on monthly recall is the most reliable. Using this figure, we get a mean of 54 kg per individual per year. However, the distribution is very skewed and the range within a 95% confidence interval is from a low of 30 kg to a high of 78 kg. The median is only 10 kg, meaning that half of the fishing respondents catch less than 10 kg per year.

The mean catches of individuals for the various habitats (calculated on the basis of the typical number of monthly fishing events multiplied by monthly average catches) are shown in table 4.3.3. Most respondents fish in rivers and streams with rivers having the highest mean yearly catch, but also the highest standard deviation. Interestingly, wet rice, perennial canal, and aquaculture pond have nearly the same means.

Figure 4.3.2 Difference: Individual yearly catches by monthly recall and by yearly recall

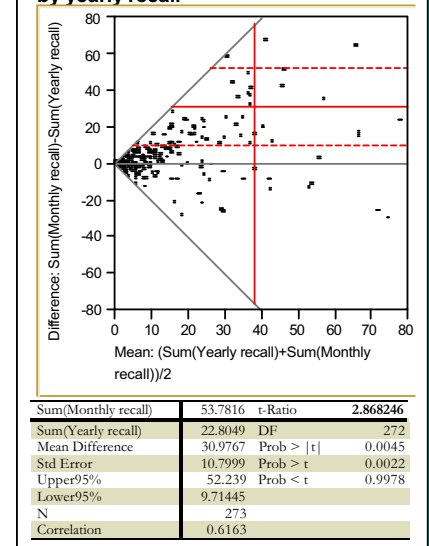


Table 4.3.3 Individuals' yearly catches by habitat

Level	Nos	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Manmade Aquaculture Pond	9	23.02	39.068	13.02	-2.595	48.64
Natural Lake	3	27.50	37.25	21.50	-14.808	69.81
Perennial Canal	3	22.80	13.83	7.99	7.083	38.52
Perennial River	166	71.55	254.66	19.76	32.675	110.44
Seasonal Canal	1	0.60
Small Stream	118	18.16	47.98	4.41	9.478	26.86
Wet Rice Rainfed	41	22.52	54.10	8.44	5.903	39.14

4.3.4 Individuals' disposal of recent catches

Information on the disposal of the most recent catch is summarized in Table 4.3.4. The majority of the catches were consumed by the people making the catch (or their household). However, a sizeable number of respondents reported that they gave away their catch to others outside the household. This may help explain why some households eat more fish than they catch - without purchasing the extra. These data should be considered indicative only and need correcting for the weights of the catches (per individual respondent) and for seasonal differences (the data apply only to the survey period, and even then only to the most recent catch).

Method of disposal of recent catch	Number of individuals reporting that method of disposal	% of total recent catch
Consumed	263	90%
Given away	49	14.7%
Sold in market	14	16.22%
Sold to middleman	9	27.9%
Bartered	2	20%
Seed fish for ponds	2	12.5%

4.3.5 Information on fish species caught

228 individuals who had recently been fishing responded to the question about the five most important fish species or other aquatic animals in their most recent catch, and the habitats where caught.

These data give an indication of the importance of various species of fish and types of aquatic animals in the fishery. They also give some indication of the use of aquatic habitats by the most important species at the time of the survey, i.e. May to August, (assuming that fishers fish in the most important fish habitats in the area).

Table 4.3.5 shows the percent of occurrences of species caught in various habitats. A total of 61 species and species groups were reported. The individual respondents had recently fished and caught aquatic animals in five different habitats: perennial rivers (133 people), small streams (80 people), rain fed rice fields (12 people), aquaculture ponds (3 people) and natural lakes (1 person).

Considering that each fisher was asked only about the five most important species in the catch and not all species caught, this is a very high number of species. This further underlines that the fisheries in Luangprabang province are highly diversified.

The most species rich habitat, during the time of the survey, was perennial rivers with 51 fish species plus snails, mussels and other aquatic animals.

The second richest habitat was small streams with 25 fish species plus snails, mussels and aquatic/semi-aquatic animals. Rain fed rice fields; aquaculture ponds and natural lakes without connection with the river had only 3-4 fish species and bivalves in some cases.

The most frequently reported species in all of the catches was the little cyprinid *P. deauratus* (85 reports). Snails were the second most frequently reported group and the three cyprinids *M. marginatus*, *Amblyrhynchichthys truncatus* and common carp (*Cyprinus carpio*) dominated the remainder of the catches (based on frequency of occurrence in recent catches).

Table 4.3.5 Percent of all occurrences of species by specific habitat

SpeciesName	Nos	River	River	River	Stream	Stream	Small stream	Stream	Small river	Stream	Stream	Stream	Stream	Stream	Stream	Stream	Stream	Stream
		Mekong	Nam Ou	Nam Khan	Nam Hang	Nam Xa	H. Mon/Sing	Nam Chek	Nam Nan/Ming	H. Eno	Nam Soy/Xaia	Nam Tee	Nam Theung	Nam Houat	Nam Dong	H. Then	Nam Sont	Nam Soy/Chi
Poropuntius deauratus	78	12.8	5.1	19.2	19.2	10.3	3.8	2.6	6.4	1.3	3.8	5.1	3.8	1.3			1.3	2.6
Snails	60	13.3	43.3	20.0	6.7	6.7			3.3	1.7	1.7			1.7		1.7		
Mystacoleucus marginatus	44	13.6	25.0	29.5	2.3	2.3			6.8			13.6	6.8					
Cyprinus carpio	30	40.0	26.7	16.7							10.0						3.3	3.3
Mussels	30	6.7	16.7	6.7	10.0	16.7			13.3	6.7		3.3		10.0	10.0			
Amblyrhynchichthys truncatus	29	65.5	24.1	6.9								3.4						
Clarias macrocephalus	24	25.0				4.2	16.7	12.5	8.3	12.5				8.3		8.3	4.2	
Unspecified aquatic or semiaquatic reptiles	24	12.5	12.5		12.5	4.2	8.3	16.7		12.5				4.2	16.7			
Kryptopterus bicirrhis	23	52.2	39.1				4.3									4.3		
Hypsibarbus pierrei	19	21.1	63.2	15.8														
Channa striata	15	33.3		6.7		6.7	20.0		6.7	20.0					6.7			
Toxotes chatareus	14	21.4		7.1	21.4	14.3	7.1		7.1					7.1			7.1	
Lobocheilos melanotaenia	12		8.3	33.3	50.0								8.3					
Cynoglossus microlepis	10	40.0	10.0	10.0		10.0	20.0									10.0		
Hemibagrus nemurus (Mystus nemurus)	10	80.0	10.0	10.0														
Puntioplites proctozysron	9	44.4	33.3						22.2									
Hemibagrus wyckioides (Mystus wyckioides)	7	42.9	14.3	14.3					14.3					14.3				
Mastacembelus armatus	7	42.9	28.6						14.3					14.3				
Hemibagrus wycki (Mystus wycki)	6	66.7		16.7		16.7												
Rasbora borapetensis	6	33.3							33.3							33.3		
Cirrhinus chinensis	5	60.0	20.0	20.0														
Esomus metallicus	5						80.0			20.0								
Oreochromis niloticus	5	20.0									40.0						20.0	20.0
Rasbora trilineata	5						60.0	20.0		20.0								
Barbodes gonionotus	4		50.0	50.0														
Probarbus labeamajor	4	75.0										25.0						
Bagarius bagarius	3	66.7		33.3														
Chela laubuca	3			33.3						33.3	33.3							
Clarias batrachus	3	33.3					33.3				33.3							
Clupisoma sinensis	3	66.7	33.3															
Glossogobius giurus	3	33.3				66.7												
Scaphognathops stejnegeri	3					100.0												
Systemus binotatus (Puntius binotatus)	3		66.7							33.3								
Aaptosyax grypus	2	50.0	50.0															
Bagarius yarelli	2	100.0																
Barbodes altus	2	50.0											50.0					
Cirrhinus mrigala	2								100.0									
Cosmochilus harmandi	2	50.0												50.0				
Lycotrichsa crocodilus	2	50.0	50.0															
Oxyeleotris marmorata	2	50.0				50.0												
Tor sinensis	2	50.0								50.0								
Anabas testudineus	1			100.0														
Chitala blanci	1		100.0															
Cirrhinus jullieni	1	100.0																
Hampala dispar	1		100.0															
Hampala macrolepidota	1			100.0														
Luciocyprinus striolatus	1	100.0																
Luciosoma bleekeri	1	100.0																
Micronema apogon	1	100.0																
Monopterus albus	1	100.0																
Ompok krattensis	1	100.0																
Osphronemus gouramy	1									100.0								
Osteochilus microcephalus	1								100.0									
Osteochilus waandersii	1										100.0							
Pangasius macronema	1		100.0															
Pangasius sanitwongsei	1	100.0																
Paralauuca typus	1	100.0																
Probarbus jullieni	1	100.0																
Raiamas guttatus	1		100.0															
Tenulosa thibaudeaui	1			100.0														
Tor tambroides	1			100.0														
Total reports	542	23	10	7	1	3	3	3	1	3	3	0	1	0	0	1	0	0

The high occurrence of common carp in the catches clearly demonstrates that this exotic species is well established in the area. The success of common carp in the region is probably due to its broad habitat tolerance. This species was reported to be caught from four of the five habitats (perennial rivers, small streams, aquaculture ponds and natural lakes; it was not caught in rainfed ricefields). Broadhead catfish (*Clarias macrocephalus*) was the only other species recorded from such a variety of habitats (perennial rivers, small streams, aquaculture pond, rainfed ricefields but not from natural lakes). The ability of common carp to colonise and successfully exploit tributary stream environment in the upper catchments of major tropical rivers has been noted elsewhere (Coates and Ulaiwi 1995).

The fact that *C. macrocephalus*, and not *C. carpio*, are reportedly caught from rainfed ricefields is encouraging in that this is consistent with biological information on the species (the former is an air-breather capable of travelling across barriers to enter rain-fed areas, not so for carp). Such results, although of only anecdotal value, help support the overall credibility of the survey.

Table 4.3.6 shows the percentages of the different species that are caught by various gears. Sixteen different fishing gears or techniques were used. The most frequently used gears were smallscoopnet and castnet which were used recently by 75 and 56 fishers respectively. These two gears also caught the widest range of species with 37 and 33 species respectively.

Most common in the scoopnet catches were snails reported by 57% of the fishers using this gear.

The most common species in catches with castnet were *Poropuntius deauratus* and *Mystacoleucus marginatus*. The species caught with the largest variety of methods was *P. deauratus* caught by 12 of the 16 gears. *Amblyrhynchichthys truncatus* and *Lobocheilus melanotaenia* were caught by nine and eight methods respectively.

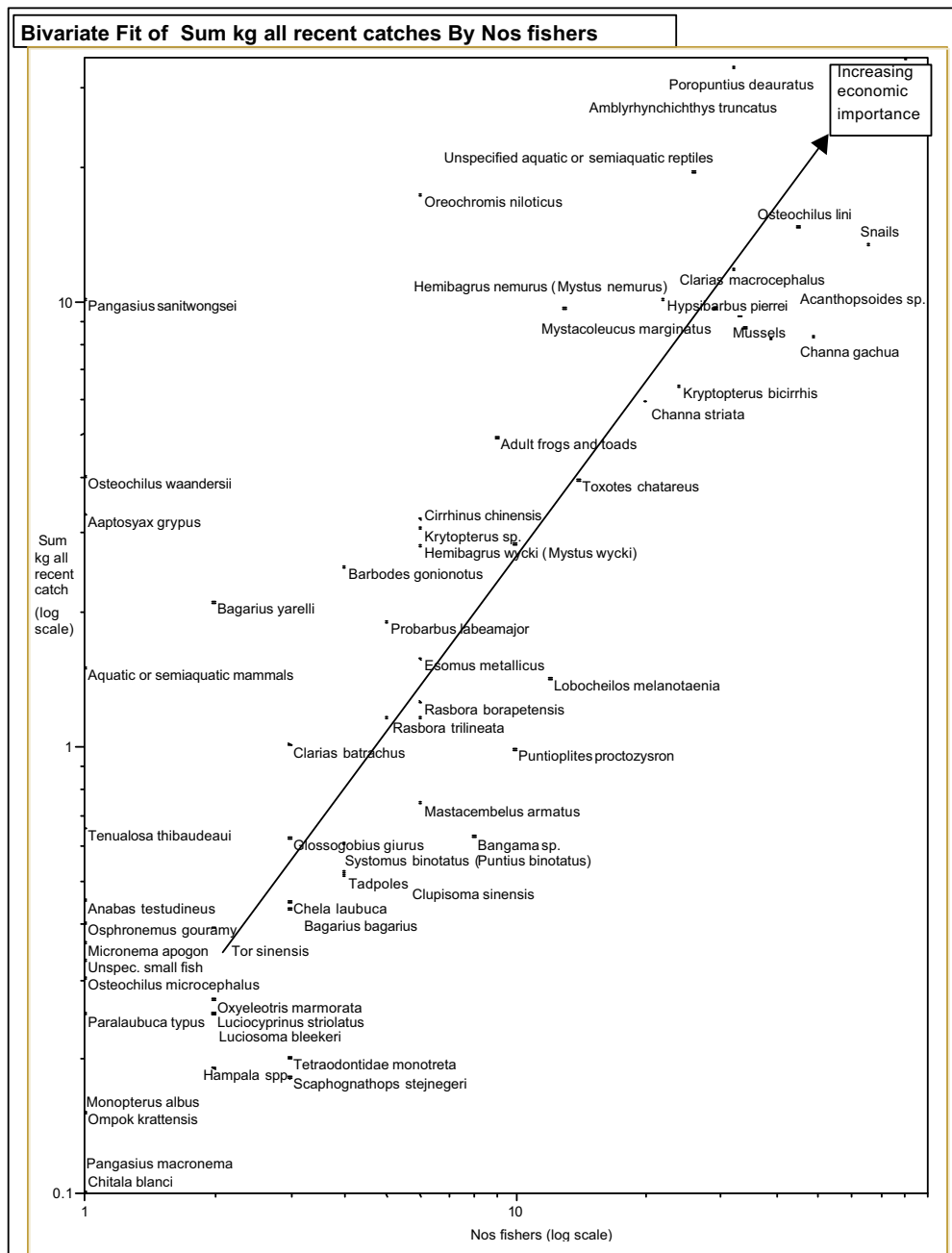
Table 4.3.6: Species caught by various gears as percent of all catch reports for particular gears

Species	Small scoop net	Castnet	Pole with single hook and line	Stationary Gillnet	Collection by hand	Long line, bottom set	Triangular scoop net	Set hook with float	Upright Basket Trap	Gillnet drifting at bottom	Basket Eel Trap	Bow and arrow	Gillnet drifting at surface	Long-handled dip net	Mong-Ty	Spear gun	Number of gears/species
Poropuntius deuratus	21.3	55.4	27.8	73.3	24.0		2	5		5			5		10	5	12
Snails	57.3	8.9		6.7	2		6										5
Mystacoleucus marginatus	14.7	44.6	5.6		16.0		4										5
Amblyrhynchichthys truncatus	5.3	30.4	11.1	2			4		25.0	10			5				9
Cyprinus carpio	12.0	30.4	16.7	6.7			2										6
Mussels	16.0				36.0												2
Kryptopterus bicirrhis	9.3	19.6	16.7	2										10			6
Unspec. aquatic reptiles	6.7				42.0												2
Clarias macrocephalus	10.7	5.4	27.8	13.3	1			5									6
Hypsibarbus pierrei	9.3	17.9		6.7			2			10							5
Channa striata	9.3	8.9	11.1	6.7	2.0			25.0									6
Toxotes chatareus	4.0	5.4	22.2	6.7	8.0												5
Lobocheilos melanotaenia		1.8	5.6		8.0		2	25.0				5			10		8
Hemibagrus nemurus		5.4	27.8			5											3
Cynoglossus microlepis	6.7	1.8	16.7	6.7	2.0												5
Puntioplites proctozystron	4.0	10.7							25.0								3
Hemibagrus wyckioides	1.3	5.4	5.6			5											4
Mastacembelus armatus	1.3	1.8	16.7			33.3											4
Rasbora trilineata	5.3		5.6	6.7													3
Rasbora borapetensis	2.7			6.7	6.0												3
Esomus metallicus	8.0																1
Probarbus labeamajor	1.3	5.4															3
Hemibagrus wycki		5.4	5.6			33.3											3
Cirrhinus chinensis	2.7	3.6		6.7													3
Oreochromis niloticus	1.3	5.4		6.7													3
Barbodes gonionotus	4.0	1.8															2
Clarias batrachus	4.0																1
Systemus binotatus	2.7	1.8															2
Bagarius bagarius	1.3					33.3											2
Scaphognathops stejnegeri	1.3	3.6															2
Glossogobius giuris	1.3	1.8		6.7													3
Clupisoma sinensis	1.3			6.7	16.7												3
Chela laubuca	2.7	1.8															2
Tor sinensis	1.3				16.7												2
Cosmochilus harmandi			11.1														1
Cirrhinus mrigala			11.1														1
Barbodes altus			11.1														1
Anabas testudineus					4.0												1
Bagarius yarrelli		1.8				16.7											2
Lycotrisa crocodilus	1.3					16.7											2
Aptosyax grypus	1.3								5								2
Oxyeleotris marmorata		3.6															1
Chitala blanci							2										1
Osteochilus waandersii				6.7													1
Pangasius macronema							2										1
Pangasius sanitwongsei									25.0								1
Paralauca typus														10			1
Osteochilus microcephalus			5.6														1
Probarbus jullieni		1.8															1
Hampala dispar	1.3																1
Osphronemus gouramy	1.3																1
Raiamas guttatus	1.3																1
Luciosoma bleekeri		1.8															1
Hampala macrolepidota	1.3																1
Luciocyprinus striolatus		1.8															1
Ompok krattensis		1.8															1
Monopterus albus								25.0									1
Tenulosa thibaudeaui		1.8															1
Micronema apogon					16.7												1
Tor tambroides				6.7													1
Cirrhinus jullieni		1.8															1
Number of species/gear	37	33	19	18	12	10	9	5	5	4	2	2	2	2	2	2	2
Number of Fishers	75	56	18	15	50	6	5	4	2	4	1	2	2	1	1	2	2

Figure 4.3.3 shows how the various species contributed to the total recent catch of all individual respondents and how many fishers caught each species of fish and type of aquatic animal. It should be emphasized that this is only an indication of economic importance of different species, since it is only applicable to a specific relatively short period of the year (since the species tend to cluster a log scale is used for readability).

Amblyrhynchichthys truncatus, and *Poropuntius deauratus* were caught by most fishers and contributed most to the total catch of all individual respondents. Unspecified aquatic or semiaquatic reptiles were the third main contributor. Many respondents also collected snails.

Figure 4.3.3 The most important species in the recent catch



5 Conclusions and extrapolations

A major objective of this study was to make reasonable estimations of the current fisheries production from Luangprabang. However, this is never an easy task. Most of the fishery operates at a small-scale level and there is no existing system for obtaining accurate data from the field on fish catches. Most fishers do not even record their catches themselves. The problem is made worse by the seasonal nature of the fishery, which means that care must be taken when extrapolating from sets of data that may refer to only a part of the year. Quantifying the seasonality of the fishery is perhaps the most difficult task in any short-term survey.

In view of the complexities of the fisheries, several complementary approaches must be taken in order to calculate total production or yield. For each method used, the results obtained should be viewed in the light of other results produced by different methods and the strengths and weaknesses of each approach used. This strategy will produce a range of figures, from the lowest to highest reasonable estimates, within which the true situation lies. However, at the current level of knowledge, an indicative "range" for fisheries production is what is required. In addition, these fisheries are known to have sometimes large natural variations in production between years, often due to, for example, differences in the flooding regime caused by the weather and, sometimes, changes between years in socio-economic conditions which can affect the way the fishery operates. Examples of the latter could be improved access to markets making fisheries more profitable or a situation of economic stagnation in which more people go fishing.

The current study has investigated actual fish catches by asking people what they remember they caught, either at the household or individual levels. Obviously, these results rely on people's memory and their ability to quantify their catches since they normally do not measure and record it. Naturally, it is assumed that people's recent memory (i.e., of recent events) is better than their long-term memory. But recent memory must be corrected for seasonal differences, e.g., was the recent catch representative of the year as a whole? Furthermore, memory of daily, weekly or even monthly activities is assumed to be more correct than yearly estimates.

It is widely known that one of the best ways of obtaining catch-estimates for small-scale inland fisheries is to study fish consumption. This is because in such communities most of the fish is produced locally and consumed locally. Therefore, what is consumed reflects what is caught and it is easier to estimate consumption than catches. However, with consumption figures it is, of course, essential to be reasonably confident of knowing where the fish is produced that is being eaten. As long as most of the fish consumed is being produced within the study area (in our case Luangprabang Province) and there are no major exports then consumption is roughly equal to production. It is also useful to know the relative contributions of aquaculture and capture fisheries to producing the fish that is consumed. In cases where large amounts of fish are imported into an area, or exported from it, then corrections to estimations must be applied. Note that for estimating total fish catches for the province, or average fish catches per household, the issue is import or export from the province. Import or export to or from the village or household is not relevant because a statistically valid random sample of villages and households was surveyed. The following conclusions



on gross fisheries production in Luangprabang Province are based upon consideration of the above factors.

It is a reasonable assumption in Luangprabang Province that most of the fresh fish and other aquatic animals are produced locally and not imported from other provinces or countries. The information obtained in the survey about where the households, and individual people, obtain their fish and aquatic animals confirms that this is the case. It is equally obvious from the survey results that a negligible amount of fish in the surveyed households is produced from aquaculture.

The economy in the surveyed villages is basically a rural subsistence economy and a close correlation between fish catches and consumption at the household level would be expected - because there is only limited scope, i.e., surplus catches, opportunity or ability for buying and selling of fish and aquatic animals. It has been shown in this report that there is a significant correlation between consumption and catches for households, but that catch figures consistently are lower than consumption of fresh fish. As mentioned in previous sections there is a very big discrepancy in the survey results between the catch figures reported at the household level and the total fish consumption of the same household.

This indicates that the yearly catch figures for the household are probably systematically under-reported. This can be a result of the methodology applied in the questionnaire, which assumes that a person can make accurate recollections of the total catches of all household members for a full year. This recall problem was anticipated and catch estimates can be made in an alternative way using the yearly recalls and recent recalls of individual people.

It is concluded (i) that consumption figures indicate that the catch estimates are, in general, underestimated, and (ii) of the various methods of calculating actual catch figures, the individual catch figures based on monthly average catches by gears and habitats multiplied by average number of fishing trips/events are considered the most reliable. This becomes clear when we look at the total fish and aquatic animal economy of Luangprabang based on our survey findings.

Table 5.1 Balancing of catches and consumption

	Fresh fish & aquatic animals consumption	Fresh fish equivalent of dried fish	Fresh fish equivalent of fermented fish	Fresh fish equivalent of dried and fermented combined	Total consumption fresh fish & aquatic animals equivalent	Individual yearly catch/monthly recall	Individual yearly catch/yearly recall	HHs yearly catch estimate
Upper HH/year cons.	115	100	16	114	227	78	28	35
Lower HH/year cons.	91	67	9	78	175	30	16	23
Upper total Tons	7,192	6,254	1,000	7,130	* 14,197	** 16,987	6,097	*** 1,816
Lower total Tons	5,691	4,190	562	4,878	* 10,945	** 6,533	3,484	*** 1,193

* calculated as the upper and lower means of HHs yearly consumption multiplied by number of HHs at 95% confidence.

** calculated by multiplying the number of individuals engaged in fishing, i.e., 55% of 395,968 population with the upper and lower yearly mean catches.

*** calculated by multiplying with the number of households engaged in fishing, i.e., 83% of 62,545 households with the upper and lower mean yearly catch.

The table shows a remarkably good correspondence between the calculated household consumption extrapolation with the individual catch/ monthly recall extrapolation.

Summing up, it is estimated that the total catch of fish and aquatic animals for Luangprabang Province per year is within a range of from **10,000 to 14,000 tons** per annum.

This range is considerably higher than existing government estimates. It should, however, be noted that official government figures refer only to the “commercial” catch and those data are, in any case, not collected in any systematic way. It is unreasonable to expect local authorities to accurately estimate local fish production without the support of surveys like the present one. This is precisely why this survey was undertaken.

These estimates for Luangprabang Province are considered entirely credible for the following reasons:

(i) they are based on a scientifically based sampling approach,

(ii) they agree with similar figures obtained elsewhere in Lao PDR (accounting for certain regional differences) as noted in section 4.2.11 (Table 4.2.10 and 4.2.11),

(iii) they are low compared to figures for other regions of the Mekong River Basin where fish are much more abundant (especially near lowland floodplains). It was expected that total fish production from Luangprabang province would be relatively low since the region does not have as good fishery resources (by comparison to lowland/floodplain areas), nevertheless, the resources are still significant, as are the total catches,

(iv) all other thorough surveys of similar fisheries have consistently shown that official fisheries statistics under-estimate total fisheries production, usually by under-estimating, or not including, small-scale catches which are notoriously difficult to obtain data for. Similarly, aquatic animals other than fish are mostly not included in these statistics. As the next section explains, Lao PDR has now quite good data on small scale fisheries, but aquatic animals and processed fish products have not yet been included in the consumption surveys.

The present survey clearly shows the importance of fish and aquatic animals to the communities in Luangprabang. However, to assess the real value of fish and aquatic animals as foodstuff, consideration must also be given to the availability of alternative sources of protein in times of crisis, and the management and investment costs in producing the various types of protein. Since wild fish and aquatic animal resources at present are almost freely available to all (depending on access to aquatic habitats) they are crucial to maintaining local food security.

4.2 Households

4.2.1 Household profiles

A typical sample household has 6 members of which 3 are children below 16 years. The population is young, 75% are below 35 years of age and 50% below 16 years.

A household has typically a homestead area of 0.05 HA, access to commons with scrub, grass and forest, 0.3 HA orchard and vegetable garden, 0.3 HA upland rice or 0.25 HA paddy rice, or 0.7 HA of other cash crops (Table 4.2.1).

With regard to livestock, it is common for a household to have either of a few buffaloes, some 10 chickens, a couple of cows or pigs.

Analysis of the correlation between the yearly household fish catches and ownership to various agricultural resources, and ownership to livestock shows no significant relationships.

The activities of the household over the year vary according to the farming cycle, mainly governed by the rice production but also governed by the monsoon/flood cycle with respect to fishing and collection of aquatic animals. The intensity of involvement in other activities is more constant over the year. Looking after the livestock is of course of major importance throughout.

Figure 4.2.1 "Importance of activities" shows the number of households that give high or medium importance to the activity in the months over the year.

4.2.2 The importance of fisheries for food and income for the household

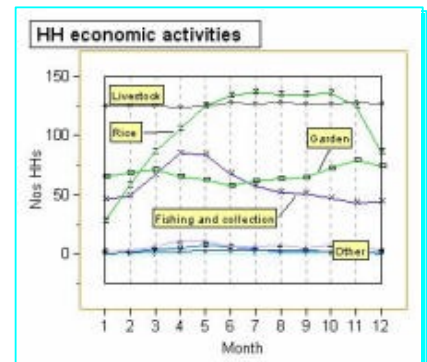
Household respondents were asked to rank the activities of the household with respect to importance for food supply and for income. The ranking is absolute in the sense that an activity only is given one relative rank.

For food supply, most households consider rice farming most important: 126 or 74% of the households give rice farming the highest rank among the activities. Livestock rearing is the second most important activity with only 17 households or 10% giving it first rank but 84 or 50% giving it second rank. Fishing and collection of aquatic animals come as the third most important activity. Only 9 households or 5% awards it first rank, but 22% gives it the second rank, followed by 53 (35%) and 34 (34%) households assigning this activity the 3rd and 4th rank respectively. Compared to orchard tending, the next ranked activity, fishing and collection is assigned a higher overall importance since 139 households gives it a rank, compared to only 79 households which ranked orchard tending. However, commercial fishing and selling of aquatic animals is ranked very low, overall, in terms of income generation. It is concluded that for the sample households, fishing and collection of aquatic animals are very important for food supply but, in general, not for income generation.

Table 4.2.1 Agricultural land (HA) of sample households

	Mean	Range	Std Dev	Std Error
Aquaculture/ponds	0.0057	0.20	0.0284	0.0021
Common property - grasslands/grazing	0.676	100.00	7.558	0.566
Common property forest/scrubs	1.820	150.00	12.792	0.958
Grazing	0.059	10.00	0.750	0.056
Homestead	0.056	1.00	0.108	0.008
Irrigated rice	0.088	2.00	0.282	0.021
Orchards	0.235	5.00	0.574	0.043
Other cash crop	0.729	70.00	5.244	0.393
Paddy rice	0.254	2.94	0.527	0.039
Upland/dry rice	0.815	6.00	0.867	0.065
Vegetable garden	0.123	2.80	0.332	0.024

Figure 4.2.1 Importance of activities



ANNEX 1

List of participants in the workshop on fisheries survey in Luangprabang province

Luangprabang, 9/5/2000

No.	Name	Organization
1	Mr. Bouchanmy	Agriculture and forestry department of Luangprabang province
2	Mr. Viengsavanh	Nafri
3	Mr. Lieng	Larrec
4	Mr. Bounkham	Livestock and fisheries department
5	Mr. Khampheth	Livestock and fisheries development division
6	Ms. Dongdavanh	Livestock and fisheries development division
7	Ms. Anuhak	Department of Plan , MAF
8	Mr. Bounthong	Provincial Aquaculture Development Project Lao97/007
9	Mr. Chanthala	Nafri
10	Mr. Tipsavanh	National Statistical Centre
11	Mr. Khamtheo	LNMC
12	Mr. Duangkham	AMFP
13	Mr. Kaviphone	AMFP
14	Mr. Vannaxay	AMFP
15	Ms. Souvanny	AMFP
16	Mr. David Coat	AMFP
17	Mr. Jen Grue Sjorslev	AMFP
18	Mr. Sten Sverdrup-Jensen	NARI Project
19	Mr. Ornchanh	Northern Agriculture and Forestry Research Centre
20	Mr. Bounta	Agriculture and Forestry Department of Khammuan Province
21	Mr. Prachit	Agriculture and Forestry Department of Champasak Province
22	Mr. Duangchit	Agriculture and Forestry Division of Savannaket Province
23	Mr. Chanphone	Livestock and Fisheries Division of Luangprabang Province
24	Mr. Souvanh	Agriculture and Forestry Section of Xiengngarn District
25	Mr. Bounchanh	Agriculture and Forestry Section of Xiengngarn District
26	Mr. Thongsook	Agriculture and Forestry Section of Phukhoun District
27	Mr. Sommai	Agriculture and Forestry Section of Phukhoun District
28	Mr. Saithong	Agriculture and Forestry Section of Chompheth District
29	Mr. Khamsing	Agriculture and Forestry Section of Chompheth District
30	Mr. Houmpheng	Agriculture and Forestry Section of Luangprabang District
31	Mr. Kaenchanh	Agriculture and Forestry Section of Luangprabang District

32	Ms. Thongbai	Agriculture and Forestry Section of Luangprabang District
33	Mr. Saikham	Agriculture and Forestry Section of Luangprabang District
34	Mr. Outhai	Agriculture and Forestry Section of Parou District
35	Mr. Thongsai	Agriculture and Forestry Section of Parou District
36	Mr. Hompheng	EU Project of Luangprabang Province
37	Mr. Bounpanh	Livestock and Fisheries Division of Luangprabang Province
38	Ms. Manivone	Livestock and Fisheries Division of Luangprabang Province

ANNEX 2 Sampling

Possible bias in the present sample can only be determined on the variables available for all the 58 villages which is limited to population size and location. The present 27 village sample is slightly biased towards medium size villages with small and very large villages under-represented. However, in the latter case this hardly matters since, e.g., Luangprabang town itself actually comprises a number of smaller, named villages, while it still must be considered a larger town. The bias away from very small villages does not appear to be very problematic either since village size in itself is not found to be an important factor influencing fisheries practices and collection of aquatic animals. What might be an important bias would be location. The map shows the

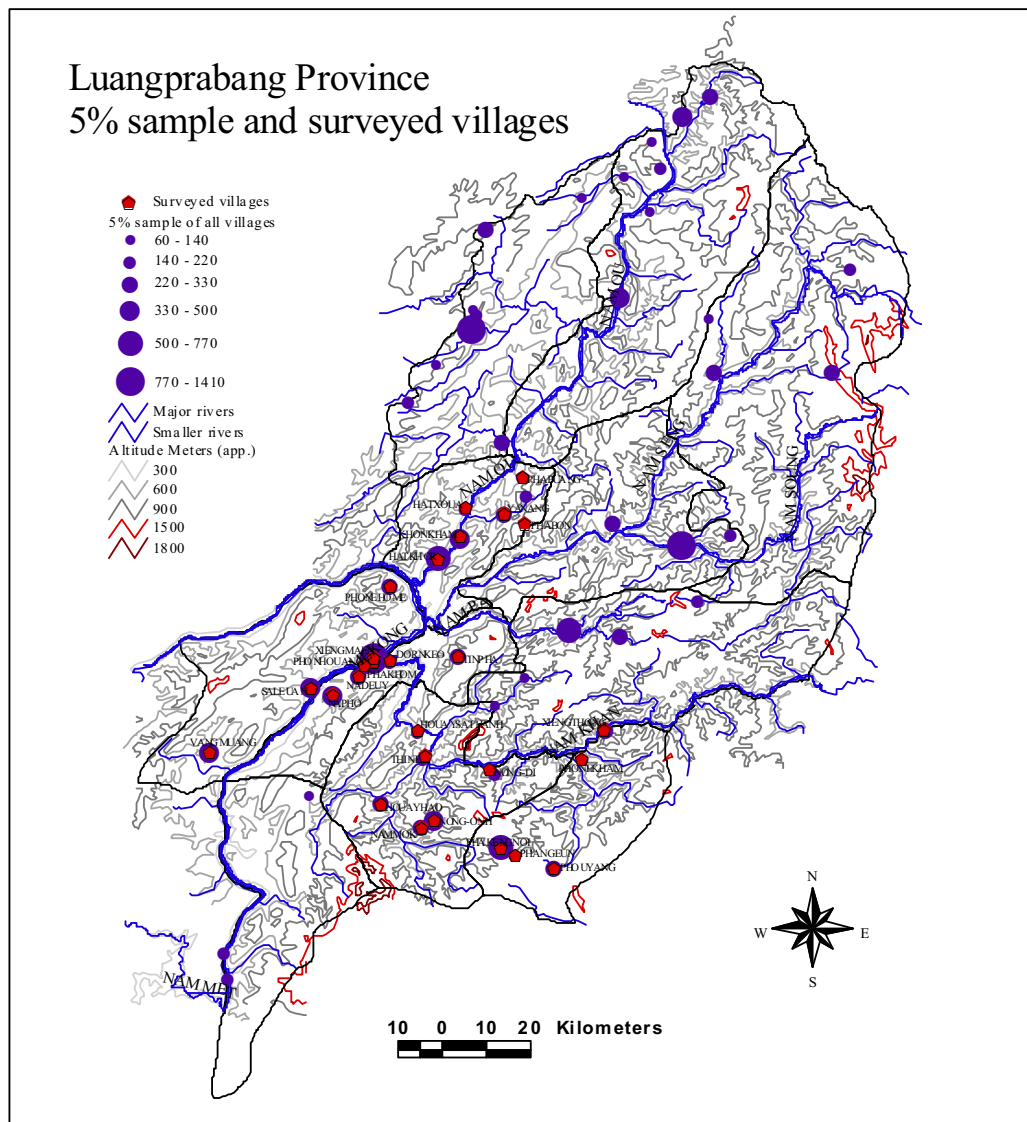


Figure : Map of Luangprabang province showing sample villages. The size of the circles indicates the relative size of the population living in that village.

location of the 58 listed and the 27 actual sample villages (indicated by a red marker). The size of the circles indicates the relative size of the population. It can be seen that the actual sample villages are situated relatively closer to Luangprabang town and that the northernmost villages have not been covered by the survey.

Some of the villages are situated close to larger rivers, others are further away from larger rivers but may have streams close by which are not shown on this map. With respect to location viz. a viz. rivers and streams the group of surveyed villages do not appear to be biased. However, the surveyed villages are more downstream on the tributaries to Mekong compared to the non-covered villages and this might affect the types of fisheries. Thus, when using the present survey for extrapolation for whole of Luangprabang province, as is also attempted in this report, one should keep in mind these aspects of the village sampling.

ANNEX 3

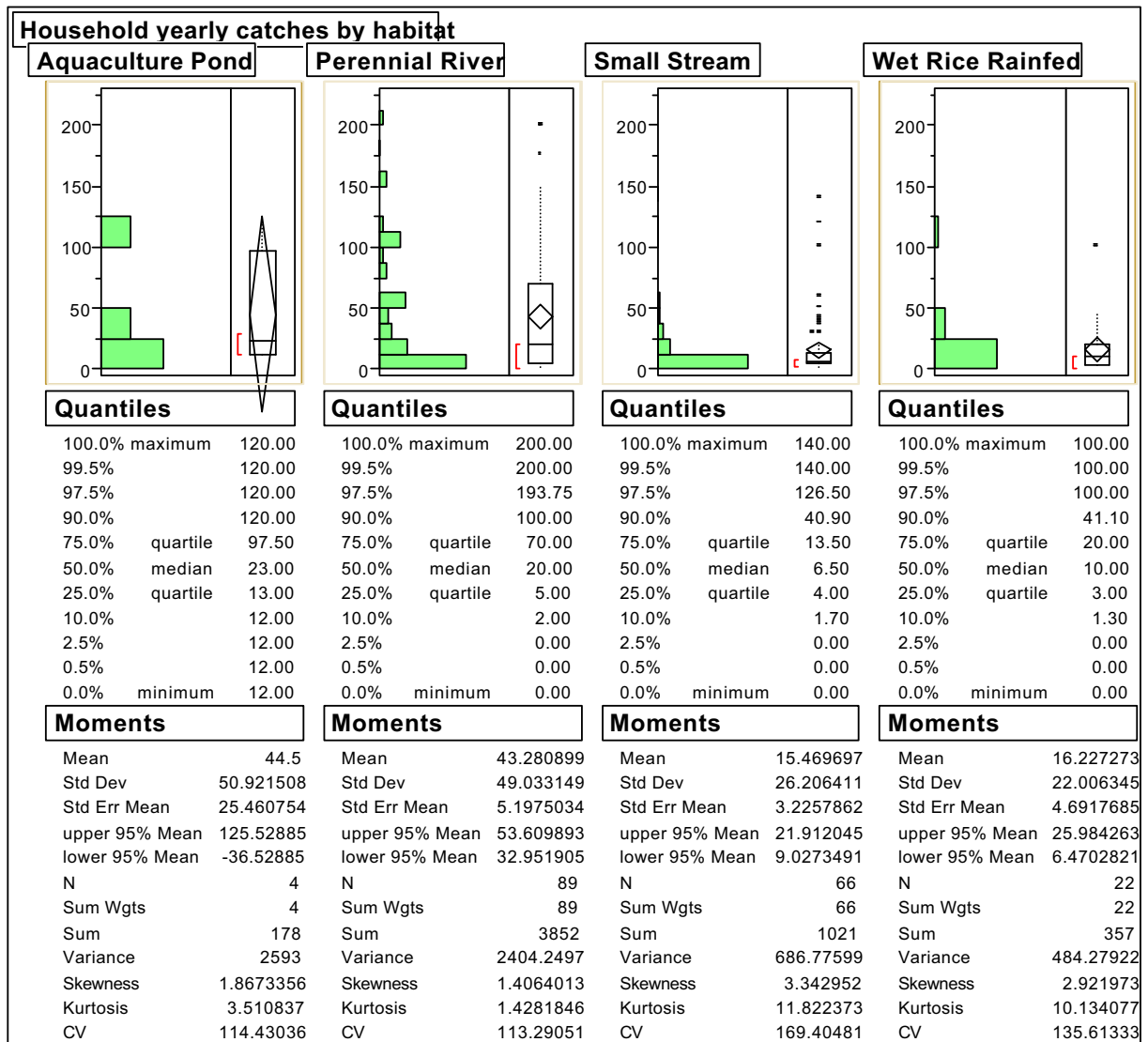
Rankings of activities by household heads

Activity	rank 1	rank 2	rank 3	rank 4	Nos
<u>Livestock - count</u>	<u>51</u>	<u>30</u>	<u>14</u>	<u>3</u>	<u>98</u>
Percent of livestock	52.04	30.61	14.29	3.06	
Percent of rank	30.18	22.73	16.47	6.98	
<u>Grow vegetable - count</u>	<u>16</u>	<u>13</u>	<u>13</u>	<u>4</u>	<u>46</u>
Percent of grow vegetable	34.78	28.26	28.26	8.7	
Percent of rank	9.47	9.85	15.29	9.3	
<u>Farm rice - count</u>	<u>21</u>	<u>9</u>	<u>6</u>	<u>6</u>	<u>42</u>
Percent of farm rice	50	21.43	14.29	14.29	
Percent of rank	12.43	6.82	7.06	13.95	
<u>Orchard tend - count</u>	<u>5</u>	<u>17</u>	<u>15</u>	<u>2</u>	<u>39</u>
Percent of orchard tend	12.82	43.59	38.46	5.13	
Percent of rank	2.96	12.88	17.65	4.65	
Fish collect AQ anim -count	4	10	13	10	37
Percent of collect AQ anim	10.81	27.03	35.14	27.03	
Percent of rank	2.37	7.58	15.29	23.26	
<u>Trade nonfish - count</u>	<u>17</u>	<u>8</u>	<u>5</u>	<u>2</u>	<u>32</u>
Percent of trade non-fish	53.13	25	15.63	6.25	
Percent of rank	10.06	6.06	5.88	4.65	
<u>Wage labor nonfish - count</u>	<u>15</u>	<u>13</u>	<u>1</u>	<u>2</u>	<u>31</u>
Percent of labor nonfish	48.39	41.94	3.23	6.45	
Percent of rank	8.88	9.85	1.18	4.65	
<u>Handicraft - count</u>	<u>8</u>	<u>8</u>	<u>7</u>	<u>2</u>	<u>25</u>
Percent of handicraft	32	32	28	8	
Percent of rank	4.73	6.06	8.24	4.65	
<u>Govern. – count</u>	<u>14</u>	<u>8</u>	<u>2</u>		<u>24</u>
Percent of govern.	58.33	33.33	8.33		
Percent of rank	8.28	6.06	2.35		
<u>Transport - count</u>	<u>9</u>	<u>6</u>	<u>2</u>	<u>3</u>	<u>20</u>
Percent of transport	45	30	10	15	
Percent of rank	5.33	4.55	2.35	6.98	
<u>Sell AQ anim - count</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>9</u>	<u>18</u>
Percent of sell AQ anim	11.11	16.67	22.22	50	
Percent of rank	1.18	2.27	4.71	20.93	
<u>Other - count</u>	<u>3</u>	<u>5</u>	<u>3</u>		<u>11</u>
Percent of other	27.27	45.45	27.27		
Percent of rank	1.78	3.79	3.53		
<u>Make/repair gears - count</u>	<u>1</u>	<u>1</u>			<u>2</u>
Percent of make/repair gear	50	50			
Percent of rank	0.59	0.76			
<u>Fish commercial - count</u>	<u>2</u>				<u>2</u>
Percent of fish commercial	100				
Percent of rank	1.18				
<u>Culture AQ anim - count</u>		<u>1</u>			<u>1</u>

Percent of culture AQ		100			
Percent of rank		0.76			
<u>Wage labor fishrela - count</u>	1				1
Percent of wage labor fish	100				
Percent of rank	0.59				
Total	169	132	85	43	429

ANNEX 4

Household Yearly Catches by Habitat



ANNEX 5

Individuals Gear Use

GearType	GearName	N: reports	Mean Units in use	Sum Units in use by sample	Mean People involved	Sum People involved	Mean Catch individuals assessment	Sum Catch individuals assessment	Mean yearly catch per gear - calculated by month	Sum yearly catch per gear - calculated	Mean Nos fish days using gear	Sum Nos fish days using gear	Mean typical catch per trip - kg
Bag-nets	Beach seine without brush park	6	1	6	2.00	12	3.83	23	10.62	64	7.00	42	0.29
Collection	Collection by hand	146	NA	NA	1.12	164	5.62	821	11.59	1692	12.97	1893	0.24
Collection	Collection with plunge basket	1	2	2	1.00	1	4.00	4	4.00	4	40.00	40	0.02
Cone shaped nets	Cast net	100	1	124	1.28	128	12.72	1272	36.57	3657	32.64	3264	0.40
Gill-nets	Drifting, at bottom	15	2	27	1.67	25	9.80	147	87.55	1313	32.87	493	0.56
Gill-nets	Drifting, at surface	16	2	24	1.75	28	10.50	168	25.61	410	20.63	330	0.41
Gill-nets	Mong Ty	15	1	18	1.40	21	14.00	210	31.98	480	37.13	557	0.45
Gill-nets	Mong peng	2	1	2	2.00	4	6.00	12	1.10	2	3.00	6	0.09
Gill-nets	Stationary	51	2	77	1.51	77	13.70	699	40.70	2076	29.14	1486	0.52
Hooks	Drifting hook with float	4	7	27	1.00	4	1.50	6	1.18	5	4.25	17	0.05
Hooks	Long line, bottom set	24	9	214	1.21	29	15.40	370	40.81	979	27.33	656	0.61
Hooks	Long line, surface set	1	50	50	1.00	1	100.00	100	150.00	150	300.00	300	0.50
Hooks	Pole with single hook and line	62	22	1358	1.26	78	7.65	474	18.37	1139	20.18	1251	0.23
Hooks	Set hook with float	24	22	518	1.04	25	7.62	183	23.72	569	21.21	509	0.22
Lift-nets	Small lift-net	3	1	4	1.00	3	4.67	14	5.97	18	13.00	39	0.09
Other	Poison	1	1	1	1.00	1	3.00	3	3.00	3	3.00	3	0.08
Scoop-nets	Long-handled dip net	4	1	4	1.00	4	5.75	23	65.38	262	33.00	132	0.43
Scoop-nets	Small scoop net	116	1	123	1.34	156	4.69	544	7.30	846	16.93	1964	0.19
Scoop-nets	Triangular scoop net	10	1	11	1.20	12	1.57	16	6.64	66	5.20	52	0.15
Small traps	Basket Eel Trap	5	9	45	1.00	5	45.60	228	237.60	1188	52.80	264	0.70
Small traps	Drop door traps	2	5	10	1.00	2	8.00	16	84.00	168	120.00	240	0.23
Small traps	Two funnel trap	7	10	73	1.86	13	7.29	51	29.47	206	19.86	139	0.20
Small traps	Upright Basket Trap	5	35	175	1.00	5	81.00	405	23.16	116	12.20	61	0.81
Small traps	Wedge Cone Trap	1	1	1	1.00	1	20.00	20	420.00	420	60.00	60	1.17
Spears	Bow and arrow	5	1	5	1.00	5	7.00	35	5.52	28	8.60	43	0.14
Spears	Spear	4	1	5	1.00	4	3.50	14	4.85	19	11.50	46	0.09
Spears	Spear gun	3	2	6	1.67	5	28.33	85	123.67	371	12.67	38	1.32

ANNEX 6

Most important species in recent catch by individuals

Species	Nos reports	Total kg	Mean kg
Osteochilus lini	45	59.16	1.31
Amblyrhynchichthys truncatus	32	33.30	1.04
Poropuntius deauratus	80	33.29	0.42
Unspecified aquatic or semiaquatic reptiles	26	19.31	0.74
Oreochromis niloticus	6	17.20	2.87
Snails	65	13.15	0.20
Cyprinus carpio	32	11.85	0.37
Pangasius sanitwongsei	1	10.00	10.00
Hypsibarbus pierrei	21	9.92	0.47
Clarias macrocephalus	27	9.53	0.35
Hemibagrus nemurus (Mystus nemurus)	13	9.49	0.73
Mussels	33	9.33	0.28
Acanthopoides sp.	34	8.63	0.25
Channa gachua	36	8.18	0.23
Mystacoleucus marginatus	46	7.16	0.16
Kryptopterus bicirrhis	24	6.65	0.28
Channa striata	20	6.03	0.30
Adult frogs and toads	9	4.89	0.54
Osteochilus waandersii	1	4.00	4.00
Toxotes chatareus	14	3.94	0.28
Cirrhinus chinensis	6	3.32	0.55
Aptosyax grypus	2	3.30	1.65
Kryptopterus sp.	6	3.09	0.52
Hemibagrus wycki (Mystus wycki)	6	2.80	0.47
Hampala dispar	1	2.70	2.70
Cynoglossus microlepis	10	2.67	0.27
Barbodes gonionotus	4	2.51	0.63
Bagarius yareli	2	2.10	1.05
Probarbus labeamajor	5	1.89	0.38
Esomus metallicus	6	1.56	0.26
Aquatic or semiaquatic mammals	1	1.50	1.50
Lobocheilus melanotaenia	12	1.31	0.11
Rasbora borapetensis	4	1.25	0.31
Rasbora trilineata	4	1.15	0.29
Hemibagrus wyckioides (Mystus wyckioides)	6	1.15	0.19
Clarias batrachus	3	1.00	0.33
Puntioplites proctozystron	10	0.98	0.10
Mastacembelus armatus	6	0.75	0.12
Tenualosa thibaudeaui	1	0.65	0.65
Bangama sp.	8	0.63	0.08
Glossogobius giurus	3	0.62	0.21
Systemus binotatus (Puntius binotatus)	4	0.60	0.15
Clupisoma sinensis	4	0.51	0.13
Anabas testudineus	1	0.45	0.45
Chela laubuca	3	0.45	0.15
Bagarius bagarius	3	0.43	0.14
Osphronemus gouramy	1	0.40	0.40
Tor sinensis	2	0.39	0.20
Micronema apogon	1	0.36	0.36
Unspec. small fish	1	0.33	0.33
Osteochilus microcephalus	1	0.30	0.30
Oxyeleotris marmorata	2	0.27	0.14
Tadpoles	4	0.27	0.07
Paralaubuca typus	1	0.25	0.25
Luciocyprinus striolatus	2	0.25	0.13
Luciosoma bleekeri	2	0.25	0.13
Lycothrissa crocodilus	2	0.25	0.13
Tetraodontidae monotretra	3	0.20	0.07
Mystacoleucus marginatus	3	0.20	0.07
Hampala spp.	2	0.19	0.10
Scaphognathops stejnegeri	3	0.18	0.06
Ompok krattensis	1	0.15	0.15
Monopterus albus	1	0.15	0.15
Cirrhinus jullieni	1	0.15	0.15
Raiamas guttatus	1	0.14	0.14
Pangasius macronema	1	0.10	0.10
Chitala blanci	1	0.10	0.10
Probarbus jullieni	1	0.09	0.09
Channa lucius	1	0.08	0.08
Unspec. small sharks and rays	1	0.08	0.08
Tor tambroides	1	0.06	0.06
Barbodes altus	1	0.04	0.04
Cosmochilus hamandi	1	0.01	0.01
Hampala macrolepidota	1	0.00	0.00

ANNEX 7

Report from the Fisheries Survey Workshop in Luangprabang Province

The Workshop on Fisheries survey in Luangprabang province was held in Luangprabang Province on 9 May 2000. 38 participants included representatives from 5 districts in Luangprabang (Luangprabang, Chomphet, Sienguen, Phoukoun, PakOu), National Agriculture and Forestry Research Institute, Department of Livestock and Fisheries, National statistics Center and other concerned Organizations were in attendance.

A survey method was presented by Mr. Kaviphone, first finding on Fisheries in Luangprabang Province by Mr. Douangkham and a future Plan by Miss Souvanny followed by discussion and recommendations. The discussion was focused: On the Methodology how to select the sampling and why we did not cover all sample site; the figure of catch and consumption were high compared to the official data.

In order to exchange and improve the information the discussions were divided into 3 groups to answer the following question: 1. What kind of fish information that the Lao government needs, 2. How to get efficient information. 3. Who will collect and analyze the data.

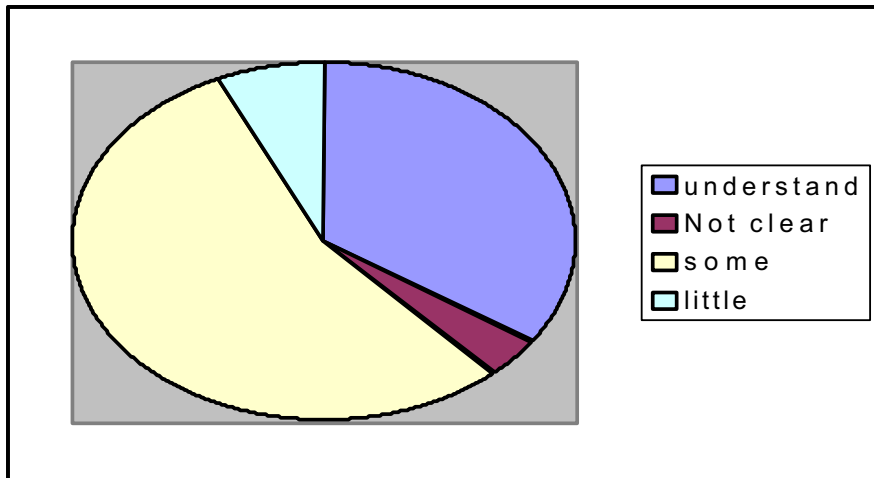
At the end the participant agree that we need to check the catch figure and consumption again and cooperate with the National Statistic Center in order to improve our data.

The recommendations can be summarised as follows:

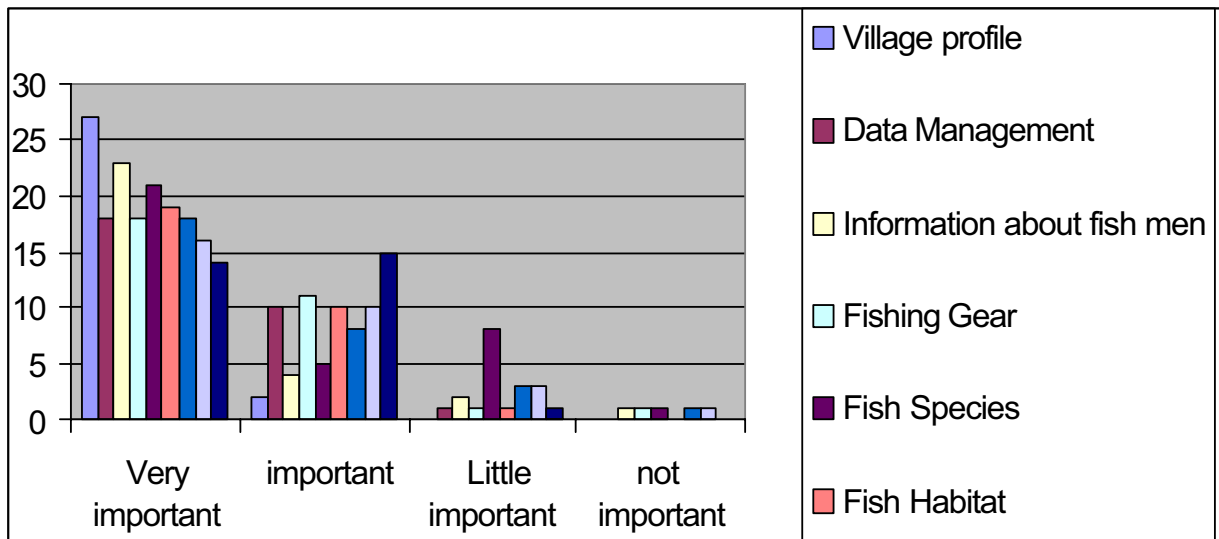
- The Village sample should be larger in order to cover the whole area in Luangprabang Province.
- Need to remove the information that is not related to fisheries (Example: Livestock, Land use)
- Need to improve the questionnaire and make it shorter before going to next step.
- Need to continue the survey on 58 Villages in Luangprabang to make sure that the data can be used representatively.
- We should go back to the Village that has been done to verify the data.
- Need to study the secondary data before going to the field.
- Need to cooperate with the National Statistics Center.
- Need to organize committee that consists of representatives from National Agriculture and Forestry Research Institute, Department of Livestock and Fisheries, National statistics Center .

Evaluation questionnaire

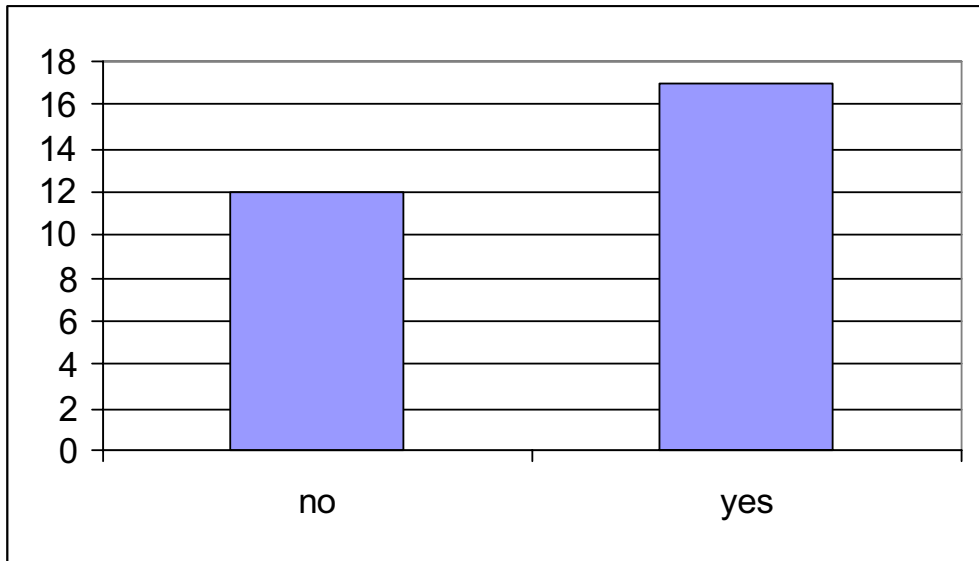
Understanding of the Method



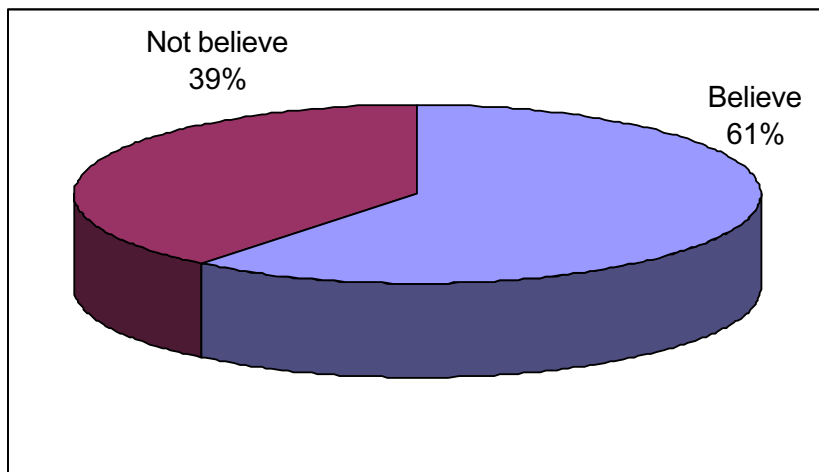
2. How relevant do you find the data in the report on Fisheries Survey in Luangprabang

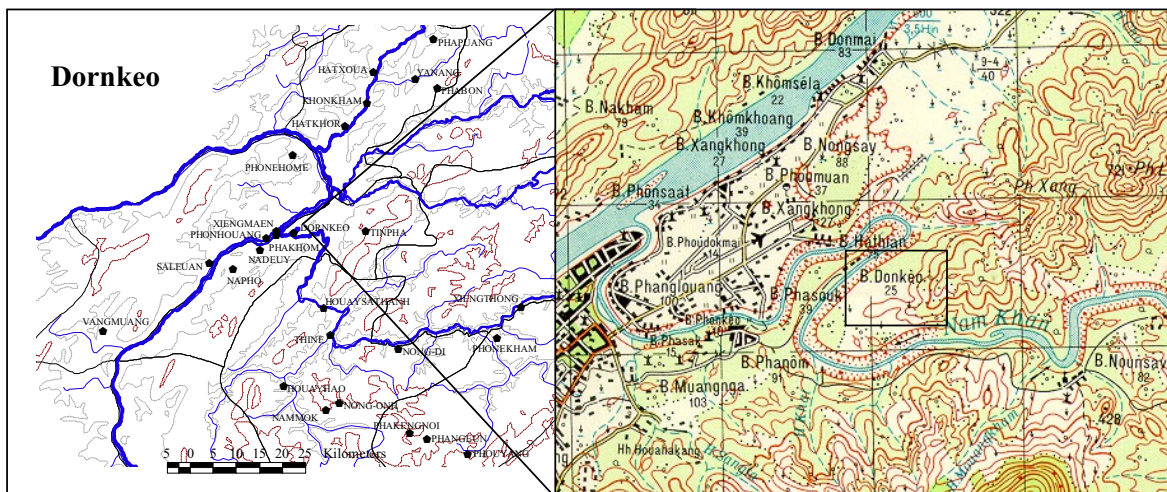


3. Do you understand the method of calculation of the catch fish?



4. Do you believe the data or not?

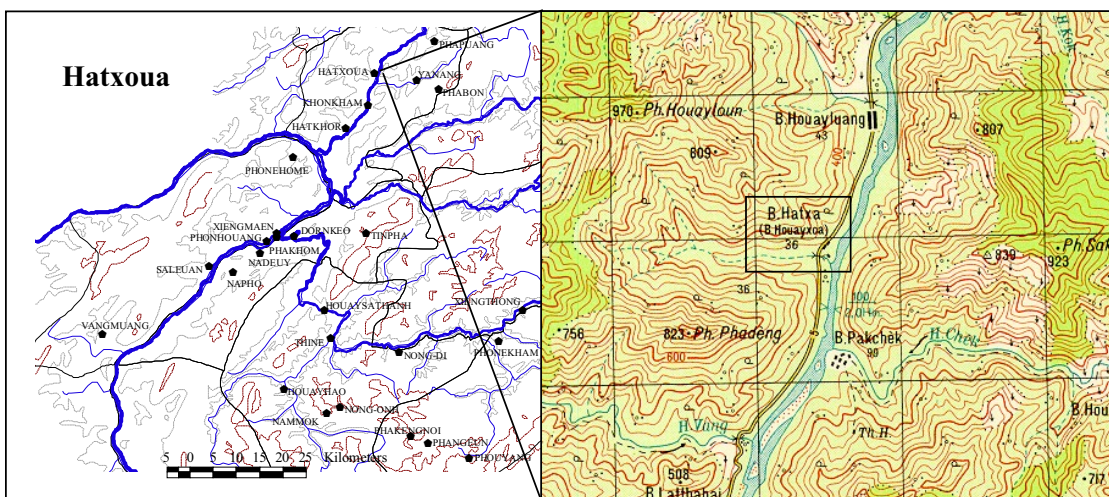




Name	Pop	HHs	Ethnic groups
DORNKEO	230	38	Laoloun
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	95%	11%	84%
Aquaculture	11%		
Rice farming	63%		
Garden	53%		
Livestock	100%		
Handicrafts			100%
Trading			3%
Govern. Serv.			16%
Labour			39%
Cash remittance			5%

Agri. Resources	Ha	Access to land	HH
Upland rice	1.85	Landless	5
Paddy rice	14.66	1-1 ha	22
Irrigated rice		1-2 ha	6
Pond m	0.5	2-3 ha	5
Vegetable		3-4 ha	
Orchards		>5 ha	
Cash crop	2.4	Aquaculture	
Aquatic habitats	1.5	HHs have ponds	4
Common forest	18	Nos ponds	5
Common grassland		Area m2	5

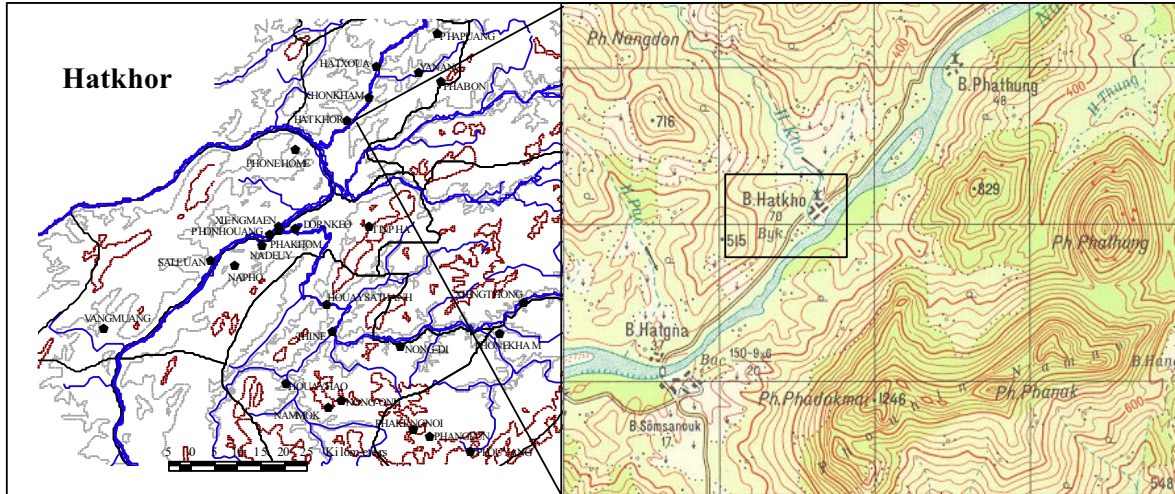
Management measures	
Conservation zone	yes
Restriction	yes
Restriction Gear	yes
Restriction Species	no



Name	Pop	HHs	Ethnic groups
HATXOUA	259	53	LounThung
Economic activities % HH	Subsistence	Main income	Suppl. Income
Capture fisheries	100%		9%
Aquaculture			
Rice farming	100%		72%
Garden	100%		
Livestock	100%		
Handicrafts			57%
Trading		2%	
Govern. Serv.		2%	
Labour			
Cash remittance			

Agri. Resources	Ha	Access to land	HH
Uplandrice	40.8	Landless	
Paddyrice	4.21	1-1 ha	1
Irrigatedrice	0.8	1-2 ha	49
Pondm		2-3 ha	3
Vegetable	2	3-4 ha	
Orchards	1	>5 ha	
Cashcrop	13.8	Aquaculture	
Aquatichabitats		HHs have ponds	
Commonforest	10	Nos ponds	
Commongrassland		Area m2	

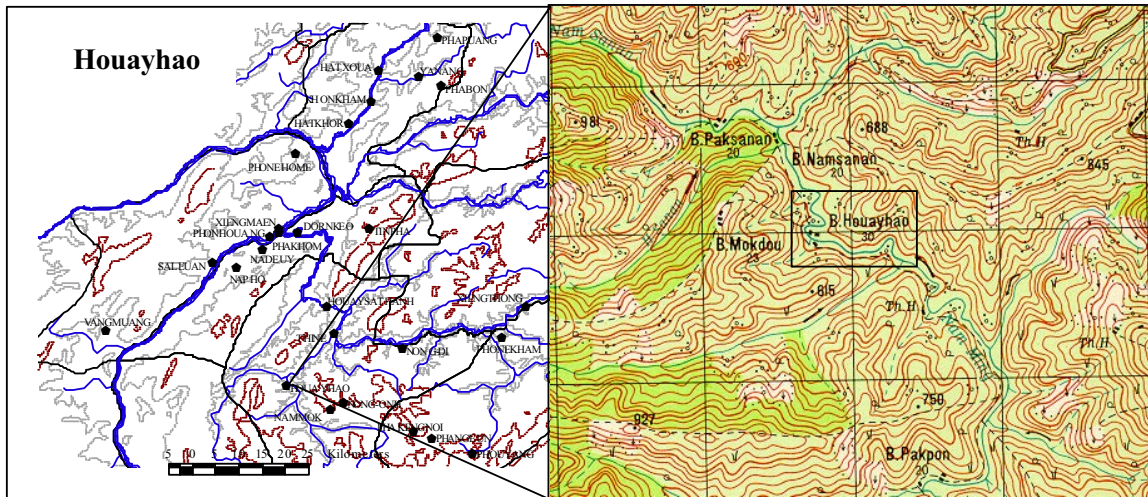
Management measures	
Conservation zone	yes
Restriction	yes
Restriction Gear	yes
Restriction Species	no



Name	Pop	HHs	Ethnic groups
HATKHOR	653	97	Laoloun
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	100%		6%
Aquaculture	1%		
Rice farming	100%		
Garden	100%		
Livestock	100%		10%
Handicrafts		31%	69%
Trading			3%
Gov. Serv.		7%	
Labour			
Cash remittance			

Agri. Resources	Ha	Access to land	HH
Uplandrice	88.64	Landless	
Paddyrice	22.27	1-1 ha	40
Irrigatedrice	2.9	1-2 ha	47
Pondm	0.02	2-3 ha	10
Vegetable	1	3-4 ha	
Orchards		>5 ha	
Cashcrop		Aquaculture	
Aquatichabitats	1	HHs have ponds	1
Commonforest		Nos ponds	3
Commongrassland		Area m2	15

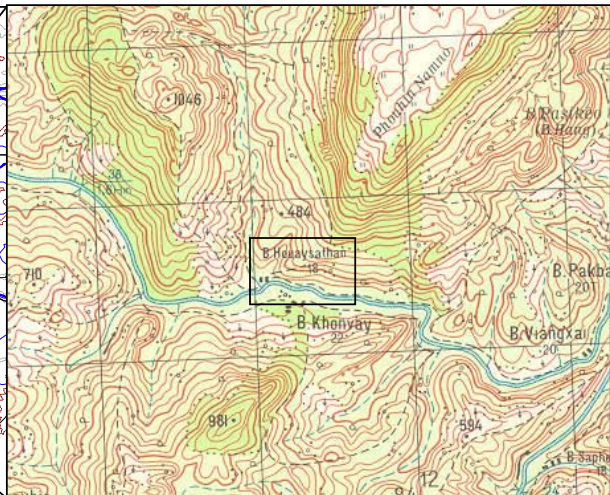
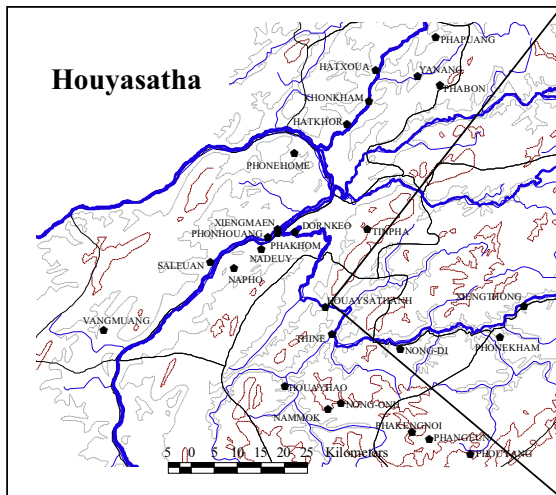
Management measures	
Conservation zone	yes
Restriction	yes
Restriction Gear	yes
Restriction Species	no



Name	Pop	HHs	Ethnic groups
HOUAYHAO	258	44	Laothung
Economic activities % HH	Subsistence	Main income	Suppl. Income
Capture fisheries	100%		
Aquaculture			
Ricefarming	100%		
Garden	39%		39%
Livestock	91%		45%
Handicrafts			14%
Trading			
Gov. Serv.		2%	
Labour		5%	
Cash remittance			

Agri. Resources	Ha	Access to land	HH
Uplandrice	39	Landless	
Paddyrice		1-1 ha	
Irrigatedrice		1-2 ha	
Pondm		2-3 ha	42
Vegetable		3-4 ha	
Orchards	3	>5 ha	
Cashcrop		Aquaculture	
Aquatichabitats		HHs have ponds	0
Commonforest	1000	Nos ponds	0
Commongrassland	20	Area m2	0

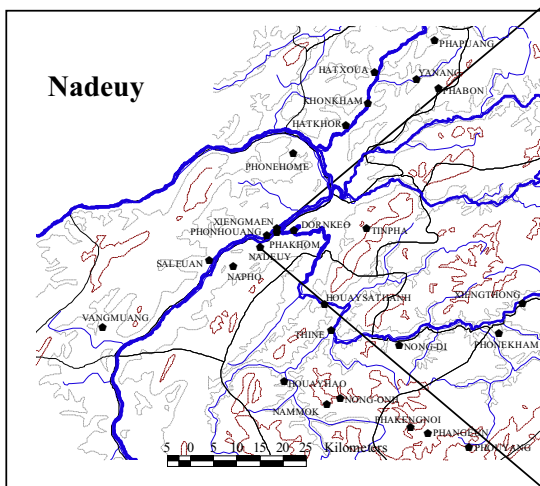
Management measures	
Conservation zone	yes
Restriction	yes
Restriction Gear	yes
Restriction Species	no



Name	Pop	HHs	Ethnic groups
HOUAYSATHANH	220	34	Laotung
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	100%		
Aquaculture			
Rice farming	97%		79%
Garden	41%		
Livestock	100%		100%
Handicrafts			
Trading		3%	
Govern. Serv.		3%	
Labour			
Cash remittance			

Agri. Resources	Ha	Access to land	HH
Uplandrice	49	Landless	1
Paddyrice		1-1 ha	
Irrigatedrice		1-2 ha	3
Pondm		2-3 ha	26
Vegetable		3-4 ha	
Orchards	2	>5 ha	
Cashcrop	7	Aquaculture	
Aquatichabitats		HHs have ponds	0
Commonforest	20	Nos ponds	0
Commongrassland		Area m2	0

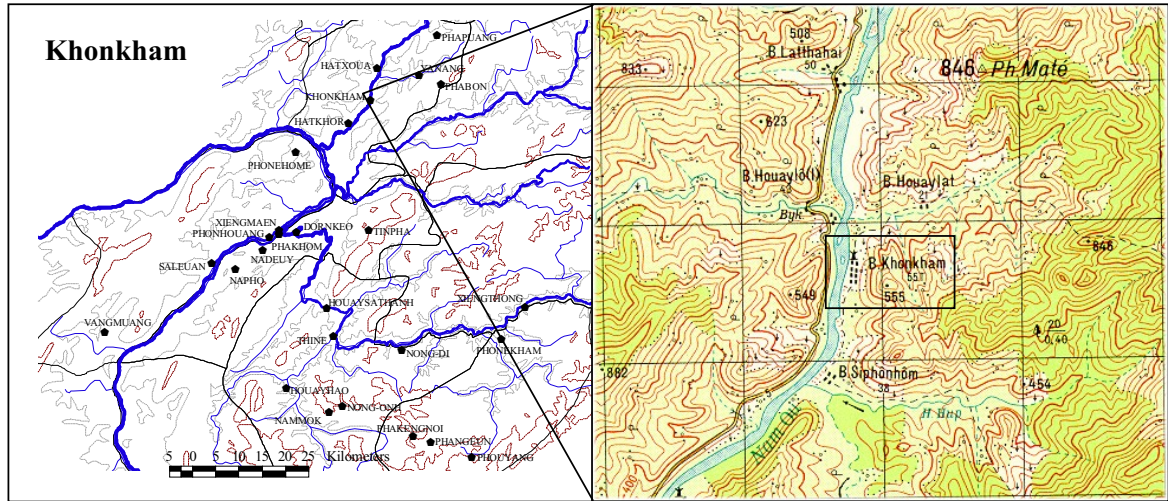
Management measures	
Conservation zone	yes
Restriction	yes
Restriction Gear	yes
Restriction Species	no



Name	Pop	HHs	Ethnic groups
Nadeuy	299	54	Laoloun
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	28%		9%
Aquaculture	4%		
Rice farming	48%		13%
Garden	100%		
Livestock	93%		
Handicrafts			
Trading		2%	7%
Govern. Serv.		4%	22%
Labour			15%
Cash remittance			7%

Agri. Resources	Ha	Access to land	HH
Upland rice		Landless	1
Paddy rice	23.14	1-1 ha	3
Irrigated rice	4.67	1-2 ha	45
Pond	64	2-3 ha	4
Vegetable		3-4 ha	
Orchards		>5 ha	
Cash crop		Aquaculture	
Aquatic habitats		HHs have ponds	2
Common forest		Nos ponds	2
Common grassland		Area m2	64

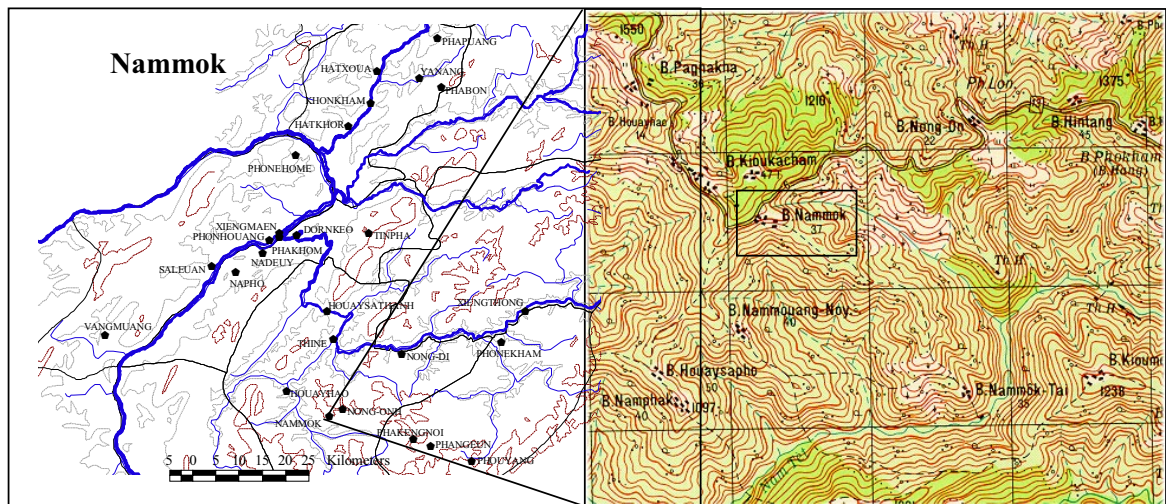
Management measures	
Conservation zone	No
Restriction	No
Restriction Gear	No
Restriction Species	No



Name	Pop	HHs	Ethnic groups
Khonkham	458	86	Laothung
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	100%		6 %
Aquaculture			
Rice farming	100%		12%
Garden	100%	1%	1%
Livestock	100%		2%
Handicrafts			100 %
Trading			41%
Govern. Serv.		15%	
Labour			
Cash remittance			

Agri. Resources	Ha	Access to land	HH
Upland rice	68	Landless	0
Paddy rice	32.15	.1-1 ha	5
Irrigated rice	10	1-2 ha	69
Pond		2-3 ha	10
Vegetable	0.5	3-4 ha	
Orchards	1.5	>5 ha	
Cash crop	4	Aquaculture	
Aquatic habitats	0.5	HHs have ponds	
Common forest	10	Nos ponds	
Common grassland		Area m2	

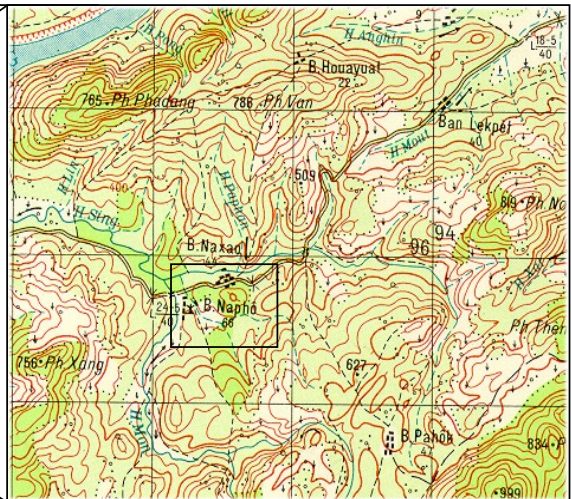
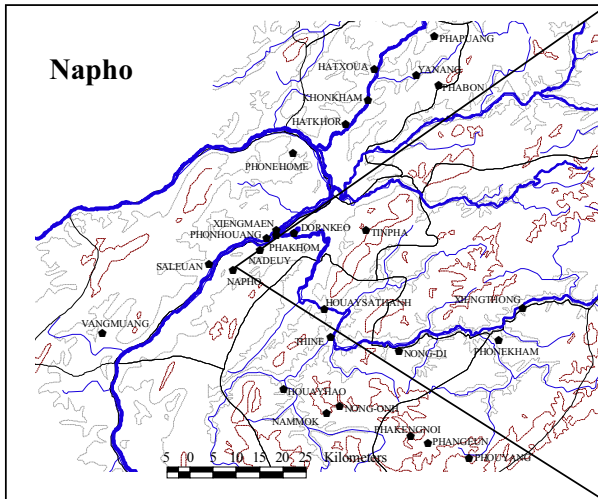
Management measures	
Conservation zone	yes
Restriction	yes
Restriction Gear	yes
Restriction Species	no



Name	Pop	HHs	Ethnic groups
Nammok	342	53	Laosung
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	57%		
Aquaculture			
Rice farming	100%		9%
Garden	100%		
Livestock	100%		
Handicrafts			
Trading			
Govern. Serv.		2%	
Labour			
Cash remittance		2%	

Agri. Resources	Ha	Access to land	HH
Upland rice	53	Landless	
Paddy rice		.1-1 ha	48
Irrigated rice		1-2 ha	5
Pond		2-3 ha	
Vegetable	8	3-4 ha	
Orchards		>5 ha	
Cash crop	13	Aquaculture	
Aquatic habitats		HHs have ponds	
Common forest	8	Nos ponds	
Common grassland		Area m2	

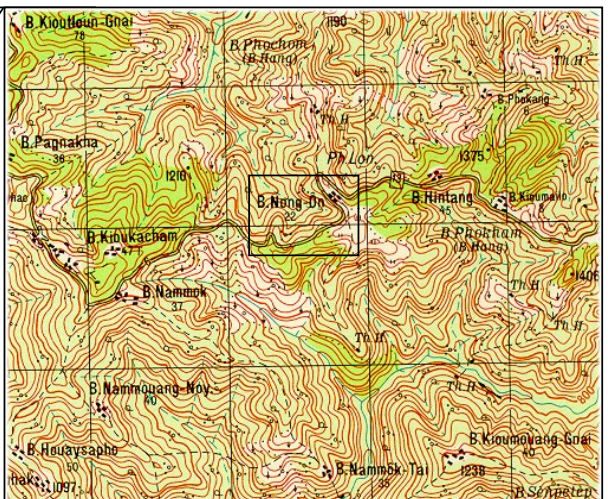
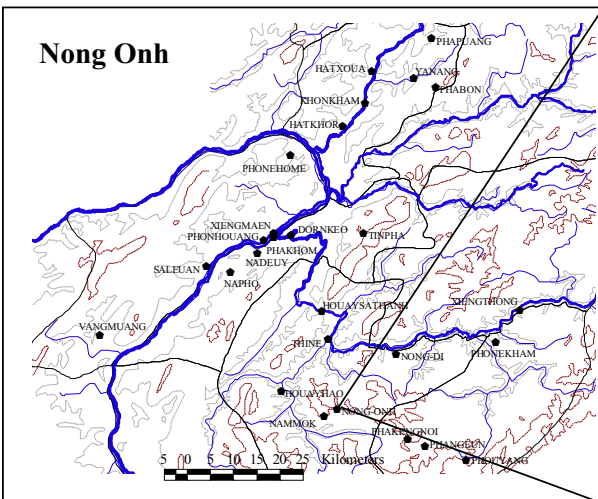
Management measures	
Conservation zone	No
Restriction	No
Restriction Gear	No
Restriction Species	No



Name	Pop	HHs	Ethnic groups
Napho	431	76	Laoloun
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	100%		
Aquaculture			
Rice farming	26%		13%
Garden	100%		
Livestock	100%	1%	13%
Handicrafts			
Trading			33%
Govern. Serv.		5%	
Labour			3%
Cash remittance			4%

Agri. Resources	Ha	Access to land	HH
Upland rice	28.95	Landless	
Paddy rice	38.53	1-1 ha	
Irrigate drice	15	1-2 ha	
Pond		2-3 ha	
Vegetable	28.59	3-4 ha	13
Orchards	3.97	>5 ha	
Cash crop	36	Aquaculture	
Aquatic habitats		HHs have ponds	
Common forest	848	Nos ponds	
Common grassland		Area m2	

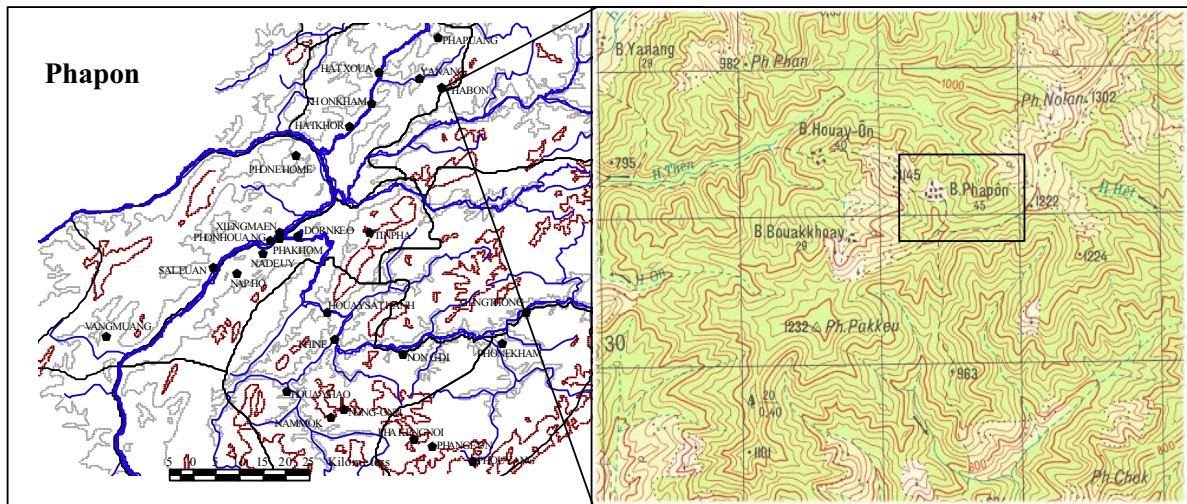
Management measures	
Conservation zone	No
Restriction	No
Restriction Gear	No
Restriction Species	No



Name	Pop	HHs	Ethnic groups
NONG-ONH	565	96	All
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	100%		
Aquaculture			
Rice farming	100%		30%
Garden	26%		
Livestock	100%		7%
Handicrafts			
Trading		2%	
Govern. Serv.		5%	
Labour		1%	
Cash remittance		1%	

Agri. Resources	Ha	Access to land	HH
Upland rice	150.2	Landless	
Paddy rice		1-1 ha	2
Irrigated rice		1-2 ha	50
Pond		2-3 ha	29
Vegetable	2	3-4 ha	
Orchards		>5 ha	
Cash crop	74.59	Aquaculture	
Aquatic habitats		HHs have ponds	
Common forest	14000	Nos ponds	
Common grassland	4000	Area m2	

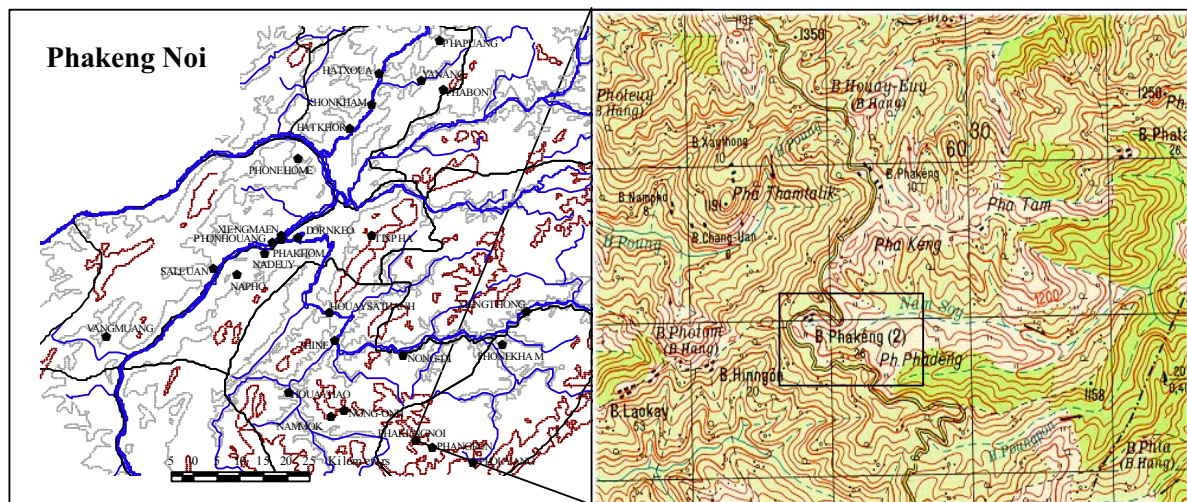
Management measures	
Conservation zone	No
Restriction	No
Restriction Gear	No
Restriction Species	No



Name	Pop	HHs	Ethnic groups
PHAPON	366	57	Laosung
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	14%		
Aquaculture			
Rice farming	100%		5%
Garden			
Livestock	95%		
Handicrafts			
Trading			
Govern. Serv.			
Labour		7%	
Cash remittance			

Agri. Resources	Ha	Access to land	HH
Upland rice	50	Landless	
Paddy rice		1-1 ha	29
Irrigated rice		1-2 ha	28
Pond		2-3 ha	
Vegetable		3-4 ha	
Orchards		>5 ha	
Cash crop	20	Aquaculture	
Aquatic habitats		HHs have ponds	
Common forest	12	Nos ponds	
Common grassland		Area m2	

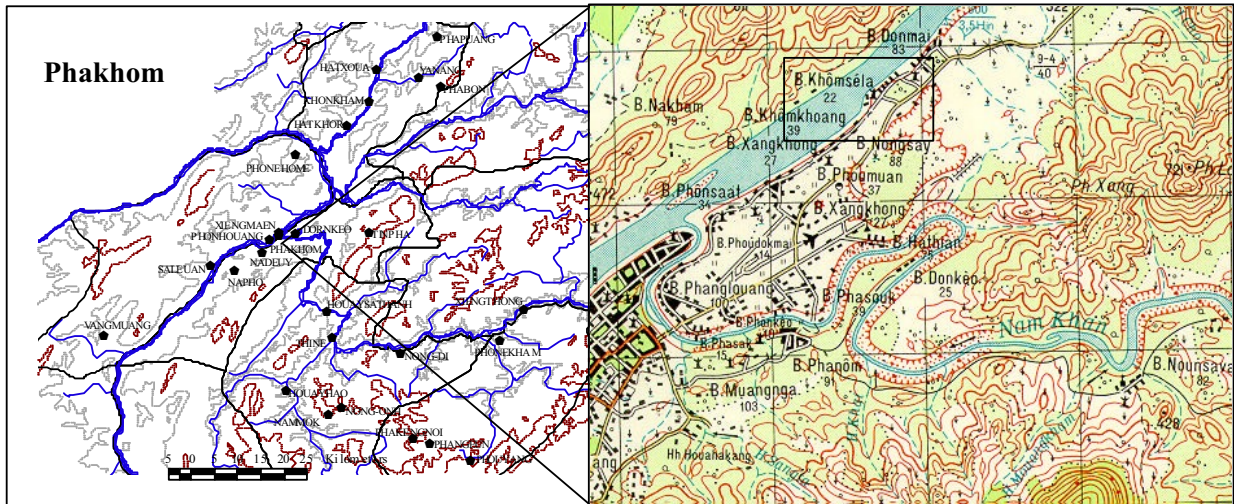
Management measures	
Conservation zone	No
Restriction	No
Restriction Gear	No
Restriction Species	No



Name	Pop	HHs	Ethnic groups
PHAKENGOI	774	122	All
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	70%		
Aquaculture	7%		
Rice farming	71%		29%
Garden	1%		
Livestock	57%		16%
Handicrafts		1%	
Trading		17%	
Govern. Serv.		11%	
Labour		2%	
Cash remittance			

Agri. Resources	Ha	Access to land	HHs
Upland rice	75.85	Landless	
Paddy rice		1-1 ha	
Irrigated rice		1-2 ha	12
Pond m	2	2-3 ha	25
Vegetable	22.23	3-4 ha	50
Orchards		>5 ha	
Cash crop	214.86	Aquaculture	
Aquatic habitats		HHs have ponds	8
Common forest	12	Nos ponds	8
Common grassland	15.47	Area m2	2000

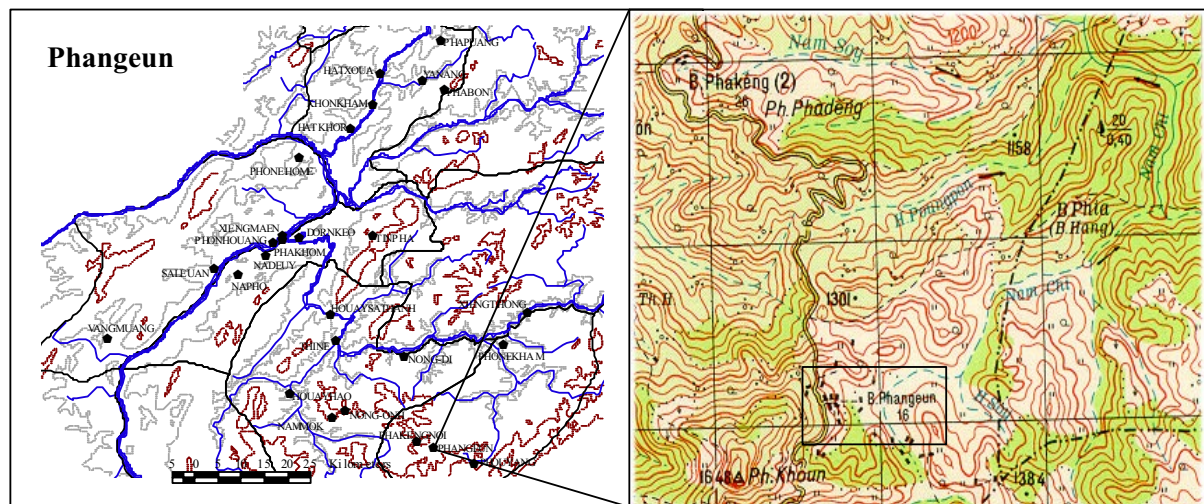
Management measures	
Conservation zone	No
Restriction	No
Restriction Gear	No
Restriction Species	No



Name	Pop	HHs	Ethnic groups
PHAKHOM	307	57	Laoloun
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	14%		14%
Aquaculture	5%		4%
Rice farming	9%		
Garden	35%		
Livestock	100%		100%
Handicrafts		7%	26%
Trading		2%	4%
Govern. Serv.		18%	
Labour		14%	
Cash remittance			

Agri. Resources	Ha	Access to land	HH
Upland rice		Landless	5
Paddy rice	9.72	1-1 ha	33
Irrigated rice		1-2 ha	14
Pond m	3.3	2-3 ha	4
Vegetable		3-4 ha	
Orchards	99.55	>5 ha	
Cash crop		Aquaculture	
Aquatic habitats		HHs have ponds	3
Common forest		Nos ponds	3
Common grassland		Area m2	3.3

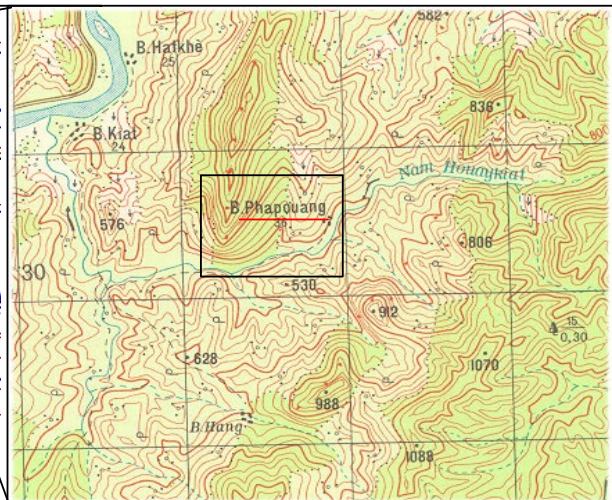
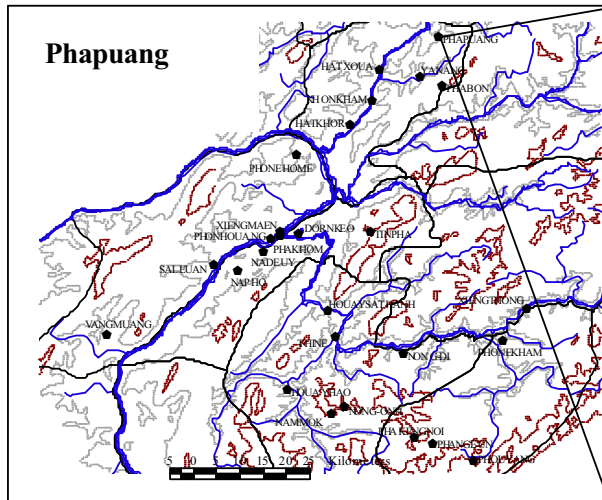
Management measures	
Conservation zone	No
Restriction	No
Restriction Gear	Yes
Restriction Species	No



Name	Pop	HHs	Ethnic groups
PHANGEUN	311	43	Laosung
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	14%		
Aquaculture	7%		
Rice farming	100%		100%
Garden	100%		
Livestock	100%		17%
Handicrafts			
Trading			
Govern. Serv.		2%	
Labour			
Cash remittance			

Agri. Resources	Ha	Access to land	HH
Uplandrice	36.3	Landless	
Paddyrice	3.2	1-1 ha	9
Irrigatedrice		1-2 ha	
Pondm	0.06	2-3 ha	
Vegetable	1	3-4 ha	
Orchards	3.23	>5 ha	
Cashcrop	14.7	Aquaculture	
Aquatichabitats		HHs have ponds	2
Commonforest	357	Nos ponds	3
Commongrassland		Area m2	600

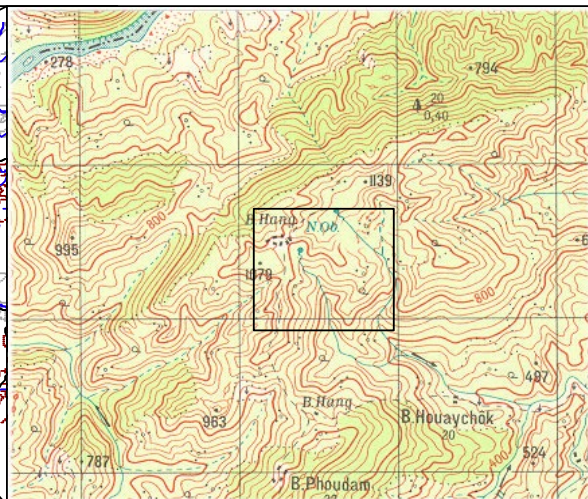
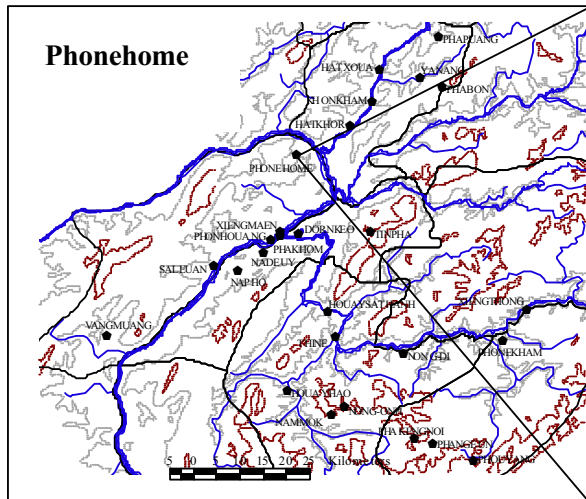
Management measures	
Conservation zone	No
Restriction	Yes
Restriction Gear	Yes
Restriction Species	No



Name	Pop	HHs	Ethnic groups
PHAPUANG	185	38	Laothung
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	100%		
Aquaculture			
Rice farming	100%		
Garden	100%		
Livestock	100%		8%
Handicrafts			
Trading			
Govem. Serv			
Labour			11%
Cash remittance			

Agri. Resources	Ha	Access to land	HH
Upland rice	145	Landless	
Paddy rice		1-1 ha	38
Irrigated rice		1-2 ha	
Pond m		2-3 ha	
Vegetable	1.5	3-4 ha	
Orchards	2.5	>5 ha	
Cash crop	2	Aquaculture	
Aquatic habitats		HHs have ponds	
Common forest	20	Nos ponds	
Common grassland		Area m2	

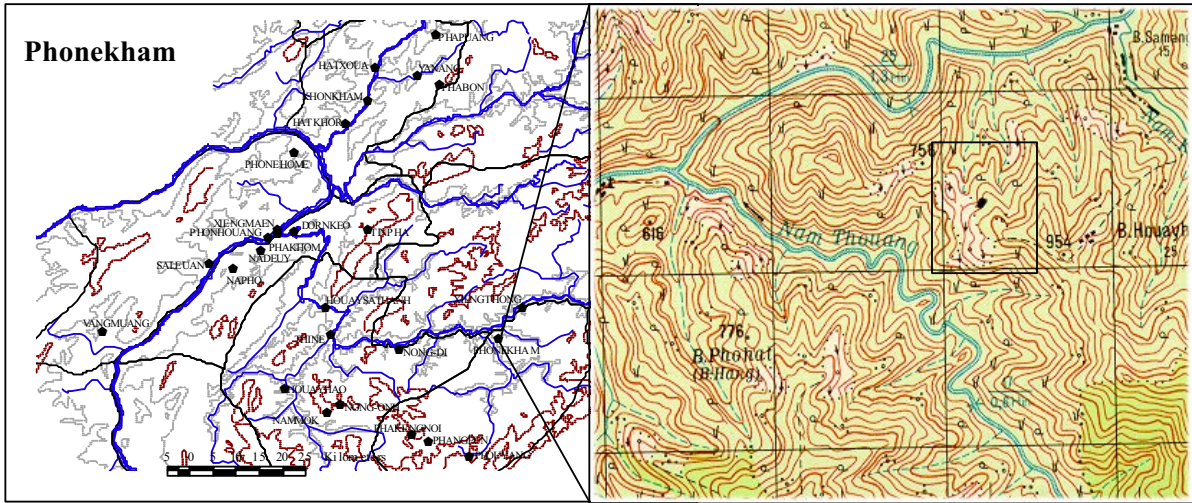
Management measures	
Conservation zone	No
Restriction	No
Restriction Gear	No
Restriction Species	No



Name	Pop	HHs	Ethnic groups
PHONEHOME	319	58	Laothung
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	69%		
Aquaculture	14%		
Rice farming	97%		
Garden	97%		97%
Livestock	97%		9%
Handicrafts			14%
Trading			
Govem. Serv		2%	
Labour			14%
Cash remittance			

Agri. Resources	Ha	Access to land	HH
Upland rice	58	Landless	
Paddy rice	11.7	1-1 ha	33
Irrigated rice	9	1-2 ha	15
Pond m	128	2-3 ha	1
Vegetable	0.2	3-4 ha	
Orchards	0.5	>5 ha	
Cash crop	7.5	Aquaculture	
Aquatic habitats	0.2	HHs have ponds	8
Common forest	5	Nos ponds	8
Common grassland		Area m2	144

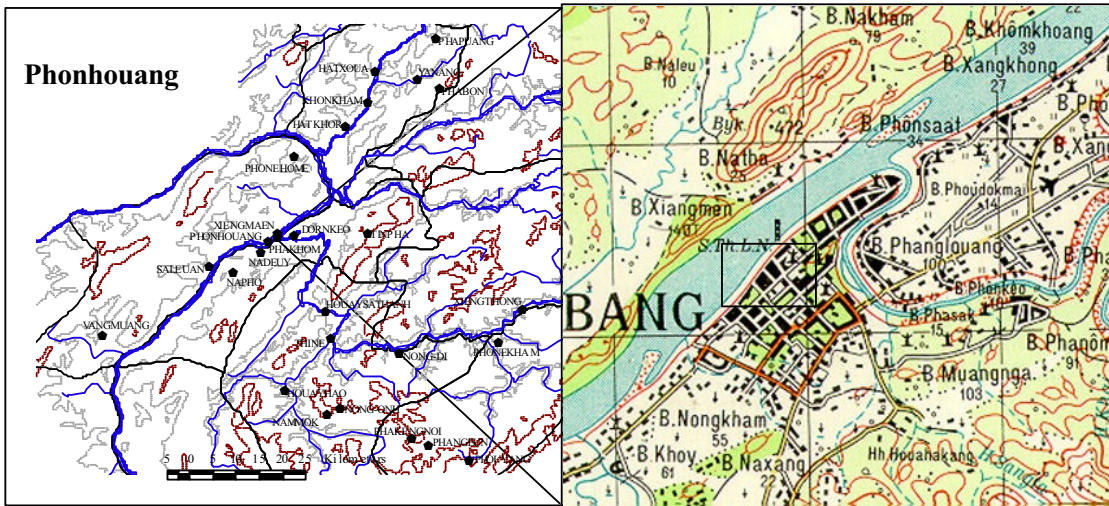
Management measures	
Conservation zone	No
Restriction	No
Restriction Gear	No
Restriction Species	No



Name	Pop	HHs	Ethnic groups
PHONEKHAM	222	21	Laotuong
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	100%		
Aquaculture			
Rice farming	100%		14%
Garden	100%		
Livestock	100%		38%
Handicrafts			
Trading			
Govern. Serv		5%	
Labour			
Cash remittance			

Agri. Resources	Ha	Access to land	HH
Upland rice	18.15	Landless	
Paddy rice		1-1 ha	21
Irrigated rice		1-2 ha	
Pond m		2-3 ha	
Vegetable		3-4 ha	
Orchards	10	>5 ha	
Cash crop	27	Aquaculture	
Aquatic habitats		HHs have ponds	
Common forest		Nos ponds	
Common grassland	30	Area m2	

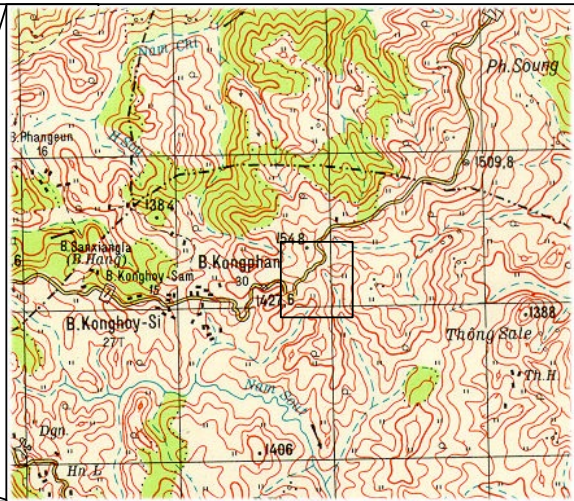
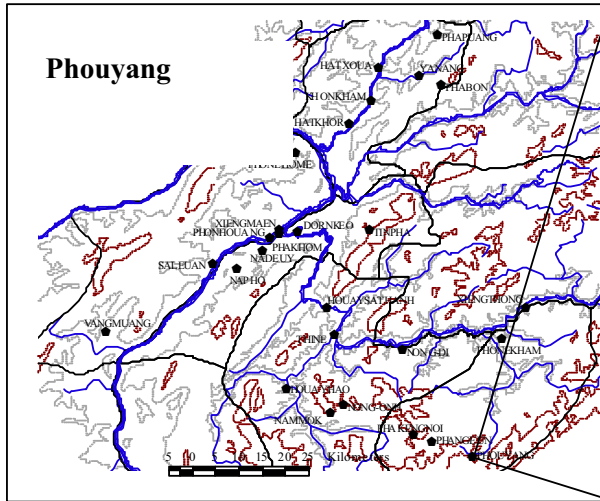
Management measures	
Conservation zone	Yes
Restriction	Yes
Restriction Gear	Yes
Restriction Species	No



Name	Pop	HHs	Ethnic groups
PHONHOUANG	538	103	Loa loun
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	17%		
Aquaculture	7%		
Rice farming			
Garden	10%		
Livestock	49%		
Handicrafts		3%	
Trading		17%	
Govern. Serv		43%	
Labour		27%	
Cash remittance			5%

Agri. Resources	Ha	Access to land	HH
Upland rice	0	Landless	0
Paddy rice	0	1-1 ha	0
Irrigated rice	0	1-2 ha	0
Pond m	0	2-3 ha	0
Vegetable	0	3-4 ha	0
Orchards	0	>5 ha	0
Cash crop	0	Aquaculture	
Aquatic habitats	0	HHs have ponds	0
Common forest	0	Nos ponds	0
Common grassland	0	Area m2	0

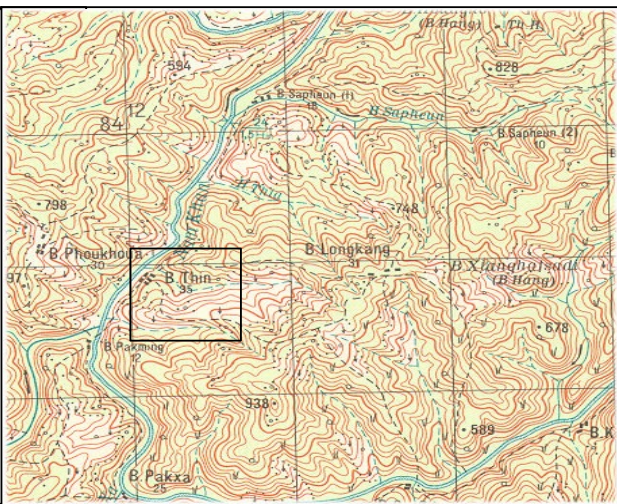
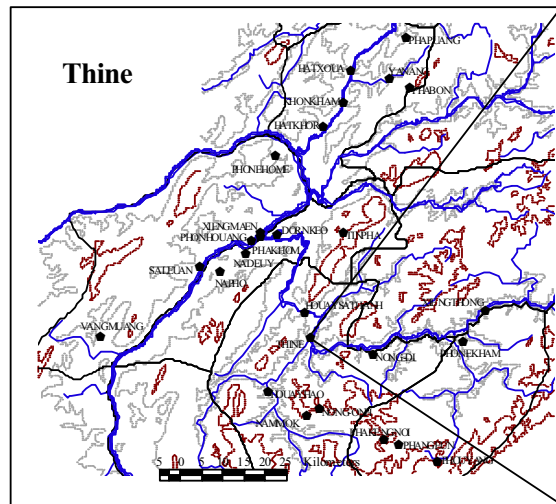
Management measures	
Conservation zone	No
Restriction	No
Restriction Gear	No
Restriction Species	No



Name	Pop	HHs	Ethnic groups
PHOUYANG	318	46	Loum Thung
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	11%		
Aquaculture	20%		
Rice farming	96%		22%
Garden			100%
Livestock	52%		15%
Handicrafts			
Trading		7%	
Govern. Serv.		7%	
Labour			
Cash remittance			

Agri. Resources	Ha	Access to land	HH
Upland rice	56.32	Landless	
Paddy rice	7.5	1-1 ha	6
Irrigated rice		1-2 ha	
Pond m	0.39	2-3 ha	35
Vegetable		3-4 ha	
Orchards		>5 ha	
Cash crop	22.85	Aquaculture	
Aquatic habitats		HHs have ponds	9
Common forest		Nos ponds	13
Common grassland		Area m2	3900

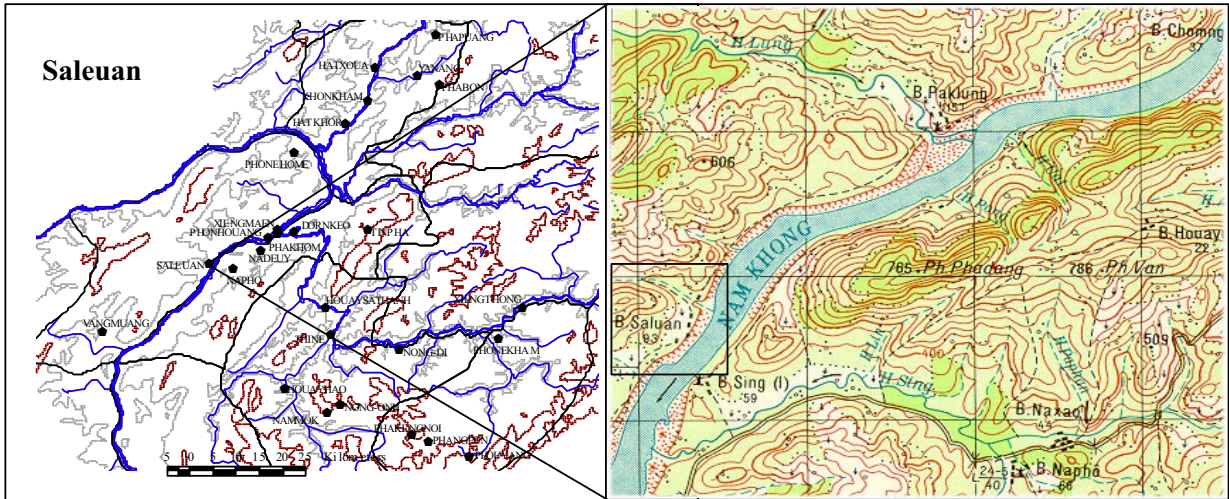
Management measures	
Conservation zone	No
Restriction	No
Restriction Gear	No
Restriction Species	No



Name	Pop	HHs	Ethnic groups
THINE	309	52	Laothung
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	100%		
Aquaculture			
Rice farming	100%		
Garden	100%		
Livestock	100%		100%
Handicrafts			
Trading			
Govern. Serv.		4%	
Labour			
Cash remittance			

Agri. Resources	Ha	Access to land	HH
Upland rice	57.6	Landless	
Paddy rice		1-1 ha	
Irrigated rice		1-2 ha	52
Pond m		2-3 ha	
Vegetable		3-4 ha	
Orchards		>5 ha	
Cash crop	29.1	Aquaculture	
Aquatic habitats		HHs have ponds	
Common forest	1000	Nos ponds	
Common grassland		Area m2	

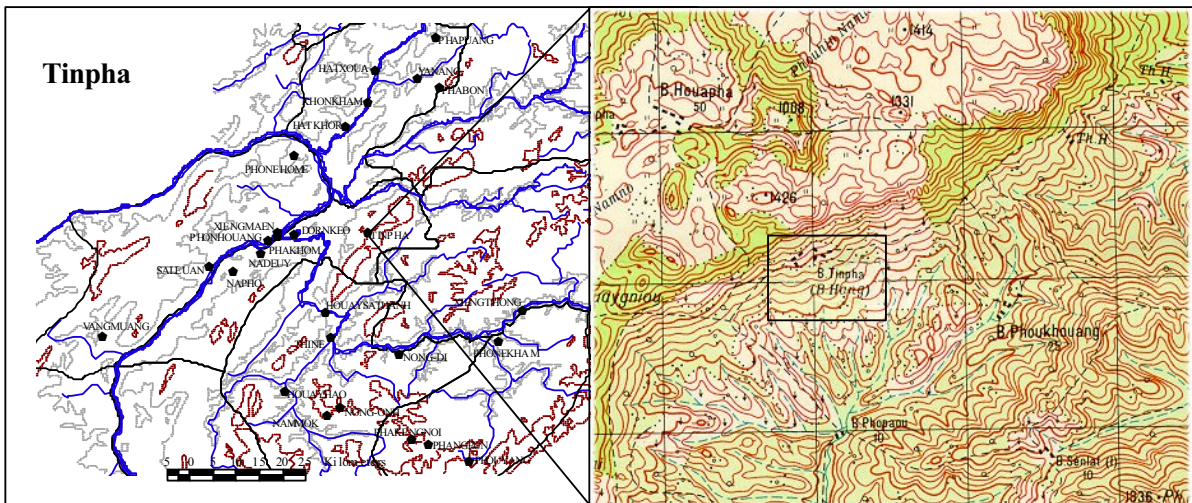
Management measures	
Conservation zone	Yes
Restriction	Yes
Restriction Gear	No
Restriction Species	Yes



Name	Pop	HHs	Ethnic groups
SALEUAN	439	74	Laoloun
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	81%		8%
Aquaculture			
Rice farming	46%		3%
Garden	95%		81%
Livestock	100%		
Handicrafts			14%
Trading		3%	
Govern. Serv.		9%	
Labour			61%
Cash remittance			3%

Agri. Resources	Ha	Access to land	HH
Upland rice	4	Landless	
Paddy rice	35.1	1-1 ha	4
Irrigated rice	2	1-2 ha	14
Pond m		2-3 ha	2
Vegetable	2	3-4 ha	
Orchards	1	>5 ha	
Cash crop	25	Aquaculture	
Aquatic habitats	8	HHs have ponds	
Common forest		Nos ponds	
Common grassland		Area m2	

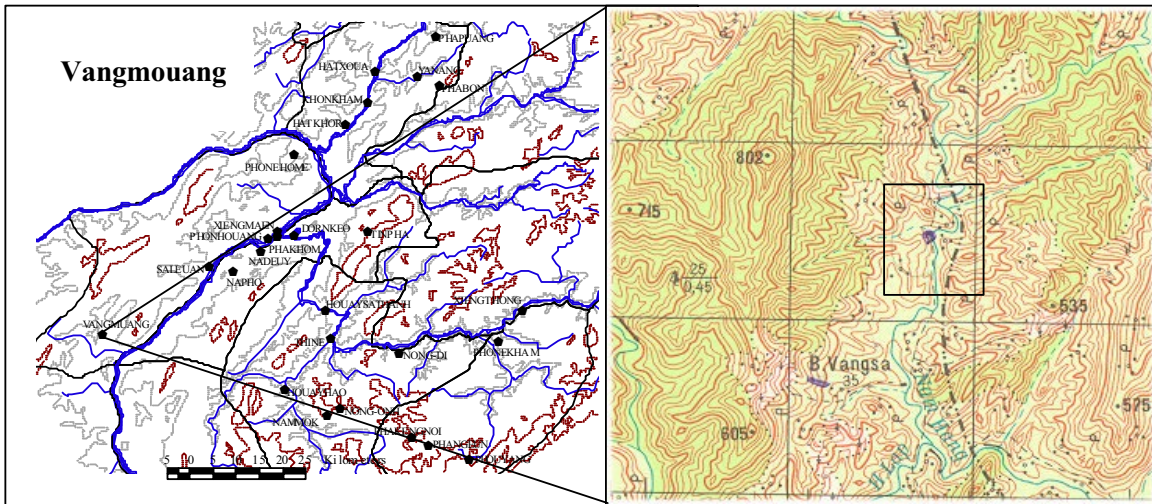
Management measures	
Conservation zone	No
Restriction	No
Restriction Gear	No
Restriction Species	No



Name	Pop	HHs	Ethnic groups
TINPHA	290	37	Laosung
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	41%		41%
Aquaculture			
Rice farming			
Garden	100%		100%
Livestock	95%	95%	
Handicrafts		3%	
Trading			
Govern. Serv.		3%	
Labour			
Cash remittance			

Agri. Resources	Ha	Access to land	HH
Upland rice	29.5	Landless	
Paddy rice		1-1 ha	
Irrigated rice		1-2 ha	
Pond m		2-3 ha	8
Vegetable	3	3-4 ha	
Orchards		>5 ha	
Cash crop	7	Aquaculture	
Aquatic habitats		HHs have ponds	
Common forest	28	Nos ponds	
Common grassland	2	Area m2	

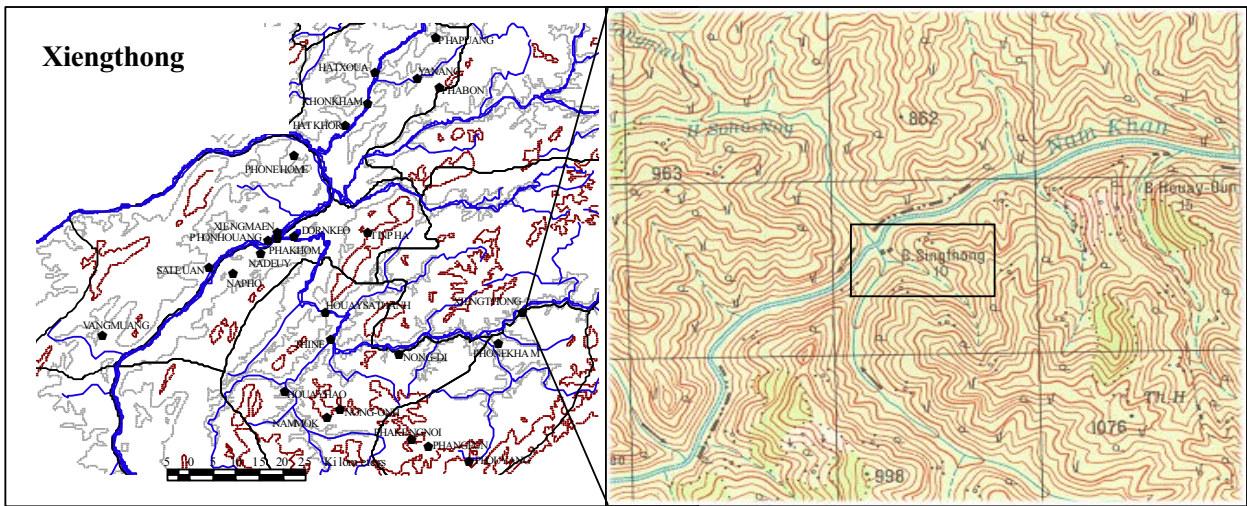
Management measures	
Conservation zone	No
Restriction	No
Restriction Gear	No
Restriction Species	No



Nae	Pop	HHs	Ethnic groups
VANGMUANG	410	74	Laotuong
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	100%		100%
Aquaculture			
Rice farming	3%		
Garden	5%	1%	
Livestock	5%	1%	14%
Handicrafts			
Trading			100%
Govern. Serv.		1%	
Labour		1%	3%
Cash remittance			3%

Agri. Resources	Ha	Access to land	HH
Upland rice	49	Landless	
Paddy rice	1.7	1-1 ha	
Irrigated rice	1.7	1-2 ha	
Pond m		2-3 ha	64
Vegetable	0.5	3-4 ha	
Orchards	0.1	>5 ha	
Cash crop	26		
Aquatic habitats		HHs have ponds	
Common forest	4	Nos ponds	
Common grassland		Area m2	

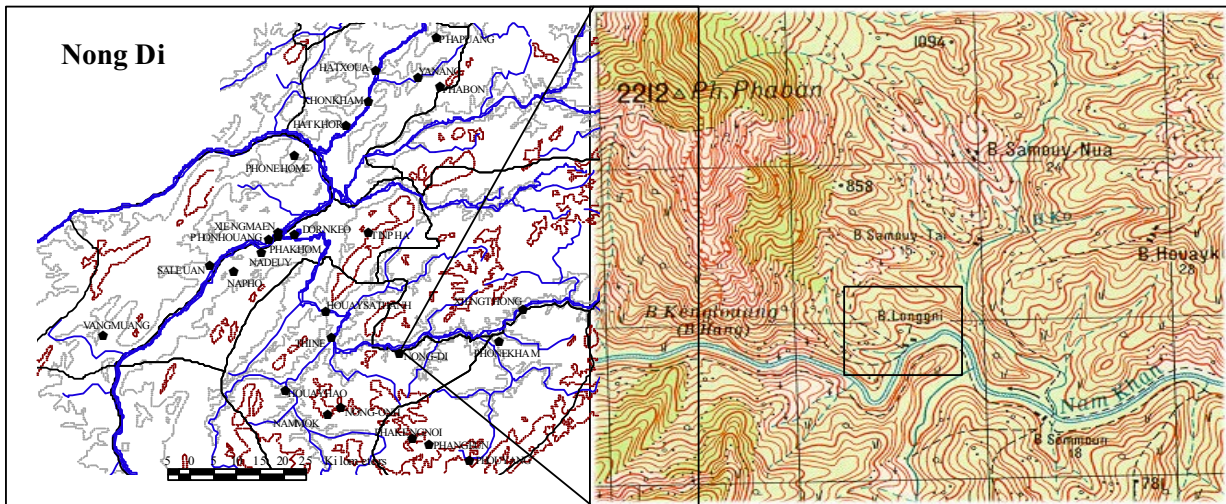
Management measures	
Conservation zone	Yes
Restriction	No
Restriction Gear	No
Restriction Species	No



Name	Pop	HHs	Ethnic groups
XIENGTHONG	265	39	Laotuong
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	95%		5%
Aquaculture			
Rice farming	100%		10%
Garden			
Livestock	100%		100%
Handicrafts			
Trading			
Govern. Serv.			
Labour			
Cash remittance			

Agri. Resources	Ha	Access to land	HH
Upland rice	93	Landless	
Paddy rice		1-1 ha	
Irrigated rice		1-2 ha	39
Pond m		2-3 ha	
Vegetable		3-4 ha	
Orchards		>5 ha	
Cash crop	6		
Aquatic habitats		HHs have ponds	
Common forest		Nos ponds	
Common grassland		Area m2	

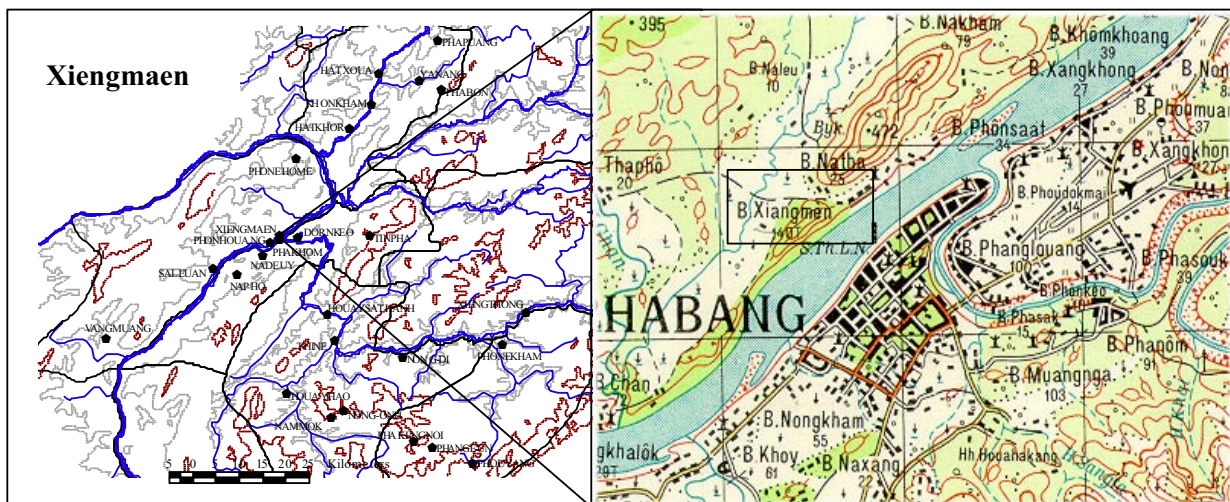
Management measures	
Conservation zone	Yes
Restriction	Yes
Restriction Gear	Yes
Restriction Species	No



Name	Pop	HHs	Ethnic groups
NONG-DI	170	24	Laotuong
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	100%	0%	8%
Aquaculture	0%	0%	0%
Rice farming	100%	0%	8%
Garden	0%	0%	0%
Livestock	88%	0%	42%
Handicrafts	0%	0%	4%
Trading	0%	0%	0%
Govn. Serv.	0%	0%	0%
Labour	13%	0%	0%
Cash remittance	0%	0%	0%

Agri. Resources	Ha	Access to land	HH
Uplandrice	16.4	Landless	0
Paddyrice	0	1-1 ha	20
Irrigatedrice	0	1-2 ha	4
Pondm	0	2-3 ha	0
Vegetable	0	3-4 ha	0
Orchards	0	>5 ha	0
Cashcrop	10	Aquaculture	
Aquatichabitats	0	HHs have ponds	0
Commonforest	0	Nos ponds	0
Commongrassland	0	Area m2	0

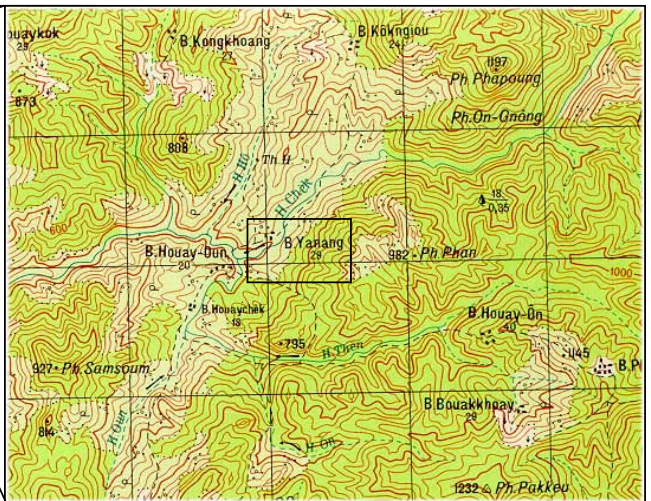
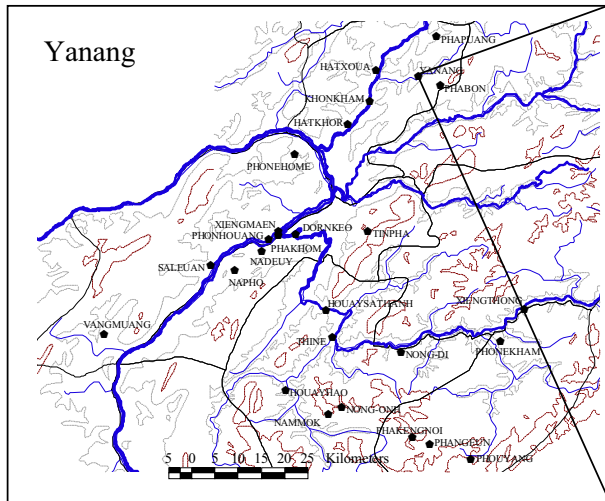
Management measures	
Conservation zone	yes
Restriction	No
Restriction Gear	yes
Restriction Species	No



Name	Pop	HHs	Ethnic groups
XIENGMAEN	1390	225	LounThung
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	67%	9%	13%
Aquaculture	8%	0%	7%
Rice farming	47%	0%	0%
Garden	100%	0%	44%
Livestock	33%	0%	9%
Handicrafts	0%	0%	1%
Trading	8%	0%	8%
Govn. Serv.	7%	0%	0%
Labour	43%	0%	0%
Cash remittance	0%	0%	1%

Agri. Resources	Ha	Access to land	HH
Uplandrice	0	Landless	15
Paddyrice	85.8	1-1 ha	36
Irrigatedrice	17.75	1-2 ha	170
Pondm	85	2-3 ha	2
Vegetable	5	3-4 ha	0
Orchards	166.5	>5 ha	0
Cashcrop	2	Aquaculture	
Aquatichabitats	0	HHs have ponds	15
Commonforest	75	Nos ponds	17
Commongrassland	0	Area m2	85

Management measures	
Conservation zone	No
Restriction	No
Restriction Gear	No
Restriction Species	No



Name	Pop	HHs	Ethnic groups
YANANG	232	45	Laothung
Economic activities	Subsistence	Main income	Suppl. Income
Capture fisheries	100%	0%	0%
Aquaculture	18%		0%
Rice farming	100%		0%
Garden	42%	0%	0%
Livestock	100%	0%	18%
Handicrafts		0%	0%
Trading		0%	0%
Govern. Serv.		0%	0%
Labour		0%	0%
Cash remittance		0%	0%

Agri. Resources	Ha	Access to land	HH
Uplandrice	35.9	Landless	0
Paddyrice	1.5	1-1 ha	45
Irrigatedrice	0	1-2 ha	0
Pondm	0.67	2-3 ha	0
Vegetable	0	3-4 ha	0
Orchards	1	>5 ha	
Cashcrop	7.4	Aquaculture	
Aquatichabitats	0	HHs have ponds	8
Commonforest	12	Nos ponds	8
Commongrassland	100	Area m2	6700

Management measures	
Conservation zone	No
Restriction	Yes
Restriction Gear	Yes
Restriction Species	No

Individual Survey No.:

□□ - □□ - □□

Date & Time:	/	/	:	Enumerators	□□	□□
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Section A-1 Involvement in fishing

- Do you catch or collect fish or other aquatic animals?** Yes No
 Do you ever use any fishing equipment? Yes No
 Do you help anybody else to catch or collect fish or other aquatic animals? Yes No

If the answer to all three questions is "no" → go to section E

Section A-2 Gear use

Gill-nets		Yes	No	Spears		Yes	No
GN001	Stationary	<input type="checkbox"/>	<input type="checkbox"/>	SP001	Spear	<input type="checkbox"/>	<input type="checkbox"/>
GN002	Drifting, at surface	<input type="checkbox"/>	<input type="checkbox"/>	SP002	Harpoon	<input type="checkbox"/>	<input type="checkbox"/>
GN003	Drifting, at bottom	<input type="checkbox"/>	<input type="checkbox"/>	SP003	Spear gun	<input type="checkbox"/>	<input type="checkbox"/>
Bag-nets				SP004	Bow and arrow	<input type="checkbox"/>	<input type="checkbox"/>
BN001	Trawl	<input type="checkbox"/>	<input type="checkbox"/>	Collection			
BN002	Small Dai	<input type="checkbox"/>	<input type="checkbox"/>	CL001	Collection by hand	<input type="checkbox"/>	<input type="checkbox"/>
BN003	Large Dai	<input type="checkbox"/>	<input type="checkbox"/>	CL002	Collection with scoop basket	<input type="checkbox"/>	<input type="checkbox"/>
BN004	Purse seine	<input type="checkbox"/>	<input type="checkbox"/>	CL003	Collection with plunge basket	<input type="checkbox"/>	<input type="checkbox"/>
BN005	Beach seine with brush park	<input type="checkbox"/>	<input type="checkbox"/>	Scoop-nets			
BN006	Beach seine without brush park	<input type="checkbox"/>	<input type="checkbox"/>	SN001	Small scoop net	<input type="checkbox"/>	<input type="checkbox"/>
Cone shaped nets				SN002	Large scoop net	<input type="checkbox"/>	<input type="checkbox"/>
CN001	Cast net	<input type="checkbox"/>	<input type="checkbox"/>	Small traps			
CN002	Big cone shaped net	<input type="checkbox"/>	<input type="checkbox"/>	ST001	Upright Basket Trap	<input type="checkbox"/>	<input type="checkbox"/>
Lift-nets				ST002	Two funnel trap	<input type="checkbox"/>	<input type="checkbox"/>
LN001	Small lift-net	<input type="checkbox"/>	<input type="checkbox"/>	ST003	Basket Eel Trap	<input type="checkbox"/>	<input type="checkbox"/>
LN002	Big lift-net on shore	<input type="checkbox"/>	<input type="checkbox"/>	ST004	Barbed Rattan Cone	<input type="checkbox"/>	<input type="checkbox"/>
LN003	Big lift-net on raft	<input type="checkbox"/>	<input type="checkbox"/>	ST005	Wedge Cone Trap	<input type="checkbox"/>	<input type="checkbox"/>
Hooks				ST006	Attractant Basket	<input type="checkbox"/>	<input type="checkbox"/>
HL001	Pole with single hook and line	<input type="checkbox"/>	<input type="checkbox"/>	ST007	Gourami trap	<input type="checkbox"/>	<input type="checkbox"/>
HL002	Set hook with float	<input type="checkbox"/>	<input type="checkbox"/>	ST008	Bamboo Tube Eel Trap	<input type="checkbox"/>	<input type="checkbox"/>
HL003	Drifting hook with float	<input type="checkbox"/>	<input type="checkbox"/>	ST009	Cylindrical drum trap	<input type="checkbox"/>	<input type="checkbox"/>
HL004	Long line, bottom set	<input type="checkbox"/>	<input type="checkbox"/>	ST010	Vertical slit trap	<input type="checkbox"/>	<input type="checkbox"/>
HL005	Long line, surface set	<input type="checkbox"/>	<input type="checkbox"/>	ST011	Basket Frog Trap	<input type="checkbox"/>	<input type="checkbox"/>
Big traps				ST012	Drop door traps	<input type="checkbox"/>	<input type="checkbox"/>
BT001	Barrages	<input type="checkbox"/>	<input type="checkbox"/>	Other			
BT002	Lee trap	<input type="checkbox"/>	<input type="checkbox"/>	OT001	Poison	<input type="checkbox"/>	<input type="checkbox"/>
BT003	Pond trap	<input type="checkbox"/>	<input type="checkbox"/>	OT002	Electricity	<input type="checkbox"/>	<input type="checkbox"/>
BT004	Arrow shaped trap	<input type="checkbox"/>	<input type="checkbox"/>	OT003	Explosives	<input type="checkbox"/>	<input type="checkbox"/>
				OT004	Rifles or shotguns	<input type="checkbox"/>	<input type="checkbox"/>

Household Survey No.: -

i. Date & Time:	/ /	:	Enumerators	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
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Section A. Household Profile / Composition

ID	Present		Name (nickname)	Sex	Age	Activities		Respondent	
	Yes	No				Part-time	Full-time	Yes	No
1.	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
2.	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
3.	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
4.	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
5.	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
6.	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
7.	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
8.	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
9.	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
10.	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
11.	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
12.	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
13.	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
14.	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
15.	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>

Sex:
 M. Male
 F. Female
 U. Unspecified

Activity Codes:
 1. Rice Farmer
 2. Other farming
 3. Fishing
 4. Fish selling

5. Fish culture
 6. Fish processing
 7. Gear making
 8. Daily Labor
 9. Government service

10. Transport service
 11. Repair shop
 12. Business
 13. Petty trade/shop

14. Money lending
 15. Handicraft
 16. school/college
 17. Others

HH-status		Type		Surface	Comments
1.	House				
1.	House material				
1.	Roof material				
		Yes	No	Length	
5.	Boat	<input type="checkbox"/>	<input type="checkbox"/>		
2.	Own car	<input type="checkbox"/>	<input type="checkbox"/>		
3.	Telephone	<input type="checkbox"/>	<input type="checkbox"/>		
4.	Television	<input type="checkbox"/>	<input type="checkbox"/>		

Household Survey No.: -

Section A. Further Comments:

1. _____
2. _____
3. _____
4. _____

Section B. Fishing Gear

Gears (and quantity) the household uses?

Gear Name	Yes	No	Quantity	Habitat Code	Comments
1. Gill-net	<input type="checkbox"/>	<input type="checkbox"/>			
2. Bag nets	<input type="checkbox"/>	<input type="checkbox"/>			
3. Cone shaped nets	<input type="checkbox"/>	<input type="checkbox"/>			
4. Lift nets	<input type="checkbox"/>	<input type="checkbox"/>			
5. Scoop nets	<input type="checkbox"/>	<input type="checkbox"/>			
6. Hooks	<input type="checkbox"/>	<input type="checkbox"/>			
7. Spears	<input type="checkbox"/>	<input type="checkbox"/>			
8. Collection	<input type="checkbox"/>	<input type="checkbox"/>			
9. Cast-net	<input type="checkbox"/>	<input type="checkbox"/>			
10. Big traps	<input type="checkbox"/>	<input type="checkbox"/>			
11. Small traps	<input type="checkbox"/>	<input type="checkbox"/>			
12. Other (list)	<input type="checkbox"/>	<input type="checkbox"/>			
13. Other (describe):	<input type="checkbox"/>	<input type="checkbox"/>			

Did any member of your household fish or collect aquatic animals, or have any fishing gears set between XXXXXX and now? <input type="checkbox"/> Yes <input type="checkbox"/> No	
	HH No
Please indicate who were involved in these fishing activities:	
	Days
<u>If No, how many days ago did any member of your household fish or collect aquatic organisms, or have any gears set:</u>	

Section B Further Comments

1. _____
2. _____
3. _____
4. _____

Household Survey No.:

□□ - □□

Section C. Catch Assessment

For the whole household, please state which habitats are used (by anybody) for fishing and/or gathering aquatic animals.

For each habitat used (i) the name, (ii) the distance in minutes (not km) by normal transportation means, (iii) in which month household uses it, and (v) if you are able to please estimate the amount of fish caught or collected from that place by the wh

	Habitat			HH members using habitat for fishing/collecting		1	2	3	4	5	6	7	8	9	10	11	12	
	Code	Name	Distance															
1.					Used													
					Days													
2.					Used													
					Days													
3.					Used													
					Days													
4.					Used													
					Days													
5.					Used													
					Days													
6.					Used													
					Days													
7.					Used													
					Days													
8.					Used													
					Days													
9.					Used													
					Days													

¹ Total catch for one year for that habitat - estimated for the whole **household**

² Importance of the **habitat** according to the following scale: 0: not important; 1: High importance; 2: Medium importance and 3: Low importance

..... continue on additional sheet if necessary

Household Survey No.:

□□ - □□

Section D RESOURCES and ASSETS

Section D-1. Land Area that can be used by the household

		Available	Area ¹	Unit	Shared HH #	Standing water/ inundated (i.e. has fish)	
						Area ²	Duration (months)
1.	Total Area:						
2.	Paddy Rice:	<input type="checkbox"/> Yes <input type="checkbox"/> No					to
3.	Irrigated Rice:	<input type="checkbox"/> Yes <input type="checkbox"/> No					to
4.	Upland/Dry Rice:	<input type="checkbox"/> Yes <input type="checkbox"/> No					to
5.	Floating Rice:	<input type="checkbox"/> Yes <input type="checkbox"/> No					to
6.	Aquaculture (ponds)	<input type="checkbox"/> Yes <input type="checkbox"/> No					to
7.	Vegetable Garden:	<input type="checkbox"/> Yes <input type="checkbox"/> No					to
8.	Orchards (including tree plantation):	<input type="checkbox"/> Yes <input type="checkbox"/> No					to
9.	Grazing:	<input type="checkbox"/> Yes <input type="checkbox"/> No					to
10.	Homestead:	<input type="checkbox"/> Yes <input type="checkbox"/> No					to
11.	Cash Crops other than rice	<input type="checkbox"/> Yes <input type="checkbox"/> No					to
12.	Common property - forest scrub	<input type="checkbox"/> Yes <input type="checkbox"/> No					to
13.	Common property - grasslands/grazing	<input type="checkbox"/> Yes <input type="checkbox"/> No					to
14.	Others (specified)						to
							to

¹ area to be recorded in local units.

² area to be recorded either in local units or percentage of total area. For unknown but large area put L, for unknown but small area put S.

D-2. Livestock, Total Count (owned or 'leased'):

		Number	Shared	
			Shared No	HH No
1.	Buffalo			
2.	Cow			
3.	Pig			
4.	Chicken			
5.	Fowl Other (Duck, Turkey, etc.)			
6.	Sheep/Goat			
7.	Other(s) specify:			
8.				

Section D. Further Comments:

1. _____
2. _____
3. _____

Household Survey No.:

□□ - □□

Section E. HOUSEHOLD Importance of activities for consumption & income

ACTIVITY		For food supply and Consumption			For Income		
		Yes	No	rank ¹	Yes	No	rank ¹
1.	Fish commercially/professionally	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
2.	Fish otherwise or collect aquatic animals	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
3.	Culture aquatic organisms	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
4.	Process Aquatic Animals	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
5.	Sell Aquatic Animals				<input type="checkbox"/>	<input type="checkbox"/>	
6.	Make, sell or repair fishing gear				<input type="checkbox"/>	<input type="checkbox"/>	
7.	Farm rice	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
8.	Grow vegetables	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
9.	Tend an orchard	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
10.	Look after livestock	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
11.	Make handicraft				<input type="checkbox"/>	<input type="checkbox"/>	
12.	Trade (non fish related)				<input type="checkbox"/>	<input type="checkbox"/>	
13.	Lend money				<input type="checkbox"/>	<input type="checkbox"/>	
14.	Perform wage - labour (employment) in fishing, fish processing, marketing or transport				<input type="checkbox"/>	<input type="checkbox"/>	
15.	Perform wage - labour (non fish related)				<input type="checkbox"/>	<input type="checkbox"/>	
16.	Work for government				<input type="checkbox"/>	<input type="checkbox"/>	
17.	Work in transport service (land/water)				<input type="checkbox"/>	<input type="checkbox"/>	
18.	Other (give description):	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	

¹ Rank in order of importance according to 1: high importance; 2: medium importance and 3: low importance

F. Aquaculture activities

Production per system		Area	Unit	Annual production (kg)	Value	Currency	HH Members involved
1.	Pond Culture:						
2.	Cage Culture:						
3.	Rice field Fish or shrimp culture						
4.	Fish stocking in rice fields	<input type="checkbox"/> Yes <input type="checkbox"/> No		Area stocked	units		
5.	which species are mainly used for stocking:						
Order of importance	Species code No	Notes					
First							
Second							
Third							
Fourth							

Household Survey No.:

□□ - □□

Consumption

Section G. Quantification of protein consumed

1.		Quantity fresh fish and aquatic animals consumed by household per week										
								Source %				
								C	A/R	P	G	
		Dry season		kg								
		Wet season		kg								
2.		Quantity processed fish and aquatic animals consumed by household per week										
				Source %				Source %				
		Type	Dry season	C	A/R	P	G	Wet season	C	A/R	P	G
i.		Fish paste	kg					kg				
ii.		Fermented fish	kg					kg				
iii.		Fish sauce	litre					litre				
iv.		Smoked fish	kg					kg				
v.		dried fish (incl. Salted)	kg					kg				
vi.		Other (specify):										
3.		Quantity animal protein consumed by household per week										
		Type	dry season				Wet season					
i.		Beef	kg				kg					
ii.		Pork	kg				kg					
iii.		Goat/sheep	kg				kg					
iv.		Poultry	kg				kg					
v.		Hen Eggs	#				#					
vi.		Wildlife (not aquatic)	kg				kg					
vii.		Insects (not aquatic)	kg				kg					
viii.		Other (specify):										

Source, express as percentage coming from	
C	Capture and gathering (by members of household)
A/R	Aquaculture/Reared for livestock) (by members of household)
P	purchased
G	given to household from elsewhere

Section E., F. and G. Further Comments :

(End of Survey) Time: :

Individual Survey No.:

□□ - □□ - □□

Section A-2

1.	Do you use any other fishing methods not mentioned above?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2.	If yes, give name and description:	
	Name	Description

Section A. Further Comments:

1. _____
2. _____
3. _____
4. _____
5. _____
5. _____
6. _____

Individual Survey No.:

□□ - □□ - □□

Section B. Catch Assessment

For each fishing method you use over one year please state (i) which place you use, (ii) which months (season) you use fishing day (or trip) for each fishing method and make an estimate for the total catch with that fishing method over on

Habitat Code	Gear Code	Units No	People No	Catch Share		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
					Number of days/trips per month								
					Typical catch per day/trip								
					typical range of catch								
					Number of days/trips per month								
					Typical catch per day/trip								
					typical range of catch								
					Number of days/trips per month								
					Typical catch per day/trip								
					typical range of catch								
					Number of days/trips per month								
					Typical catch per day/trip								
					typical range of catch								

..... If necessary continue on additional sheet

21/02/01

Individual Survey No.:

□□ - □□ - □□

Section C. Most Recent Catch

➤ Did you fish or collect aquatic animals, or have any fishing gears set between XXXXXX and now? Yes No

If **no**, how many days ago did you fish or collect aquatic organisms, or have any gears set :

Habitat code #

Gear ID#	# of units	# of people involved	Catch (kg)	how does this catch compare with a typical catch for this time of year*	Species in catch by percentage															
					sp. code	%	sp. code	%	sp. code	%	sp. code	%	sp. code	%						

Habitat code #

Gear ID#	# of units	# of people involved	Catch (kg)	how does this catch compare with a typical catch for this time of year*	Species in catch by percentage															
					sp. code	%	sp. code	%	sp. code	%	sp. code	%	sp. code	%						

* express as percentage of typical catch, for less than typical put e.g. 75%, 50% etc, for more than typical put e.g. 150% 175%, 200% etc. If the catch is typical (usual) put 100%

Section C. Further Comments:

Individual Survey No.:

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Section C – Most Recent Catch contd.

Habitat code #

Gear ID#	# of units	# of people involved	Catch (kg)	how does this catch compare with a typical catch for this time of year*	Species in catch by percentage															
					sp. code	%	sp. code	%	sp. code	%	sp. code	%	sp. code	%						

Habitat code #

Gear ID#	# of units	# of people involved	Catch (kg)	how does this catch compare with a typical catch for this time of year*	Species in catch by percentage															
					sp. code	%	sp. code	%	sp. code	%	sp. code	%	sp. code	%						

Habitat code #

Gear ID#	# of units	# of people involved	Catch (kg)	how does this catch compare with a typical catch for this time of year*	Species in catch by percentage															
					sp. code	%	sp. code	%	sp. code	%	sp. code	%	sp. code	%						

express as percentage of typical catch, for less than typical put e.g. 75%, 50% etc, for more than typical put e.g. 150% 175%, 200% etc. If the catch is typical (usual) put 100%

add more boxes if necessary for additional habitats.

Individual Survey No.:

□□ - □□ - □□

Section D – 1 Disposal of Most Recent Catch

Purpose		% of total catch	main species used for this purpose (code #'s)
Consumed fresh in own household	<input type="checkbox"/> Yes <input type="checkbox"/> No		
fish processed/preserved in own household	<input type="checkbox"/> Yes <input type="checkbox"/> No		
fish sold:	<input type="checkbox"/> Yes <input type="checkbox"/> No		
by household at market	<input type="checkbox"/> Yes <input type="checkbox"/> No		
to middleman	<input type="checkbox"/> Yes <input type="checkbox"/> No		
given to relatives/friends in another household	<input type="checkbox"/> Yes <input type="checkbox"/> No		
bartered/exchanged for goods	<input type="checkbox"/> Yes <input type="checkbox"/> No		
sold for ornamental/aquarium fish	<input type="checkbox"/> Yes <input type="checkbox"/> No		
used as seed fish for stocking	<input type="checkbox"/> Yes <input type="checkbox"/> No		
Other: (specify)			

Section D. Further Comments:

Individual Survey No.:

□□ - □□ - □□

Section E Activities over the year

Activities	Yes	No		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Professional fishing	<input type="checkbox"/>	<input type="checkbox"/>	When Days ¹												
Other fishing activities or collecting aquatic animals	<input type="checkbox"/>	<input type="checkbox"/>	When Days												
Aquaculture	<input type="checkbox"/>	<input type="checkbox"/>	When Days												
Processing aquatic animals	<input type="checkbox"/>	<input type="checkbox"/>	When Days												
Sale of aquatic animals	<input type="checkbox"/>	<input type="checkbox"/>	When Days												
Making, selling or repairing fishing gear	<input type="checkbox"/>	<input type="checkbox"/>	When Days												
Employment in fishing or fish processing, marketing, gear making or transport	<input type="checkbox"/>	<input type="checkbox"/>	When Days												
Rice planting, transplanting, harvesting or looking after	<input type="checkbox"/>	<input type="checkbox"/>	When Days												
Looking after vegetables or orchard inc. planting and harvesting	<input type="checkbox"/>	<input type="checkbox"/>	When Days												
Looking after livestock	<input type="checkbox"/>	<input type="checkbox"/>	When Days												
Handicrafts (making)	<input type="checkbox"/>	<input type="checkbox"/>	When Days												
Trading (not fish related inc. handicrafts)	<input type="checkbox"/>	<input type="checkbox"/>	When Days												
Money lending	<input type="checkbox"/>	<input type="checkbox"/>	When Days												
Wage labour (not fish related)	<input type="checkbox"/>	<input type="checkbox"/>	When Days												
Government service	<input type="checkbox"/>	<input type="checkbox"/>	When Days												
Transport service (land or water)	<input type="checkbox"/>	<input type="checkbox"/>	When Days												
Student (resident outside village)	<input type="checkbox"/>	<input type="checkbox"/>	When Days												
Child at school in village or near village	<input type="checkbox"/>	<input type="checkbox"/>	When Days												
Other, describe			When Days												
Other, describe			When Days												

¹Indicate the number of days (per month) that this activity is undertaken

Section E – Further Comments

End Time	:

Village Profile Survey No.:

Interview Identification

		Start	
i. Date & Time:	/ /	:	Enumerators <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>

ii. Key Respondents Interviewed	Name(s)	Position

Section A-1 Village Identification (partly from mapping exercise)

1.	Village Code Number: <input type="text"/> <input type="text"/> - <input type="text"/> <input type="text"/> - <input type="text"/> <input type="text"/> - <input type="text"/> <input type="text"/>	VERIFICATION			
2.	Village Name				
3.	Village Position	Longitude			
		Latitude			
4.	Altitude (meters)				
5.	Distance to Nearest Urban Centre (km)				
6.	Market in Village?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
7.	If yes, Fish market in Village?			<input type="checkbox"/> Yes	<input type="checkbox"/> No
7.	'middle person' in Village?			<input type="checkbox"/> Yes	<input type="checkbox"/> No
8.	Access Category	<input type="checkbox"/> Paved Road	<input type="checkbox"/> Lake/reservoir	<input type="checkbox"/> Paved Road	<input type="checkbox"/> Lake/reservoir
		<input type="checkbox"/> Dirt road	<input type="checkbox"/> River(s)	<input type="checkbox"/> Dirt road	<input type="checkbox"/> River(s)
		<input type="checkbox"/> Track	<input type="checkbox"/> Water ways	<input type="checkbox"/> Track	<input type="checkbox"/> Water ways
		Yes	No	Size and Distance	Yes No Size and Distance
9.	Large lake or Reservoir	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
		Name			
		Yes	No	Number	
10.	Large River	<input type="checkbox"/>	<input type="checkbox"/>		Name
		Yes	No	Number	Yes No Number
11.	Small lakes and Reservoirs	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
12.	Small streams and Canals	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
		Permanent		Seasonal	Permanent Seasonal
13.	Status (of small water bodies near village)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Village Profile Survey No.:

Section A-2. Population

		Census	Verification
1.	Number of inhabitants:		
2.	Number of Households:		
3.	Ethnic Groups (give names)	1.	
		2.	
		3.	

Section A-3. Confirmation of Village Location

1.	Has the village location changed within the last 10 years? <input type="checkbox"/> Yes <input type="checkbox"/> No		
If YES,	2.	Which Year:	
	3.	How Far from Original Location:	(km) Village name(s)
	4.	Did Village Merge with Another	<input type="checkbox"/> Yes <input type="checkbox"/> No

Section A-4. Water Management Scheme (from mapping exercise)

		Influence	Relative position	Distance (km)
1.	Reservoir	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Downstream <input type="checkbox"/> Upstream <input type="checkbox"/> Near or at village	
2.	Size <input type="text"/> <input type="checkbox"/> Rai <input type="checkbox"/> Hectare <input type="checkbox"/> km ²			
3.	Irrigation scheme	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Upstream <input type="checkbox"/> Downstream <input type="checkbox"/> Near or at village	
4.	Flood protection embankment controlling flooding of land near village	<input type="checkbox"/> Yes <input type="checkbox"/> No		

Section A Further Comments:

Village Profile Survey No.:

Section B-1. Agricultural/Farmland/Cultivation Area (standing water/fish from mapping exercise)

Type of agricultural land	Present	Area	Unit	Standing Water/Fish?	
				Area (%)	Duration (# of months)
1. Total Area					
2. Paddy Rice:	<input type="checkbox"/> Yes <input type="checkbox"/> No				
3. Irrigated Rice:	<input type="checkbox"/> Yes <input type="checkbox"/> No				
4. Upland/Dry Rice:	<input type="checkbox"/> Yes <input type="checkbox"/> No				
5. Floating Rice:	<input type="checkbox"/> Yes <input type="checkbox"/> No				
6. Aquaculture (ponds, ...)	<input type="checkbox"/> Yes <input type="checkbox"/> No				
7. Vegetable Garden	<input type="checkbox"/> Yes <input type="checkbox"/> No				
8. Orchards	<input type="checkbox"/> Yes <input type="checkbox"/> No				
9. Cash Crop (non-rice crop)	<input type="checkbox"/> Yes <input type="checkbox"/> No				
10. Aquatic habitats - rivers	<input type="checkbox"/> Yes <input type="checkbox"/> No				
11. Aquatic habitats - swamps	<input type="checkbox"/> Yes <input type="checkbox"/> No				
12. Aquatic habitats - reservoirs	<input type="checkbox"/> Yes <input type="checkbox"/> No				
13. Aquatic habitats - lake	<input type="checkbox"/> Yes <input type="checkbox"/> No				
14. Commons - forest/scrub	<input type="checkbox"/> Yes <input type="checkbox"/> No				
15. Commons - grassland/grazing	<input type="checkbox"/> Yes <input type="checkbox"/> No				
16. Other(s) (specified)	<input type="checkbox"/> Yes <input type="checkbox"/> No				

Section B-2. Access to Farmlands (own/leased/borrowed...)

How many HHs have access to farmlands of the following sizes:		Number of HHs
1.	Landless	
2.	1- 2 Rai	
3.	3 - 6 Rai	
4.	6 -12 Rai	
5.	13 - 60 Rai	
6.	more than 60	

Section B-3. Aquaculture

	# Units	Total Area	# of HH's having
1. Fish Ponds			
2. Fish Pen/Cage Culture			

Village Profile Survey No.:

Section B4. Stocking rice fields

1.	Fish stocking in rice fields	<input type="checkbox"/> Yes <input type="checkbox"/> No
2.	Percentage of households involved	
3. which species are mainly used for stocking:		
Order of importance	Species code #	Notes
First		
Second		
Third		
Fourth		

Section-B Further Comments

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Village Profile Survey No.:

Section C-1. Large Scale Gear (for commercial use):

	Type of Large Scale <u>gears</u> operated In or near the Village	Total Number of Units:	Total Number of Households	
			Within village	Outsiders
1.	Trawl (list or use codes)			
2.	Dai			
3.	Lift net			
4.	Long line			
5.	Barrage			
6.	Pond trap			
	Other - specify:			
7.				
8.				
9.				
10.				

Section C-2. Migratory Fishers:

1.	Do villagers <u>leave</u> (migrate from) the village to go to fishing grounds far away for <u>commercial</u> fishing activities?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2.	Do outsiders <u>come</u> to or near the village for <u>commercial</u> fishing activities?	<input type="checkbox"/> Yes <input type="checkbox"/> No

Section C Further Comments:

1. _____
2. _____
3. _____

Village Profile Survey No.: **Section D-1. Fishery related Middle to Large Scale Business Activities**

<i>(businesses or households)</i>		Number of Units or Households	Number of People Involved	
			self employed	labour
1.	Trading (Buy & Sell)			
2.	Transport (not traders)			
3.	Fish Paste and fermented fish Processing			
4.	Fish Sauce Processing			
5.	Other Fish Processing (inc. salting, drying, smoking)			
6.	Make/Sell Boats			
7.	Make/Sell Fishing Nets			
8.	Make/Sell Trap-Baskets or other fishing gear			
9.	Make/Sell Ice			
10.	Make Fences			
11.	Other (specify)			

Section D-2. Fish marketing in neighbouring countries

		Country	Quantity
1.	Fish sold/transported to other countries?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2.	Direct sale to merchants from other countries	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3.	Sale in another country?	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Section D-3. Economic Activities and income

Number of households dependant on the following activities for Subs/Cash Income		Subsistence	Cash Income	
			Main	Suppl.
1.	Capture fisheries (including catching, processing, trading, labour)			
2.	Aquaculture (cage and pond)			
3.	Rice Farming			
4.	Garden (vegetables and orchard)			
5.	Livestock (raising and trading)			
6.	Handicrafts			
7.	Trading other goods			
8.	Money Lending			
9.	Government Service			
10.	Labour (non fisheries)			
11.	Cash remittance from outside village			

Village Profile Survey No.:

Section E-1. Community Based Aquatic Resource *[Management]* Initiatives:

Does the village have any of the following:		
1.	Conservation zone – Reserve Area for fish: (e.g.: Seasonal back-swamps)	<input type="checkbox"/> Yes <input type="checkbox"/> No
2.	Community Ponds:	<input type="checkbox"/> Yes <input type="checkbox"/> No
3.	Restriction on fishing on the basis of Season:	<input type="checkbox"/> Yes <input type="checkbox"/> No
4.	Restriction on the basis of Gear:	<input type="checkbox"/> Yes <input type="checkbox"/> No
5.	Restriction on the basis of Species:	<input type="checkbox"/> Yes <input type="checkbox"/> No
Other: describe		
Other: describe		
Other: describe		

Section F Further comments

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

(End of Survey) Time: :

LARReC Data and Information Unit

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