


A REVIEW OF SOCIOECONOMIC STUDIES IN THE FISHERIES SECTOR IN CAMBODIA



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Citation:

Hap N., Un S., Nasielski J. 2016. A review of socioeconomic studies in the fisheries sector in Cambodia. Inland Fisheries Research and Development Institute (Fisheries Administration) and WorldFish. Phnom Penh, Cambodia. 14 pp.

Key words:

Economic assessments – fish value chain – livelihoods – valuation – Mekong

ISBN-13:978-9924-9046-2-5

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Inland Fisheries Research and Development Institute (IFReDI)

PO Box 582, Phnom Penh, Cambodia

Website: ifredi-cambodia.org

2016

Printed in Cambodia

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TABLE OF CONTENTS

- 1 INTRODUCTION 1**

- 2 OVERVIEW OF THE FISH TRADE SECTOR..... 3**
 - 2.1 INLAND FISHERIES PRODUCTION 3
 - 2.2 MARKETING SYSTEM OF INLAND FISHERIES PRODUCTS..... 4
 - 2.3 EXPORT MARKET 7

- 3 REVIEW OF THE METHODOLOGY OF SOCIOECONOMIC STUDIES ON CAMBODIAN FISHERIES 8**
 - 3.1 1998 STUDY “SOCIOECONOMIC ASSESSMENT OF FRESHWATER FISHERIES OF CAMBODIA” 8
 - 3.1.1 Methodology and sample selection 8
 - 3.1.2 Important aspects of the methodology 9
 - 3.2 2006 STUDY “SOCIOECONOMICS AND VALUES OF RESOURCE IN THE TONLE SAP AND MEKONG-BASSAC” 9
 - 3.2.1 Methodology and sample selection 10
 - 3.2.2 Important aspects of the methodology 10
 - 3.3 2009 STUDY “ECONOMICS AND LIVELIHOODS OF SMALL-SCALE INLAND FISHERIES IN THE LOWER MEKONG” 10
 - 3.3.1 Methodology and sample selection 11
 - 3.3.2 Important aspects of the methodology 11

- 4 CONCLUSIONS 12**

- 7 BIBLIOGRAPHY 13**



Abstract

We present a review of the fish trade sector in Cambodia, and a critical analysis of the main studies on the socioeconomic value of fish in Cambodia. We focus in particular on the design and methodological approach of three major studies. Weaknesses and pitfalls to be avoided are identified. Lessons drawn from this analysis provide a basis for the development of an improved approach of socioeconomic assessments of fisheries resources in the Mekong Basin.

Keywords

Economic assessments – fish value chain – livelihoods – valuation – Mekong

Acknowledgements

Hap Navy supervised the report;
Un Sophea co-authored the report;
Joshua Nasielski contributed the review of studies.

Citation

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1 INTRODUCTION

Cambodia has two main rivers, the Mekong and the Tonle Sap, which includes Southeast Asia's largest lake extending across the center of the country. The Mekong, the 12th longest river in the world (MRCS, 1992), dominates the hydrology of the country. It originates in China and passes through Myanmar, Laos, Thailand, Cambodia and Vietnam before entering the South China Sea.

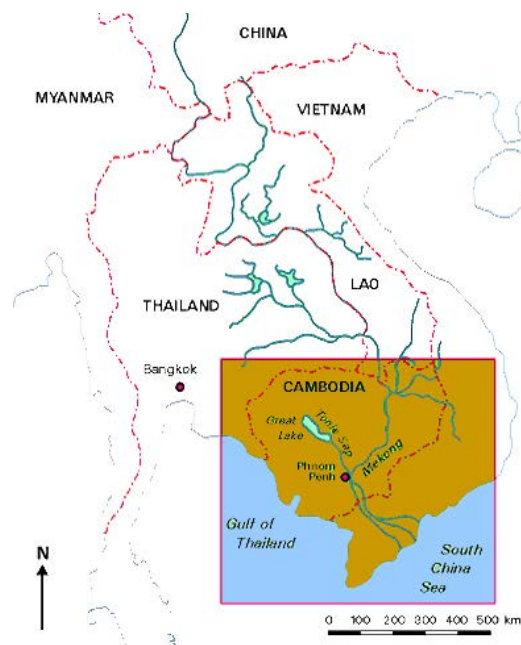


Figure 1: Lower Mekong Basin and Cambodia

The diverse aquatic resources of the Mekong and the Tonle Sap provide benefits to millions of people in Cambodia. People living on and around rivers and lakes enjoy both economic and non-economic benefits including food security and nutrition, mainly from fish and other aquatic animals, and livelihood opportunities (fishing and fishing-related activities for household income). According to the National Environmental Action for Plan 1998-2002, more than three million people depended on the Tonle Sap Lake and its river for their livelihoods (MoE, 1998). The Food and Agriculture Organization estimated in 2011 that the fisheries sector employed “around 420 000 people directly”. However, Baran *et al.* (2014) note that “in the 2008 census, only 0.6% of the population declared fishing as a primary activity, though 64% of all rural households are engaged in fishing (FAO, 2010) and 85% of households (i.e. more than 11 million people) are rural (WB, 2009)”. This probably explains why FAO also estimated that “around six million people or 50% of the population are ‘employed’ on a part-time basis in fisheries” (FAO, 2011).

According to McKenney and Tola (2002), fisheries diversified rural livelihood activities and insured against the risk of agricultural failures. Fisheries also provided easy access to income-generating activities with very little capital investment and no land. Moreover, fisheries played a vital role in food security, maintaining and improving nutrition. All this contributed to making fisheries an important sector for the national economy. According to the Department of Fisheries (2001), 35% of the population was living in a fishing-dependent commune in 1998. Scientific assessments by van Zalinge *et al.* (2000) indicated annual volumes of inland fish catches of 289 000 to 431 000 tons between 1994 and 1997 with retail market values of between \$250 million and \$500 million. According to official country statistics, the inland catch peaked at 528 000 tonnes in 2013. Starr (2003) reported that fisheries output accounted for about 12% of the country's gross domestic product, exceeding rice production which contributed about 10%. Baran *et al.* (2007) reported that the overall fisheries sector contribution to GDP ranged between 10 and 12%.

Although the Lower Mekong Basin (LMB) and the Tonle Sap are recognized as very important in terms of fish resources, a precise estimate of the economic value of LMB fisheries has been lacking. Ahmed *et al.* (1998) assessed socio-economic aspects of freshwater capture fisheries in Cambodia, Baran (2005) estimated the value of Cambodian inland fisheries, and Rab *et al.* (2006) researched the socioeconomics and values of resources around the Tonle Sap and in the Mekong-Bassac area (the Bassac River being the largest distributary of the Mekong). Since then, no studies have assessed the status of an important and rapidly evolving sector, hence the need for a comprehensive study assessing the economic values of inland fisheries in Cambodia to build broader understanding and assess the benefits of fisheries in the Cambodian part of the Lower Mekong Basin.

2 OVERVIEW OF THE FISH TRADE SECTOR

2.1 INLAND FISHERIES PRODUCTION

Fisheries contribute about 75% of the animal protein intake of Cambodian households most of which comes from freshwater fisheries. The country is considered to have the world's most productive inland fisheries, which account for about 60% of commercial fisheries production alone (Ahmed *et al.*, 1998). In terms of inland fisheries, the country used to be ranked fourth in the world after China, India and Bangladesh (FAO, 1999). It now ranks fifth following the FAO's recent inclusion of figures from Myanmar. Of the total inland production, about 17% used to be from commercial (large-scale) fisheries, 25% from middle-scale fisheries, 36% from small-scale (family) fisheries and 22% from rice-field fisheries.

Inland fisheries production fluctuated between 2000 and 2014 while production from aquaculture increased eightfold. Yet, capture fisheries still supply markets with six to eight times more fish than the aquaculture sector. Data from the Fisheries Administration (2010) showed that the inland catch, mostly fish, ranged from 245 600 tons in 2000 to 528 000 tons in 2013. Production of fish from aquaculture, mostly freshwater species, jumped from 14 410 tons in 2000 to 49 925 tons in 2014 (Table 1). This represented six to eight times more capture fish than aquaculture fish.

Table 1: Total production of inland fisheries in Cambodia, 2000-2014

Years	Inland capture fish (tonnes)	Marine capture fish (tonnes)	Aquaculture fish (tonnes)
2000	245 600	36 000	14 410
2001	385 000	42 000	13 857
2002	360 300	45 850	14 547
2003	308 750	54 750	18 410
2004	250 000	55 800	20 760
2005	324 000	60 000	25 915
2006	422 000	60 500	34 160
2007	395 000	63 500	35 190
2008	365 000	66 000	39 925
2009	390 000	75 000	49 925
2010	405 000	85 000	59 935
2011	445 000	91 000	71 908
2012	509 000	99 000	73 900
2013	528 000	110 000	90 000
2014	505 005	120 250	110 055

Source: Fisheries Administration

2.2 MARKETING SYSTEM OF INLAND FISHERIES PRODUCTS

There is strong domestic demand not only for live fish but also preserved forms such as fish paste, fermented fish, salted-dried fish, smoked fish and fish sauce. The main stakeholders in the inland fisheries marketing system and supply chain include fishermen, collectors/middlemen, wholesalers, retailers, processors and exporters. Among those who do not directly trade fish are transporters, fish handlers and workers at landing sites and markets, fishing equipment producers and sellers, boat makers, money lenders, ice and salt suppliers, drivers of boats and motor-cycle taxis, fisheries officers, police, local authorities, basket producers and sellers, landing place owners and market managers (Rab *et al.*, 2005).

a. Fishing Lot Owners

Amid growing pressure on wild fish resources, the Royal Government of Cambodia recently overhauled the fishing lot system established more than a century ago. Fishing lot owners used to control the product and functioned as fish suppliers to wholesalers and other traders, processors, collectors and exporters, either at fishing lots or landing sites (Rab *et al.*, 2005). They never exported themselves but stocked fish in pens or cages for sale to urban markets in the closed season in both fresh and processed forms. Some lot owners were financed by larger exporters, traders or government officials, and were consequently obliged to sell their catch to their financial backers (Rab *et al.*, 2005).

In 2012, the Government abolished all fishing lots across the country with the aim of allowing full local access to fisheries, reducing poverty and sustainably managing the resources. Some lots were handed over as fishing grounds for local people while others were taken as fish sanctuaries. Others were allocated for research or as fish conservation zones.

b. Fishermen

Regardless of whether they fish part time or full time, fishermen are classified as small, medium or large-scale depending on size of catch potential and type of fishing gear. Normally, small-scale (family-scale) means 1-3 persons who fish primarily for household consumption and income. The number of small-scale fishers is increasing annually as the population grows and as alternative livelihoods become scarce. Medium-scale means extended families and village-level partnerships of 3-6 persons who catch fish for family income or processing. These kinds of fishers sell to collectors and sometimes directly to consumers (Rab *et al.*, 2005). Large-scale includes a seasonal *dai* bagnet fishery on the Tonle Sap River in Phnom Penh and Kandal Province, the only industrial-scale fishery found anywhere in the Lower Mekong Basin.

c. Fish Collectors/Middlemen

Collectors or middlemen obtain fish directly from those who are using the fishing grounds. Generally, they have one or several boats with ice boxes during the collection period. Fish collectors are specialized operators who buy fish throughout the year, bringing catches to landing sites. They set prices with fishers, depending on quality and daily market demand and supply. Most fish collectors have capital for immediate cash payments although they also often provide credit in cash and in kind (e.g. fishing gear). In practice, some collectors also get loans from wholesalers, middlemen and exporters to whom they sell fish at the landing site (Rab *et al.*, 2005).

d. Wholesalers

Wholesalers represent an important part of the fish marketing chain since major quantities of fish are channeled through them. In Cambodia, they are best compared to fish distributors who have a permanent stall at a fish-landing site, floating village or distribution center. They usually buy fish from fishers, collectors or middlemen and sell these to exporters, retailers and restaurants. This business is very much location-specific, and the scale may depend on whether a wholesaler is based in a provincial town or in a city area. Wholesalers are the main traders and providers of capital to most medium and large-scale fishers (Rab *et al.*, 2005).

e. Semi-wholesalers

Semi-wholesalers are traders who have a permanent stall inside or outside a market, whereby fish are brought by fish collectors/middlemen or wholesalers. Semi-wholesalers act sometimes as retailers but they usually have an additional function in distributing fish to small retailers who sell fish at local markets directly to consumers and processors. Most semi-wholesalers are fish traders at the provincial level but some also operate in cities or transport fish from the capital to sell to retailers in fish-deficit provinces (Rab *et al.*, 2005).

f. Retailers

Fish retailers are those who sell fish in markets directly to consumers or restaurants. In many cases, they have a permanent stall inside or outside the market. Generally, each provincial or local market has many fish retailers selling fish every day (Rab *et al.*, 2005). They are mostly women but often have spouses or relatives who help them buy fish from the landing site or the distribution center. Some retailers who work alone (such as widows or widowers) buy fish from semi-wholesalers in the same market or place where they sell fish directly to consumers. In addition, there are also retailers who are itinerant traders, selling from a basket or another container and moving from place to place.

g. Processors

Fish processors are generally fishers or fish farmers (but not all of them) or businesspersons. The processors, who mainly buy fish from fishing-lot owners or traders/middlemen/fish collectors, produce items such as fish paste, salted dried fish, fermented fish and smoked fish. Processed products are usually sold to domestic markets, although some products and species are also sold to international markets (Rab *et al.*, 2005).

h. Exporters

Exporters sell fish products to neighboring countries (Laos, Thailand and Vietnam) and other countries. They generally purchase fish directly, store them with ice in containers and export them by land or air as live fish (Rab *et al.*, 2005).

i. Transporters

Fish transporters provide transportation services to fish traders/wholesalers but are not involved in buying or selling fish. They are important in the fish trade channel. The mode of transport differs from one area to another. Fish are usually transported by boat, motorbike, mini-truck or pick-up car from fishing grounds to landing sites, local markets and fish distribution centers as well as to processors and export markets in neighboring countries. Transporters pay a registration fee to the Fisheries Administration and a series of unofficial road taxes from the landing site to the final destination.

All stakeholders in the inland fisheries marketing system – particularly fishermen, *dai* owners, local collectors and local fish processors – operate without any organized information system regarding price, market demand or annual catch volumes. An overview of the supply chain for inland fisheries products is shown in Figure 2. Although there are different elements of the producer components – inland, aquaculture and processing – they have similar marketing channels as well as supply chains. Fish harvested by all scales of fishers and fish farmers are immediately landed (i.e. at the landing site or port), and transferred to collectors and/or processors. Sometimes, harvested fish are kept alive in pens or cages for sale during periods when supply is scarce and prices improve.

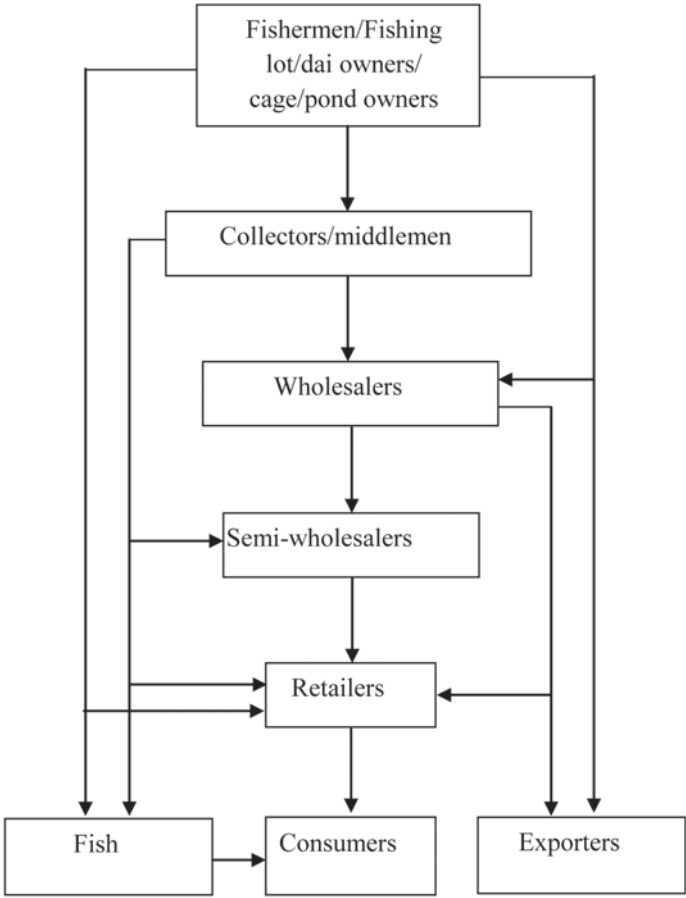


Figure 2: Supply chain of inland fisheries products in Cambodia’s fish marketing system. Source: Rab *et al.*, 2005

The infrastructure for marketing and trading inland fisheries products is generally still very poorly developed in terms of landing, storage, preserving, transport and retail facilities. This limits market opportunities and also prevents those selling fish to schedule selling decisions to their competitive advantage (Rab *et al.*, 2005).

Fish processing and trade often complement fishing or farming and therefore provide an additional source of income for many households. Fish marketing and trade offer one of the few opportunities for women and poor households around the Tonle Sap Lake to increase their household income, and their engagement should consequently be encouraged.

2.3 EXPORT MARKET

While the domestic market for freshwater fish is relatively well established despite constraints to distribution and infrastructure, the export market is still developing. Fish exports consist mainly of processed fish products from industrial-scale processing plants and high-value species exported to neighboring and other countries (Rab *et al.*, 2005). Exports are growing in response to increasing international demand and rising prices in other countries.

Exports of freshwater fish products fall into three categories. The first involves the export of chilled fish by land to Thailand. The second is the export of live fish and catfish fingerlings in cages by boat to Vietnam. The third involves the export of high-value live fish and selected fish products by air to markets such as Singapore, Malaysia, Hong Kong and China. Markets for frozen fish (such as fish fillets and fish balls) and salted dried fish include Taiwan, Japan, Australia and the United States.

Official figures show annual exports of inland fisheries products fluctuating between 22,000 and 52,000 tonnes between 2005 and 2009. These figures are unlikely to reflect the true levels as much export activity is not formally recorded. According to Rab *et al.* (2005), exporters often do not report all exports at land border points. In 2006, the International Trade Centre of UNCTAD and WTO estimated the annual value of exports at around \$100 million, largely based on figures for the value of fish imported from Cambodia in the records of trading countries (ITC, 2006).

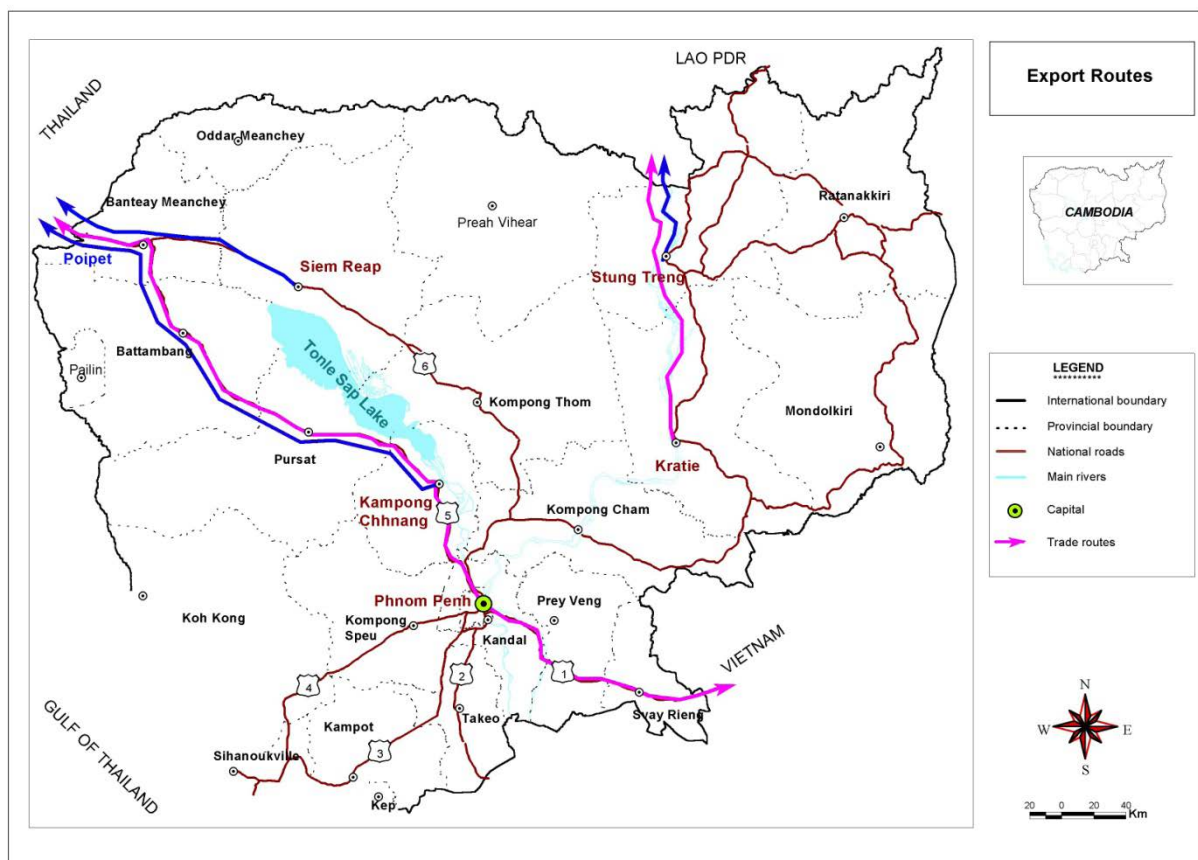


Figure 3: Fish export routes in Cambodia. Source: Rab *et al.* (2005)

3 REVIEW OF THE METHODOLOGY OF SOCIOECONOMIC STUDIES ON CAMBODIAN FISHERIES

3.1 1998 STUDY “SOCIOECONOMIC ASSESSMENT OF FRESHWATER FISHERIES OF CAMBODIA”

We review below the study “Socioeconomic assessment of freshwater fisheries of Cambodia” by Ahmed *et al.* (1998).

3.1.1 Methodology and sample selection

The study surveyed eight provinces with access to fishery resources¹. The authors do not explicitly explain why these provinces were selected nor do they define “access to fishery resources”. Each district within a province is classified as either a fishing district or a non-fishing district. Then, every commune within a fishing district is classified as either a fishing commune or a non-fishing commune.

The survey defines fishing communes and districts as those which have access to a water body and whose population is active in fishing; this is the only explicit criterion to distinguish fishing from non-fishing districts/communes. This classification is also based on information that was collected during: “1) meetings with province/district level fishery officials 2) interviews with Key Potential Informers 3) personal observations by project experts during site visits.” These observations, meetings and interviews also form the basis for stratifying fishing communes according to two criteria: type of fishing ground² and dominant fishing practice³. Once stratified according to these two criteria, these fishing communes (328 in total) were listed and 83 of them (i.e. 25% of the total) were randomly selected for sampling.

Households in these fishing communes are listed. Five per cent of the households in the list of each commune are randomly selected to complete the survey. After the selection, households are classified as either fishing or non-fishing households (both fishing and non-fishing households were surveyed). A household is defined as a fishing household if the household head or at least one member of the household is actively engaged in fishing most of the time⁴.

¹ The eight provinces selected: Kandal, Kampong Cham, Kampong Chhang, Siem Reap, Pursat, Battambang, Kampong Thom, Phnom Penh

² Four possible values: principle rivers/great lakes, small reservoirs/lakes/streams, inundated forests, ricefields/floodlands, other rivers/lakes

³ Five possible values: mainly family fishing, family fishing and fishing lot, middle-scale and family fishing, middle scale and fishing lot and family fishing,

⁴ The definition of household in the study is: ‘Household is defined to consist of members of the family, including joint and extended families, who contribute to the common welfare of the family by providing production and income and who live and dine together whenever they are at home. Members residing outside their home for education, job and other purposes are also part of the household.’

Ahmed *et al.* are explicit in that the study target population is the population living in fishing communes within fishing districts. According to the study, there are a total of 452,714 such households. A total of 5,117 household were surveyed, or about 1% of the population.

The survey, which consists of a pre-designed questionnaire, was completed in two phases, one in mid-1995 and one in early 1996. The survey was divided into two periods because of the limited manpower and capacity available to carry out field surveys. One supervisor and three to six data collectors were hired to conduct the survey in each province. The emphasis during the first period of the survey was on establishing and testing methodologies and creating a core group of researchers through on-the-job training and learning-by-doing.

3.1.2 Important aspects of the methodology

This study is not an inferential study. Ahmed *et al.* do not attempt to draw conclusions from their sample to the population they are studying (i.e. fishing communes within fishing districts). Rather, they simply describe the results of their surveyed sample. There does not seem to be any inferential statistics in the report.

Ahmed *et al.* most likely used a stratified random sampling method when selecting fishing communes, perhaps with proportional representation. The study divides the fishing communes into strata using two criteria and then selects a random sample from each stratum. It seems likely that the sample size is proportional to the size of the stratum⁵. However, the final report is not explicit in this regard.

The household sampling method is implicitly population-weighted⁶. Thus, a commune with 100 households would have 5 surveyed households while a fishing commune with 200 households would have 10 surveyed households.

In determining which households are considered fishing-dependent, Ahmed *et al.* use a relatively loose definition. For instance, although 39% of surveyed households are considered fishing dependent, 76% of surveyed households would be considered “rice farming dependent” using the same criteria and data.

3.2 2006 STUDY “SOCIOECONOMICS AND VALUES OF RESOURCE IN THE TONLE SAP AND MEKONG-BASSAC AREAS”

We review below the study entitled “Socioeconomics and values of resource in the Tonle Sap and Mekong-Bassac areas: results from a sample survey in Kampong Chhnang, Siem Reap and Kandal Provinces” by Rab *et al.* (2006).

⁵ That is, sample size for a strata equals the total sample size times the size of the strata divided by the population size

⁶ The population being households not persons

3.2.1 Methodology and sample selection

The study selects three provinces around the Tonle Sap as well as in the Mekong-Bassac sub-basin, giving no reason as to why they were selected. Unlike Ahmed *et al.* (1998) who only surveys households living in fishing communities, Rab *et al.* group villages into three categories: fishing villages, fishing-cum-farming villages and farming villages⁷. In each province, the authors select one of each type of village for the study (i.e. nine villages in total). Again, no reason nor selection method explain why these nine villages were selected.

After village selection, Rab *et al.* interview the village chiefs and stratify households into three income classes (low income, middle income, high income), then randomly select 45 households from each village (15 households from each income group).

Ahmed *et al.* (1998) and Rab *et al.* (2006) pose similar questions on demographics and socioeconomic information including values of homes, household assets and fishing equipment and the prices of farm products, fresh and processed fish and inputs for aquaculture.

The survey was performed twice, in the closed fishing season (September 2003) and the open season (January 2004). The first survey involved an in-depth questionnaire while the second was limited to fish catch, marketing and processing activities. Three teams of data collectors were formed and trained. The selected village head was interviewed to get general information by using guiding questions.

3.2.2 Important aspects of the methodology

Relying on village chiefs to classify households into income groups without objective standards can create a substantial bias and does not formally allow comparison or generalization. The survey included a question on household income. However, this question was asked after households were selected and classified into a wealth group.

The survey is not population-weighted with respect to income. For example, 30% of surveyed households are “high income” even though they may make a much smaller percentage of the overall village population.

3.3 2009 STUDY “ECONOMICS AND LIVELIHOODS OF SMALL-SCALE INLAND FISHERIES IN THE LOWER MEKONG BASIN”

We review below the study “Economics and livelihoods of small-scale inland fisheries in the Lower Mekong Basin: a survey of three communities in Cambodia” (Navy and Bhattarai, 2009).

⁷ Fishing villages had populations that were 80%-90% fully involved in fishing, farming villages had populations that were 80%-90% fully involved in farming, fishing-cum-farming villages had populations that were 80%-90% fully involved in fishing during the wet season and farming during the dry season.

3.3.1 Methodology and sample selection

This study is focused on gathering information about small-scale fishers (i.e. family fishers) to help inform pro-poor fisheries policy. The authors gather quantitative data on the costs and returns of Cambodia's small-scale fisheries to see if they are an economically viable activity for the poor. In addition, qualitative data on the fishers and their villages is presented.

The study is based on two information-gathering techniques: a participatory rural appraisal (qualitative information) and a household survey (quantitative information). The authors focus on three villages in three different Cambodian provinces representing three distinct fishery ecosystems: Kampong Chhnang (Tonle Sap Lake ecosystem), Takeo (Mekong-Bassac ecosystem) and Stung Treng (Upper Mekong ecosystem). Local informants helped select 10-12 fisher families for participatory rural appraisals in each village; after the appraisals, the information gathered was cross-checked by interviewing other informants and fishers.

Sixteen households were selected for a structured questionnaire. This generated detailed cost/return information for small-scale fishers during the open and closed fishing seasons. The questionnaire detailed information on socioeconomic characteristics, cost structures used in fishing trips, level of fish catch, different measures of profitability (with and without taking family labor into consideration), species of fish caught, market sale patterns and profitability. From this information, the authors calculated different measures of earnings from fishing activities.

3.3.2 Important aspects of the methodology

This is a very small study, whose inferential power is most limited. The wide variation of costs/returns in the three surveyed villages suggests that these variables are highly location dependent. If anything, this study provides evidence that larger samples are needed to generate accurate cost/return data.

The authors note that about 10-15% of the daily fish catch is consumed by the family and not sold but the economic value of this consumption is not included in the cost/return analysis. Thus the analysis probably understates the economic returns to fisher families since they avoid purchasing food by consuming part of their fish catch.

In calculating an implicit family labor cost, the authors assume that two family members per day fish during the open season and one family member per day fishes during the closed season.

4 CONCLUSIONS

We reviewed in the above sections the findings of the major studies of the economic value of fish in Cambodia and the methodology or biases of these studies. This information provides a basis for the development of a fisheries welfare valuation project and underlines the weaknesses of the previous projects and the pitfalls to be avoided.

In a complement to these points, Béné *et al.* (2009) provides conceptual elements important for a welfare analysis project. Béné makes a distinction between poverty and vulnerability. Poverty is a static measure at a given time, while vulnerability takes into account the fact that poverty is a dynamic condition and changes in time: a household subject to external shocks may become “transiently poor.” Vulnerability is now recognized as a central element of poverty (Chambers, 1989; Khan, 1998; Narayan *et al.*, 2000; World Bank, 2000; Prowse, 2003).

Recent work demonstrates, however, that while vulnerability and poverty are related, they are not systematically correlated (e.g. McCulloch and Calandrino, 2003). Thus fishers are not necessarily the poorest of the poor in monetary terms but may instead be among the most vulnerable socio-economic groups due to their particularly high exposure to certain natural, health-related or economic shocks and disasters (Allison *et al.*, 2006). The question of whether fishers are chronically poor because of the inherent low productivity of the sector, or vulnerable to poverty due to their high exposure to risks and shocks, or possibly both, has immediate relevance for the design of cost-effective poverty reduction strategies.

Béné’s vulnerability index paves the way for better assessing the level of vulnerability in a sample of fishermen. This index is based on daily cash income dependent upon fish (i.e. *actual income* earned from selling the fish + *in-kind income*) corresponding to i) the value of fish used for household consumption (at market prices) and ii) the value of fish used for barter. Four main groups of decreasing vulnerability are defined:

- full-time fishers (‘specialists’) who are not engaged in any other activity;
- ‘generalist’ fishers who derive all their income from fishing but are also engaged in subsistence activities;
- ‘fishing-farming’ households engaged in multiple activities and whose cash-dependence on fish is greater than 50 percent; and
- ‘farming-fishing’ households engaged in a multiple activity livelihoods with a cash dependence on fish lower than 50 per cent.

By integrating the above conceptual elements and drawing lessons from the previous socio-economic studies of the fisheries sector in Cambodia, particularly in terms of statistical robustness and representativeness, upcoming studies can build on solid bases and provide an undisputed conceptual and practical contribution to the valuation of the fisheries sector in Cambodia and the Mekong Basin.

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The project “Assessing economic and welfare values of fish in the Lower Mekong Basin” was funded by the Australian Centre for International Agricultural Research (ACIAR). It was implemented by WorldFish between 2012 and 2016, in collaboration with the Inland Fisheries Research and Development Institute of the Fisheries Administration (IFReDI), the Cambodian Agricultural Research and Development Institute (CARDI), the Royal University of Phnom Penh (RUPP) in Cambodia, Ubon Ratchathani University (UBU) in Thailand, and Can Tho University (CTU) in Vietnam.



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