Economic Studies of Tropical Small Scale Fisheries:
A Discussion of Methodologies

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ABSTRACT

El enfoque multidisciplinario para los estudio de pesquerías a pequeña escala va en aumento. Estudios recientes en Bahía de San Miguel en las Filipinas realizados por el Centro Internacional de Administración de los Recursos Acuáticos Vivientes (ICLARM, en inglés) La Universidad de Rhode Island en Centro América, y la FAO, junto a la UNEP, en la Bahía de Bengala, han enfatizado sobre las investigaciones multidisciplinarias en pesquería.

Los equipos de estos estudios multidisciplinarios, están compuestos, normalmente, por biólogos, economistas, sociólogos y/o antropólogos. El propósito de estos esfuerzos multidisciplinarios es el de proveer información más completa sobre los datos y análisis pertinentes a la administración y desarrollo de pesquerías.

Los estudios mencionados arriba tuvieron como objetivos el desarrollo, prueba y evaluación de los sistemas de información de componentes selectos de las pesquerías. Cada estudio desarrollo una metodología para colectar y analizar datos biológicos, económicos, y sociológicos. Este trabajo discute y evalúa los métodos desarrollados en dichos estudios para la colección y análisis de datos económicos y sociológicos. Los métodos se comparan en términos de su relevancia en la administración pesquera y el desarrollo de "toma de decisiones".

Además, se discute un método de colectar y analizar datos económicos desarrollados por el autor, para un estudio de producción y mercadeo de las pesquerías a pequeña escala en las Filipinas. Este método fue utilizado por un pequeño equipo de investigación, con fondos limitados, y probó ser exitoso. El mismo tiene el potencial de poder ser usado por otros en estudios de pesquerías a pequeña escala. El método se compara, entonces, con aquellos usados por los otros estudios.

THE ECONOMICS OF PRODUCTION AND MARKETING IN A SMALL SCALE FISHERY: MATALOM, LEYTE, PHILIPPINES

There are many misconceptions and unanswered questions related to small scale fishermen and fishing communities in the Philippines and in other developing countries. Among these are questions dealing with the behavior of fishermen and fishing communities, especially when a fishery is overfished, and the alleged imperfections in the marketing system resulting from the "suki" or market/credit relationship between a fisherman and middleman which is prevalent in the Philippines. The goal of this research, conducted on the Matalom fishery, was to examine these questions through an economic analysis of production of the major fishing gears, a costs and earnings study, and through a technical and pricing efficiency and performance analysis of the fresh fish marketing system.

The economic analysis was built around a fisherman and middleman record keeping system. This system was felt to be preferable to interview or observation techniques for collecting information about the fishing and marketing activity because of the difficulties in monitoring any sample of fishermen or middlemen using the other techniques. Using the interview or observation technique, if a fisherman did not appear at the landing site on a particular day it was difficult to determine if he had not fished, sold his fish somewhere else, or fished on another boat. The record keeping system allows you to keep track of the fisherman's activities during the study period.

This study had five phases for data collection (Table 1). The first phase of the study involved a general assessment of the site to familiarize the investigator with the physical setting of the project site; the local government, business, and community leaders; the fishermen and their families; the community structure; and the fishing activity. Time was spent with the fishermen to allow them to get to know the investigator and the purpose of the project. This general site assessment period is felt to be essential to success of the project. It allows the investigator to gain support from local leaders which is essential for gaining cooperation from all sectors of the community. This time allows the research team to answer questions, listen to problems and needs, and develop a number of preliminary impressions which can help to focus the research. These discussions help to avert many potential misunderstandings about the work and develop friendships which can help break down cultural barriers and greatly enhance the research.

Table 1. Field research data collection methodology, Matalom Leyte, Philippines.

Phase	Duration
1. General site assessment	1 month
2. Household census	1 month
3. Costs and returns record-keeping	10 months
4. Middlemen record-keeping and market survey	10 months
5. Agriculture/fishing market survey	3 months

The second phase of the research involved the design, testing and implementation of a general household census in the communities to be studied. The census was used to identify the actual number of fishermen and fishing households in each village. The census also provided baseline information on socioeconomics, the fishing activity, marketing and problems. Village leaders accompanied the research team to make introductions and answer questions. All households in the village were contacted. This information was then processed and analyzed to develop a more complete understanding of the fishermen and to serve as a sampling frame for further data collection.

Phase three of the research began with selection of the major gears to be monitored and the fishermen to keep daily records. The sampling unit used in the study was the fishing unit (boat/gear combination), rather than individual fishermen.

Using the household census, the boat/gear combinations to be studied were selected from those most widely used in the village and to be representative of

the fishery. The sample size chosen for study was dependent on the workload which could be accommodated by the two member research team. A 10% minimum sample of all boat/gear combinations was used.

With assistance from local community and fishing leaders, the fishermen/cooperators were selected purposively rather than randomly. The fishermen were chosen in this manner based on their willingness to participate in the long term record keeping and also their own or a family member's ability to read and write in order to complete the record keeping form. While the cooperators will be selected purposively and this may affect the representativeness of the sample, it is felt that the highly reliable data obtained in this manner outweighs these potential sampling problems.

As stated above, a self-enumeration record keeping system was selected for use in collecting fishing activity data. With this system, fishermen kept daily records of all fishing trips, as well as non-fishing activities. A printed form asking for information on 28 variables including time fishing, gear used, area fished, operating costs, species of fish caught, amount caught, amount sold, amount for own use and price received was given to each cooperator. Strict confidentiality was maintained.

Initially, the research team checked the record forms every two days to continue instruction and answer questions. After this initial period, as the cooperators became more familiar with the procedure, the checking schedule was reduced to twice a week. Periodic checks on the actual fishing activity was conducted to ensure accuracy. The forms were collected once every ten days, checked for omissions, processed and summarized. A summary statement of the results of the record keeping form was given to each cooperator once a month to teach financial management skills.

As the record keeping progressed and a strong friendship was developed between the research team and fishermen, in depth interviews were conducted with each cooperator. This interview served to collect specific information on socioeconomics, capital assets, mobility, other household economic activities, credit, marketing, satisfaction with life, and problems. This interview filled in information gaps about the fisherman, his family and their life. Development and management of the fishery cannot just focus on the fishery but must also include other sectors of the fisherman's life that impact upon him and his family. This social and economic profile helps place the study in a more substantive context and allow for an evaluation of the impacts of development on the whole household. A shorter version of this interview was conducted toward the end of the research to verify the data and collect more information.

The data was aggregated into weekly and study period totals and averages for use in analysis. Fishing effort, catch and gross earnings statistics were prepared to measure the productivity and profitability of each boat/gear combination. Average investment and replacement cost were prepared for each gear.

The primary method of economic analysis used was budgeting or partial analysis techniques. Average fixed and variable costs were calculated from the data, including average operating costs per trip and operating costs as a percentage of gross revenue. One often overlooked cost factor, opportunity cost of labor and capital, was calculated. The opportunity costs of labor and capital are imputed costs; they are the returns that these factors of production could earn if they were used in an alternative activity. The opportunity costs were

calculated for each gear for a more tangible measure and comparison of fishermen's returns. Net returns to owners, operators and crew were calculated, as was average daily wage and net return per man-hour at sea.

Phase four of the research was the middleman record keeping and market survey. The objective of this phase was to collect data that could be used to examine market performance and efficiency. The marketing firm was selected for analysis. The middlemen/cooperators were selected from the household census.

A self enumeration record keeping system similar to that used for the fishermen was chosen for use. The record keeping form had 25 variables focusing on quantities and prices of purchases and sales by species, location of purchase and sale, hours worked, number of purchase and sale transactions, and operating costs. A similar system for form checking and collection as that used for the fishermen was utilized.

The accuracy of the middlemen forms was monitored in a number of ways. These record forms were compared to each other and to those of the fishermen whom they purchased fish from to crosscheck the types of species caught that day and the prices received. Observation of actual transactions throughout the study period provided a check. Price data collected in the markets were also compared with the middlemen records. All of these methods provided checks on the data and its accuracy.

An in depth interview was conducted with each middleman to collect information on capital assets, firm size, business operations, socioeconomics, market structure, satisfaction with life, other economic activities, marketing services, and problems. A second interview was conducted toward the end of the study.

Retail price data was collected daily in several of the regional markets where the middlemen traded or fish from the Matalom fishery was sold. This data was collected by employees of the markets. The retail prices collected in the markets were crosschecked for accuracy by comparing them with the middlemen records. During visits to the markets to collect the price data, additional information was collected on market operation, market structure, and middlemen business practices.

The fresh fish marketing system was analyzed by combining concepts of descriptive, organizational and pricing efficiency approaches to market analysis. The perfectly competitive model was used as a norm against which the observed system was analyzed. The descriptive approach included identification of market participants, description of marketing channels, description of market facilities, and transportation and distribution routes.

To build on this description of the marketing system and to provide systematic analysis of the market, a model from the field of industrial organization which traces a causal flow between market structure, conduct and performance was used (Bain).

To allay certain criticism's of the industrial organization approach and to strengthen the results of this framework, the performance dimensions were modified and expanded by use of pricing efficiency criteria (Bressler and King, Lele, Farruk, Smith). With this methodology, the pricing system plays a central role in the analysis, allowing for a determination of where the marketing system departs from the perfectly competitive model and the reasons for this departure.

Phase five of the research, conducted during the latter part of the study period, involved identifying linkages between agriculture and fishing production and marketing system of Matalom. Data collection involved interviews with farmers and agricultural middlemen, as well as observation. The reason for this analysis was to be able to identify common problems and needs of fishermen and farmers for integrated development. Many of the problems and needs were found to be the same and since many of the fishermen farmed on a part time basis, it was important to integrate these two economic sectors.

The major results of the study revealed an overexploited fishery in which fishermen were using a variety of methods to support themselves including farming more, applying more effort (in terms of time spent fishing and use of a variety of gears to target a mix of fish species) to fishing, engaging in other part time economic activities, or leaving the fishery. The results revealed fishermen to be heterogeneous, mobile, and rational in their behavior toward the fishery and survival. Competition within the marketing system was found to be imperfect or nonperfect, but there appeared to be a fair degree of pricing efficiency. Positive net margins and profits were found, although not all costs and risks faced by the middlemen could be measured. Middlemen were found to earn more than fishermen. Exploitation of the fishermen by the suki was found to be tempered by the isolated nature and social customs of the fishing community. Increased market information to fishermen would increase competition.

It should be noted that no secondary data existed on the Matalom fishery. The only source of data on trends or characteristics of the fishery was from the fishermen and middlemen who provided information from memory.

COMPARISON OF METHODOLOGIES

Recently, several research studies have been conducted on small scale fisheries and the role research can play in designing fisheries management and development programs.

One of these studies was conducted in Central America with a focus on the Gulf of Nicoya in Costa Rica, by the University of Rhode Island (ICMRD, 1981). A second study was conducted on San Miguel Bay in the Philippines by the Institute of Fisheries Development and Research of the University of the Philippines in the Visayas in cooperation with the International Center for Living Aquatic Resources Management (ICLARM) (Smith and Mines, 1982). A third study was conducted on the fisheries of Kerala in India by the Programme for Community Organisation in cooperation with the FAO/UNDP regional project for small scale fisheries promotion in South Asia (Kurien and Willmann, 1982).

There were many similarities in the methodologies used in these three studies. Among these are that record keeping or self enumeration is preferable to interview or observation techniques; that researchers should make maximum use of historical and secondary data for the fisheries and other related sectors; and, above all, research on small scale fisheries be multi-disciplinary, or inter-disciplinary in nature, so that data is shared by researchers (Smith and Pauly, 1982). All three of these research projects were multi-disciplinary investigations, stressing stock assessment, economic and social aspects of research to complement each other.

While there was general agreement over data collection methodologies, each study utilized a different analytical methodology. The ICMRD study emphasized the development of a Cobb-Douglas production and revenue function and the value of marginal products for each of the gear types studied. No costs and earnings were reported. Market analysis utilized the structure and performance framework with emphasis on examining potential economies of scale at both the wholesale and retail levels.

The ICLARM study focused on analysis of costs and earnings and the determination of the returns to capital and labor of each gear type. The opportunity costs of labor and capital were calculated. Emphasis was given to analyzing the existence of pure profits (resource rents above costs) in the fishery. Market structure was analyzed and price data was collected to analyze form and spatial price efficiency of both fresh and dried fish. Marketing costs, returns and margins in both the wholesale and retail markets were analyzed as were the presence of economies of scale.

The Kerala study emphasized the analysis of costs and earninigs of 24 different boat/gear combinations. Factor productivities, cost-effectiveness, earnings and profitability under different sharing systems, and variations between different fishing centers were analyzed. Market structure and prices were analyzed to determine their affect on gross earnings.

As can be seen, each research project had a slightly different emphasis and a different approach to analysis of the data based on the goals of the project. All three, however, gave priority to the collection and analysis of cost and earnings data. Record keeping was the preferred method of data collection. Both wholesale and retail markets were studied using the structure, conduct and performance analytical framework. Price efficiency analysis was utilized in the ICLARM study to complement this framework. The researchers utilized personal interviews to collect data rather than recordkeeping, although this reportedly provided satisfactory data for the ICMRD study. The ICLARM study reported that they underestimated the willingness of middlemen to cooperate and that a recordkeeping system would have been used if this had been known.

LESSONS LEARNED
A number of important lessons about conducting research on small scale fisheries were learned from this research. These include:

1. Developing a close and trusting relationship with the cooperators is essential for success of the research; cooperation of the participants is of utmost importance.
2. At the beginning of the research, it is imperative to spend time explaining why the data are being collected, its benefits and its uses.
3. Utilize local leaders to assist in introducing the researcher, the research goals, and provide insights into culture and practices.
4. Accompany the fishermen and middlemen as they do their work and assist them where possible.
5. Develop a regular monitoring system to measure the accuracy of the data being collected.
6. Provide regular feedback on the preliminary results to the cooperators.
7. Make sure that research methodology remains flexible in order to adapt to changes over time.
8. In larger, multi-disciplinary studies coordinate all survey activities so that

duplication can be reduced and so that data can be used to crosscheck accuracy.

9. Whenever possible use and train local individuals as research assistants.

10. Talk to fishermen in groups regularly so that they know you are not holding anything back or treating anyone differently.

11. Use a methodology that is transferable so that data from other areas can be compared with it.

SUMMARY

To date there have been few economic studies of small scale fishermen. A methodology used to study a small scale fishery in the Philippines was presented in this paper. This methodology emphasized the study of both the production and marketing sectors of the fishery. Recordkeeping seems to be the preferred method to collect data. There are a number of methodologies used to analyze costs and earnings data, all of which are useful. A combination of descriptive, organizational and pricing efficiency methodologies is preferred in analyzing marketing systems. Most important is that research on small scale fisheries should be multi-disciplinary in nature.

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