

Information needs and analytical techniques for economic research in small-scale fisheries

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The essence of economics lies in addressing the so-called 'economising problem': how to maximise overall satisfaction through the efficient use and management of limited resources (including labour, capital, technology, and natural resources). In other words, how can we achieve the most benefits for the least cost? From a societal perspective this is not without its complexities. Should 'satisfaction' be measured relative to 'wants' or 'needs'? Should future needs receive equal weight to those of the present? Should non-material as well as material aspects be considered? These questions are by no means trivial, and attract plenty of attention among all sorts of economists. Nevertheless, the key idea of managing resources to achieve 'maximum satisfaction' (however measured) remains at the centre of economic thinking.

In the present brief discussion, no attempt is made to repeat or even to summarise all the existing literature on data needs and analytical methodologies in fishery economics. Instead, I will merely outline the categories of economic questions that arise in small-scale fisheries, the tools used to address those questions, and some relevant considerations in collecting information and conducting economic analysis within the fishery context.

The rather diverse toolkit used by economists in attempting to quantify and address the economising goal seeks to provide:

- the means for understanding economic aspects of fishery operations, including the harvesting processes, processing and other post-harvest activities, marketing and consumer demand;
- a suitable set of techniques for analyzing economic data, modelling policy options, and formulating appropriate management and development approaches.

Not surprisingly, most of these tools, the vast majority of which were developed in Northern countries, require large amounts of data. However, it is important to recognize explicitly that the idea of 'information needs' is a relative one. There are no 'absolute' needs for fishery information in the same way as, say, humans have an absolute need for protein in our diet. Although everyone might agree that information is **useful** in management and development, in fact it is not **crucial**. Instead, decisions about the acquisition of information should

be seen as inherently economic in nature. There must be a balancing of acquisition costs and the value of information in improving social 'satisfaction', through some form of 'cost/benefit' calculation. Indeed, there are interesting efforts underway in various fisheries and fishery donor agencies to prioritise information 'needs' through such approaches.

If we recognise that we cannot afford to know everything about a fishery, it becomes clear that most simple listings of information 'needs' are really lists of 'wants'. Not all of these will be of equal importance in any given situation. Nevertheless, it is useful as a starting point to compile a somewhat comprehensive 'wish list' of economic questions which could be important in small-scale fisheries. Table I presents such a list of questions, adapted and extended from material provided by Panayotou in a particularly useful publication, *Small-Scale Fisheries in Asia: Socioeconomic Analysis and Policy* (Panayotou, 1985).

Also indicated in Table I are the various economic methodologies used in addressing questions arising in fishery research. Among these are Lorenz curves and Gini coefficients (for examining income distribution), 'cost and earnings' balance sheets (for analyzing and summarizing the financial picture), production functions and profit functions (for describing input-output relationships), econometric demand analysis and market surveys (for understanding and predicting final consumer demand), and bio-socio-economic management models (for exploring regulatory options).

In examining this variety of techniques, it is useful to note that the study of economics is often 'split' in two predominant ways. First, as in other disciplines such as biology and sociology, economics can be practised through both qualitative and quantitative research. The former often involves verbal reasoning, through socio-economics, 'policy analysis' and case studies, while the latter emphasizes mathematical and statistical methods. Although the 'mathematization' of economics has become fashionable, a full understanding of the complex fishery system undoubtedly requires qualitative as well as quantitative studies.

A second 'split' in economic thinking divides the field into the two clearly distinguished branches of micro-economics and macro-economics. In overly

Table 1. Economic questions in small-scale fisheries and methodologies for their analysis

SOCIO-ECONOMIC CONDITIONS 1 In broad terms, what are the overall structure, activities and standards of living of small-scale fishing communities and households? 2 How do standards of living of small-scale fishing households differ among households themselves, relative to those of other socio-economic groups (e.g. farmers) and in comparison to the national average? What factors account for these differences? 3 What is the particular role of women in fisheries, and how do gender differences, if any, affect fishery management and development?	TOOLS AND TECHNIQUES Socio-economic surveys are the principal means used to collect community and household data on fishing income and other income sources, distribution of income and wealth, access to capital, cost data, demographic information (such as age and family size), gender roles, etc. In examining income and wealth distribution, two useful tools are Lorenz curves and Gini coefficients. Bio-socio-economic models can address the dynamics of socio-economic processes in fisheries
SOCIAL, INSTITUTIONAL AND MACRO-ECONOMIC FACTORS 4 What is the relative importance of economic versus socio-cultural factors (such as religion, social organisation of production, and ownership arrangements) in determining fishing behaviour, particularly entry to and exit from the fishery? How does this depend on income levels? 5 How much and how easily does labour move between the fishery and alternative areas of employment? How "mobile" are fishermen, and those in the post-harvest sector, both in occupational and in geographical terms? 6 What impact do macro-economic government programmes (such as the provision of credits to fishermen) have on the economics of both the fishermen and the fishery as a whole?	Socio-economic analysis and case studies (qualitative) and econometrics (quantitative regression analysis) address the relative roles of economics and non-economic factors in the fishery. Labour mobility studies, model of labour dynamics and attitudinal surveys provide insights into the implications of policy options both inside and outside the fishery. Joint macro/micro studies can analyse impacts of both national and international programmes (e.g. structural adjustment), on the fishery within the broader economy
PRODUCTION TECHNOLOGY AND ECONOMIC EFFICIENCY 7 Why do fishermen operating in the same location catch different quantities of fish? Is it due to differences in the type and size of gear, boat size, engine power, mesh size of net, time spent fishing, or varying degrees of inefficiency in the use of these inputs? 8 What is the contribution of each fishing input to catch? Would a doubling of all inputs double catch? 9 Are operating inputs such as fuel and labour used at their profit-maximising level?	Production Functions, calculated using multiple regression analysis, are often used to describe the relationship between harvest levels and the various fishing inputs. These, combined with cost data, can be used to determine the 'efficient' levels of inputs, and the 'scale economics' that describe the effects of enterprise expansion. Bio-economic models are increasingly used to analyse dynamic aspects of harvesting processes.
COST STRUCTURE AND PROFITABILITY 10 What are the relative capital and labour intensities of various fishing technologies at different locations? 11 What proportion of total costs is 'fixed' – independent of the day-to-day operations? 12 What is the degree of dependence on credit, and at what cost? 13 How are the total revenues divided between the boat owner and the crew for different types of gear and in different locations?	The 'Cost and Earnings' survey produces economic and financial balance sheets both of individual fishing enterprises and of fishermen groupings (by gear, size, etc...). The variables collected in such a survey may include capital costs, other fixed costs (for annual fees, maintenance, etc.), variable/operating costs, landed values and other income, division of income between crew and boat owner, level of debt and return on investment.

Table 1. Economic questions in small-scale fisheries and methodologies for their analysis (cont'd)

14 Do prices of fish and fishing inputs differ substantially among vessel sizes and among locations to the extent that they have an effect on profitability? How sensitive is the cost structure of various types of gear to fuel price increases? 15 Which vessel sizes, types of gear and fishing grounds are on the average more profitable? What other factors besides vessel size, gear type, location, and prices have a bearing on profit?	Profit functions are analogous to production functions, providing the means to examine profitability as a function of inputs levels, type of boat, cost structure and fish price levels, using empirical relationships derived statistically.
MARKETING SYSTEM 16 What trends are envisioned in the price of fish and of the inputs used in harvesting? 17 To what extent are fish used for subsistence, sold locally, or exported? Is the fishery system relatively self-contained, or dependent on external economic forces? 18 What route does fish travel from the landing site to the consumer, and what is the role of intermediaries in the course of this marketing process? 19 Is there exploitation of fishermen by middlemen, or are the middlemen receiving a 'just' price (the opportunity cost) in return for their service? What are the roles of isolation, immobility, and indebtedness in creating and/or maintaining exploitation?	Econometrics (notably statistical regression) are commonly used to analyse fish demand and predict changes in that demand, while market survey are standard tools used to examine consumer preferences. A key aspect of these analyses is the determination of product substitutes and complements, which requires study of non-fishery and particularly agricultural production. Research on the marketing channels through which fish are distributed is typically carried out through accounting mechanisms for tracking the physical sales, as well as the costs and value added, of the products.

simplified terms, the former deals with the behaviour of 'firms' and consumers, and their market interactions through supply and demand relationships, whereas the latter focuses on the 'big picture' of inflation, unemployment, trade, national accounts, intersectoral interactions, etc. In fisheries, micro-economics is oriented at the level of the individual fisherman, the fish consumer, and the local fishery itself, whereas macro-economics deals with such topics as the relationship between the various coastal activities — fishing, tourism, and industry, etc. — or the dynamics and mobility of labour inside and outside the fishery. Micro-economic studies have typically predominated in the fishery sector, but, as with the qualitative/quantitative balance, a full analysis of fishery options demands both 'micro' and 'macro' studies, particularly in a world in which macro effects invariably impact on options at the micro level.

Discussion

This very brief article should be regarded as a comprehensive overview of information and methodology in economic studies of small-scale fisheries. As noted earlier, it is confined to three main points:

- the presentation (in Table 1) of a set of potentially relevant economic questions in small-scale fisheries, and some of the corresponding methodologies for dealing with them;
- a caveat about the need for cost/benefit analysis in assessing information 'needs'; and
- a brief discussion of the nature of economic analysis, particularly the splits between qualitative and quantitative studies, and between macroeconomic and microeconomic approaches.

Much more detailed discussion of these matters can be found in the references on page 11, in the output of such organizations as the International Association for the Study of Common Property and the International Institute for Fisheries Economics and Trade, and in a forthcoming series of International Development Research Centre publications surveying the 'state of the art' in international fishery socioeconomics research. (Contact the author for further details.)

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Traditionally based marine management systems in Vanuatu

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Introduction

In Vanuatu increased reliance is being placed on marine resources to support and sustain national development, because land-based mining is non-existent and the agricultural sector could never be productive enough for this purpose. Throughout the coastal area and in adjacent oceanic waters, Ni-Vanuatu and a few foreign interests target marine resources in operations that range in scale from subsistence to industrial.

In Vanuatu, religious, cultural and historical traditions play a modern role that is impossible to over-emphasize. As might be expected of a pastoral and hunting people, much of this tradition is intimately bound up with observation of and reverence for the natural world. As noted in the National Constitution:

A further major reason for natural resource protection in Vanuatu is the close identification that all ni-Vanuatu feel with the land, their own custom land in particular. Ni-Vanuatu living in a degraded environment will suffer a spiritual or cultural loss with a consequent lowering of the Quality of Life.

The preoccupation with custom pervades all aspects of environmental management in Vanuatu: 'Everywhere there are taboo areas, cemeteries, old village sites, important rocks and other custom places that need to be protected against damage from development'.

Among the fundamental duties which the Constitution of Vanuatu (Section 7) stipulates for 'Every person.... to himself and his descendants and to others [is]... to protect Vanuatu and to safeguard the National wealth, resources and environment in the interests of the present generation and of the future generation.'

This statement contains the basic elements of environmental management:

- protection of the environment;
- forms of resource use which minimise social and environmental disturbances; and
- a long-term view of balanced resource development.

Traditionally based management

This management system is the foundation of traditional, community-based marine tenure. It involves the owners protecting their marine resources from outsiders via self-imposed harvesting restrictions, which may vary from gear restrictions to closed seasons.

Land tenure

The ownership of inshore waters plus the fringing reef follows from land tenure regulations. Land tenure determines not only access to land, which is a prerequisite for most development projects, but also authority over land, which is a prerequisite for environmental management. In Vanuatu, the significance of tenure goes further, for the relationship to land is a fundamental aspect of Ni-Vanuatu cultures. The Constitution provides that :

'All Land in the Republic belongs to the indigenous custom owners and their descendants.' (Article 71, Chap. 12 of the Constitution of Vanuatu); and