

Workshop on
'Economic research and Integrated Fisheries Management',
The Hague, 7 October 1997

FISHERIES, FISHERIES POLICY AND APPLIED ECONOMIC RESEARCH

Review of topics

Pavel Salz

Contents

| | |
|--|---|
| Summary and conclusions | 3 |
| 1. Introduction | 3 |
| Definition of economics | 3 |
| 2. Economic research | 3 |
| Economics | 3 |
| Fisheries chain | 4 |
| Fishing fleet | 4 |
| Processing and trade | 4 |
| Markets | 4 |
| Resource economics | 5 |
| 3. Economics and ecology | 5 |
| View of the world | 5 |
| Limits to growth | 6 |
| 4. Economics and culture | 6 |
| 5. Economics and policy | 6 |
| Political choices | 6 |
| Management measures | 7 |
| Institutional arrangements | 7 |
| 6. Economics and technology | 7 |
| 7. Economics and spatial and temporal considerations | 8 |
| 8. Required tools | 8 |
| Data | 8 |
| People | 8 |

Summary and conclusions

1. This document aims to explain to non-economists what economics can contribute to the analysis of various fisheries issues.
2. Definition: Economics deals with the allocation of scarce resources, which may be put to different uses.
3. Main contribution of economics to the analysis of the fishing sector and fisheries management may be summarized as follows:
 - definition, quantification and interpretation of economic indicators at various analytical levels;
 - analysis of property ownership arrangements in fisheries (problem of the commons);
 - assessment of long term scarcity in relation to market prices (problem of market failure as one of the main driving forces behind overfishing);
 - sector dynamics;
 - development of policy options and specification of involved trade-offs;
 - consumption patterns and their effect on price formation;
 - valuation of public goods (environment);
 - technological development and productivity.

1. Introduction

Economics enjoys an increasing attention in the assessments of fisheries issues at various levels (local, national and EU). However, it appears that many people, while they sense that an economic contribution is required, have difficulty to formulate appropriate economic questions.

This document aims to explain what economics can contribute to the analysis of fisheries issues, particularly to administrators, policy makers and colleagues in other fields of science. It touches upon most relevant items, but for the sake of brevity it is not meant to be exhaustive. It is written for non-economists.

After this introduction, the paper consists of seven chapters, which deal with economics in itself and the relation to other fields in science and society. These fields are:

- a/ ecology,
- b/ culture,
- c/ policy and institutions,
- d/ technology,
- e/ spatial and intertemporal considerations.

Finally, attention is given to the required tools. There is a strong interdependence between the various issues discussed. In some cases repetitions occur because one item is approached from different angles. But in many other instances, making further links is left to the reader.

Definition of economics

Economics deals with the allocation of scarce resources, which may be put to different uses.

2. Economic research

Economics

Growth and welfare of the society are measured in economic (or monetary) terms. In general a distinction can be made between analysis from the point of view of society at large (macro level) and analysis from the perspective of an individual (micro level). The macro analysis assess the general position of large(r) groups of interested parties (a country, region, sector, etc.). On the other hand micro analysis looks at very well specified (homogeneous) economic units (businesses, families, etc.).

Economics analyses phenomena like income creation and distribution, employment, trends in prices (inflation), structure of national, regional or sectorial economies, etc. Applied economic analysis tackles often the question 'Who wants to know what and why?' The scope and the background of questions formulated by various 'actors' (administration, industry organizations, individual business, etc.) may call for varying economic analysis.

The fisheries sector is just a small part of the overall economic activity. Therefore it is subject to influences far beyond its control: inflation, exchange rates, fiscal policies, etc.

Research issues:

- * quantification and interpretation of economic indicators regarding the fisheries sector
- * relation between fisheries and the broader economy
- * trade-offs in distribution of benefits

Fisheries chain

The fisheries chain starts from the fishing fleet, through various levels of trade and processing down to consumers. It also includes various secondary suppliers (e.g. banks, boat building). As the fishing fleet is at the beginning of the chain, its activities are echoed through all the following links. One job on board (or 1 mECU income) may be multiplied manyfold in the chain.

Indicators determined and analysed throughout the chain regard costs of production, earnings (value added), investments, prices of inputs and outputs, structure of the chain (e.g. in terms of sizes of companies), distribution of benefits or economic power relations, etc.

Research issues:

- * operation of the chain
- * multipliers
- * business dynamics

Fishing fleet

The fishing fleets are at the heart of applied fisheries economics research. Their results are determined partly by their physical productivity, i.e. the catch per unit of fishing effort in tonnes. However, it is the monetary terms which matter for the economic analysis: production costs incurred, revenues obtained, investments, income, etc.

The size and the activity of the fleet, together with its productivity, determine the intensity of the exploitation of a fish stock.

Fleets are seldom homogeneous. They are composed of different types of vessels and technologies with varying competitive advantages. Various fleet segments may participate in different fisheries - exploit different stocks, using different gears. While some vessels may be profitable, others may suffer losses. Economics can provide understanding of these differences.

Research issues:

- * costs and earnings
- * determinants of capacity, activity and productivity
- * relations between flexibility (technology, fisheries) and profitability
- * competitive position

Processing and trade

Processing and trade partly determine the commercial feasibility of the exploitation of certain stocks. Fish obtains positive economic value only when it reaches its final destination, i.e. the consumer. Trade shows the availability of fish to the consumer and at the same time it reflects information as to the consumer requirements up through the chain, back to the primary producers. Competition among the producers takes place when fish products are traded between the various links of the chain. Today, world wide markets exist for fish as well as for its substitutes.

Research issues:

- * competition and substitution, price elasticities
- * consumer trends and requirements
- * product valorisation
- * dynamics of distribution patterns

Markets

Markets are what Adam Smith called the 'invisible hand'. 'Somehow' various agents/actors meet and agree upon what they want to buy or sell and at which price. Structure of the markets in terms of size and number of players determines the results. Various players may demonstrate competitive advantages over others because of the information or other qualities which they may possess. Markets represent the abstract dynamics of the economic system.

In theory perfect markets produce 'perfect' prices, i.e. prices which reflect the scarcity of a given resource (fish). In practice, markets are seldom perfect. Consequently, prices give often wrong signals (incentives) to those involved. In fisheries, market failure occurs because the access to stocks is relatively free (ownership is not well defined) and no information is available regarding the stock

abundance in distant future. Consequently, the costs of exploitation are relatively low (in long term perspective) and this leads to an intensive exploitation at any one moment. The interests of future generations are not properly reflected in the existing market prices. From the economic perspective 'market failure' is one of the major problems to be addressed in fisheries management.

New markets may be 'constructed' to alleviate some of the imperfections. Futures and options markets exist today, precisely to account for long term considerations.

Research issues:

- * structure of the market, its effect on price formation and the players
- * market incentives and imperfections
- * consequences of alternative specifications of ownership / property rights
- * development of new types of markets

Resource economics

Fish stocks are a renewable natural resource. In theory it should be possible to exploit it at some 'optimum level'. A criterion for such optimum is difficult to define. Fisheries system is highly dynamic. Statistical (un)likelihood of the consequences of a given exploitation intensity and pattern should be given major attention.

Resource economics brings together a number of aspects discussed in this paper: economically optimal exploitation, uncertainty and market imperfections calling for non-market ways of valuation of the resources (e.g. shadow pricing).

Research issues:

- * exploitation under uncertainty, stochastics
- * optimality, its feasibility and trade-offs
- * determination of long term scarcity (shadow prices)

3. Economics and ecology

View of the world

Fish stocks and fisheries are part of a larger, integrated ecosystem. The philosophy with which men look at this system determines at least partly the scope of analytical conclusions which economic science will draw. This may be illustrated by two (extreme) examples.

First is the fragmented and utilitarian view. Men is standing outside the ecological system. The natural resources are 'at his service'. Each component of the system is looked at separately, without its links to the rest of the system. If the component cannot be used somehow, it has no economic value. In these cases market price does not exist.

Second is the integrated view. Man is a part of his environment. All components contribute to the proper functioning of the system. Value should be also given to 'existence' not only to 'utility'. This view is in the background of the 'precautionary approach', which has been introduced as a concept to fisheries analysis and management recently. Taking this view, economic analysis cannot rely anymore on (existing) 'traditional markets' and on the prices which these markets produce. Valuation of unpriced 'goods' is required. The major challenge to applied economic research is the question of 'how to operationalize' concepts like the precautionary approach to make them acceptable to the real economic world. Acceptable operationalization will offer new instruments in fisheries management: indirect incentives through taxes or subsidies instead of the traditional administrative rules and regulations.

These topics are closely linked to 'Resource economics' discussed above.

Research issues:

- * valuation and utility
- * fragmented vs. integrated approaches
- * operationalization of (precautionary and/or other) principles to real world economic processes
- * trade-offs between various components of the system on different time scales

Limits to growth

A major distinction between fisheries and most other economic activities is that the natural environment imposes limits to the size of the industry. A given sea can sustain only a certain amount of fish. This amount of fish can potentially generate income for a certain maximum number of fishermen. The long run natural limits cannot be unambiguously determined with the current state of knowledge.

This has several consequences for topics of economic research. As the physical basis (stocks) of the sector (fleet) is limited, greater value added can be only obtained through lower production costs or

higher prices of fish. Furthermore, intensive competition occurs as individual enterprises attempt to obtain a 'larger piece of the cake' in order to achieve income growth (race for fish). Distribution of access rights (and thus income) must be addressed explicitly.

Research issues:

- * relation between fleet capacity and stocks
- * distribution of benefits (access) and related trade-offs
- * dynamics of competition (race for fish)

4. Economics and culture

Culture is the sum of (formal and informal) institutions which create rules and norms for human actions and give these actions a meaning. Fishing is not only an economic activity, but also a way of life in the fishing communities. Cultural factors affect decisions of the various individuals. A few examples are: competition among fishermen for highest gross revenues, vessels as a status symbol, maintaining fishing despite decreasing income, sons of fishermen become also fishermen, etc.. These examples show that economic decisions regarding fishing operations, investment and trade may be heavily influenced by cultural factors.

The issues of traditionally (free) access to fishing grounds and property rights is also determined by cultural and historical considerations. Economic theory suggests that users of the 'common' natural resources (fish stocks) should pay to the society for their privileged access to these resources. Still, even today this seems culturally (politically) difficult to accept.

Open access to common resources leads to the 'tragedy of the commons' and 'free riding' behaviour. These processes are closely related to the market failure. 'Tragedy of the commons' may be considered as another major problem in fisheries management.

Common cultural background determines the social fabric of the fishing communities. Common perseverance to maintain such cultural identity may manifest itself in political and economic decisions taken: maintenance of traditional institutions, solidarity in a community and/or commercialisation of relations between people. Economic pressure may cause the disappearance of the fishing sector and lead to a break down of the traditional social fabric.

Finally, culture determines, at least partly, consumption patterns. Habits of eating certain species of fish make fish production commercially feasible. Information about the cultural determinants of consumption habits may contribute to broadening of the markets and valorisation of products..

Research issues:

- * cultural influences of economic decisions
- * approaches to open access and property rights
- * dynamics of community development
- * culture and consumption

5. Economics and policy

Political choices

Common Fisheries Policy (CFP) aims to protect and promote the interests of fishermen, fish stocks, larger environment as well as the consumers. These objectives may be compatible in the long run, but at any given point in time choices must be made which benefit one objective at the expense of another.

Economic considerations are among the major factors affecting such political choices. Although economics (or any other science) cannot resolve some basic problems, economics is capable of producing a consistent set of options to facilitate the selection process. Such options may show which groups will benefit from a given decision and at which point in time, i.e. income distribution. Various trade-offs can be made visible.

Research issues:

- * valuation of non-economic objectives
- * trade-offs between objectives and their achievement (costs of policy)

Management measures

Policy is implemented with specific management instruments - TACs and quotas, decommissioning schemes, mesh size regulations, etc. Such measures usually involve financial expenses. Some measures are rules and regulations and their effective implementation requires a system of control.

prosecution and punishment if necessary. Other types of measures are incentives intended to stimulate certain desired behaviour (or discourage undesired one).

In most (if not all) cases, the effectiveness of management measures depends on a large number of factors, influences and incentives to which the fishing companies are subject in the real world. The economic forces play an important role in this respect. Economic analysis can place the management measures in the total force field of economic incentives. Such analysis allows conclusions as to the likely effectiveness of the measures, e.g. is the decommissioning premium sufficient in view of economic performance of the fleet. It may also compare the likely effectiveness of certain alternatives: mesh size vs. price regulations. The analysis may not only shed light on the extent of the desired consequences, but it may equally well explore the undesired ones, which may be just as relevant (e.g. in terms of creation and distribution of income or employment).

Research issues:

- * desired and undesired effect of measures
- * economic incentives and effectiveness of policy
- * definition of relevant indicators (operationalization of objectives)

Institutional arrangements

Fisheries policy is not implemented in a vacuum. It is a result of existing institutional and policy arrangements, e.g. level of government involvement, which institution is responsible for what, etc. The decision making process is determined by the involved institutions. A specific question in this respect regards the division of rights and responsibilities between the government administration (EU - national - local) and the industry organizations. Different institutional arrangements may differ in terms of their economic efficiency.

Research issues

- * institutional arrangements (co-management, division of rights and responsibilities): options and economic efficiency

6. Economics and technology

Competition between companies is the driving force behind the ever increasing technological efficiency. The physical environment imposes limits on the total potential volume of production of wild caught fish. Competition then occurs in either higher prices (valorisation through better quality in broadest sense) or lower costs per unit of catch. In both cases the financial productivity (value added or income) per unit of costs will increase.

Productivity increase is usually achieved by replacing labour by capital. The required investments create new jobs on shore, but lead at the same time to loss of jobs on board.

Techno-economic research may demonstrate the acceptability and economic consequences of certain technical measures.

Technological development is not necessarily purely technical. It may also affect the organizational aspects of the firms as well logistics in the whole chain.

Research issues:

- * valorisation of products (quality)
- * potential of cost reduction
- * relation between productivity, income and employment
- * techno-economic feasibility of management measures
- * developments in organization and logistics
- * economics of gear selectivity
- * economic dimension of the reduction of environmental effects

7. Economics and spatial and temporal considerations

Autonomous economic development as well as fisheries management policies lead to changes in structure of the industry, characteristics of employment and income distribution. These changes occur in space and time. The dynamics of the system makes that groups of fishermen or regions become prosperous, while others are obliged to leave the industry and look for new economic activities. Such changes take time.

Furthermore, some generations may benefit more from the available fish stocks than others. The choice between less fish now and possibly more in the future is well known in fisheries.

Research issues:

- * income distribution among fleets and/or regions
- * trade-offs in time and space
- * alternative time paths of development (recovery)
- * coastal zone management

8. Required tools

Reliable research requires a solid basis in terms of people, data and physical and organizational infrastructure.

Data

Sufficiently detailed and reliable data on the performance of the fleets (costs and earnings) is a sine qua non for most of the research mentioned above. Empirical research without data is not feasible. Some of the data must be collected on regular (annual) basis. In other cases ad hoc surveys may be sufficient.

Even if the main object of the research are the fishing fleets, many issues must be viewed in a broader perspective, e.g. chains, regions, etc. This means that at times data must also be collected on related subjects.

In order to allow assessment of quality, assure consistency, easy access, etc. data must be stored in appropriate data bases.

EU requirements:

- * collection of data in most countries is largely insufficient
- * EU-wide data base does not exist

People

Data must be properly interpreted. This can be done only when the involved scientists know how the data has been collected, what its strengths and weaknesses are and how it relates to the real world. For this task a certain minimum number of experienced researchers is required, who dispose of appropriate physical and organizational infrastructure.

EU requirements:

- * setting up research units in various EU Member States where they do not yet exist.

Concluding remark

The above outline of empirical economic research regarding fisheries shows that almost all fields are closely linked to various non-economic aspects of the topics under study. The nature of these topics calls for close collaboration between economists and specialists in other sciences (multidisciplinary, holistic approach). However, in empirical research it is equally essential to develop and maintain working relations with the policy makers, administrators, fishermen and their representatives. How such networks can be developed and implemented may be a research topic of its own right.