Fisheries Management Costs: Concepts and Studies

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Abstract. Few doubt the need for government intervention to manage the use of fisheries resources. The nature of access to fisheries resources means that intervention is required to provide for optimal economic performance and to meet environmental objectives. Management authorities therefore spend considerable funds to conduct stock research, make decisions and enforce those decisions. It is estimated that 36 per cent of all government financial transfers associated with fishery policies in OECD countries[2] are for research, management and enforcement services. At its April 2000 meeting the OECD Fisheries Committee adopted an outline for a study on the costs of these services. The study will explore the extent of these costs and analyze how they vary between countries, fisheries and management systems in use. Further, it will explore how these costs are shared between management authorities (through general budgetary funds) and users of the fisheries resource.

Keywords: management, government expenditure, government financial transfers, governance, cost recovery.

1. INTRODUCTION

Governments spend a lot of money managing their fisheries. Such expenditure is made in the understanding that fisheries management can generate benefits for commercial fishers, consumers and others in society. This paper attempts to identify more clearly the services provided by governments and the beneficiaries of those services. With this context in mind, the paper also outlines the OECD Fisheries Committee's forthcoming study on the costs of managing fisheries.

2. TYPES OF FISHERIES SERVICES

In this discussion, we will briefly discuss the various types fisheries management activities that that support fisheries management systems. To this end, the costs examined will be those incurred in (after Arnason, Hannesson and Shrank, 1999):

- Research to inform fisheries management decision-makers (henceforth referred to as "research services").
- Creating and implementing fisheries management systems ("management services").
- Enforcing fisheries management rules ("enforcement services").

In the course of the Committee's study on government financial transfers (see Flaaten and Wallis, 2000), it became clear that a significant proportion of government expenditure on fisheries policies is used to fund these activities. In 1997 an estimated USD 2.2 billion was spent on these activities, about 36 per cent of total government financial transfers associated with fishery policies. Table 1 gives an overview of the costs of fisheries research, management, and enforcement in each OECD country collected in the course of the government financial transfers study. Henceforth, the term "fisheries services" will be used when referring to fisheries research, management and enforcement services as a group.

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1 This paper contains the views of the authors and not necessarily those of the OECD.

2. Member countries of the Organisation for Economic Co-operation and Development are: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, France, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden Switzerland, Turkey, United Kingdom and the United States.

Research services are used as a basis for management decisions and the creation of new management systems (Arnason, 1999). Common examples of research activities include data collection, surveys, data analysis and stock assessment. Research activities are normally determined by the information needs of the decision-makers that are implementing the management rules. For example, when setting a TAC, information is usually required on the impacts of different catch limit strategies on the size of the fish stock biomass.

Table 1. Estimates of OECD Countries' Expenditure on Managing Fisheries: 1997

	Research Costs (USD million)	*Management Costs (USD million)*	*Enforcement Costs (USD million)*	*Total Costs (USD million)*	*Landed Value (USD million)*	*Management Costs/ Landed Value (Per cent)*	*Landings (000 Tonnes)*	*Management Costs/ Landings (USD/Tonne)*
Australia[1]	9.50	19.45	• • •	28.95	259	11%	71	407.79
Canada	40.84	95.60	([2])	136.44	1 621	8%	894	152.63
EU 15 Total	181.65	137.77	272.91	592.34	9 324	6%	6 377	87.22
Belgium	1.33	• • •	0.41	1.74	99	2%	27	64.71
Denmark	27.18	7.92	14.30	49.40	521	9%	1 813	27.25
Finland	14.46	4.26	1.80	20.52	29	70%	119	172.70
France	14.14	59.62	([2])	73.76	756[3]	10%	358	206.12
Germany	19.32	5.03	21.17	45.52	194	23%	260	175.36
Greece	6.47	4.79	24.85	36.11	387	9%	153	236.33
Ireland	9.63	0.77	81.74	92.14	220	42%	309	298.53
Italy	7.04	5.73	48.74	61.50	1 749	4%	441	139.32
Netherlands	16.40	2.72	5.45	24.56	466	5%	448	54.84
Portugal	8.79	9.50	6.65	24.95	319	8%	206	120.89
Spain	11.61	17.06	8.38	37.05	3 443[3]	1%	1 007	36.81
Sweden	20.17	8.96	12.87	42.00	129[3]	32%	350	120.14
United Kingdom	25.11	11.41	46.56	83.08	1 012	8%	888	93.61
Iceland	9.45	3.59	7.56	20.59	877	2%	2 224	9.26
Japan	115.70	512.40	• • •	628.10	14 117	4%	6 067	103.53
Korea	5.10	1.26	• • •	6.36	4 929	0%	2 423	2.63
Mexico	10.80	5.40	0.60	16.80	1 017	2%	1 222	13.75
New Zealand	11.90	15.20	13.22	40.32	475[4]	8%	• • •	• • •
Norway	23.53	16.95	57.64	98.12	1 343	7%	2 856	34.35
Poland	3.05	4.88	• • •	7.93	215	4%	381	20.83
Turkey	• • •	• • •	• • •	• • •	212	• • •	84	• • •
United States	95.44	165.73	400.00	661.17	3 644	18%	4 635	142.66
OECD Total	506.96	978.24	751.92	2237.12	38 032	6%	33 610	71.43

Source: OECD (2000a) and OECD (2000b)

• • • Information not available.

0 Less than 0.5 of the unit of value.
1. Refers only to Australian Commonwealth Fisheries.
2. Included in management costs figure.
3. Does not include national landings in foreign ports.
4. Estimate.

When developing new management systems or rules, research advice is usually sought on the likely impacts of the proposals being considered. For example, decision-makers are likely to be interested in how a change in a minimum mesh size limit affects the age-structure of the stock, recruitment and biomass growth. From an economic perspective, they are usually interested in whether a change in this management setting will increase the returns to fishers.

In 1997 approximately USD 507 million was spent on fisheries research in OECD countries (8 per cent of all government financial transfers to fisheries). Government, quasi-government or stand-alone research institutions[3] normally carry out fisheries research. Most countries use general tax revenues to fund research services. Some countries levy the commercial fishing industry to recover some of these research costs. Co-operative research initiatives between the commercial fishing industry and the government research agency, which often take place in the increasing prevalent co-management context, also have the effect of sharing research costs between the sector and general taxpayers.

Management services usually comprise three functions (Arnason, *op cit*.):

- Administering the existing management system. This can involve monitoring fishing licences, permits, vessel numbers and catch returns.

- Adjusting management settings within an existing management system. An example of these types of adjustment is the annual process of setting TACs that commonly occurs in most OECD countries.

- Recommending amendments or additions to the existing management system. An example of this more fundamental form of change might be the decision to introduce new effort controls (e.g., limits on number of vessels) or output controls (e.g., vessel or fisher quotas).

In total, OECD countries spent approximately USD 978 million in 1997 on costs associated with management services (16 per cent of all government financial transfers to fisheries). A central government agency is normally responsible for creating and implementing the fisheries management systems. In most countries this activity lies within the purview of the Ministry of Fisheries or a similar government agency. In the case of the second two dot points above, close co-operation with the relevant political processes occurs. Adjusting management settings is often the decision of Minister(s). Making amendments or additions to management systems tends to require new laws and regulations that require the support and sponsorship of Minister(s) to navigate the relevant legal and parliamentary processes. Given the nature of these activities, and the concerns of Ministers, decision-makers and stakeholders that advice be independent from bias towards individual sectors or sub-sectors, management services are usually funded out of general tax revenues.

Enforcement services typically involve surveillance of compliance with fisheries laws and a role in the prosecution of fishers who do not comply with those laws. Surveillance takes place at-sea and on-land. Often working in co-operation with the Coast Guard or Navy, at-sea surveillance involves boarding of fishing vessels and checking of vessel licences, fishing licences, fishing gear and the size of fish. On-shore surveillance can involve the checking of landings at port and at auctions. Information collected on-shore can be used for the cross-checking of catch against licences and quotas. Apart from minor offences, prosecution for non-compliance with fisheries rules usually involves the presentation of cases to the legal system. This preparation is normally carried out by the officials from the Fisheries Ministry or relevant sector department, or by general law enforcement officers.

Approximately USD 752 million was spent on fisheries enforcement in OECD countries in 1997 (12 per cent of all government financial transfers). Given its nature, enforcement is almost always conducted by a government agency, whether it be the Fisheries Ministry, the Police or the Coast Guard or Navy. Governments normally wish to ensure that these enforcement activities are only conducted in strict accordance with the law and by agencies that are directly responsible to a Minister(s) and the law-making body of representatives (e.g., a parliament, senate or congress). The funding for enforcement usually comes from general tax revenues.

2.3 The Benefits of Managing Fisheries

The levels of expenditure devoted to managing fisheries suggest that the resource and its users are important to governments. In its government financial transfers study, the OECD Committee for Fisheries found that expenditure on fisheries services was essential for ensuring the sustainable use of fish stocks and the aquatic ecosystem (Flaaten and Wallis, *op cit*.). It is possible to discuss in more detail how sustainable use, itself a concept that is understood in a number of ways, may create benefits.

3. This includes international research institutions that provide advice on important international stocks. For example: International Council for the Exploration of the Sea (ICES).

Fisheries services have the potential to create benefits for commercial fishers, consumers, recreational fishers, society, minority groups and government agencies. ***Commercial fishers*** can potentially benefit from fisheries services in three ways (Haynes, Geen and Wilks, 1986):

- Increasing output from the fishery by managing the stock in a way that maximises yields over the long run. This management objective may not coincide with maximising economic yield for commercial fishers, but for most exploited fish stocks it represents an improvement over the open access situation where rent is dissipated from the fishery.

- Reducing costs per unit of effort by reducing competition for fish. Reducing competition between fishers, either by allocating individual output limits (e.g., individual quotas) or by limiting inputs (e.g., limits on the number and size of vessels), creates the opportunity for increased profits for fishers.

- Increasing the return per unit of output from the fishery. An example of this could be a change in a management system that allows fish to grow to a larger size before they are harvested. If the market places a premium on larger fish, and the value of the earlier catch forgone is less than that premium, then fishers have gained a benefit from the management system change.

Consumers will benefit from fisheries services if they result in higher catches and more stable supply (Haynes *et al.*, *op cit*.). These benefits will be realized through the market mechanism (i.e., more plentiful product and lower prices), resulting in an increase in consumers' surplus.

The benefits received by commercial fishers and consumers are often described as market benefits. The potential ***non-market benefits*** can be received by (Haynes *et al*., *op cit*.):

- Recreational fishers, if fisheries services result in higher catches and reduced crowding on fishing grounds.

- Society, if fisheries services maintain option and existence values of fish and other species in the aquatic ecosystem.

- Cultural minorities and indigenous people, if fisheries services provide for the interests and customs of those groups.

Society may also reap non-market benefits the where management services help ensure that the supply of fish is maintained over time. Although consumers will reap many of these benefits through the market system (see above), an additional benefit, often described as "food security", can be created. Best understood in psychological terms, it relates to how well a society considers it can meet its food nutrition needs. In some contexts it is taken to mean the ability of a country to be self sufficient in food production. "Food security" can be ensured through trade as well however.

Government agencies can also be a beneficiary of fisheries services (Haynes *et al.*, 1986; Tullock, 1965). In many cases, bureaucracies see the size of their budgets as being directly, and positively, related to their value to society as a whole. Hence a larger budget implies more value to society. Individuals within a bureaucracy also have the opportunity to gain from larger budgets. The combination of these incentives means that budgets may be larger than that which would be the case under more competitive conditions. Work may be undertaken that is of negligible value in improving either the market or non-market benefits discussed above. An example may be a detailed level of monitoring that is unnecessary for the needs of the vessel licensing system in place. In this situation the benefits arising from the use of general tax revenues would be received solely by the government agency concerned.

2.4 Management and Management Costs

When designing and implementing management systems, fisheries managers can be tempted to exclude their own costs from consideration, taking for granted the provision of taxpayer funds. As such, management services are considered to be "costless". But active incorporation of fisheries services costs into management considerations could have implications for policy design. In particular it could have implications for how governments view the socially optimal level of effort in a fishery. If such costs are taken into account by fisheries managers, it could be expected that the socially optimal stock level would be lower and the effort level higher - compared to the case of costless, perfect enforcement and management. For a thorough analysis, see Sutinen and Andersen (1985).

Fisheries are regulated mainly for profitability and resource conservation reasons. Successful regulations should lead to relatively higher stock levels and higher profitability. Given the higher profitability in the fishery, economically rational harvest firms would have an incentive to break the law (e.g., over-fish an allocated quota, violate technical regulations, avoid resource taxes and enter illegally closed fisheries). The expected gains from the violation of the regulation - and the probability of being detected and punished - affect fishers' behavior. At the margin, it is likely that economic rational fishers would want to adapt their activities so that the expected marginal profit equals the expected marginal penalty. Managers can raise the expected

marginal penalty by increasing likelihood of detection through increased control and enforcement activity.

However, fisheries services are not costless. Detecting and convicting fishers that violate regulations requires costly inputs (Coast Guard, aircraft, on-board and on-shore observers, and judicial institutions). These costs can be compared to the benefits to commercial fishers and society. Moving fisheries towards a higher stock level and higher profitability increases both enforcement costs and the benefits to commercial fishers and society. These costs and benefits move in the same direction. Eventually however, the marginal costs of management increase above the marginal benefits created for fishers and society. Beyond this stock level, fisheries costs make it less beneficial for the fisheries managers to invest in the stock (compared to a situation where fisheries services are costless).

2.5 Management Costs and Fishery Performance

In addition to accounting for about 36 per cent of the government financial transfers in OECD countries, the USD 2.2 million expended on fisheries services represents some 6 per cent of the value of landings. This percentage varies substantially between Member countries: from 0 to 70 per cent of the value of landings. The magnitude of these costs has implications for how policy makers view of fishery performance. Put simply, it could be expected that fisheries services should be generating benefits (market and non-market values) of at least USD 2.2 billion a year across the OECD. Because of the composition problems associated with valuing and comparing market and non-market benefits, it is difficult to estimate if these benefits are in fact realised.

Given the profitability problems prevalent in the fisheries of many OECD countries, one may question whether the rent (i.e., returns above normal profits) created by commercial fishers is even equivalent to 6 per cent of the value of landings across OECD countries. Admittedly, rents created by fisheries services are unlikely to have a long-lasting effect on profit streams. They are likely to make their way into fishers' cost structures in the form of higher asset values and/or more expensive support services. In fisheries where the supply of one of the factors of production is inelastic, rents created by fisheries management can be expected to be capitalized into the value of that factor (e.g., vessel values, license values, quota prices).

But what if the recipients of the rents created by fisheries services also had to pay for those services? How would this affect their economic performance? As a first step this would involve recovery from commercial sector of some portion of the costs of fisheries services. If commercial fishers were to directly pay for the benefits they receive, the level of fishing effort level is unlikely to be effected. But it is likely that such a policy would prompt restructuring of the fishery, with implications for vessel numbers and employment.

If some fisheries services costs are recovered then the fishers will face increased costs. This will either reduce profits of fishers, or move them into loss-making positions. Fishers at the margin will be affected; those who move into loss-making positions will be bought out fishers with lower cost structures. This process is likely to be associated with reduced demand for labor and capital.

Hatcher and Pascoe (1998) investigated the impact that charging might have on England's demersal fishery in the English Channel. They found that the introduction of a cost recovery charge increases the costs incurred by all fishers, "resulting in some formerly profitable vessels becoming unprofitable." Their analysis indicates that over the longer run these unprofitable vessels will leave the fishery and the fleet will adjust accordingly. New Zealand's introduction of the cost recovery regime in 1994 may also have been associated with a drop in demand for labor in the fleet. Employment in New Zealand's harvesting sector dropped by 8 per cent between 1995 and 1997.

The analysis by Hatcher and Pascoe also highlights the impact on the fleet structure of different charging methods. A charge based on a flat fee on all vessels is likely to disadvantage smaller vessels more than larger vessels. A charge based on capacity units encourages larger vessels to leave rather than smaller ones. As a consequence, capacity is likely to decrease by more than vessel numbers.

This discussion suggests charging may have broader applications other than just the recovery of fisheries services costs. Charging could be used as a capacity management policy. Recent international initiatives have encouraging states to play a more active role in managing fishing capacity. Charges levied on capacity units may represent a viable and less costly (to taxpayers) option that traditional means of reducing capacity (e.g., vessel decommissioning).

2.6 Institutional Implications of Management Costs

In most OECD countries, all the costs of fisheries services are funded out of general tax revenues. The primary recipients of the market values generated by these services are commercial fishers and, through the marketing system, consumers. The contributors to these services are many and diffuse (general taxpayers) and the beneficiaries are few and distinct (commercial fishers and consumers). While this may not be desirable from a perspective of economic efficiency (admittedly a view that excludes impacts of

transactions costs and non-market values), there are likely to be valid socio-political reasons for this state of affairs.

Some countries have move sought to shift the costs of fisheries services, which currently borne by the general taxpayer, onto the primary beneficiaries. In different forms this has meant that commercial fishers now have to pay for the costs of certain fisheries services and/or have increased involvement in management of the resource (e.g., co-management). As the other main beneficiary, consumers bear the costs to the extent that the market allows fishers to pass costs onto them through higher prices (just like any other business cost).

An important institutional effect is that recovery of fisheries services costs involves the imposition of a selective and compulsory fee one group of individuals in society. Commercial fishers normally have no choice: if they want to fish then they have to pay a share of the costs. In most OECD countries this represents a significant socio-political issue. It is certainly likely to change the nature of the relationship between commercial fishers and government agencies. Commercial fishers now have strong incentive to ensure that fisheries services maximise their benefits. In some cases this may mean trying to pay as little as possible. This creates an inevitable tension with government agencies seeking to provide for other non-market values that are codified in the law (as well protecting the size of their budgets).

A shifting of costs, whether it be in through recovery of costs and/or in increased involvement in management of the resource, also creates opportunities for improving the effectiveness and efficiency of the provision of fisheries services. The fact that fishers have to pay these costs means they have an incentive to:

- More carefully consider their own priorities for government agencies' research. Previously there were few incentives for commercial fishers to economise on their research requests. Now they have an incentive to only put forward proposals that are likely to benefit them.

- Rigorously review how government agencies carry out fisheries services. There may even be calls to move some fisheries services into a competitive environment to improve the chances of them being delivered in a more efficient manner.

A closer working relationship between commercial fishers and government agencies, although not necessarily a more harmonious one, has been evident since the introduction of cost recovery in some countries (e.g., New Zealand).[4]

3. THE OECD STUDY

3.1 Study Objectives

The above discussion provides a useful context for the OECD's study on the costs of managing fisheries. The OECD's Fisheries Committee will be undertaking a study that:

- Documents the fisheries management systems in use, the fisheries services provided to support management systems, and the method of funding those services, for all OECD countries.

- Analyses how fisheries services and their costs vary between countries, fisheries and management systems.

- Shows how countries have improved, or propose to improve, the way that fisheries services meet the requirements of fisheries management systems.

3.2 Member country contributions

3.2.1 Country Notes

Member countries will be submitting information on their management systems, the fisheries services that support those systems, and the funding of those services. These submissions will form an inventory that goes into the synthesis report. Member countries have been asked to send these country notes to the Secretariat before the end of 2000.

3.2.2 Fishery Case Studies

Member countries were also invited to provide fishery case studies. These will show how fisheries services are being used to support management systems in a particular fishery. Member countries have been encouraged to provide case studies that broadly fall within this theme. Such contributions could include the following parts:

- The Fishery. A brief description of the stock, the production from the fishery, the main stakeholders, and the size and structure of the commercial sector.

- Management systems. A description of the management instruments and consultation mechanisms.

4 See Roy, E (1998).

- Fisheries services. A discussion of research, management and enforcement services. For each activity this would include a description of who carries it out, its functional relationship with the management system and other fisheries services, and how the appropriate level of fisheries services is determined.

- Financing fisheries services. A description of how fisheries research, management and enforcement activities are financed and where these funds come from.

Case studies that describe changes in how fisheries services are provided and financed have been especially encouraged. These changes may be due to an institutional reform or result from the creation or amendment of management systems. The case studies can include an assessment of the impact of these changes on government agencies and stakeholders, as well as an evaluation of the effects on the efficiency and effectiveness of how fisheries services are provided.

It is proposed that these case studies be presented to the 86th (autumn 2000) and 87th (spring 2001) sessions of the Committee.

3.3 Synthesis Report

The content of the synthesis report will depend on number and quality of Member country contributions. Nevertheless, a report with the following parts is envisaged:

- Executive Summary

- Introduction

- Fisheries Governance in OECD Countries. This part will be an inventory of *(i)* management systems used, *(ii)* fisheries services provided and *(iii)* the costs of fisheries services and their funding. It would draw heavily from the country notes submitted by Member countries.

- Fishery Case Studies. This part will summarise the key elements of each of the case studies.

- Study Findings. This part would contain conclusions that can be drawn in relation to the study objectives. In particular, the different ways fisheries services are provided, how they relate to the different types of fisheries and management systems in use, and the potential for the more efficient and effective provision of those services.

This outline only gives a general indication of what the synthesis report will look like. A more detailed outline will be presented for discussion and agreement to the 87th session of the Committee (spring 2001).

A first draft of the synthesis report be presented to the 88th session (autumn 2001) with a view to final adoption at the 89th (spring 2002) or 90th sessions (autumn 2002).

4. CONCLUSIONS

Governments intervene in fisheries to the benefit of commercial fishers and others in society. In OECD countries the costs of fisheries management was estimated to be around USD 2.2 billion. In most countries these costs are paid by the general taxpayer. It can be argued that a more direct relationship between the primary beneficiaries of fisheries management, fishers and consumers, could lead to more efficient interventions. By having to bear a portion of the costs of fisheries management, fishers will pressure governments for services that meet needs in an efficient and effective manner. In the next two years the OECD's Committee for Fisheries will be documenting the nature and extent of fisheries management costs in Member countries. These experiences will provide a useful context for recommendations on promising institutional frameworks for the provision of fisheries services.

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