

Management and Enforcement Costs in Norway's Fisheries

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Abstract: This paper discusses public expenditures on fisheries in Norway. The purpose is to identify management and enforcement costs, management being defined as regulations necessary to overcome the open access problem. Management costs thus include costs of devising and enforcing fisheries regulations. They also include stock assessments and monitoring at sea, but do not include research with a more academic orientation, search and rescue operations, and various infrastructure such as fishing harbors. The figures cover the period 1990-1999. The management costs amount to 7-13 percent of the catch value, a variation which is primarily due to the variability of the annual catch value. Total expenditures on the fisheries sector have been much higher in the past; in 1990-91 subsidies were more than 20 percent of the catch value but were down to approximately two percent in 1996-99.

INTRODUCTION

It is well known that unfettered competition in the fishing industry leads to inefficiency in the form of excessive use of capital and manpower and decimation of fish stocks. The regulation of fisheries is not costless however. When assessing the net benefits of fisheries regulations these costs obviously have to be taken into account. A cursory glance at the results of fisheries regulations world wide suggests that the benefits realized by these regulations may not be large enough to justify them. If so, they had better not be undertaken.

In this paper we try to assess the management and enforcement costs in Norway's fisheries. This is a first and necessary step towards answering the question whether these costs are worthwhile. Elsewhere we have assessed the potential rent in Norway's fisheries at 20-30 percent of the value of landings, before accounting for management costs (Hannesson and Steinshamn, 1996). While this is well above the figure for management costs which we shall arrive at below, this potential has not been fully realized, but to what extent it has been realized still remains to be investigated. The question whether these costs are worthwhile under the present management regime is therefore still open.

THE DATA

Virtually all costs of management and enforcement in Norway's fisheries are covered by the government. Two government ministries are involved, the Ministry of Fisheries and the Ministry of Defense, which administers the coast guard. The cost data have been compiled from the budget documents presented annually to the

Norwegian Parliament.¹ The numbers reported are the actual outlays according to government accounts, except for the last two years (1999 and 2000), for which budgeted figures are presented.

Not all public expenditures on the fisheries can be identified as management and enforcement costs. A case in point is subsidies to the industry, which clearly are neither. The approach is to start with aggregate expenditures and then eliminate all such expenditures as appear unrelated to management and enforcement. The cost figures to be reported are net costs; i.e., government outlays less the reported revenues under each budget item, and so the cost reported is net of any cost recovery. Since subsidies to the industry are included in the budget figures, these will be reported as well.

DEFINITION OF MANAGEMENT AND ENFORCEMENT COSTS

In broad terms, we may distinguish between two main categories of management and enforcement costs, costs of devising regulations and costs of enforcing the regulations. We discuss each of these, as a preliminary for identifying the appropriate items in the government accounts.

Costs of devising regulations. Any sensible fishery regulation must be based on assessment of fish stocks. This in turn requires extensive collection and processing

¹ The government budget is presented in "Stortingsproposisjon" No. 1 for each parliamentary session, and the budgets for each ministry are presented in accompanying documents, one for each ministry.

of data, both at sea and from the landings of fish. Such activity is undertaken by fisheries research institutions specifically set up for this purpose. Management costs therefore include the cost of such institutions and such infrastructure as research vessels needed for gathering and processing data. All expenditure by such research institutions need not, however, be fisheries management costs, as they are often engaged in basic research on fish stocks and the marine environment. Here we shall take a narrow view of this and exclude expenditure on research of a more fundamental nature supported by the Research Council of Norway, which demands that the research it funds meets certain academic standards. Nevertheless, much of this research is related to assessment of fish stocks and the marine environment and thus has at least in part the ultimate goal of benefiting the industry. Some of this research can, however, be viewed as pursuit of general knowledge with no specific beneficiary.

After the stock assessment has been done, the information passes through an elaborate apparatus of devising and negotiating fishery regulations. The management costs include costs of the institutions set up for this purpose, such as ministries and other official or semi-official bodies, membership in international organizations dealing with stock assessment in the international arena (such as the International Council for the Exploration of the Sea), etc.

Costs of enforcement. Fisheries regulations are useless if they are not enforced. Enforcement is critical because each individual decision maker has an incentive to breach regulations even if they are beneficial for the industry as a whole; otherwise the regulations would not be needed in the first place. These costs include costs for patrol boats at sea to deter both foreign and domestic fishermen from breaching the regulations, which for foreigners often means keeping them out of the national economic zone. Land based controls and gathering of information (such as catch statistics) are also necessary and are undertaken by specialized bodies such as the Directorate of Fisheries in Norway. To the extent that breach of fisheries regulations ends up with the courts there is a cost being incurred in the judicial system. We have not attempted to account for such costs, and it would not in any case be easy to extract figures on this from the expenses of running the court system.

It could be argued that the cost of **infrastructure** should be included in the management costs of fisheries. The fishing industry needs specific infrastructure for transportation and navigation; navigational instruments such as lighthouses, electronic navigational systems, port facilities, and more. This it shares, however, with sea going traffic in general, and it is not easy to say how much of the cost of this can be ascribed to the fishing industry. Furthermore, land based industries also are

dependent on infrastructure such as roads and railways, the costs of which for the most part are borne by the public. It is not clear that costs of infrastructure specific for the fishing industry should be regarded as management costs to be borne by the industry itself, as long as other industries do not carry the burden of financing land based infrastructure. We will therefore exclude the costs of infrastructure such as fishing ports and lighthouses.

It could also be argued that fishing is more risky and exposed to the elements than most other industries and so needs a special organization and equipment for **rescue operations**. These characteristics are, however, also shared with other ocean going traffic. We shall take a narrow view here and not regard the costs of search and rescue operations as management costs.

OVERVIEW OF PUBLIC EXPENDITURE ON THE FISHING INDUSTRY IN NORWAY

An overview of public expenditure in Norway on the fishing industry 1990 – 2000 is provided in Table 1. The figures show government expenditure on the Ministry of Fisheries and the coast guard,² the offsetting income, and the resulting net expenditure. The net expenditure has declined from about 50 percent of the value of landings³ in 1990 to about 20 in 1996-99. This is in part due to a rise in the offsetting incomes; net expenditures as percent of gross expenditure have declined from about 90 percent in 1990 to 76 in 1996-1999, but also, and more significantly, the decline is due to a reduction in subsidies, as will be explained below.

As already mentioned, all of this expenditure cannot be regarded as management and enforcement cost. The next step will be to “purge” the figures in Table 1 of expenditures on fish farming and activities not related to management and enforcement in the capture fisheries. Below we will examine the expenditures and incomes item by item in this regard.

EXAMINATION OF BUDGET ITEMS

Ministry of Fisheries

The first line in Table 1, labeled “Ministry of Fisheries”, relates to expenditures for operating the ministry itself, while the items below show the expenditure of the ministry on various activities outside its own domain. In addition to the management of capture fisheries the ministry is responsible for aquaculture, fish processing

² For 1999 and 2000 the table shows budgeted figures.

³ Some of this expenditure is related to fish farming while the value of the catch includes only catches of wild fish, inflating the percentage shown in the table.

and exports, fishing harbors, and navigational infrastructure. The ministry does not keep any separate public accounts of administering these activities. According to a recent budget proposal (1998) the workload related to exports and aquaculture has been increasing in recent years, but it is nevertheless our impression that most of the work of the ministry is related to the capture fisheries. Well over one half of all exports of fish products stems from the capture fisheries (20 billion "kroner", out of 28 billion in 1998). The assumption that one half of the ministry's expenditure is related to management of the capture fisheries is probably not too high.

Membership in international organizations

The international organizations dealing with fisheries and in which Norway is a member are, with minor exceptions, all concerned with capture fisheries. In 1998 over 97 percent of this expenditure went to organizations dealing with capture fisheries and marine mammals,⁴ and the figure for other years is of a similar magnitude. We have chosen to ignore the small fraction of expenditures on other organizations and attribute all of these to the management of capture fisheries.⁵

Institute of Marine Research and operations of research vessels

The Institute of Marine Research, located in Bergen, is a semi-official institution which gets most of its support from the government through the Ministry of Fisheries. It deals with both capture fisheries and aquaculture, but the bulk of its expenses concern the capture fisheries. Table 2 shows the expenditure of the institute in 1997-99 on its various activities and research programs, as they appear in its activity plans.⁶ The share of aquaculture in the expenditures financed by the Ministry of Fisheries was 12-14 percent of the total and has been increasing over time. Other expenditures financed by the ministry go to programs and activities related to the capture fisheries. In addition the institute gets some support from external sources, such as the Research Council of Norway, the

⁴ These organizations are The International Council for the Exploration of the Sea (ICES), The International Commission for Fisheries in the Northeast Atlantic (NEAFC), The Northwest Atlantic Fisheries Organization (NAFO), and The North Atlantic Marine Mammals Commission (NAMMCO).

⁵ In 1998 the ministry paid for membership in three international organizations dealing with navigation, harbors and lighthouses. This amounted to about 2.5 percent of the total expenditure on international organizations.

⁶ These figures are published in the budget for the Ministry of Fisheries.

Norwegian development agency (NORAD), and some is financed by private companies (the oil industry, for example). Some of the activities financed from external sources are thus unrelated to the capture fisheries in Norway.

Some of the activities financed by the Research Council probably are of a sufficiently applied nature for being regarded as management costs. On the other hand, some of the activities financed by the ministry may contain an academic component. We adopt the rough and ready rule of regarding all expenditures financed by the ministry, except for expenditures on aquaculture, as management costs of the capture fisheries and all of the activities financed by external sources as unrelated to management.

It remains to establish cost shares for the capture fisheries and aquaculture. The cost of operating the research vessels is included in the activity plans of the Institute of Marine Research. In 1997-99 the cost of the research vessels accounted for about 30 percent of the total expenditures financed by the Ministry of Fisheries. If we assign all of the cost of the research vessels and 80 percent of the remaining costs to the capture fisheries we end up with 86 percent of the total expenditures of the institute as being used for the capture fisheries. This is roughly the same percentage as shown in Table 2 for 1999 but less than for the two previous years. Note that it is net expenditure which is identified as management cost. The incomes accounted for under the Institute for Marine Research and the research vessels are externally financed research and contract work such as investigations for the oil industry.

Research in fisheries and aquaculture

Most of the expenditure on this item can hardly be classified as management and enforcement costs of capture fisheries. Table 3 shows a further breakdown of this expenditure for 1992-2000. The Institute of Nutrition deals with food and feed research and not with fisheries management in any sense. The PUSH program deals with sea ranching. Development may come close to being subsidies to fishing and fish processing, as it provides grants to firms to enhance their efficiency and improve their infrastructure. The grants to the Research Council of Norway are mainly used for research of an academic nature, even if it is not necessarily undertaken in universities; much of this is undertaken at the Institute of Marine Research. This money would be a part of the external financing of the institute, even if the money originates from the Ministry of Fisheries. Even if this research is of an applied character we have chosen not to regard it as a part of management costs.

This leaves us with the Institute of Fisheries Research in Tromsø. This institute deals mainly with fishery and

aquaculture research and is in many ways similar to the Institute of Marine Research in Bergen but much smaller, even if it has a broader scope. Most of the grant provided by the Ministry of Fisheries is used to finance research on fish stocks and the operations of a research vessel; in 1996-98 about 60 percent of this grant was used for financing management related research on fish stocks.⁷ It seems not to be far off the mark to ascribe one half of the Ministry's grant to management costs.

Directorate of Fisheries

Most of the activities of the Directorate of Fisheries concerns the capture fisheries, but the Directorate is also responsible for regulations on fish farming. We have obtained from the Directorate the following breakdown of the expenditure for 1996 on the major lines of activity (numbers in million "kroner"):

Resource management	131.2
Management of aquaculture	23.2
Quality control – nutrition	75.0
Sea and coastal zone management	14.4
Total	243.9

Most and possibly all of the activities under resource management concern management of capture fisheries. The activities under Sea and coastal zone management are of a more varied nature; much of this concerns work in connection with coastal zone planning and development, which may concern both fish farms, harbors, and shore based installations. Quality control and nutrition concerns quality control and inspection of fish catches and fish processing, both for capture fisheries and aquaculture.

Ascribing all the activities under resource management to management costs and excluding the rest, we end up with 54 percent of the total expenditure of the Directorate of Fisheries being attributable to the capture fisheries in 1996. This is probably representative of the remaining years in the sample. Attributing one half of the Directorate's costs over the period considered to management and enforcement costs of the capture fisheries probably is a cautious estimate.

The incomes of the Directorate of Fisheries are fees for various kinds of services rendered by the Directorate. These fees are levied both on the capture fisheries and aquaculture. Most of these fees seem to hit the capture fisheries, but we will assume that they do so in the same proportion as the expenditures (50 percent) when subtracting these fees to find the net expenditures on the capture fisheries.

Subsidies due to the fisheries agreement

The fisheries agreement is an agreement between the government and the Norwegian Federation of Fishermen on income support, the intention of which is that fishermen should attain incomes on par with people in comparable occupations. The government has given income support to the industry on the basis of this agreement for more than 30 years. These subsidies are not in any sense management costs.

The income reported under the fisheries agreement 1990-92 are fees on exports and have therefore been subtracted from the gross expenditure when calculating the subsidies in Table 4.

Miscellaneous

This is expenditure on training for fish workers, particularly women, information activities and campaigns to counter what is seen as threats from environmental groups, and various other items. Most, and possibly all of this, amounts to subsidies or social welfare expenditures rather than management costs, and so we will account for them under subsidies in Table 4.

Government banks

These are grants to the Government Regional and Development Bank and the Government Bank for Fisheries, but the latter has now been reorganized as a part of the former. These grants finance subsidized loans and grants for building or decommissioning fishing vessels and are thus to be considered as subsidies.

Coastal Management

The items under coastal management are administration, fishing harbors, lighthouses, piloting, traffic centers, and electronic navigation instruments. This infrastructure is for the benefit for all traffic at sea, not just fishing vessels. The item "fishing harbors" is the one most directly related to the fisheries. This item includes expenditure which also benefits sea going traffic in general, such as the dredging of ship lanes. The fishing harbors themselves are also used to some extent by other vessels. Lighthouses and electronic navigation instruments are used by all sea going traffic. Piloting is, on the other hand, not needed by the fishing fleet, and traffic centers are mainly needed for large freight and passenger ships. As discussed above, we will not consider these as management costs.

⁷ See budget for Ministry of Fisheries, various years.

The coast guard

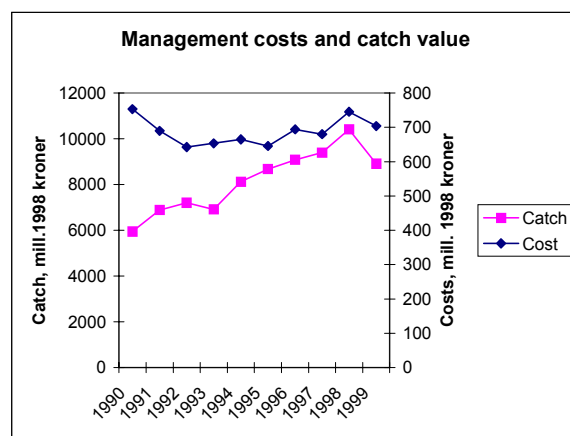
Most of the activities of the coast guard are for the benefit of the capture fisheries in one form or another. The coast guard inspects vessels at sea and enforces regulations, and deters foreign vessels without the appropriate authorization from entering the exclusive economic zone. The Ministry of Defense has provided the information that about 70 percent of the activities of the coast guard are related to the fisheries. Hence we ascribe 70 percent of the net expenditure on the coast guard to fisheries management and enforcement costs.

CONCLUSION

The management costs are shown in Table 4. These costs, expressed as percent of the value of landings, were at their highest in 1990, almost 13 percent, but have remained between seven and eight percent since 1994. The main reason why the percentage has fallen is that the value of the catch has increased much faster than the management costs, as can be seen from Figure 1, which shows the value of the catch and the management costs at constant prices.⁸ The management costs have been rather steady and without trend over the 1990s while the value of the catch increased by almost 70 percent from 1990 to 1998, but declined in 1999. Since 1990 was a bad year for Norway’s fisheries while recent years have been better than average, management costs appear to correspond to about ten percent of the catch value on the average.

Table 4 also shows subsidies and social expenditure on the fisheries. Since the beginning of the 1990s the subsidies to the fisheries have almost vanished. The subsidies amounted to almost a quarter of the value of landings in 1990 but then fell quickly and have been about two percent since 1996. It remains to be seen whether the lean years now foreseen for the cod fisheries for the next few years will reverse that development.

Figure 1



REFERENCE

Hannesson, R. and Steinshamn, S.I. (1996): Grønne skatter og fiskerinæringen (Green taxes and the fisheries). SNF Report No. 2/1996, Bergen.

⁸ Value figures have been inflated or deflated by the consumer price index, using 1998 as a base.

Table 1

Public expenditure in Norway on Ministry of Fisheries and the coast guard, '000 "kroner"

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Ministry of Fisheries											
Ministry	37563	35564	39158	41469	39170	39213	41437	45900	49704	49700	55900
Membership in international organizations	2470	1362	1367	2862	2953	3009	3316	3570	3964	5120	5800
Sum Administrasjon	40033	36926	40525	44331	42123	42222	44753	49470	53668	54820	61700
Institute of marine research	123486	144616	110935	178144	178590	209887	223293	271073	254907	235540	264500
Operations of research vessels	120728	62841	61533	79514	91618	99658	98688	106725	121527	102780	159600
Research in fisheries & fish farming	153122	165930	236041	236422	226266	224992	233123	230531	248015	237630	246400
Sum Research and development	397336	373387	408509	494080	496474	534537	555104	608329	624449	575950	670500
Directorate of fisheries	180124	205352	209619	209394	210873	211101	221871	222991	236543	239300	250300
Subsidies due to the fisheries agreement	990185	1049857	543218	268574	178823	155862	88459	109428	82212	105000	
Miscellaneous	58588	89061	24603	35238	38246	26354	28786	21962	19075	22810	23860
Government banks	144600	134000	155355	97800	110435	102845	56925	32709	78220	52500	52000
Sum Management of fisheries and fish farming	1373497	1478270	932795	612006	538377	496162	396041	387090	416050	419610	326160
Coastal administration	83187	100446	151851	144949	138274	143445	146933	147087	130440	139300	140830
Fishing harbors	94417	115378	155607	122980	118523	141127	159157	169613	185356	192000	202000
Lighthouses	182621	198576	208842	209688	200162	200583	193269	195821	198209	195600	197000
Piloting	172553	180750	211824	227976	235198	242454	250080	291313	337760	326500	333600
Traffic centers							15847	19451	53165	58150	33010
Electronic navigation instruments	11893	11270	23221	82597	67149	37446	40787	35207	27204	32970	33900
Sum Coastal management	544671	595150	751345	788190	759310	765055	806073	858492	932134	944520	940340
Sum, Ministry of Fisheries	2355537	2483733	2133174	1938607	1836284	1837976	1801971	1903381	2026301	1994900	1998700

Table 2

Institute of Marine Research, activity plans, budgeted expenditures

	1997			1998			1999		
	Ministry	Others	Total	Ministry	Others	Total	Ministry	Others	Total
Activities									
1 Resource assessment and advice	69206	26357	95563	80756	13434	94190	79141	13440	92581
2 Marine environment assessment and advice	28604	7427	36031	32172	4949	37121	30616	8128	38744
3 Aquaculture and advice	11002	1902	12904	11042	496	11538	14049	4053	18102
4 Fisheries in developing countries							0	67536	67536
5 Support activities	1270	13646	14916	1679	15550	17229	225	12612	12837
Subtotal	110082	49332	159414	125649	34429	160078	124031	105769	229800
Research programs									
6 Resources and environment in coastal zone	3937	2268	6205	4191	3453	7644	4173	2729	6902
7 Ecosystem, Norwegian Sea	17203	8852	26055	14849	7537	22386	11999	4908	16907
8 Reproduction and recruitment	3090	1834	4924	3603	1827	5430	2595	2788	5383
9 Population dynamics	6519	5308	11827	6465	6368	12833	4801	5854	10655
10 Measurement methods	12285	5524	17809	8494	4189	12683	6975	4104	11079
11 Responsible fishing	11039	13062	24101	12749	15356	28105	14200	11454	25654
12 Production of smolt	1518	3322	4840	3708	8083	11791	4000	5690	9690
13 Aquaculture organisms	4268	13107	17375	3587	11712	15299	4132	9177	13309
14 Marine biodiversity				2861	2400	5261	1952	3153	5105
15 Sea ranching	3761	8149	11910						
16 Marine pollution	2567	3286	5853	1461	4628	6089	2848	4588	7406
17 Fisheries in developing countries		47909	47909	0	54873	54873			
18 Fish diseases and biotechnology	2582	6755	9337	4850	6303	11153	4247	6026	10273
Subtotal	68769	119376	188145	66818	126729	193547	61922	60441	122363
Grand total	178851	168708	347559	192467	161158	353625	185953	166210	352163
Aquaculture as % of total (lines 3, 12, 13, 15 and 18)									
	12.93			12.05			14.21		

Table 3

Expenditure by Ministry of Fisheries on research in fisheries and aquaculture

	1992	1993	1994	1995	1996	1997	1998	1999	2000
Institute for Nutrition	40732	35702	37961	36895	22211	24447	28302	19130	21700
Research Council of Norway	180000	163900	165500	166000	171500	170030	170000	182000	179500
PUSH program					10004	8298	879		
Institute of Fisheries Research, Tromsø	12000	17600	16000	13300	14500	14800	15040	16000	19200
Development		715	2987	8797	14908	12956	33794	20500	26000
New building, Institute of Fisheries Research, Tromsø	1559	15505	2987						
Sum	236041	236422	226266	224992	233123	241695	248015	237630	246400

Areas of research financed by a grant to the Research Council of Norway

	1995	1996	1997	1998	1999
Resources	28210	33080	31400	29700	31120
Aquaculture	46890	53500	54950	54000	55250
Technology	24100	19500	18900	18800	19800
Processing and markets	5610	11200	15300	15400	17230
Industrial development	26375	17000	14500	13800	13800
Social sciences		5600	4000	4000	4000
Grants to institutions, sholarships, etc.	28532	27200	27000	27000	30000
Miscellaneous	6283	4420	3980	7300	10800
Sum	166000	171500	170030	170000	182000

Table 4

Management costs in Norway's fisheries ('000 "kroner")

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Ministry of Fisheries											
Ministry	18781.5	17782	19579	20734.5	19585	19606.5	20718.5	22950	24366.5	24850	27945
Membership in int'l organizations	2470	1362	1367	2862	2953	3009	3316	3570	3964	5120	5800
Institute of marine research	96372	110348.8	86089.6	82358.4	82129.6	84671.2	107574.4	88624.8	107989.6	107760	119600
Operations of research vessels	120728	61336	59843	75794	69633	72284	71383	73022	76108	72500	128600
Inst. of Fish. Research, Tromsø			6000	8800	8000	6650	7250	7400	7520	8000	9600
Directorate of fisheries	83943	98239	88592.5	85527	86596	93559	97265	94563.5	100490.5	103115	107332.5
Sum, Ministry of Fisheries	322294.5	289067.8	261471.1	276075.9	268896.6	279779.7	307506.9	290130.3	320438.6	321345	398877.5
Coast guard	308556.5	308208.6	307873.3	315867.3	342542.9	328519.8	353932.6	375298	425035.8	398801.9	405427.4
Grand total	630851	597276.4	569344.4	591943.2	611439.5	608299.5	661439.5	665428.3	745474.4	720146.9	804304.9
Value of landings (million kr.)	4976.5	5967.9	6384.7	6269.5	7470.1	8175.7	8662.3	9183.8	10409.43	9118	0
Man. costs as % of catch value	12.68	10.01	8.92	9.44	8.19	7.44	7.64	7.25	7.16	7.90	
Subsidies and social expenditure											
The fisheries agreement	963342	1010658	527997	248574	164734	155862	88459	109428	82212	105000	0
Miscellaneous	58588	89061	24603	35238	38246	26354	28786	21962	19075	22810	23860
Government banks	144600	134000	155355	97800	110435	102845	56925	32709	78220	52500	52000
Total subsidies	1166530	1233719	707955	381612	313415	285061	174170	164099	179507	180310	75860
-as percent of catch value	23.44	20.67	11.09	6.09	4.20	3.49	2.01	1.79	1.72	1.98	