Financial Support to Fisheries

IMPLICATIONS FOR SUSTAINABLE DEVELOPMENT

OECD

OECD PUBLISHING

Financial Support to Fisheries

IMPLICATIONS FOR SUSTAINABLE DEVELOPMENT

OECD

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The OECD is a unique forum where the governments of 30 democracies work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

The OECD member countries are: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The Commission of the European Communities takes part in the work of the OECD.

OECD Publishing disseminates widely the results of the Organisation's statistics gathering and research on economic, social and environmental issues, as well as the conventions, guidelines and standards agreed by its members.

This work is published under the responsibility of the OECD Committee for Agriculture Fisheries.

Also available in French under the title:
Les aides financières au secteur de la pêche
Leurs répercussions sur le développement durable

Foreword

All OECD countries provide some form of financial support to their fisheries sectors. The type and level of support varies significantly between countries and takes the form of either general support, such as the provision of management, research and enforcement services, or more targeted direct support, such as payments for vessel construction and modernisation, income support, tax exemptions and loan guarantees. To a greater or lesser extent, all forms of support have an impact on key aspects of the fisheries sector. As support programs are an instrument of economic policy, their impacts are initially reflected in the economic operations of fishers – that is, by reducing costs, raising prices or increasing income. These economic impacts will then generally affect both environmental and social aspects of the sector and, because the fisheries system is dynamic with many feedback and interactive mechanisms, there are likely to be further rounds of economic, environmental and social effects.

The purpose of this report is to explore the range of economic, environmental and social effects of financial support to the fisheries sector in OECD countries. The analysis is undertaken within a sustainable development paradigm, emphasising the effects within, and the interactions between, the three pillars of sustainable development under various fisheries policy settings. This approach expands on the relatively narrow focus on the trade and environmental aspects of support programs that has characterised much of the debate to date and seeks to ensure that a more holistic perspective is taken on this important policy area. Given that OECD countries provide support to the sector to meet a range of economic, environmental and social objectives, such a holistic approach will provide greater insight into the efficacy of different types of support in meeting policy objectives, identify actual and potential areas of policy incoherence, and highlight any trade-offs that may need to be undertaken in addressing policy goals.

This report builds on a stream of work that has been undertaken by the OECD Committee for Fisheries. The Committee produced inventories of financial support and economic assistance to the fishing sector in OECD countries in 1965, 1971, 1980 and 1993, and more recently has undertaken a more systematic effort to define and measure government financial transfers (GFTs) to the fisheries sectors in Member countries. As part of a three-year study, entitled *Transition to Responsible Fisheries*, the Committee examined GFTs and their impact on resource sustainability. A central feature of the study was the development of a classification system for GFTs and the collection of detailed information on GFTs for 1996 and 1997. Since that study, the OECD has collected country data on GFTs on an annual basis, and has published the results in the series of statistical publications, *Review of Fisheries in OECD Countries: Country Statistics* (for example, OECD 2004). The issue of GFTs was then addressed as part of the three-year study on *Fisheries Market Liberalisation* which analysed the trade and resource implications of increased liberalisation in the fisheries sector. The study covered tariffs, non-tariff barriers, investment restrictions, as well as GFTs.

As a follow-up to the *Fisheries Market Liberalisation* study, the Committee for Fisheries decided to examine the issue of GFTs in more detail. The Committee also decided to analyse GFTs within a sustainable development framework. The concept of sustainable development has been an increasingly important feature of the policy agendas of OECD Member countries in recent years and is reflected throughout the OECD where sustainable development has been identified as an important policy priority. For example, the 1998 Ministerial Council recognised the achievement of sustainable development as a key priority for OECD countries (OECD 1998). This commitment was reiterated at the 2001 Ministerial Council Meeting where Ministers recognised sustainable development as an overarching goal of the Organisation and its Member countries.

The report was approved by the Committee for Fisheries at its meeting on 10-12 October 2005 and the Committee agreed to make the report available to a larger public.

Acknowledgements

Anthony Cox of the OECD Fisheries Division was the primary author of the report, assisted by Carl-Christian Schmidt.

Several consultants made major contributions to the study: Dr. Rognvaldur Hannesson, Norwegian School of Economics and Business Administration (Chapter 5); Dr. Tony Charles, St. Mary's University of Halifax, Canada (Chapter 7); Dr. Quentin Grafton, Australian National University (Chapter 8); In addition, several OECD countries provided case studies: Canada (Chapter 9); Spain (Chapter 10); Norway (Chapter 11); and the Australian Bureau of Agricultural and Resource Economics (Chapter 12).

The report was edited and prepared for publication by Sophie O'Gorman and Emily Andrews Chouicha.

Table of Contents

ABBREVIATIONS

ABARE	Australian Bureau of Agricultural and Resource Economics
ASCM	Agreement on Subsidies and Countervailing Measures
CFP	Common Fisheries Policy
EAGGF	European Agricultural Guidance and Guarantee Fund
EC	European Commission
EEZ	Exclusive Economic Zone
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FIFG	Financial Instrument for Fisheries Guidance
IUU	Illegal, unreported and unregulated fishing
MSY	Maximum sustainable yield
MEY	Maximum economic yield
nm	Nautical mile
RFMO	Regional Fisheries Management Organisation
SAPARD	Special Accession Programme for Agriculture and Rural Development
WSSD	World Summit on Sustainable Development
WTO	World Trade Organization

EXECUTIVE SUMMARY

The fisheries sector in OECD countries receives around USD 6.4 billion a year in transfers from governments. Around 38% of the transfers is provided for the management, research and enforcement of fisheries while 35% is directed to the provision of fisheries infrastructure. The remaining transfers are in the form of direct payments to the sector or transfers that the reduce costs of fishing, including vessel construction and modernisation payments, decommissioning schemes, income support, fuel tax exemptions and interest rate concessions, to name but a few. Because of difficulties in identifying the full range of transfers, this figure is most probably an underestimate of the total support provided to the sector.

The negotiations underway in the WTO to clarify disciplines on fisheries subsidies, and the call in the WSSD Plan of Implementation to eliminate subsidies that contribute to illegal, unreported and unregulated fishing and to overcapacity, underscore the significance that the international community places on the issue of government support to the industry. Many OECD governments have undertaken or are contemplating reforms in their fishing sectors to shift towards more sustainable and responsible fisheries, including reconsideration of the extent and type of support provided to the sector.

This report analyses the impacts of transfers on key aspects of the economic, environmental and social dimensions of the sector. An integrated analytical approach is required because transfers have an impact on resource stocks, rent generation, economic profitability, trade in fish and fisheries products, investment in fleet capacity, employment, regional growth and social cohesion. They are also used to address a broad range of economic, social and environmental objectives and it is critical that governments ensure that the sustainable development of the sector is not hampered by policy incoherence between the range of objectives and policies in these areas.

Analytical Framework

The analytical framework used in this study is based on the sustainable development concept. Government implementation of a transfer policy will impact firstly on the economic dimension as it is an economic policy instrument designed to change the prices faced by agents in the sector, or to change the relative wealth of participants. The effects on the economic dimension will then flow through to the environmental and social dimensions, which will in turn generate dynamic feedback effects amongst the three dimensions. The main advantage of taking a sustainable development approach is that it allows the full range of short-term and long-term effects of transfer policies to be addressed, potentially identifying and avoiding unintended or unforeseen consequences.

From an ***economic perspective***, all transfers will, to a greater or lesser extent, reduce the costs or raise the incomes of fishers and other sector recipients (for example, vessel builders and gear suppliers). This will occur either directly (for example, through transfers such as fuel tax exemptions or grants for construction or modernisation) or indirectly (for example, through the government provision and funding of management services and infrastructure). The consequent impacts on the sector will then depend critically on the type of management system in place, the effectiveness with which management regulations are enforced, and the status of the stocks being fished (i.e. whether they are overfished or underfished).

In general, a transfer will initially augment the profits of fishing enterprises. In open access fisheries where there is little or no effective management, transfers will lead to increased fishing effort through investment in new gear and fishing vessels and a more intensive use of existing vessels. In the long term, the excess effort in the fishery will lead to resource rents being competed away, reduced catches and fish stocks, and reduced profitability.

Introducing catch controls, if they are perfectly enforced, will not have any effect on fish stocks or fish catches, provided that the target total allowable catch is set primarily with respect to sustainable yield (but recognising that other policy factors may occasionally play a role). However, if the catch controls are not perfectly enforced, or if there is no control on fishing effort, then there is likely to be increased effort entering the fishery with lower revenues, higher costs and resource rents being competed away. Effort controls on their own will only partially overcome this problem because it is very difficult for fisheries management agencies to effectively regulate every aspect of fishing effort (time at sea, vessel size and power, gear, number of people, skills of skippers and crew, etc) and fishers are, to varying degrees, able to expand effort along uncontrolled dimensions.

The use of individual rights to catch or for fishing effort will significantly change the outcome of the provision of transfers as they will eliminate the need for fishers to race to catch the fish and introduce an incentive for fishers to land catches at minimum cost. Financial transfers will only serve to increase both the profits in the fishery and the market value of rights (if the rights are transferable). If transfers are incorporated into the expectations of fishers and communities, they will have a negative impact on resource management and sustainability.

The ***economy-wide effects*** of transfers to the fishing sector have received little attention in the policy debate to date because, with some notable exceptions (such as Iceland), the fishing sector is relatively small in terms of GDP and employment. However, the sector often plays a more significant role in terms of trade and for employment and income in coastal regions. Transfers divert human and other resources into the fishing industry where they yield a lower return than in the economy at large. Indeed, their long term contribution can even be negative, as would happen when transfers exacerbate the depletion of fish stocks that results from the poor or ineffective management of the sector.

The ***trade effects*** of GFTs represent the final dimension of the economic pillar and have been the focus of much discussion in the WTO negotiations on fisheries subsidies. It is difficult to generalise about the likely effects of GFTs on trade patterns. If there is open access, or if management regulations are not effectively enforced, then transfers may well result in those fishers receiving the transfers being able to expand supplies to the domestic and world markets, thereby affecting trade flows and prices. Over the longer term, trade expansion induced by transfers, which is not underpinned by effective management, will be counter-productive in terms of reductions in catches and fish stocks in the country providing the support. Expansion of supply can also arise if transfers are applied to under-exploited fisheries or to aquaculture operations (and the latter may place pressure on the harvest sector to also expand production or, alternatively, to seek support).

The ***environmental effects*** of transfers flow directly from the economic effects and can be divided into three main sets of impacts: effects on the target fisheries; effects on associated fisheries resources (i.e. bycatch); and effects on the broader environment. The combination of catch controls, effort controls and rights based management will have a range of effects on target stocks. The more effectively a management regime restricts the catch of the target stock, then the lower will be the likely effect of transfers on the stock. The impacts on multi-species fisheries are more complex to assess as they depend on the nature of species interdependence and whether fishers can target different species.

Transfers which lead to increased effort and catches may also result in the increased bycatch of non-target species and, paradoxically, many OECD countries have also introduced bycatch reduction plans accompanied by financial support for the purchase, installation and operation of more "environmentally-friendly" fishing techniques and gear (such as bycatch reduction devices).

The ***social dimension*** of GFTs is particularly significant as a number of OECD countries have historically used some types of transfers to address social concerns such as regional development, community support and unemployment in fishing communities. However, it has been increasingly recognised that social policy tools, rather than fisheries management tools, should be the main mechanism to meet social objectives, or they should at least be coherent and mutually supportive.

Financial transfers can have an impact on individual capabilities and human capital through improving education and skills of fishers and their families, improving their health and reducing poverty. However, they can also serve to reduce individual and community resilience and the flexibility to respond to changes in economic and natural conditions. Expectations of on-going government support can become embedded in decision-making processes of fishers and their communities, insulating the sector from necessary adjustments, and further reducing the incentive to diversify economic activities. Transfers can also inhibit or support the development of social capital within the sector.

Effects of Different Categories of GFTs

Research, management and enforcement expenditures are a central feature of GFTs in OECD countries. These transfers are essential in ensuring that publicly-owned fisheries resources are appropriately managed, research is undertaken to underpin management settings and regulations are enforced. It is generally assumed that such transfers are benign in terms of economic and environmental impacts on the sector although their effectiveness in meeting management objectives has not been empirically tested as yet in OECD countries. There is also scope for increasing cost recovery and user charging to improve the efficiency of service delivery in this area, particularly for those services where the industry is the sole beneficiary.

Governments provide a variety of ***fisheries infrastructure,*** such as harbour and landing facilities, navigation services, and search and rescue support. In the absence of user charges for the use of government provided infrastructure, the costs of the fishing industry are reduced and potential profits increased, irrespective of the management regime in place. The environmental effects, however, are dependent on how well catches and effort are constrained. In the absence of effective limits on catches and effort, such transfers could increase pressure on stocks by artificially reducing fishers' costs and making fishing more attractive. This can also have an impact on community resilience by sending mixed signals about the sustainability and profitability of fishing activities.

Payments for access to other countries' waters may involve an explicit monetary transfer, the transfer of fishing technology, assistance with improving fisheries management institutions, the provision of market access in the fishing country, or some combination of these. The effects of access payments will differ between the countries providing the transfer (the distant water country) and receiving the transfer (the host country) and the management arrangements in pace in both countries. In general, there are unlikely to be any effects on the fish stocks of the distant water country and the access payments will help to boost the income of the distant water fleet. The effects on the fish stocks of the host country will depend on whether the incoming capacity displaces or adds to existing capacity and the effectiveness of the management and enforcement in the host country.

The provision of ***payments for vessel decommissioning and licence retirement*** is a key feature of many OECD countries fisheries policies. They have been increasingly used in recent years as means of addressing the over-capacity in many OECD fleets (which occurred at least partly as a result of the past provision of vessel construction payments). However, the available evidence suggests that most vessel decommissioning schemes fail to reach their objectives and that some may actually increase overcapacity as they inject new capital into the sector. Effective decommissioning and licence retirement schemes should be implemented in conjunction with management changes to insure that effort does not leak back into fisheries. Caution is also needed to ensure that the social effects of the transfers are not counter-productive and that the transfers are provided as part of a larger package of social adjustment measures.

Transfers for investment and modernisation include government payments and tax incentives for the construction and modernisation of fishing vessels, as well as loan guarantees and loan restructuring schemes. Many countries have only recently changed their funding priorities away from vessel construction. Transfers to vessel modernisation are still widely provided although the effects of such transfers may be similar to the effects of support for vessel construction, in particular when the payments effectively increase fishing capacity. The dependence of regional communities on support for capital costs can reduce the community resilience and increase dependence of regions on government support.

OECD countries also provide ***transfers for income support and unemployment insurance,*** including direct payments to employees and vessel owners, industry specific unemployment insurance schemes, and payments for temporary cessation of fishing. Income support to employees reduces the costs to firms of keeping them in the industry and can often prevent adjustment away from unsustainable levels of fishing. The social dimension is particularly significant as income support can often work to increase community dependence on government support and reduce community resilience.

A number of ***other cost-reducing transfers and direct payments*** are also provided by OECD countries, including interest subsidies, fuel tax exemptions and price support mechanisms. Many of these transfers will increase incomes or reduce variable costs, and will more directly affect the competitive position of fishers in international trade.

Key findings

It is clear that ***transfers have an important, but limited, role to play in fisheries management policy***. They are an important part of the government's policy toolbox as they are used to provide research, management and enforcement services that may not necessarily be supplied by the market. However, this is generally limited to a subset of fisheries services, the benefits of which flow to the community in general, rather than to the industry specifically. The other major rationale for the provision of transfers is to assist the industry during times of structural change. Temporary transition payments can ease the burden of adjustment of restructuring, and can help set segments of the industry on a sounder footing.

Outside these areas of clear market failure or temporary assistance, the rationale for transfers is not clear cut. Transfers increase the profits of the industry in the short term and the benefits of particular transfer policies need to be weighed against the potential costs. Transfers become capitalized in the asset values of vessels, quotas and access rights, reducing the flexibility of the industry to adjust. Depending on management settings, there may be impacts on trade patterns and pressures arising from increases in capacity, which may also have international spillover effects (for example, in IUU fishing). Cost-reducing transfers insulate the fishing industry from the real costs of their operations and artificially inflate profits, inhibiting industry adjustment to changing economic and environmental conditions.

The study has highlighted the ***shortcomings in the transparency*** of fisheries support programmes in many OECD countries. Much of the data and information on the programmes are difficult to access and analyse, and there remain significant gaps in the data. Particular areas of concern that have been raised cover the extent of sub-national transfers (at regional and local levels) and the cost of off-budget items such as tax concessions, loan guarantees and interest subsidies.

It is clear that ***an integrated approach to assessing support programmes*** is required. Financial support to the fisheries sector has a wide range of impacts, often reaching beyond the intended target(s) of the programmes. Such policy inadvertence can be particularly critical in the fisheries sector where getting policies wrong has a high cost in terms of long term impacts on an often fragile resource. Identifying the inherent trade-offs in balancing competing objectives and ascertaining the dynamic (second and third round) highlights areas of actual and potential policy incoherence.

The ***effectiveness of the management regime and its enforcement is*** critical in determining the effects of transfer programmes. Importantly, it is the effectiveness of the management regime in enforcing rules and securing rights that is a key factor, just as much as the type of management regime itself. Anything less than perfect enforcement will generally result in adverse impacts on all dimensions and under all management regimes. Whether these adverse impacts lead to a net welfare loss as a result of the transfer policy is an open empirical question which will vary according to the conditions applicable in different fisheries settings. However, there are some types of management regimes which tend to be more robust than others. For example, management regimes which are characterized by stronger access rights will tend to be more self-enforcing as the industry has a greater incentive to cooperate with enforcement measures. A higher degree of stakeholder participation is likely to reinforce this incentive.

Financial support for the sector should be de-coupled from fishing activity in order to ensure that fisheries management policy tools are not used as the primary means to achieve social and regional development objectives. The analysis has highlighted the problems that arise when financial support is linked to fishing activity, either directly (through cost-reducing transfers) or indirectly (through income support programs). Many transfers tend to increase dependence on financial support, reduce individual and community resilience and inhibit adjustment to changing conditions. While there is clearly a need for government intervention to address pressing issues in these areas, using fisheries management as the major mechanism carries a significant risk that one of the fundamental objective of sustainable fisheries – stock conservation – will be compromised and will send blurred policy messages to sector participants.

Imposing time limits on support programmes will improve their effectiveness and increase community and individual resilience. Expectations of government assistance tend to become embedded in the decision making processes of fishers and fishing communities. Expectations of ongoing government support reduce the flexibility of individuals and communities to respond to fluctuations in economic and natural conditions. The incentives to invest in diversified economic activities are likely to be reduced as the expectation of continued government support will insulate the sector from necessary adjustments.

Finally, it is evident from the experiences of a number of countries, such as Norway, New Zealand, Iceland and Australia, that ***the reduction of financial support does not necessarily spell doom and gloom for the industry*** and have generally resulted in increased profitability and reduced dependence on government assistance over the medium to longer term from reducing financial support. Reduction in financial support was not the only factor in the evolution of the industries in these countries as the process of adjustment as part of a broader package of management reforms designed to set in train structural changes that put the industry on a more sustainable footing from an economic, environmental and social perspective. In each case, stronger access rights were instituted, generally with the active cooperation of the industry. Ineffective firms disappeared, improving the balance between the available resources and the fishing fleet, helped by improved management regimes which helped to internalize the dynamic process of fleet capacity adjustment.

PART I

GOVERNMENT FINANCIAL TRANSFERS FROM A SUSTAINABLE DEVELOPMENT PERSPECTIVE

Chapter 1

Government Financial Transfers to Fisheries in OECD Countries

The debate over financial support to the fisheries sector has spawned a variety of definitions and classification frameworks, with potential for creating confusion about coverage and the implications for policy. The definition used by the OECD is government financial transfer (GFT) which is the monetary value of government interventions associated with fisheries policies. This chapter discusses definitional issues and data limitations, and presents the data in OECD countries for the period 1996-2003.

OECD countries provided USD 6.4 billion in GFTs to the fishing sector in 2003, equivalent to 21% of the value of fisheries production. Around 38% of the GFTs were directed towards management, research and enforcement expenditures while another 35% were provided for fisheries infrastructure construction and maintenance.

Limits on the data indicate that the data presented in this study are an underestimate of the total GFTs that are provided by OECD countries.

The OECD work on financial support to the fisheries sector takes place at a time of increased national and international attention on the problems and issues confronting the sector. There have been considerable efforts at national and supranational levels to address the potential adverse effects of financial support to the fisheries sector. Over the last two decades, a number of OECD countries have moved to significantly scale back support to the sector. In the early 1980s, for example, New Zealand radically restructured its fisheries management system, including removing all GFTs with the exception of transfers for management, research and enforcement (and instituting cost recovery for most of the latter transfers). Norway also underwent major change in both its management and support regimes in the 1990s. More recently, the European Union undertook a review of its Common Fisheries Policy (CFP) which, while not reducing the financial support provided to the sector, altered the emphasis in the type of support provided. For example, transfers for vessel construction under the CFP were stopped as of 31 December 2005 (although transfers for vessel modernisation remain) and a greater emphasis is to be placed on the promotion of environmentally friendly practices.

One of the common features of the recent evolution of support policies in many OECD countries has been the changing nature of some forms of support provided to the sector. Notably, most OECD countries have shifted, or are in the process of shifting, away from funding the construction of fishing vessels, largely in response to the recognition that there exists significant overcapacity in many OECD fleets and that the provision of public resources for increasing capacity is not justified on either environmental or economic grounds. While the total amount of support has not declined, and is not expected to do so in the foreseeable future, increasing emphasis is being placed on "environmentally-friendly" support, often linked to the introduction of more environmentally acceptable fishing gear and technologies, the reduction of fishing capacity and effort, closure of fishing grounds, retraining of fishers, and so on. However, the effectiveness of this shift in focus in terms of improving the sustainability of fisheries and the economic health of the fishing sector remains to be tested.

The increased domestic attention being given to support for the fisheries industry is reflected in the recent international commitments that have been undertaken to address the issue of fisheries subsidies. The major policy forum in which fisheries subsidies are currently being addressed is the World Trade Organization (WTO). At its Fourth Ministerial Conference in Doha, Qatar, in November 2001, the WTO undertook (in paragraph 28 of the communiqué) to "clarify and improve WTO disciplines on fisheries subsidies, taking into account the importance of this sector to developing countries" (WTO, 2001). Discussions are currently being conducted in the Negotiating Group on Rules within the WTO and several countries have made submissions on possible approaches to disciplining fisheries subsidies. The submissions to date agree to the need to discipline fisheries subsidies, much of the debate focusing on the potential scope, modalities and legal mechanisms of any disciplines (see, for example, WTO 2004a, b).

Following the commitment under the Doha Agenda, the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg called for countries to "eliminate subsidies that contribute to illegal, unreported and unregulated fishing and to over-capacity, while completing the efforts undertaken at the WTO to clarify and improve its disciplines on fisheries subsidies…"(United Nations, 2002, paragraph 30(f)). This call served to further focus policy attention on the linkages between fisheries subsidies and illegal, unreported and unregulated (IUU) fishing and over-capacity. Indeed, this has been of policy concern for some years and has been reflected in the discussions in the WTO where several countries' submissions have emphasised the links. More generally, fisheries and oceans issues featured prominently in the WSSD Plan of Implementation with, amongst other things, a commitment to maintain or restore the world's fish stocks to levels that can produce the maximum sustainable yield by 2015 (United Nations 2002 paragraph 30(a)).

Elsewhere at the international level, both the FAO and UNEP have examined the fisheries subsidies issue as part of their work programs. The FAO has conducted two expert consultations and a technical consultation on the issue. The expert consultations focused on defining subsidies and on developing a methodology for identifying subsidies (FAO 2000, 2003). UNEP has published two reports fisheries subsidies in recent years (Porter 1998, 2002). In 2004, UNEP held a workshop on the topic and published 2 reports analysing in more detail the resource effects of particular subsidy programs and laying out some options for incorporating resource impact considerations into fisheries subsidies disciplines (UNEP 2004a, b).

Finally, environmental NGOs have played a prominent role in the international debate over fisheries subsidies. The World Wide Fund for Nature (WWF) has been particularly active in addressing the data gaps on fisheries subsidies through the production of two publications and the conduct of a workshop (WWF 2001a, b). In 2004, WWF produced a detailed position paper which proposed a way forward in the WTO negotiations on fisheries subsidies (WWF 2004).

There is, therefore, clearly an increasing policy interest in the addressing the harmful effects of support to the fisheries sector. The gathering policy momentum is especially evident in the WTO, but is also clearly significant in national policy debates. In an era of tightening government budgets and increased emphasis on efficiency in service delivery, financial support for all sectors is under greater scrutiny. One purpose of this study is to assist OECD countries in addressing these concerns through the provision of data and policy analysis to underpin domestic and international discussions. While the report is based on the experiences of OECD countries, the policy lessons are also clearly relevant to non-OECD countries. As the study is based upon the sustainable development paradigm, this may hold even truer as such a paradigm allows countries to identify tradeoffs and conflicts against the background of their own cultural, social and economic priorities.

Definition and Classification of GFTs

The last few years have seen a great deal of effort being devoted to defining what constitutes financial support to the fisheries sector in a range of forums such as the WTO, OECD, FAO and APEC. This has resulted in a variety of definitions and classification frameworks being used in the policy debate to date and has had the potential for creating confusion about the coverage of the various definitions and the implications for policy. In this chapter, the definition of government financial transfers (GFTs) used by the OECD is presented and discussed in relation to the definitions of subsidy and support used elsewhere in the policy debate. Data on GFTs in OECD countries for the period 1996 to 2003 are also presented, both at the aggregate OECD level and at the country level.

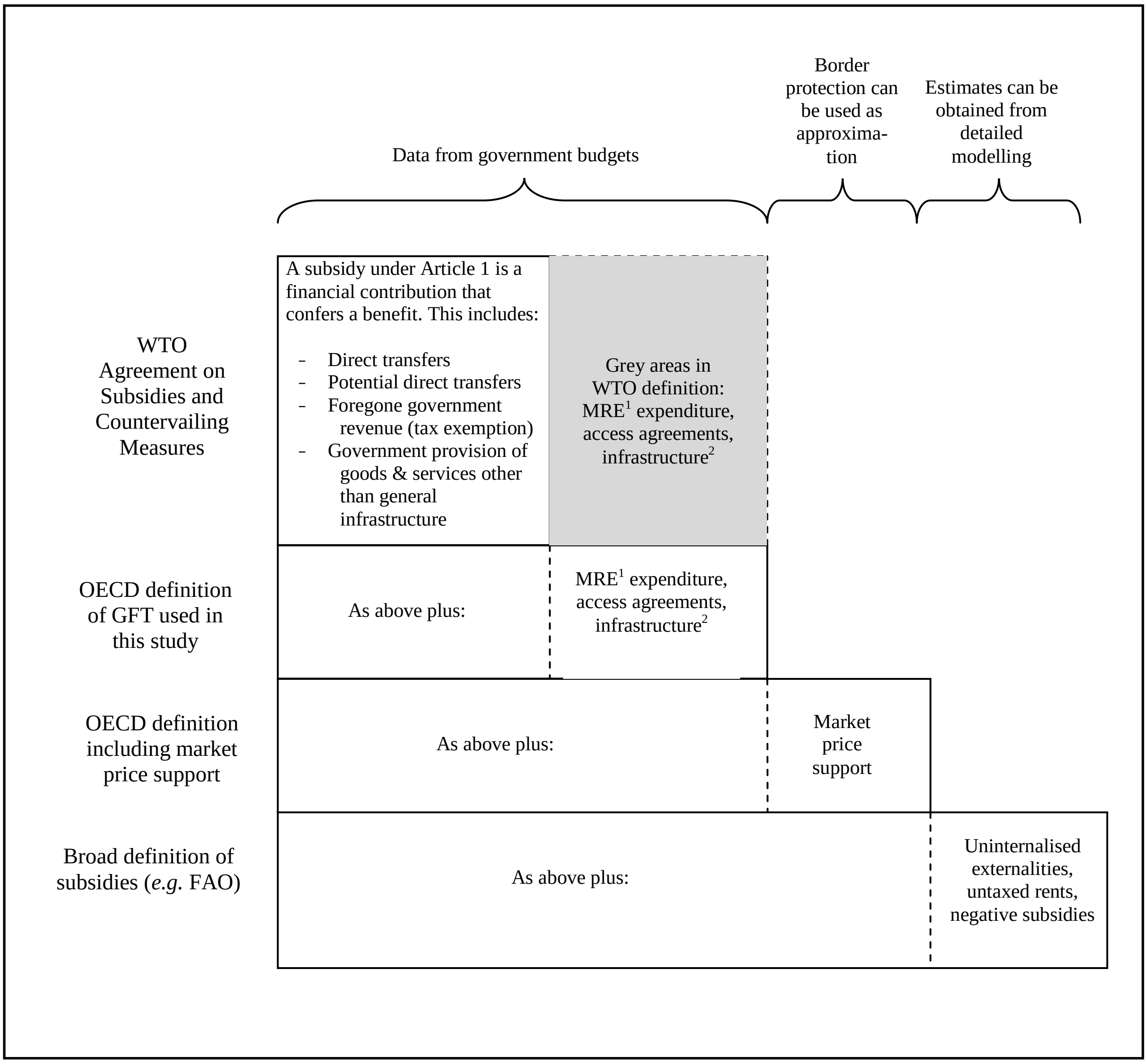
Government financial transfers (GFTs) are defined as “the monetary value of government interventions associated with fisheries policies” and covers transfers from central, regional and local governments (OECD 2000, p. 129). They include transfers which are directly provided from government budgets; which are a potential direct transfer of funds or liabilities (such as loan guarantees); and which consist of foregone government revenue (such as tax exemptions). Transfers which provide support to the sector but which are not made directly to the sector, such as payments for fisheries management, research and enforcement, fisheries specific infrastructure, and fisheries access agreements, are also included. This definition was developed for the study on Transitions to Responsible Fisheries and has since been used in the annual collection of GFT data undertaken as part of the Review of Fisheries.[1] Throughout this report, the terms “GFT”, “support” and “transfer” are used interchangeably. It should also be noted that the scope of the report is limited to transfers to marine capture fisheries and does not include transfers to aquaculture or to the processing sector.

Figure 1.1 provides a schematic representation of the relationship between the alternative definitions of support that have been used in the policy debate. The only internationally legally agreed definition of a subsidy is described in Article 1 of the WTO Agreement on Subsidies and Countervailing Measures (ASCM) (WTO 1999, p. 231). In this definition, a subsidy is defined as a financial contribution by a government or any public body that confers a benefit to a (set of) producer(s), where a financial contribution can involve a direct transfer of funds, a potential direct transfer (such as through a loan guarantee), foregone government revenue, government provision of goods and services other than general infrastructure, and government purchases of goods. The WTO

1. Note that market price support (in the form of border measures) was also included in the GFT definition used in the study on the Transition to Responsible Fisheries but is excluded in this study as discussed later in this section.

definition also excludes support provided through border protection measures (such as tariffs) which are dealt with in a separate agreement.

Figure 1.1. Schematic Representation of Alternative Definitions of Support



1. MRE refers to management, research and enforcement. 2. Infrastructure is a grey area and is included in both the WTO and OECD definitions for reasons of inclusiveness.

Source: OECD, WTO (1999, p. 231), FAO (2000).

The OECD definition of GFT covers subsidies as defined under the WTO as well as transfers related to management, research and enforcement, fisheries access agreements, and fisheries specific infrastructure. This latter item is a grey area as it is included in the WTO definition, but has yet to be tested in the WTO. Moreover, no notifications of infrastructure subsidies for the fisheries sector have been notified to the WTO. This is discussed further below. Subsidies under the WTO ASCM are therefore a subset of

OECD GFTs. Note that the definition of GFTs used in the *Transition to Responsible Fisheries* also includes market price support.

Some analysts and organisations have advocated a much broader definition of subsidy, arguing that government policy interventions in general constitute a form of support for the fishing sector. Inclusion of this item in a definition of subsidies has been recommended by the two FAO Expert Consultations on subsidies in the fishing industry (FAO 2000, 2003). The consultations focused in particular on government interventions that have different short term and long term effects (such as gear regulations that have a short term cost to the industry, but a long term benefit to society as a whole) and on the lack of government intervention to internalise externalities (such as lack of management measures or inadequate enforcement). Untaxed resource rents and negative subsidies (*i.e.*, taxes) also feature in the broad definition. While there is clearly an element of support to the industry in these broader types of policy actions (or inactions), the value is difficult to quantify in most cases (see Box 1.1).

“Grey” areas requiring clarification

For the majority of the GFTs identified above, the rationale for their inclusion in the OECD definition are quite clear; they clearly constitute either a direct or indirect transfer to the fisheries sector. However, the situation with respect to a couple of the types of GFT may be less obvious: infrastructure expenditure; and payments for access to other countries’ fishing grounds. These “grey” areas can be controversial and require some further clarification, mainly because a large proportion of GFTs are expended in these areas.

Infrastructure expenditure

Most OECD governments provide transfers for the construction and maintenance of infrastructure to support the fishing industry. This includes harbours, quays, lighthouses, navigation facilities, roads, refuelling facilities and landing facilities, but also can include the provision of services such as sewerage, lighting and water to a fishing community. Governments generally provide this infrastructure to the industry without charging for the use of the facilities or services, although some countries do levy charges for the use of port facilities.

Several definitional and technical issues arise in relation to the treatment of infrastructure expenditure in the study. First, it may be difficult to identify when infrastructure should be classified as “general” infrastructure, and when it should be classified as “fisheries-specific”. Clearly, general port facilities that are available to all marine users would not necessarily count as being fisheries-specific infrastructure, whereas harbour facilities that were specially constructed or used primarily for the fishing industry would appropriately be classified as specific support. So there is a continuum from general to specific with respect to infrastructure, and the dividing line between the two is not clear. To date, the WTO has not had to develop guidelines on this issue as, while the WTO definition of subsidy excludes general infrastructure, the definition has not been tested in the WTO, either in relation to fisheries or more generally.

Box 1.1. Items Excluded from the OECD Definition of GFTs

A number of transfers are specifically excluded from the OECD definition. These include: uninternalised externalities; "negative" subsidies; market price support; and untaxed resource rent.

Uninternalised externalities

An element of support is provided to the fishing industry when, as a result of a lack of government intervention, the external or social costs imposed by the industry's activities are not borne by the industry itself. This is known as an uninternalised externality and arises when the marginal social cost of fishing activities exceeds the marginal private cost borne by fishers. An example of an uninternalised externality is the cost associated with the loss of seabirds as a result of the use of a particular fishing technique. The cost to the fishers from the seabirds' deaths is zero, but there may be a social cost associated with the loss of biodiversity and existence value. If this social cost is not charged to fishers, then it can be argued that there is an element of support for the industry.

However, it is generally quite difficult to determine the monetary value of that support. In addition, it can be argued that the support element arises as a result of government policy actions in areas (such as environmental policy) which are well outside the area of the more direct fiscal support provided through GFTs. For these reasons, uninternalised externalities are not included in the definition used by the OECD.

"Negative" subsidies

It has been argued that "negative" subsidies need to be included in the definition of subsides to ensure a balanced view of the net fiscal burden on the fishing industry (FAO 2000, 2003). These negative subsidies include taxes and fees. In principle, inclusion of such items would provide improved information of the full range of fiscal interventions made by the government and would enable the potential distorting effects to be fully assessed. It is, however, difficult to know where to draw the line. Should such an accounting include income taxes or value-added taxes paid on inputs? In addition, the focus of the policy debate to date has been on the cost to governments of support provided to the industry.

Market price support

Market price support occurs when, as a result of government policy, the domestic price of a product is greater than the world market price. This support is normally created by trade restrictions and import/export duties. An attempt to assess whether market price support, as a broad concept, could be meaningfully estimated was undertaken in the early 1990s using cod as a case study. The inherent technical problems in estimating a producer support estimate proved too great an obstacle at that stage. The primary problem concerned the heterogeneous nature of the fisheries commodity market and the consequent difficulty in establishing a world reference price from which price gaps can be measured.

Untaxed resource rent

Some writers have suggested that un-taxed rent associated with the exploitation of publicly owned or managed fisheries resources should also be included in the GFT accounting as this represents a transfer from society to the sector (see, for example, Campbell and Haynes 1990; Stone 1997; Milazzo 1998). This argument relates to rent generated by governments not charging private individuals or enterprises for preferential access to a natural resource, such as a fishery (or, in other natural resource-based industries, a stand of pine trees or a gold deposit). Resource rent accrues to an industry when its net revenues from exploiting the resource exceed the normal returns to factors of production. In the case of a fishery, resource rent is the excess, over the long term, of revenues over the necessary costs of commercial operations in the fishery where the costs of operation include all normal cash expenditure plus depreciation, the opportunity cost of capital and labour and a margin for risks being faced.

Whether or not rents are generated in a fishery depends largely on the management regime in place. In open-access fisheries and fisheries with poorly enforced regulations, resource rents are dissipated through expansion of effort and increased competition for the resource. Management instruments that restrict access to a fishery, provide incentives for participants to minimise costs and allow individuals to engage in profit-maximising behaviour such as individual quotas (transferable and non-transferable) and exclusive area-use rights may move fishing effort back to a level at which rents are again generated. These rents tend to become quickly capitalised into asset values (*e.g.* the price of quota) if they are not recouped by the government. At the moment, these rents are generally *not* taxed, except indirectly through income tax. If the management instruments do not create conditions for the generation of resource rent to begin with, however, it is hard to justify counting that foregone revenue as support to the industry. It is worth noting that there are examples of resource rent taxes and charges for access to publicly owned resources in place in other extractive industries (most notably in the petroleum sector).

Second, the actual amount of money spent on infrastructure is not necessarily the major item of policy interest. Rather, the key concern is the under-pricing of the services provided by the infrastructure. This is where the element of support actually lies. There may be solid public policy grounds for the government provision of infrastructure relating to the existence of market failures in the form of natural monopolies in the private provision of these facilities (characterised by high fixed costs and low constant marginal costs). However, in many cases, there are also grounds for charging the users of the services, provided that the beneficiaries can be clearly identified and the benefits of charging the users outweigh the costs of administration and collection. This issue was canvassed in the recent study on *Fisheries Management Costs* (OECD 2003a). It should also be noted that this argument applies equally to all users of fisheries-related infrastructure (*e.g.* recreational users, commercial shipping, etc).

A related issue is the difficulty of determining the appropriate price that should be paid by users, and hence what the support element actually is. In particular, it needs to be decided whether the price should reflect the marginal social cost of the services or just the private cost. The underpricing of infrastructure services is also an issue in other sectors where infrastructure plays an important role, such as forestry, mining, transport and water services. In those sectors (particularly the water and transport sectors), the underpricing of infrastructure is considered to provide significant support to the industry, with potentially important distorting effects on production and consumption patterns.

Fourth, country reporting of data on infrastructure expenditures has been relatively patchy in the OECD to date. This may reflect the fact that the provision of infrastructure is often undertaken by government departments other than those responsible for fisheries management (for example, by regional development agencies and local government authorities) and the transfers may therefore be difficult to identify. The possibility of a resulting under-reporting of infrastructure expenditure by some countries presents an unbalanced perspective of the relative significance of infrastructure support across OECD countries.

Finally, as noted above, some countries may charge for the use of facilities such as harbours and quays. However, presently, the revenue from this charging is not generally reported. Whether or not such charges constitute full cost recovery, it is desirable that the charges that are made for the use of infrastructure be offset against the transfer element so that a net figure can be obtained. This is similar to the situation for expenditures on research, management and enforcement where cost recovery charges are reported and then deducted from the total transfers to provide a net transfer figure.

Payments for access to other countries' fishing grounds

A number of countries pay for their fleets to have access to the fishing grounds of other countries. When these access payments are not recouped from the industry, they constitute support to the fishing fleet of the donor country. When the cost of the access payments is recovered from the fleet then the support is confined to the value attached to the government seeking access acting as a broker to secure access as, arguably, this reduces the transactions costs of private companies in negotiating access.

In some cases, the access payment may exceed the value that the foreign fishing fleet may have been willing to pay for the access, and the transfer element needs to be calculated against a reference price for what the industry is willing to pay for access. In principle, such a reference price would be determined through an open auction for the rights. Payments above that reference price would then be a straight transfer from government to government. In this situation, the transfer element to the fishing fleet is only the amount of the payment not recovered from the fleet, up to the reference price. Recovering the full cost of access payments would constitute a tax on the fleet if the access payments were above the reference price.

Access payments are sometimes made as part of a development package. This may take the form of assistance for capacity building in the recipient country to ensure the sustainable management of its resources. Access payments may also be provided to improve the facilities of the recipient country's fishing sector infrastructure. Irrespective of the stated objectives, the use of access payments remains controversial. It may be questioned whether the development packages would be forthcoming if the recipient country did not allow the donor country's fleet access to its resources. It can also been argued that the use of development aid to enhance fisheries facilities (such as ports and processing facilities) may primarily benefit foreign fishing fleets rather than the domestic fleets. In addition, many recipient countries are concerned about the loss of foreign currency if access payments are subjected to discipline under the WTO processes (Grynberg 2003).

It is therefore often difficult to disentangle the objectives and effects of access payments. In the interest of full transparency, both the amount of the access payments and the amount that is recouped from the fishing fleet receiving the benefit of access should be reported. As discussed later in this report, the EU and the United States recover some portion of access payments from their fleets, but not the full payment.

Defining access payments as a GFT highlights a potential contradiction arising from the differential treatment of a country's fishing fleet in its domestic EEZ compared to their treatment in a foreign EEZ. The element of support arising from access payments is the underpricing of access for a country's fleet to another country's EEZ. If the full, market-clearing price for access was repaid by the foreign fleet to its government, then there would be no net transfer to the industry. Nor would there be a transfer if the fleet paid the host country directly for access. In contrast, Canada is the only OECD country that currently charges their domestic fishing industry for access to resources in their own EEZs, although some other countries (such as New Zealand and Iceland) are exploring the option of recouping some portion of resource rent from their fishers. So there is an inconsistency between the treatment of a country's fishers in its own EEZ, where access is unpriced, and in foreign EEZs, where access clearly has a price.[2] From a definitional perspective, however, there is a qualitative difference (albeit subtle) between a government paying for access for its fleet in other EEZs and a government choosing not to charge for access to its own resources: one is an act of commission, the other an act of omission. As a result, payments for access to other countries' waters are included as a GFT in the OECD definition.

The issue of charging for access to fish resources was raised in Box 1.1 where it was noted that free access to resources can be considered to be a financial support under a broad definition of the term. Indeed, the fishing industry stands in stark contrast to most other natural resource sectors where charging for access to publicly owned resources is the norm. In the forestry industry, many OECD countries charge private companies a stumpage fee for access to the resource and the concessions are auctioned off in some cases. Similarly, mineral and oil and gas leases are regularly sold, traded or auctioned, with the prices reflecting the scarcity value of the resources (amongst other things). However, for various historical, cultural and institutional reasons, such charging for access to fish resources has not been instituted in OECD countries to date (with the exception of Canada). The willingness of foreign fleets and their governments to pay for access to resources points to the basic economic argument that scarce fish resources have a price attached to them. By effectively giving away access to domestic resources, governments run the risk of sending inappropriate signals about the scarcity value attached to fish resources.[3]

Classification of GFTs

The purpose in classifying transfers is to facilitate analysis of how the provision of transfers may affect fishers' behaviour, to improve the transparency attached to data on transfers and to facilitate cross-country comparisons. Different types of transfers will influence the decisions taken by fishers in different ways, resulting in a range of possible responses depending on the conditions attached to the transfer, the state of the fleet, the condition of the resource stock and, perhaps most importantly, the management system in place.

In this study, GFTs are classified in two dimensions according to: the type of measure; and the program objective. Following the study on *Transition to Responsible Fisheries* (OECD 2000), transfers can be classified according to the type of measure under one of the following headings:

1. Direct payments from government budgets to fishers, which were primarily directed at increasing the income of fishers.
2. Cost reducing transfers, which are aimed at reducing the costs of fixed capital and variable inputs.

---

2. The case may also arise where the foreign fleet is charged for access but the host country fleet does not pay for similar access. Such differential treatment does not necessarily matter from an efficiency perspective provided that the access price paid by the foreign fleet is less than the resource rent that will accrue. There are, however, distributional issues that may be of concern.

3. However, open access fisheries, regulated open access fisheries or fisheries with ineffective management will not generate resource rent and so the optimal charge for access to these fisheries will be zero. Management regimes which restrict access and catches will result in resource rent being accrued over time and so a positive price for access would be optimal.

3. General services, which are transfers paid from governments' budgets which are not necessarily received directly by fishers but nevertheless reduce the costs faced by fishers.

A fourth category, *cost recovery*, is included to reflect the fact that a number of countries recoup part of the management costs from the fishing industry. This ensures that the net cost to the government is presented in the collated data on GFTs. As discussed above, *market price support* is included in principle, but was not calculated in OECD (2000).

This classification provides a very broad perspective on how transfers are provided to the sector and a good summary of the GFTs provided to the sector. However, it does not lend itself to a more detailed analysis of the economic, environmental and social effects of different types of transfers. Different programs within the broad categories are likely to have different effects on production decisions by the fishers, and hence on the economic, environmental and social outcomes. For example, the direct payments category includes payments for vessel decommissioning and buyouts of quota and licences as well as transfers which are targeted to income support. The intentions and effects of these two groups of transfers are quite different and it is difficult to analyse them together under the category of direct payments.

Similarly, the cost reducing transfers category includes transfers which reduce the capital costs of fishers as well as transfers that reduce the variable costs of fishers. However, they will have quite different effects on the costs of operations, with implications for how fishers respond: transfers to reduce capital costs will alter investment decisions and can be expected to have a different effect on fleet capacity and operations than transfers to reduce variable costs.

As a result, a more detailed classification based on the intended objective of the transfer program is also used in this study. This classification contains seven categories as follows:

- *Management, research and enforcement expenditure*
  - The annual monetary value of transfers from governments used to provide management, research and enforcement services to the fisheries sector. This covers both domestic and international management as well as payments to support producer, community and cooperative organisations. Any management costs recovered from producers should be identified to obtain a net transfer figure.
- *Fisheries infrastructure expenditure*
  - The annual monetary value of the charges forgone or reduced for the use of government provided infrastructure, transfers for restocking fish resources, transfers to improve the infrastructure of fisheries communities. Any infrastructure user charges should be identified to obtain a net transfer figure.

- *Payments for access to other countries' waters*
  - The annual monetary value of government-to-government payments for the right of access for a country's fishing fleet to operate in another country's EEZ.
- *Payments for vessel decommissioning and licence retirement*
  - The annual monetary value of payments made to fishers for the removal of vessels and licences from a fishery, including buyouts of quotas and catch history.
- *Investment and modernisation schemes*
  - The annual monetary value of grants for the construction of new vessels and the modernisation of existing vessels, including direct grants, loan interest loans and loan guarantees.
- *Income support and unemployment insurance*
  - The annual monetary value of income support provided to fishers in the form of direct payments, grants for the temporary withdrawal of vessels, payments for disaster relief and reduced seasons, retirement and retraining payments, and unemployment insurance.
- *Other cost reducing transfers and direct payments*
  - This category covers the annual monetary value of transfers that are intended to reduce the costs of fishers that are not included elsewhere in the classification. These primarily take the form of taxation exemptions (especially for fuel tax), loan guarantees, low interest loans, underwriting of insurance costs, bait subsidies, transport subsidies and income tax deductions for fishers.

An indicative list of the types of transfer programs that are included in each of the categories is provided in Box 1.2. This list is intended to be illustrative only and is not contain an exhaustive listing of transfers. It should be noted that some transfer programs may be applicable to more than one category depending on the way in which the program is constructed and implemented.

Box 1.2. Indicative List of Transfers in the Classification by Programme Objective

Management, research and enforcement expenditure

Management expenditure
Enforcement expenditure
Expenditure for information collection and analysis
Payments to support community based management
Expenditure to promote international fisheries cooperation
Research expenditure
Funding of information dissemination
Expenditure on the protection of marine areas
Payments to producer organisations
Support to improve the management of cooperatives

Fisheries infrastructure expenditure

Support to build port facilities for commercial fishers
Reduced charges for use of government provided infrastructure
Support to improve fishing villages
Expenditure on exploratory fishing
Support for artificial reefs
Fisheries enhancement expenditure
Support to enhance the fisheries community environment
Regional development grants
Aid for restocking of fish resources

Payments for access to other countries' waters

Payments for vessel decommissioning and licence retirement

Vessel decommissioning schemes
Buyouts of quota and catch history
Buyouts of licences and permits

Investment and modernisation schemes

Grants for new vessels Grants for modernisation
Subsidised loans for vessel construction
Loan guarantees for vessel construction
Grants for purchase of second-hand vessels
Interest subsidies for the purchase of machinery and equipment for fishing vessels
Subsidised loans for vessel modernization
Loan guarantees for vessel modernisation
Interest subsidies for the purchase of second hand vessels

Income support and unemployment insurance

Income support
Price support payments to fishers
Direct aid to participants in particular fisheries
Temporary grants to fishers and vessel owners
Compensation for damage from predators on fish stocks
Retirement grants for fishers
Grants for retraining of fishers into other activities
Grants to set up temporary or permanent joint ventures in other countries
Unemployment insurance
Grants to small fisheries
Grants for the temporary withdrawal of fishing vessels
Compensation for closed or reduced seasons
Disaster relief payments
Income guarantee compensation
Vacation support payments

Other cost reducing transfers

Low cost loans to young fishers
Interest rebates
Underwriting of insurance costs
Payments to reduce accounting costs
Transport subsidies
Income tax deductions for fishers
Tax exemptions for deep-sea vessels
Reduced charges for government services
Miscellaneous transfers
Funding for promotion and development of fisheries
Low cost loans to specific fisheries
Loan guarantees
Low cost insurance
Contributions to match private sector investments
Fuel tax exemptions
Support for development of deep-sea fisheries
Support for crew insurance
Provision of bait services
Market intervention

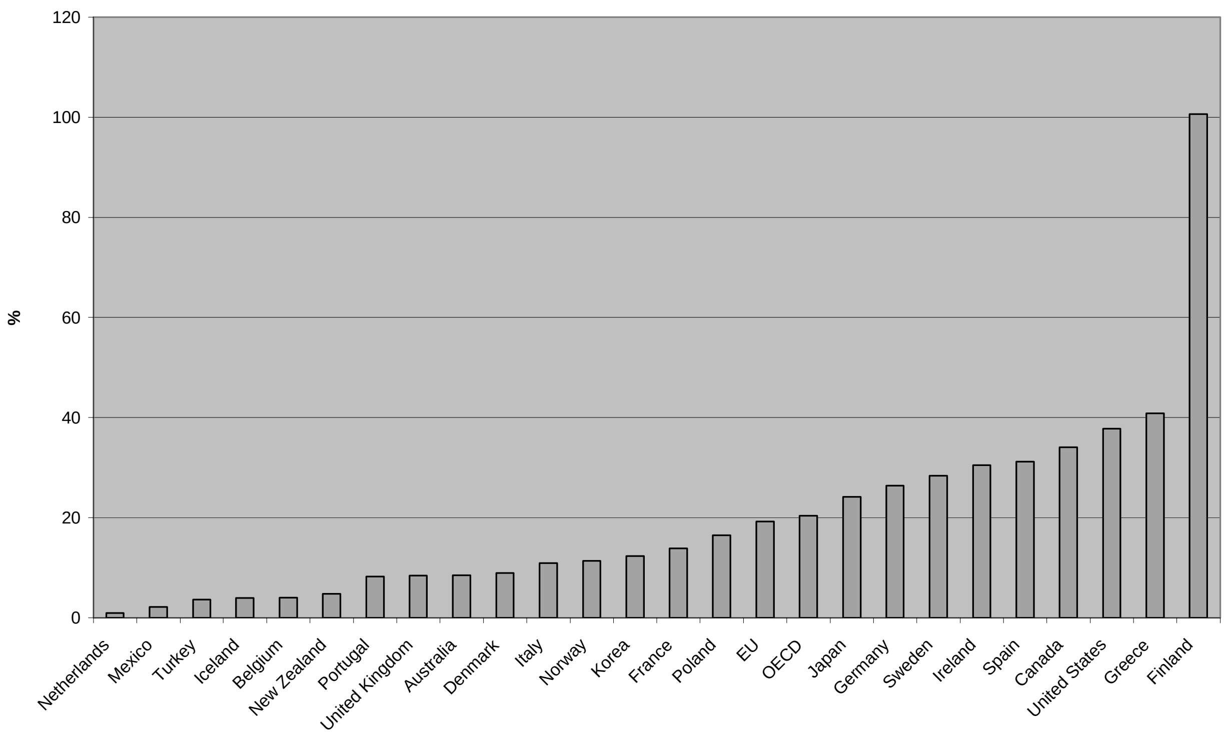
Source: OECD

GFTs in OECD Countries

Government financial transfers to the fisheries sector in OECD countries amounted to USD 6.4 billion in 2003 (Table 1.1). This is approximately USD 0.4 billion less than the amount provided to the sector in 1996 (in nominal terms), the first year that such data were collected, although there have been annual fluctuations over the period. In absolute terms, Japan provided the largest amount of financial support in 2003 (USD 2.3 billion), followed by the United States (USD 1.3 billion), Canada, Spain and Korea (each providing USD 0.5 billion). The EU as a whole provided USD 1.5 billion in GFTs to the fisheries sector in 2003.

In 2003, GFTs represented around 20.4% of the value of landings, which is an increase of two percentage points compared to 1996 (Figure 1.1). There was considerable variation around the OECD average, with Finland providing financial support equal to the value of landings. Ireland, Spain, Canada, the United States and Greece also provided GFTs in excess of 30% of the value of landings in 2003.

Figure 1.1. GFTs as a Percentage of the Value of Landings, 2003



Source: OECD.

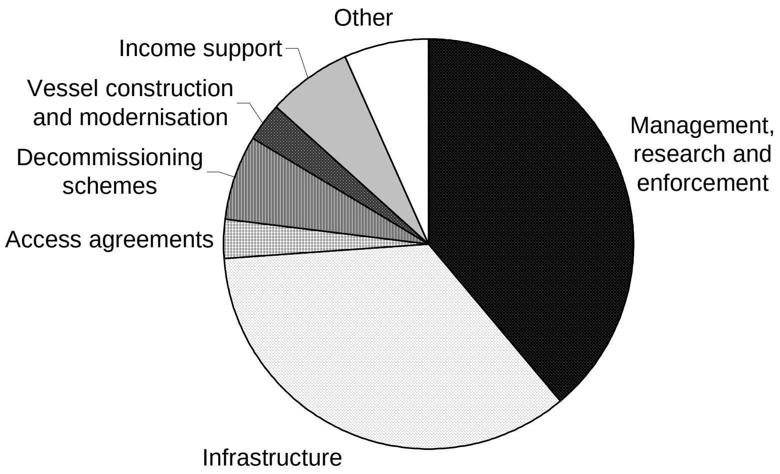
Table 1.1. Government Financial Transfers to Marine Capture Fisheries in OECD Countries, 2003
(USD million)

	Management, research and enforcement	Infrastructure expenditure	Access payments	Decommissioning payments	Investment and modernisation	Income support	Other transfers	TOTAL
Australia	11	0	0	0	0	0	70	81
Canada	162	68	0	0	0	254	61	524
EU [b]	474	57	194	299	179	157	173	1532
Belgium	2	0	0	0	1	0	1	4
Denmark	62	1	0	17	11	0	0	92
Finland	10	2	0	0	0	2	6	20
France	36	1	0	5	11	16	109	179
Germany	40	0	0	2	5	0	0	47
Greece	45	18	0	0	35	0	21	118
Ireland	59	0	0	0	6	0	3	68
Italy	32	0	0	116	0	0	0	148
Netherlands	0	0	0	4	0	0	2	6
Poland	10	0	0	0	0	0	0	10
Portugal	26	0	0	0	0	1	0	27
Spain	69	30	0	142	108	137	17	504
Sweden	24	1	0	1	1	2	2	31
United Kingdom	67	3	0	0	0	0	0	70
Iceland	19	0	0	0	0	16	0	36
Japan	560	1708	0	13	26	5	0	2312
Korea	22	395	0	18	1	0	59	495
Mexico	21	0	0	0	0	0	0	21
New Zealand	19	0	0	0	0	0	0	19
Norway	125	0	0	3	0	1	13	142
Turkey	2	17	0	0	0	0	0	19
United States	1094	18	0	100	0	1	78	1290
OECD	**2508**	**2263**	**194**	**432**	**206**	**435**	**454**	**6472**

a. Includes OECD estimates for some countries. b. Sum of all EU countries plus access payments.

Source: OECD

Figure 1.2. Financial Support by Programme Objective, Total OECD, 2003



Source: OECD.

Most of the GFTs were devoted to management, research and enforcement expenditures (38%) and infrastructure expenditure (35%) (Figure 1.2). Decommissioning schemes (7%), income support (6%) and other cost reducing transfers and direct payments (7%) comprised a large portion of the remaining support. The relative importance of different types of support has changed between 1996 and 2003 (Figure 1.3). The relative share of fisheries services has increased while the share of infrastructure expenditure has declined. The shares of income support, vessel decommissioning schemes and vessel construction and modernisation payments have all increased marginally.

The period since 1996 has seen the amount of GFTs provided to the OECD fisheries sector fluctuate around USD 6 billion (measured in nominal USD), with an average annual decline over the period of 0.8% (Table 1.2 and Figure 1.4).[4] Most OECD countries have seen the financial support to the sector decline over the period 1996-2003, including many EU countries, Japan, Norway and Iceland (Figure 1.5). A number of countries experienced average annual increases. For some countries, this was due primarily to increased expenditures on management, research, enforcement and infrastructure (for example, New Zealand, Korea and the US), while other countries increased their expenditures across the direct payments, cost reducing transfers and general services categories (for example, Greece and Spain)

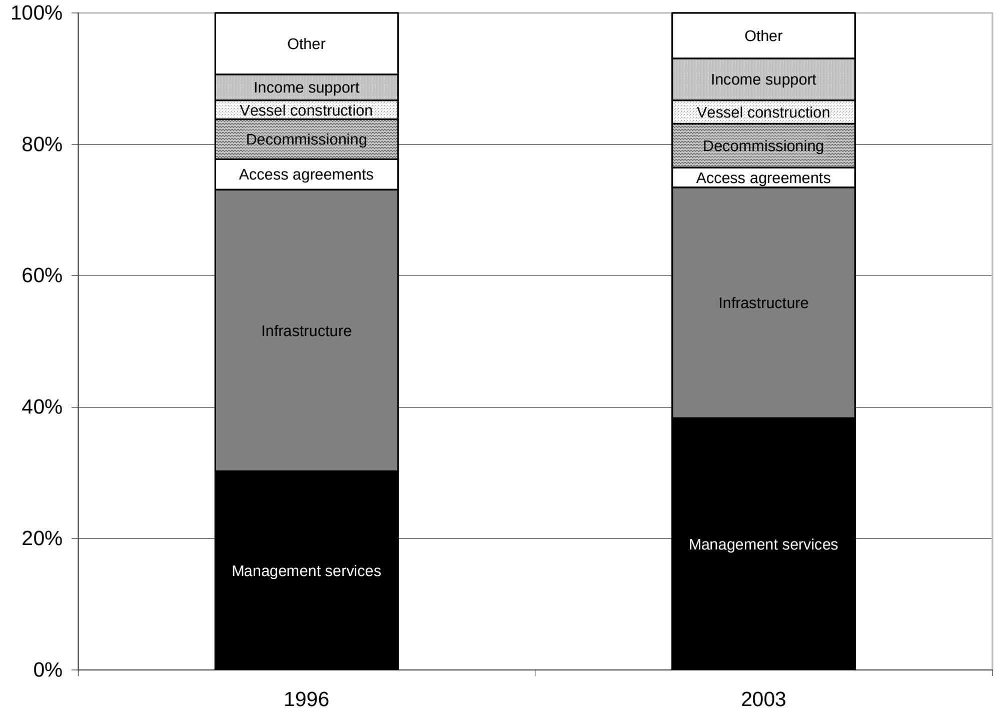
4. This may mask the effects of relative exchange rate movements over the period and does not take into account inflation in individual countries over the period. The average annual decline is expressed as a geometric rate of change.

Table 1.2. Government Financial Transfers, 1996-2003 [a]
(USD million)

	1996	1997	1998	1999	2000	2001	2002	2003
Australia	77	83	69	74	69	64	74	81
Canada	510	398	378	497	478	483	464	524
EU [b]	1 549	1 435	1 392	1 232	1 136	1 293	1 047	1 532
Belgium	5	5	5	4	7	4	3	4
Denmark	86	82	91	60	46	67	89	92
Finland	29	26	27	14	11	14	14	20
France	158	141	101	72	156	128	144	179
Germany	82	63	76	75	69	70	38	47
Greece	52	47	27	43	62	64	83	118
Ireland	113	99	112	118	88	71	61	68
Italy	163	92	122	75	150	232	121	148
Netherlands	40	36	35	34	1	11	12	6
Poland	8	8	8	8	8	9	9	10
Portugal	72	65	43	29	26	25	25	27
Spain	246	345	297	296	286	269	187	504
Sweden	62	53	27	27	21	19	23	31
United Kingdom	115	128	91	76	69	66	65	70
Iceland	41	36	37	35	31	27	27	36
Japan	3 186	2 946	2 136	2 538	2 864	2 532	2 324	2 312
Korea	368	379	212	449	312	412	481	495
Mexico	14	17	17	19	21	22	23	21
New Zealand	15	17	10	13	15	15	19	19
Norway	173	163	153	181	181	99	155	142
Turkey	29	15	4	3	26	17	15	19
United States	874	990	1 020	1 084	1 035	1 162	1 131	1 290
OECD Total	**6 836**	**6 479**	**5 428**	**6 125**	**6 166**	**6 127**	**5 761**	**6 472**

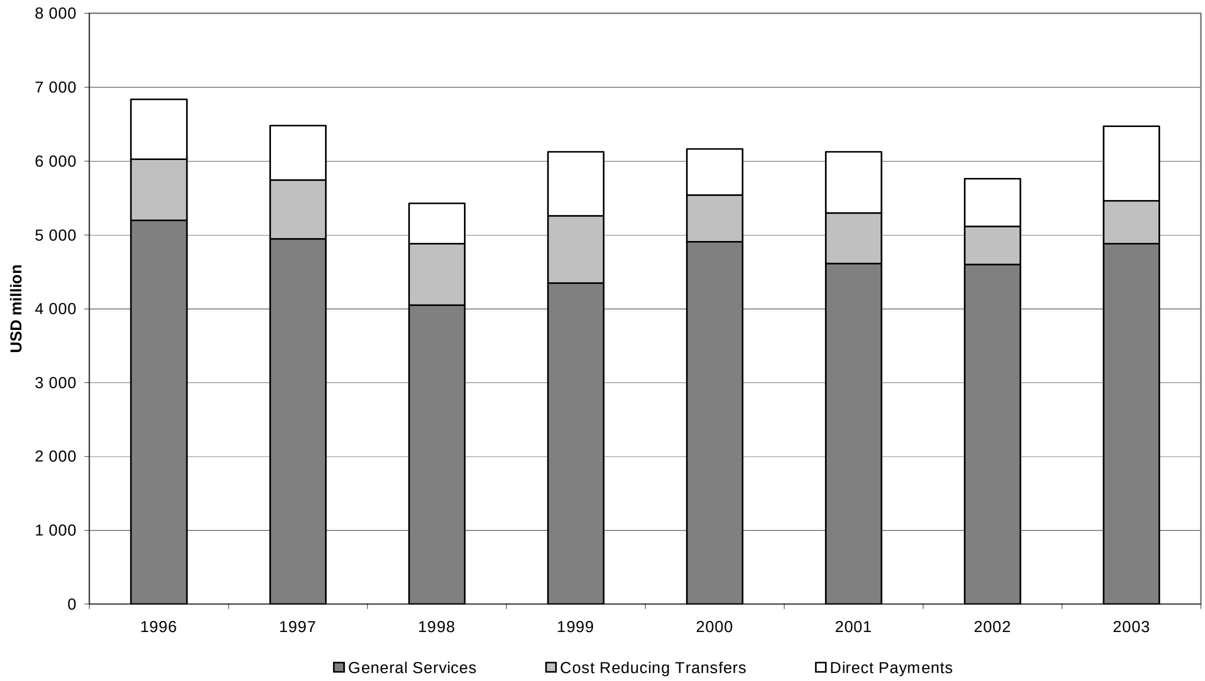
a. Includes OECD estimates for some countries. b. The value of access agreements is included in the EU total.
Source: OECD.

Figure 1.3. Shares of GFTs by Programme Objective, Total OECD, 1996 and 2003



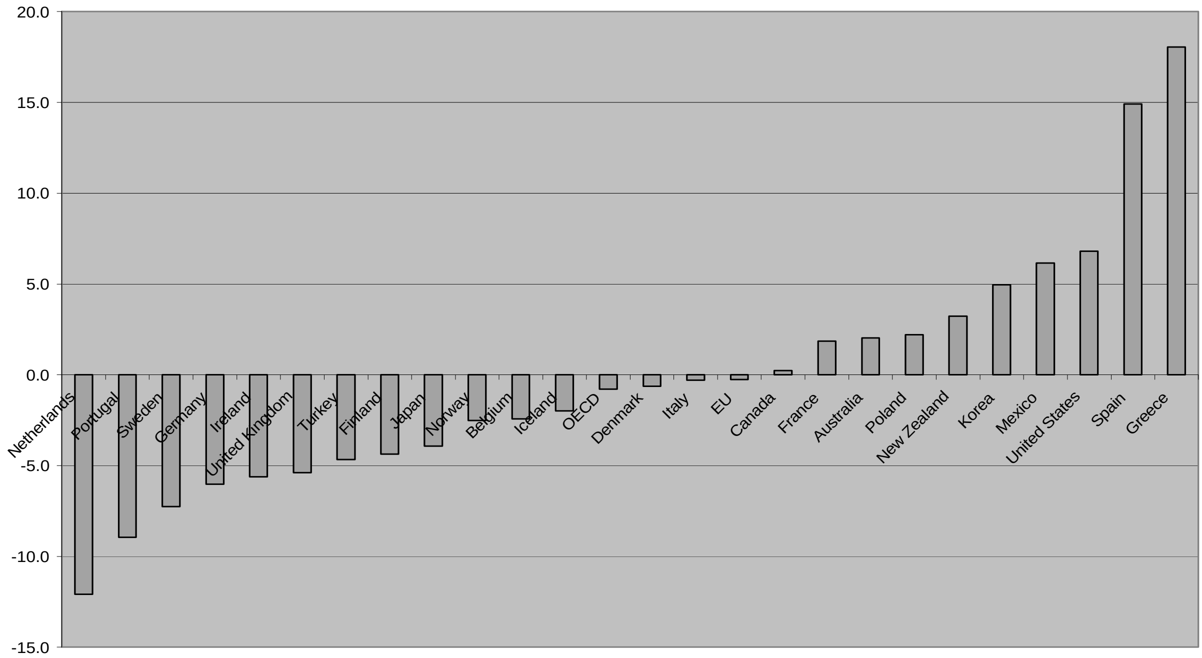
Source: OECD.

Figure 1.4. Total OECD Government Financial Transfers by Category, 1996-2003



Source: OECD.

Figure 1.5. Change in Financial Support 1996-2003[1]
(Average annual percentage change)



1. Poland is included in the EU for the whole period. Percentage changes are calculated on the nominal US dollar values of GFTs in the two years using 1996 and 2003 yearly average exchange rates.

Source: OECD.

Data issues and caveats

Data on GFTs were obtained from the existing data on GFTs collected by the Secretariat as part of its annual statistical collection, supplemented by OECD Member countries' responses to a questionnaire completed for the study, and by information obtained from the Secretariat. Detailed country data are provided in Annex 1 of this chapter. As a result, the data represent the most accurate picture of GFTs available to date. However, there are several issues in the data collected by the Secretariat that need to be taken into account when interpreting the data (see also Steenblik and Wallis 2001 and Cox 2002).

First, the voluntary nature of the reporting requirement has, on occasion, limited the amount of detail that some countries are willing to provide on transfers. As a result, there are some gaps in the information and in the level of detail necessary to undertake more extensive analysis of the data. A number of these gaps are filled by Secretariat estimates of missing data. In addition, there is a lack of independent monitoring of the information provided by countries. The success of the data collection process relies very heavily on peer pressure to ensure that information is forthcoming and is accurate. However, at present there is very limited use of more formal peer review processes, whereby the transfer policies and data of particular countries can be examined in a more transparent manner. The subsidy notification system under the WTO Agreement on Subsidies and Countervailing Measures (ASCM) has not particularly improved the transparency of information on support programmes (Box 1.2).

Second, it is evident that not all items of budget and off-budget support to the fisheries sector in OECD countries have been captured in the data collection process. This is most clearly the case for off-budget support where the cost to government is revenue foregone, rather than direct outlays. For example, two countries (Australia and Greece) have reported the value of fuel-tax concessions (exemptions and rebates from diesel fuel) although it is understood that most OECD countries provide such fuel tax exemptions to their maritime industries. A similar area of concern is the extent of the use of loan guarantees and income tax exemptions, which may not be fully captured in the data. A further issue with respect to off-budget items, but even less easy to address and measure, is the non-collection of fees for the provision of services such as harbours, navigation aids, fire fighting services and so on where the services are provided primarily for the use of the commercial fishing industry. There is a divergence of views within OECD countries about the appropriate treatment of such transfers.

Third, the data is collected at the national level and usually does not contain information on transfers made at a sub-national (that is, regional or local) level. Evidence available from the fisheries management costs study undertaken by the Committee (OECD 2003) indicates that such sub-national transfers may be significant for some countries. This is particularly likely to be the case for those countries operating under a federal system of government where there may be extensive state expenditures on fisheries-related transfers that are not reported to the federal government. However, there are potential problems with attempting to collect such data due to the large number of sub-national entities that may provide transfers to the fishing industry in the OECD.

As a result of these issues and caveats, the estimates of GFTs provided in this report are likely to be an underestimate of the level of financial support actually provided to the sector. The magnitude of the difference between reported and actual GFTs is not known.

Summary profiles of GFTs in selected OECD countries

As part of the study, OECD member countries were surveyed to obtain an inventory of GFT programmes in their countries. Note all countries provided inventories and the following pages provide a summary of the key features of the inventories that were provided to the study. The full text of the inventories are available on the OECD Fisheries website (www.oecd.org/agr/fish).

Canada

Over the period 2001-2003, Canada provided funding for a total of 32 programs of financial support for the sector at the Federal level.[5] Fourteen of these programs have been terminated prior to or during the period, although annuity payments will continue for some programs. Funding totalled CAD 828.9 million in the financial year 2002-03 compared to CAD 839.4 million and CAD 856.3 million in 2000-01 and 2001-02, respectively.

The major single element of financial support is the Employment Insurance (EI) Scheme for Fishers which totalled CAD 312.7 million in 2002-03. The objective of the

5. Data on provincial programs are not available.

programme is to provide short-term income support for self-employed fishers (primarily in inshore commercial fisheries) during the non-fishing season and it is administered by Human Resources and Skills Development Canada (HRSDC). Fishers EI is designed to protect self-employed fishers from the uncertainties of the fishing industry due to high seasonality and fluctuating catch rates. Two benefit periods of 26 weeks are available to accommodate the summer and winter fisheries respectively.

Expenditure for research, management and enforcement amounted to CAD 300 million in 2002-03 with research accounting for 39% of the total. Infrastructure expenditure is directed to the development and maintenance of harbours for the commercial and recreational sector and amounted to CAD 92.9 million in 2003. Free berthage is provided to small commercial fishing vessels (<13.5m) in Atlantic Canada and all commercial fishing vessels in the Prairie provinces and the North-West Territories. Receipts from user charges from other users totalled CAD 1.7 million in 2003.

Funding for the development of aboriginal commercial fisheries is the other major element of financial support in Canada. Following the *Sparrow* decision by the Supreme Court of Canada in 1990, DFO launched the Aboriginal Fisheries Strategy (AFS) in 1992, the objective of which was to provide a framework for regulation of aboriginal peoples' right to fish for food, social and ceremonial purposes and to contribute to the economic self-sufficiency of aboriginal communities. CAD 10.9 million was expended under the Allocation Transfer Program is to assist aboriginal communities to obtain access to commercial fisheries and/or other economic development opportunities. The program facilitates the voluntary retirement of commercial licences and the issuance of licences to eligible aboriginal groups in a manner that does not add to the existing effort on the resources. Under the Fisheries Access Program established in 1999, assistance is provided to eligible aboriginal groups in the form of non-repayable contributions to facilitate the voluntary retirement of commercial licences, vessels and gear, constructing new vessels and gear and providing training and other skill development activities. Around CAD 68.3 million was provided under this program in 2003.

Czech Republic

In the Czech Republic, financial support is provided to the aquaculture and fish processing industries under the Special Accession Programme for Agriculture and Rural Development (SAPARD), the European Agricultural Guidance and Guarantee Fund (EAGGF) and the Financial Instrument for Fisheries Guidance (FIFG).

The structural subsidies provided under SAPARD were begun in May 2002 and grants for 15 fish-processing projects had been made by the end of 2003 worth a total of EUR 1 533 804 in public co-funding by the European Union and the State budget. These subsidies are aimed at the modernisation of the technological processes used in processing fish and fish products. There will be no further projects supported by this SAPARD Programme with the funding being replaced by support provided through the EAFFG and the FIFG under a programme entitled "Rural Development and Multifunctional Agriculture".

Funding is available through the Rural Development and Multifunctional Agriculture programme to the raise competitiveness of pond-based fish farming and breeding. This includes:

1. support aimed at maintaining and improving the genetic potential of fish, including monitoring of the fish yield (subsidy granted in 2003: CZK 4 179 700);
2. support aimed at conserving and promoting the genetic resources of fish (subsidy granted in 2003: CZK 3 000 000);
3. support for broader and easier access to information and key concepts from the scientific sphere and research (subsidy granted in 2003: CZK 105 000);
4. support for education programmes to improve conditions in organisations providing practical training to pupils (subsidy granted in 2003: CZK 1 140 000);
5. support for pond functions not related to fish production (such as flood prevention, environmental protection, aquacultural functions, recreation, protection of vegetation, game and birds); this support is granted as part of general support provided to Czech regions. The main functions of the pond-based aquacultural industry can be said to be water storage, a means of keeping water in regions and improvement of water quality (subsidy granted in 2003: CZK 71 000 000).

A range of projects are eligible for funding under this programme including:

- construction of new processing facilities or the renovation of existing ones, and the modernisation or purchase of new fish-processing plants (to bring facilities and plants up to EU health and sanitation standards);
- projects to increase the production capacity of aquaculture (construction of production units or modernisation or expansion of existing units);
- new producer organisations, activities of which are aimed at eliminating pathological risks in fish farming; and
- market studies, introduction of e-commerce, research on new market opportunities, participation in fairs and expositions, and regular campaigns to promote fish products.

FIFG co-funding for an amount of EUR 7.251 million has been decided for the 2004-2006 period. This amount will be supplemented by EUR 3.080 million of national funding (Table 1.3)

Table 1.3. Czech Republic Fishery Budget (2004-2006)

(EUR '000)

	Rural Development and Multifunctional Agriculture programme	Technical Assistance	Total
FIFG	6 956	295	7 251
National budget	2 981	99	3 080
TOTAL	9 937	394	10 331

Source: Czech Republic country submission, www.oecd.org/agr/fish.

Iceland

Limited transfers are provided by Iceland to their fishing industry. Research and management services are provided through the Directorate of Fisheries, the Ministry of Fisheries, the Marine Research Institute and the Icelandic Fisheries Laboratories and the Coast Guard provides fisheries surveillance. The Ministry of Fisheries is responsible for management of the Icelandic fisheries and the implementation of legislation to this effect. The Marine Research Institute is the centre of scientific research for marine resources and responsible for recommendation of the annual TAC for the stocks subject to catch restrictions. The Directorate of Fisheries and the Coast Guard are responsible for ensuring compliance with the Fisheries Management Act.

Wage costs for the fishing industry are subsidised through an income tax deduction for fishers. The deduction is generally available to the fisheries sector and is also available to seamen on coast guard vessels, research vessels, dredging vessels, ferries, cruise ships, rescue vessels and harbour pilot boats. All persons employed as fishers on fishing vessels are entitled to the income tax deduction for fishers. The wages they receive for their work as fishers must, however, comprise at least 30% of their taxable income base. This includes both the owners of vessels, who themselves work as fishers on their own vessels, and employees on vessels of less than 12 GWT. Furthermore, seamen on coast guard vessels, research vessels, dredging vessels, ferries or merchant vessels, sailing either between countries or in Iceland's coastal waters, and seamen on rescue vessels and harbour pilot boats, irrespective of whether the pilot is a permanent crew member or not, are eligible for the deduction. Baiters in full-time positions, who are hired under a written contract for a catch share, are also entitled to the income tax discount. The number of fishers who received the deduction has declined from 7 702 individuals in 2001 to 7 059 individuals in 2004.

The cost of providing the financial transfers is offset to some degree by the use of levies and fees. The most recent change has been the introduction of a fishing fee (*veiðigjald*) which was levied for the first time on 1 September 2004. The fishing fee is levied on allocated harvest rights and landed catch for the year and is based on the net returns to the fishery (calculated by deducting fuel costs, wage costs and other operating costs from the annual value of catches). The fee is then assessed at 9.5% of net returns. The Icelandic parliament *Althingi* decided to allow fishing vessel owners a transitional period, phasing in the fishing fee in equal steps from 2004 to 2009 (the fee is currently set at 6%).

A fisheries surveillance fee is also levied and includes the fee for on-board surveillance and processing permit, operating licence, payments for export certificates and catch quota transfers. The fisheries surveillance fee covers the costs of the Directorate of Fisheries for fisheries surveillance, but part of the fee has been abolished and replaced by the fishing fee.

The Fisheries' Development Fund was intended to encourage increased profitability in the fisheries sector and has been in operation since 1994. The Fund made grants for retirement of vessels and purchased properties used for fish processing and their accompanying processing equipment and was also entrusted with the financing of a major share in a new research vessel for the Marine Research Institute. To cover the cost of these extensive tasks and financial obligations, fees were levied on vessel owners and, for a time, on owners of processing plants. These parties have completely financed the Fund's activities. The levy was abolished when a fishing fee was introduced.

Italy

Italy provided around EUR 190 million in financial transfers to the fishing industry in 2004. This support was provided through the EU structural fund Financial Instrument for Fisheries Guidance (FIFG) and through the National Triennial Plans overseen by the Directorate General for Fishing and Aquaculture in the Ministry for Agricultural and Forestry Policies. The National Triennial Plans call for the rationalisation and development of the whole fishing industry, where not only short and medium term targets, but also long term considerations, are included.

The programme financing provided by the FIFG covers eleven main areas:

a) Decommissioning schemes
b) Fleet renewal and modernisation of fishing vessels
c) Protection of marine resources in coastal waters
d) Aquaculture
e) Fishing port facilities
f) Processing and marketing of fishery an aquaculture products
g) Small-scale coastal fishing
h) Socio-economic measures
i) Measures to find and promote new market outlets
j) Operations by members of the trade
k) Innovative actions and technical assistance

Financial support provided through the National Triennial Plans is directed towards:

a) Compensation for closed seasons
b) Compensation for damage to the fishery sector
c) Support to promotion and marketing
d) Interest rebates and loan guarantees
e) Management expenditure
f) Research expenditure

Expenditures on management, research and enforcement and infrastructure accounted for 65% of total transfers in 2004 (Table 1.4). Decommissioning schemes were the next most significant category. A total of 1 764 vessels were decommissioned over the period 2000-2006, with priority given to small scale trawlers. Under the EU Common Fisheries Policy, aid for the renewal of fishing vessels was phased out at the end of 2004. Over the period 2000-2006, a total of 466 vessels were constructed with financial support and a further 4 477 vessels received assistance for modernisation. Income support consists primarily of compensation for the closure of fishing grounds. Such closures are used to control fishing effort and are also part of national recovery plans for fish stocks. The main beneficiaries are the bottom and pelagic trawler fleets.

Table 1.4. Summary of Financial Support to the Italian Fishing Sector (2004)

Category of transfer	Budget	
	EUR '000	%
Management, research and enforcement expenditure	52 697	27.6
Fisheries infrastructure expenditure [1)]	72 857	38.2
Payments for access to other countries' waters	-	-
Payments for vessel decommissioning and licence retirement	36 562	19.2
Investment and modernisation schemes	10 475	5.5
Other cost reducing transfers	1 125	0.6
Income support and unemployment insurance	16 350	8.6
Other transfers not elsewhere classified	547	0.3
Total	190 613	100

1) Fisheries infrastructure expenditure include the harvesting, aquaculture and processing sectors and fishing port facilities

Source: Italy country submission, www.oecd.org/agr/fish.

Japan

The main items of financial support provided by Japan to the fishing industry are direct payments for fishery restructuring, interest subsidies, infrastructure expenditure and general services expenditure.

The "Fishery Restructuring Program for Fishery Resource Rehabilitation" provides direct payment assistance for fishing fleet reduction. The program was started in 1981 following the reduction in access to distant water fishing grounds following the introduction of the 200 mile zones by coastal countries. The fleet reduction program was established to avoid the resulting capacity overcrowding Japanese fishing grounds. A total of 1 615 mid- to large-scale fishing vessels were scrapped under this program from 1981 to 2004. The type of these scrapped vessels included, but were not limited to, high seas driftnet fishing vessels, large- and mid-sized purse seiners, large trawlers, large- and mid-sized squid jiggers, and pelagic tuna long liners. All fishing licenses of the scrapped vessels were revoked. All of the vessels were completely scrapped (body panels must be dismantled and the engine shaft must be destroyed) to become eligible for the government payment. In this context, any resale, reuse, or export of the vessel is prevented. The annual amount of the transfer budget has been rather stable with a range of JPY 2.0-3.8 billion in most years. The vessel owners are required to share substantial part of the scrapping costs[6] and the rest of the amount is to be paid by the government under this program. The actual government budget for this program from 2001 to 2003 is shown in Table 1.5 below.

6. Between 33 - 56% of the costs are shared by vessel owners.

Table 1.5. Summary of Financial Support to the Japanese Fishing Sector, 2001-2003

(JPY million)

Programme	2001	2002	2003
Fishery restructuring program(vessel decommissioning)	2 050	3 393	2 101
Interest subsidy	3 954	3 850	2 990
Infrastructure expenditure	243 969	213 396	203 910
Management, research and enforcement	62 727	74 511	62 560

Source: Japan country submission, www.oecd.org/agr/fish.

The major form of cost reducing transfers in Japan is an interest subsidy. The interest subsidy program is designed to assist structural adjustment of coastal fisheries under certain conditions. The main purpose of the program is to contribute to the introduction of advanced fisheries' management for structural adjustment of small-scale coastal fisheries. The actual differences between commercial and the subsidized interest rates are within a range of 1.25% to 0.01%. Renewal of small fishing boats and equipments are supported in the program in an effort to facilitate improvement of worker's safety on family owned coastal boats. This subsidy apparently does not contribute to the increase of fishing capacity because Japan restricts the number of fishing vessels as well as the size of each vessel through the licensing scheme of the government. In fact, the number of the coastal fishing boats, as well as the production amount of coastal fishery, is decreasing continuously although these coastal fisheries are eligible to receive this subsidy. The annual amount of the budget for cost reducing transfers has been stable around JPY 2.5 - 4.1 billion since mid-1990[7] (Table 1.5).

The largest type of transfer to the Japanese fishing sector is allocated to the construction of coastal infrastructure. This transfer is the government payment for the construction of new, or the extension of existing, fishing ports and other coastal public facilities, including breakwaters, public wharves, navigation routes, roads, water supply and sewerage systems, and park facilities. This is a government program to establish regional public infrastructures, in an effort to improve maritime transportation bases, to ensure safety navigations, and to enhance quality of peoples' living environment of regional communities including disaster prevention. This transfer is not paid directly to the industry but is used to provide infrastructure support. The annual amount of the transfer for this category has been within the range of JPY 190 - 336 billion since the 1980s, and totalled JPY 203 billion in 2003 (Table 1.5).

The provision of general services such as management, research and enforcement expenditures amounted to around JPY 62 billion in 2003 (Table 1.5). These transfers include, but are not limited to:

7. The amount of the budget for cost reducing transfers in 1980's was approximately JPY 7.8-14.4 billion.

- Monitoring, surveillance, and control of fisheries operations. This cost includes the construction of government patrolling vessels.
- Cost for scientific surveys, research and development, including operational costs of the National Institute of Fisheries Research and its branches, and the National Fisheries University.
- Domestic education, information dissemination, and vocational training services related to fisheries.
- Official development assistance for foreign countries in the field of fisheries.
- Financial contributions to international governmental organisations related to fisheries (for example, RMFOs and UN organisations).

Norway

The financial support provided by Norway to its fishing sector has declined from NOK 153 million in 2001 to a budgeted NOK 121 million in 2004 (Table 1.6). This represents a significant decline from a peak in 1991 when total support amounted to approximately NOK 1 100 million (Hermansen and Flaaten 2004). Payments for vessel decommissioning and license retirement represent the major item of expenditure, totalling NOK 35 million in 2004. The decommissioning scheme for vessels less than 15 meters was established 1 July 2003 is partly industry financed (about 50% of the total payments). Over the period 2001-2003, 197 applications were received for decommissioning and 113 vessels were decommissioned.

A range of cost reducing transfers are provided to the sector, totalling NOK 57.1 million in 2003 (budgeted NOK 29.1 million in 2004). These transfers include:

- soft loans under the Income Guarantee Compensation Scheme to allow vessels with short-term liquidity problems to participate in the fisheries (NOK 2.5 million in 2003). The scheme ended in 2004;
- transportation support to reduce the cost disadvantages caused by geographical or structural conditions (NOK 42.2 million in 2003, reduced to NOK 25 million in 2004);
- support to long-line baiting centres to stimulate increased efficiency in long-line baiting in order to extend the vessels' operating time and improve the profitability of vessels (the grant is NOK 11 per 100 baited hooks) (NOK 10.4 million in 2003). No support has been provided since 2004 under this scheme; and
- compensation to reduce the fishing fleet financial expenses when waiting for financial compensation in case of damage to fishing gear, damage caused by oil-related industry, when landing non oil-industry trash and the loss of fishing grounds (NOK 2.0 million in 2003).

The Fisheries General Agreement – Reserve Fund was established to serve as a buffer for the schemes covered by the General Agreement, and to provide financial help to fisheries related projects. The Reserve also allows a better control of spending on the other schemes covered by the Agreement and hence contributes to reduce total need of government funding to the fisheries sector. Some transfers are related to research activities, there are cost reducing transfers and when there is a deficit on the minimum wage scheme, it's covered by the Reserve Fund. Transfers to the sealing industry (support to 3 – 5 seal hunting vessels hunting mainly in the Greenland/Jan Mayen area) are also covered by this scheme, and represents more than 50%t of the total transfers in the period. The General Agreement is terminated as of 1 January 2005. Support to the seal hunting vessels will continue as an independent program.

Table 1.6. Summary of Financial Support to the Norwegian Fishing Sector

(NOK million)

Types of transfers	**2001**	**2002**	**2003**	**2004[1]**
Management, research and enforcement	38.4	35.4	25.0	21.1
Fisheries infrastructure expenditure	3.0	3.0	3.0	0.5
Payments for access to other countries' waters	-	-	-	-
Payments for vessel dec. and license retirement	13.9	11.7	13.4	35.0
Investment and modernisation schemes	-	-	-	-
Other cost reducing transfers	47.6	39.7	57.1	29.1
Income support and unemployment insurance	7.9	8.1	9.9	11.0
Other transfers	15.0	15.0	16.6	9.0
Scheme for various types of transfers (General Agreement – Reserve Fund)	23.5	21.8	30.9	13.0
Total transfers	149.3	134.7	155.9	118.7
Estimated administrative costs	4.1	3.4	3.2	2.4
Grand total	153.4	138.1	159.1	121.1

[1] Budgeted figures.

Source: Norway country submission, www.oecd.org/agr/fish.

Slovak Republic

The Slovakian fisheries sector is a part of the programme for sustainable rural development, under the general Sectoral Operational Programme. This involves investments for the period of 2004–2006, with two measures being available to the fisheries sector relating to fish processing and the promotion of fisheries products, and aquaculture. While the Slovak Republic does not have any marine capture fisheries, their inventory is included here to demonstrate the particular experience of an aquaculture-oriented country.

The broad objective of the programme on fish processing and the promotion of fisheries products is to increase the competitiveness and quality of processed fishery products while reducing adverse impacts on the environment. The more specific objectives are to:

- To decrease production costs and improve working conditions;
- To increase the quality of products;
- To improve hygienic conditions;
- To reduce negative impacts on the environment.

The support is provided as a non-repayable financial contribution, with the processing and aquaculture sectors both being eligible for the aid. The grant aid for this measure is over the period of 2004-2006, which is the duration of the Sectoral Operational Programme. Approximately EUR 2.1 million is available under the programme (Table1.6).

Table1.7 Summary of Financial Support to the Slovak Republic Fishing Sector

('000 EUR)

Year	Fish Processing	Aquaculture
2004	488.7	733.1
2005	697.8	1 046.7
2006	903.8	1 355.7
2004-2006	2 090	3 135.5

Source: Slovak Republic country submission, www.oecd.org/agr/fish.

The objectives of the financial support provided to the aquaculture sector are to increase the effectiveness, competitiveness and quality of fish-farming facilities while adhering to environmental protection standards. This is achieved by using aid to:

- reduce the production costs and increase the labour productivity;
- introduce new environmentally-friendly technologies;
- preserve specific genetic attributes of the local farmed lines and original lines and species;
- expand fish breeding in freshwater aquaculture; and to
- offer new employment opportunities.

Approximately EUR 3.1 million is available under the aquaculture programme over the period 2004-2006 (Table 1.7).

Sweden

Sweden provides financial support to the fisheries sector under the EU's Financial Instrument for Fisheries Guidance (FIFG). The objectives of the programme are to:

- Contribute to achieving a sustainable balance between fishery resources and their exploitation.
- Strengthen competitiveness of the sector and develop economic viable enterprises in the sector by creating a favourable structure.
- Improve market supply and value added to fishery and aquaculture products.
- Contribute to revitalising areas dependent on fisheries and aquaculture.

The support is provided in the form of direct payments, cost reducing transfers and as a type of loan. Under the loan conditions, beneficiaries have no obligation to pay back the loan as long as the stipulated conditions are met. The construction of the loan includes no interest and might be called a conditioned subsidy. In normal cases the loan is written off during a ten year period. A security has to be given if the aid is in the form of a loan and if the value of the aid (loan) amounts to more than SEK 400 000.

Support for renewal of the fishing fleet is limited to vessels below 18 meters. For modernisation of the fishing fleet, the vessels have to be listed in the EU's register of fishing vessels for at least five years. There is a higher grant for projects of collective interest within the small-scale coastal fisheries. Otherwise the transfer is generally available to the fisheries sector. Aid is granted only on condition that the fishing effort is not increased. Priority is given to project in order to increase the fish quality and to improve the selectivity of the fishing gears, as well as to improve working conditions and safety on board.

The Swedish Government has appointed the Swedish Board of Fisheries as managing and paying authority for the fisheries programme outside Objective 1 areas. The Swedish Board of Fisheries has the competence to issue national instructions concerning the FIFG.

The Industry Development unit of the Swedish Board of Fisheries has the practical function of the managing authority and the head of the unit decides to approve or reject aid to individual project or investments. The unit is co-ordinating the administration of the FIFG and has prepared a manual for the Swedish Board of Fisheries and the County Boards on handling and payments. The County Boards, acting as intermediate bodies, work closely together with the Board of Fisheries with the implementation of the programme. The County Boards receive all applications of structural aid. The decision-making process is shared between the Board of Fisheries and the County Boards. The separation of duties is stipulated in a national ordinance.

The approved beneficiaries of the support scheme are specified for each measure and include: fishers, authorities, institutes, organisations, aquaculture companies, public owners of fishing harbours, companies active in fishing harbours, fishery associations, processing industries, trade associations, producer's organisations, associations of companies and non-profit associations, county boards, the Swedish Board of Fisheries, external consultants.

Over the period 2001-2003 (half the period of the FIFG cycle), around SEK 173 million was provided to the sector (Table 1.8). The estimated number of recipients is 1 000, comprising 500 fishers, 200 processing industries, 100 aquaculture companies, and 200 other recipients.

Table 1.8. Summary of Financial Support to the Swedish Fishing Sector under the FIFG

(SEK million)

Year	Approved expenditure	Disbursements	Uptake (%)
2001	90.4	4.5	5.0
2002	111.5	82.5	74.0
2003	111.8	86.3	77.2

Source: Sweden country submission, www.oecd.org/agr/fish.

United Kingdom

As with the other EU countries, the primary method of direct support for the fishing industry is through the Financial Instrument for Fisheries Guidance. The objectives of financial assistance measures as outlined in detail in the European Council Regulation (EC) No. 2792/1999 are to:

- contribute to achieving a sustainable balance between fishery resources and their exploitation;
- strengthen the competitiveness of structures and the development of economically viable enterprise in the sector;
- improve market supply and the value added to fishery and aquaculture products; and
- contribute to revitalising areas dependent on fishing and aquaculture.

The accompanying UK strategic programme objectives are:

- sustainable exploitation of resources
- adoption of an inclusive approach to fisheries management (i.e. managers, scientists and industry working collaboratively);
- support for fisheries dependent communities;
- ensuring an economically viable fishing industry; and
- developing a culture of quality (facilitating traceability and quality control).

With the exception of decommissioning schemes, grants are generally provided in the form of matching contributions. Aid to the fishing industry under FIFG is covered in the following Programmes and is subject to a number of rules and conditions (see Box 1.3):

- a single Programme of fisheries aid for the whole of the UK outside Objective 1 areas, with sub-programmes for England, Scotland and Wales; and
- separate Programmes for each Objective 1 area (Cornwall, Merseyside, West Wales and the Valleys) and transitional Objective 1 areas (Highlands and Islands and Northern Ireland).

The anticipated expenditure for the FIFG programme outside Objective 1 for the period 2000-2006 is shown in Table 1.9 below. The uptake to the end of 2004 is shown in Table 1.10. While the uptake has been fairly low up till the end of 2004, it can be expected that this will accelerate as the end of the FIFG programme period nears in 2006. The bulk of the expenditure (around 45%) is directed towards vessel decommissioning schemes. While the bulk of the funding is directed towards England, the uptake of the grants has been fairly low (at 19% of available funding up until 2004). Grants for the processing and marketing of fishery and aquaculture products comprise the second largest element of expenditure and are restricted to the private sector.

Box 1.3. Rules and Conditions for UK Grants

The UK grants to the sector are subject to a series of broad rules. These rules provide an example of the framework within which financial support can be provided and address some of the issues raised in Chapter 4 of this report. The conditions focus on articulating and quantifying costs and benefits of the support programme, cost-effectiveness of the project for which the grant is offered, and a time limit on the length of time for which the grant is offered. The conditions, in brief, are:

In general to be eligible for aid, the project:

- must not be the subject of an application for another EU grant under another scheme;
- must comply with EU and UK legislation;
- must have a funding package which includes match funding from UK public money and, where appropriate, private funds.

The project should also:

- quantify outputs and provide details of clear and attainable targets;
- demonstrate an additional and sustainable benefit to the industry;
- require the minimum grant necessary to enable the project to proceed;
- provide good value for money;
- be cost effective;:
- be completed within two years of approval;
- create new jobs, or safeguard existing jobs, and reduce seasonality of employment;
- protect the environment; and
- include technical innovation.

Source: United Kingdom country submission, www.oecd.org/agr/fish.

Under the measure for operations by members of the trade, aid is available to producer organisations to support short term operations which will improve the safety, sustainability and economic viability of the fishing industry. A collective organisation is one acting on behalf of and in the interests of the fishing industry or a part of the industry. For improvements to fishing port facilities, aid is available for capital investments which are of collective interest to fishermen using a port. They must contribute to the general development of the port and represent an improvement of services offered to fishermen. At least 50% of the vessels affected by the project must be UK or EU registered. Aid for innovative measures will be available for activities such as pilot projects, studies and demonstration trials. Funding will be available for innovative measures which are designed to identify opportunities for future restructuring and to improve the sustainability for the fishing industry. Aid will be provided for projects which are provided for projects which are of collective benefit to the fishing industry and which are implemented on the initiative of public bodies or, for the pilot projects only, private sector bodies.

Table 1.9. Summary of Financial Support to the United Kingdom Fishery Sector under the FIFG Programme[1]

(in £ million and %)

Measure	UK Total		Of which:					
			England		Scotland		Wales	
	£ m	%	£ m	%	£ m	%	£ m	%
Decommissioning	63.5	45	52.7	68	10.7	18	0.1	5
Vessel modernisation	8.0	6	2.7	3	5.0	8	0.3	13
Aquaculture	2.2	2	0	0	1.3	2	0.9	37
Fishing port facilities	8.3	6	2.7	3	5.4	9	0.2	9
Processing and marketing	29.8	21	2.7	3	26.7	44	0.4	18
Promotion	2.0	1	1.9	2	0	0	0.1	4
Operations by members of the trade	18.8	13	10.3	13	8.3	14	0.2	9
Innovative measures	3.8	3	1.9	2	1.9	3	0.1	4
Technical assistance	4.1	3	3.8	3	1.6	3	-	0
Total	140.6	100	77.3	100	60.9	100	2.4	100

1. Outside Objective 1.
Source: United Kingdom country submission, www.oecd.org/agr/fish.

Table 1.10. Uptake of the FIFG, Programme Budget to the end of 2004[1]

	Uptake (%)		
Measure	**England**	**Scotland**	**Wales**
Decommissioning	19.4	99.1	0
Vessel modernisation	2.2	4.0	0
Aquaculture	-	7.7	0
Fishing port facilities	37.0	3.7	0
Processing and marketing	33.3	29.6	0
Promotion	10.5	0	0
Operations by members of the trade	13.6	9.6	0
Innovative measures	10.5	5.3	0
Technical assistance	4.0	0	0
Total	**18.1**	**33.0**	**0**

1. Outside Objective 1.
Source: United Kingdom country submission, www.oecd.org/agr/fish.

Chapter 2

A Sustainable Development Framework for Assessing the Effects of Government Financial Transfers

This chapter provides an overview of the concept of sustainable development and discusses its application to the analysis of GFTs provided to the fisheries sector. A checklist approach to analysing the effects of subsidy programs within the framework of the sustainable development paradigm is proposed as a way of developing a pragmatic and simple approach to answering the key policy questions on fisheries GFTs.

While there is no single framework for adequately addressing the sustainable development paradigm, the task of analysing the effects of fisheries transfers is not infeasible once the elements of the analytical framework are broken down to its constituent components. The major challenge lies in addressing the interface between the three dimensions and the dynamic nature of potential policy effects.

The concept of sustainable development has been a feature of the policy agendas of OECD Member countries for many years and has been explicitly included in the policy frameworks of most countries. It has also been embraced at the OECD level and OECD Ministers have, on several occasions, highlighted the achievement of sustainable development as a key priority for OECD countries and as an overarching goal of the Organisation and its Member countries (OECD 2001, 2002).

Sustainable development has proved to be a difficult concept to define categorically and much intellectual energy has been devoted to trying to develop a single coherent definition. However, its general intent is well understood. The concept implies integration between economic, environmental and social goals in policy formulation; a long-term perspective about the consequences of today’s activities; and an understanding of how short-term conflicts can be addressed and resolved. As such, the sustainable development paradigm is a potentially powerful framework for ensuring that governments take into account the full range of effects of policy decisions. This is particularly important for the fisheries sector as the potentially exhaustible nature of the resource base makes the linkages between the three dimensions of sustainable development very explicit and is underscored by the inter-generational considerations inherent in fisheries policy.

The purpose of this chapter is to provide an overview of the concept of sustainable development and addresses how it can be applied to the analysis of GFTs provided to the fisheries sector. A checklist approach to analysing the effects of subsidy programs within the framework of the sustainable development paradigm is proposed as a way of developing a pragmatic and simple approach to answering the key policy questions on fisheries GFTs. The first part of the chapter outlines the concept and how it applies to the fisheries sector. The latter half of the chapter is then devoted to developing key concepts within the economic, environmental and social dimensions of sustainable development.

The key message from the chapter is that the task of analysing the effects of fisheries transfers is not infeasible once the elements of the analytical framework are broken down to its constituent components. The major challenge then lies in addressing the interface between the three dimensions as well as the dynamic nature of potential policy effects. In this respect, the checklist offers a guide for policy makers in their evaluation of support programs while ensuring that all relevant outcomes of fisheries transfers are addressed in a coherent way.

What is Sustainable Development?

The question of what constitutes sustainable development has attracted a lot of policy attention in recent decades. While there have been many attempts to refine the concept of sustainable development, the Brundtland Report remains the most quoted definition. By this definition, sustainable development is development that “meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED 1987, p. 43). The Brundtland Report also emphasised the priority of attending to the needs of the world’s poor and the “idea of limitations imposed by the state of technology and social organisation on the environment’s ability to meet present and future needs” (p. 43). Most subsequent attempts to refine the concept have built on the Brundtland Report and have arrived at essentially the same broad point of reference: the whole rationale for sustainable development is to increase human well being, particularly that of the least advantaged in society, while at the same time avoiding uncompensated future costs.

Enshrined in the concept of sustainable development is a concern that policies should address the economic, environmental and social dimensions of sustainability. Economic policies have typically identified “development” with the growth of real per-capita income or consumption. However, sustainable development seeks to ensure that the quality of economic growth is taken into account as well as its quantity, and that human well-being is considered alongside economic growth. In broad terms, *economic sustainability* covers the requirements for strong and durable economic growth, such as preserving financial stability, and ensuring capacities to invest and innovate. *Environmental sustainability* focuses on maintaining the integrity, productivity and resilience of biological and physical systems, and on preserving access to a healthy environment. *Social sustainability* emphasises the importance of individual and community resilience, of safety nets capable of adapting to major demographic and structural changes, of equity and of democratic participation in decision making.

One of the strengths of considering the three dimensions is that it provides the opportunity to identify “win-win” outcomes that allow for the achievement of multiple objectives (for example, by phasing out support that is both environmentally and economically damaging). But the linkages between the dimensions also suggest that tradeoffs are sometimes unavoidable, as objectives may sometimes conflict and national priorities may differ. For example, policies aimed at environmental goals may lead to short-term losses in economic output. Conversely, policies that support economic activities of specific sectors or regions may have a negative impact on environmental quality. Similarly, policies aimed at improving economic efficiency can run counter to objectives for equity and social cohesion, while policies to achieve equity may do so in ways that impinge on the efficient functioning of markets. Thus sustainable development stresses the long-term compatibility of the economic, social and environmental dimensions of human well-being, while acknowledging that these dimensions may also be in conflict in the short-term.

Sustainable development at the level of the fisheries sector

Though sustainable development is most obviously interpreted at the global or national level, it is also clearly relevant at the sectoral level. Through the range of goods and services they provide, specific sectors play an important role in meeting human needs and in improving human well-being. Further, the activities of the sector may impinge on the resources available to other sectors and to future generations. In general, the first-best solution to avoid unsustainable practices is correcting for externalities and providing economic agents with appropriate incentives, irrespective of the sector in which they operate.[1] This may imply reducing the weight of specific sectors in policy interventions and moving away from support programmes targeted to them in favour of general interventions that address directly a country's social and environmental aims. For example, it may be preferable to provide general income support for workers in formerly subsidised sectors rather than support tied to the production of specific goods in the sector.

The fisheries sector is a prime illustration of the importance of the sustainable development concept in ensuring that the effects of policy interventions incorporate the full range of costs and benefits across all participants in the sector. To place fisheries in a sustainable development context, analysis must address multiple objectives. The FAO (1999) broadly identified these as:

- Sustaining fisheries harvesting and processing activities based on specified and marine ecosystems;
- Ensuring the long-term viability of the resource base which supports these activities;
- Catering for the well-being of the fishery workforce and fishery community within a wider social and economic context; and
- Maintaining the health and integrity of marine ecosystems for the benefit of other uses and users (including biodiversity, intrinsic value and other economic uses such as tourism and recreation).

It is obvious that aspects of these objectives will be compatible, while others may conflict. For example, the broad sustainable development objectives of maintaining fish stocks and preserving fisheries habitat are obviously consistent with conservation goals of the fishery sector. However, other objectives of sustainable development may place limits on how the fisheries sector can pursue its own goals. The need to protect biodiversity may lead to restrictions being placed on particular fishing methods with a resulting cost to the sector. Similarly, economic costs arise when fishing in certain areas may be restricted or banned altogether because priority is granted to other users, such as tourism, aquaculture

1. Externalities arise when the actions of an economic agent impose costs on others and those costs are not reflected in the prices faced by the agent.

or conservation. In this sense, policies aimed at ensuring that the fisheries sector contribute to sustainable development depart radically from policies aimed at sustaining the sector's level of economic activity.

The role of a sustainable development framework is then to assist governments and other stakeholders identify the compatibilities and potential conflicts and to find a way of assessing how and in what way they should be addressed. An essential element in this process is an examination of the interactions between the three dimensions of sustainable development.

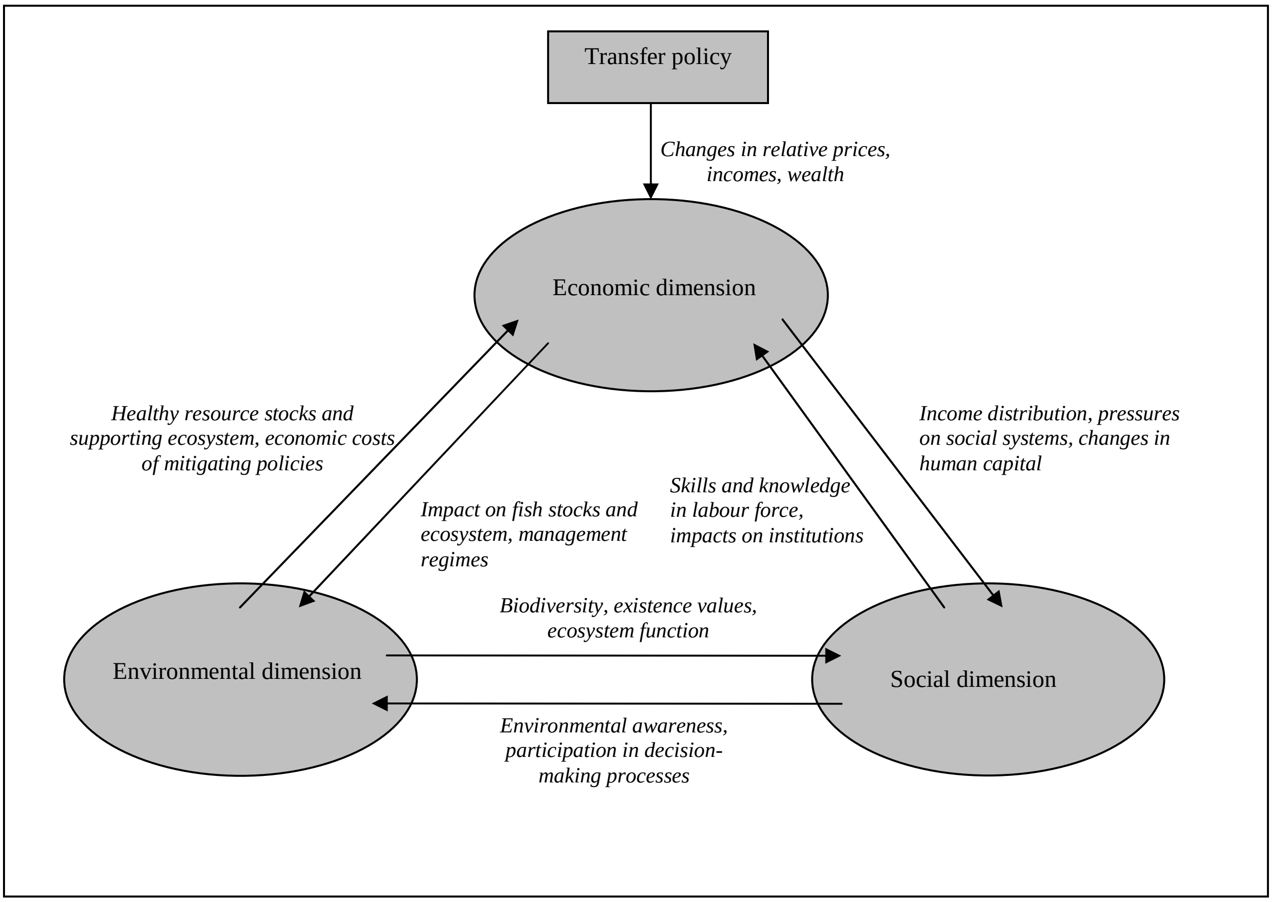
Interactions between the three dimensions of sustainable development

Sustainable development emphasises the links among the three dimensions, their long-term complementarity and the need to balance them when conflicts arise in the short-term. Indeed, it can be argued that it is at the interfaces between the three dimensions that the concept of sustainable development is most policy relevant (Lehtonen 2004). A simplified representation of the interactions in the case of subsidies to the fisheries sector is provided in Figure 2.1. Government implementation of a transfer policy will impact firstly on the economic dimension as it is an economic policy instrument designed to change the prices faced by agents in the sector, or to change the relative wealth of participants. The effects on the economic dimensions will then flow through to the environmental and social dimensions, which will in turn generate dynamic feedback effects amongst the three dimensions. For example, the interaction between the economic and environmental dimensions includes, on one side, the effects on the fish stocks and the broader ecosystem of the pattern of fishing activities that may be changed as a result of the provision of subsidies. On the other side, the productive functions of the fisheries resource base may be affected in the short- and long-term (depending on the effectiveness of management measures in place). There will also be the economic impacts of measures designed to protect fish stocks and their associated environment feeding back to the economic dimension.

The interactions between the economic and social dimensions encompass, on one hand, the impacts of transfer policies on the distribution of benefits and income, as well as on the skills, incentives and structures in the labour market. GFTs create winners and losers and may sometimes lead to pressures on social and cultural systems. They may also help create a culture of subsidy dependence, particularly in regional areas where alternative employment opportunities may be limited. Conversely, support to the sector can affect the provision of human inputs to the fisheries sector (in the form of labour, skills, knowledge and creativity), and the way in which social norms, attitudes and institutions affect the functioning of markets and the need for further policy interventions (such as enforcement of regulations).

The interactions between the environmental and social dimensions are dependent on the impacts of fisheries transfers on the economic dimension; that is, the effects of the transfer on the interaction are "fed through" the economic effects (for example, from the economic to the environmental to the social dimensions). The effects of GFTs on fish stocks and the supporting marine ecosystem may affect the provision of environmental amenities (such as biodiversity and existence values) which are important to individuals, but often in non-quantifiable ways. On the other hand, changes in human capital and community resilience arising from the provision of GFTs (such as through support for training and co-management) may alter the level of environmental awareness in the fisheries sector and the willingness of participants to participate constructively in decision making processes.

Figure 2.1. Interactions Between the Economic, Environmental and Social Dimensions of Sustainable Development



Source: Adapted from OECD (2001).

The interactions between the three dimensions are also dynamic in nature, with effects of policy changes likely to continue to reverberate through the system. For example, support to improve the human capital of fishers in terms of their ability to participate in fisheries co-management arrangements (through training in environmental awareness or conflict management) may reduce the transactions costs associated with the development and enforcement of fisheries management regulations (Abdullah, Kuperan and Pomeroy 1998). As a result, the initial support may pay off in terms of improved human capital, increased stakeholder involvement in management institutions, increased compliance and reduced economic costs of enforcement. Alternatively, some forms of support may have a negative feedback and hinder the attainment of sustainable development objectives. For example, some forms of support may inhibit natural contraction of the industry, either by discouraging vessel owners and crew from leaving the industry (through special income support), or by reducing the cost of operating a fishing vessel or having it tied up in port. Such policies have contributed to the maintenance of an inefficient level of excess capacity, which in turn has slowed the recovery of depleted fish stocks.

The nature and size of many of these interactions are not known and hence much of the research on sustainable development is directed at better understanding them. In general, the economic-environment interface in the fisheries sector could arguably be regarded as being the best served in terms of theoretical analysis. There is a significant literature on the bio-economics of fisheries with many empirical applications at the individual fishery level. The specific case of fisheries transfers is less well covered, especially in terms of empirical analysis, although the theory is well known and understood. There is increasing attention being paid to the economic-social interface in the fisheries sector, particularly in terms of regional development and institutional issues, although there is less information available on income distribution and the transfer efficiency of support policies. The role of support policies in enhancing or inhibiting community resilience and adaptability has been a particular concern in some OECD countries in recent years. The environment-social interface is perhaps the least well-addressed, both generally and in terms of the fishery sector although this does not necessarily reflect its relative importance in the policy sphere. Rather, it is indicative of the difficulty of formulating and measuring the interactions between the two dimensions.

The nature of the interactions also depends on the time frame under consideration. As noted earlier, objectives in the economic, social and environmental dimensions are not always mutually compatible and policy makers need to find robust solutions for dealing with the unavoidable trade-offs that arise. This is particularly relevant for the fisheries sector where inter-generational considerations loom large due to the renewable, but potentially exhaustible, nature of the fisheries resource and its supporting ecosystem. The effects of transfers may take time to percolate through the fisheries system. A good example of this is the time lag that occurred between the provision of significant government support for vessel construction in many OECD countries in the decades up to the 1990s and the effects on the sector in terms of excess capacity, reduced stocks and declining profitability. While factors other than transfers contributed to this situation (such as ineffective management), the time element is clearly evident.

An integrated approach to analysing GFTs

It is clear that managing fisheries for sustainable development is a multi-dimensional and multi-level process, which must consider a wider range of factors than the sustainability of fish stocks and fisheries alone. An integrated approach to the assessment of fisheries support policies can be developed through the use of a "sustainable development checklist". The aims of such a checklist are to:

- Identify the economic, environmental and social effects of transfer programs, both in quantitative and qualitative terms as appropriate;
- Identify and trace the linkages between the three dimensions;
- Identify potential complementarities and possible conflicts between the three dimensions;
- Assess the efficacy and cost-effectiveness of transfer policies; and
- Highlight the dynamic effects of transfer policies.

A checklist approach will provide policy makers with a systematic way of assessing the incidence and effectiveness of transfer programs and will help improve the transparency of programs. Naturally, the final decisions on the implementation or reform of fishery transfer programs must be taken by taking into account economic, environmental and social objectives, resource endowments and historical and cultural factors. The role of the checklist is to help policy makers elucidate the implications of policy choices across the sustainable development spectrum.

A schematic representation of the checklist is presented in Figure 2.2. The following describes the steps in the checklist that are followed in analysing a particular transfer policy:

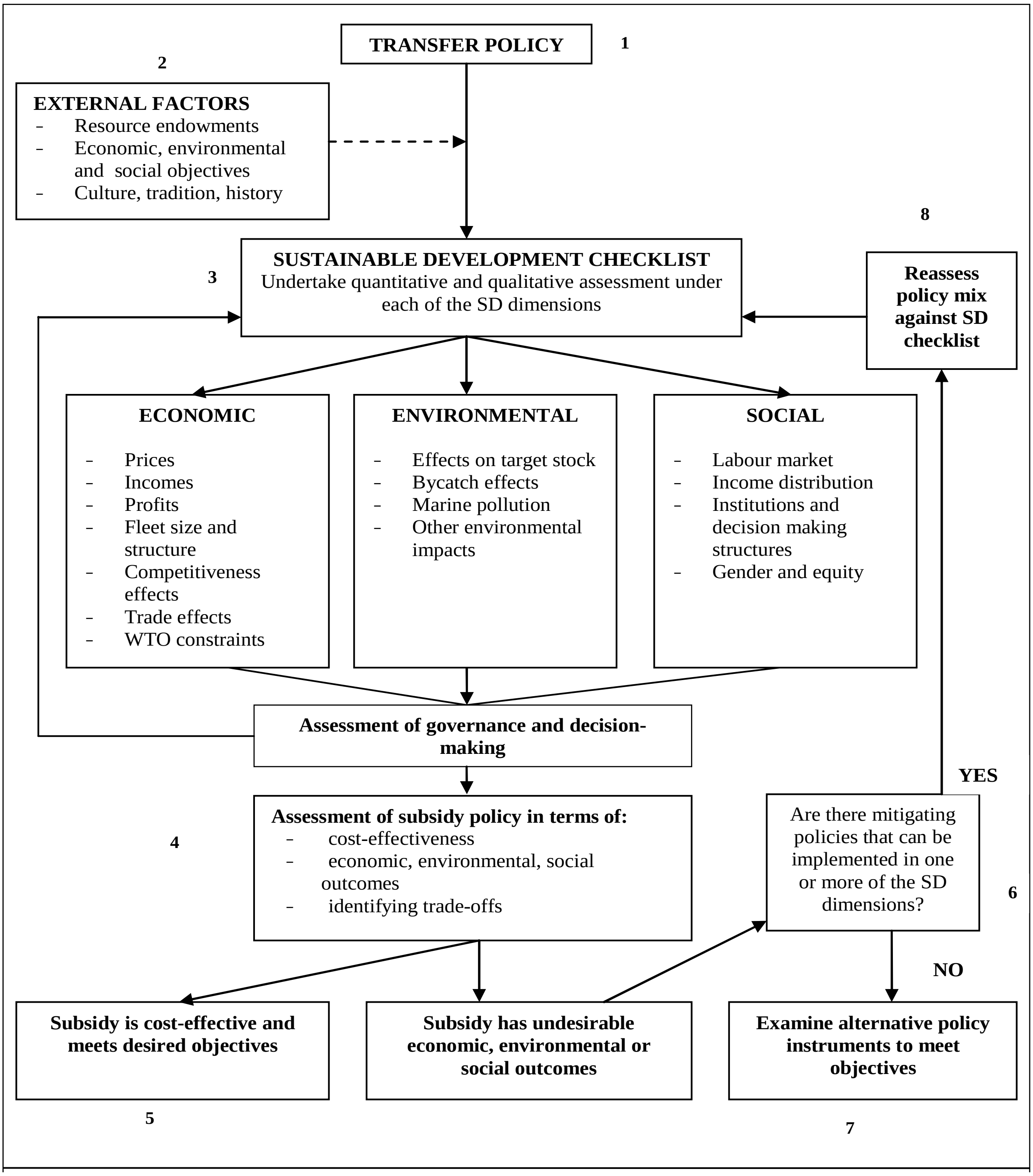
1. Identify and describe the transfer policy, including information on recipients, eligibility criteria, delivery mechanism, time horizon, management regimes for recipient fisheries.
2. Identify external factors that need to be considered, including resource endowments, the fisheries management framework, broad economic, environmental and social objectives, and cultural, historical and traditional factors.
3. Undertake qualitative or quantitative assessments under each of the sustainable development dimensions, as appropriate. The key issues under each of the dimensions are listed in Figure 2.2 and expanded upon in the following sections.
4. Assess the transfer policy in terms of the economic, environmental and social outcomes, interactions between the three dimensions (including synergies and conflicts), potential tradeoffs, and cost-effectiveness. This should take into account the size of the impacts and the probabilities associated with the potential outcomes. Such an integrated risk management approach highlights the fact that policy making is done in a world of uncertainty and that risks attached to outcomes need to be taken into account.
5. If the transfer policy meets the desired objectives in a cost-effective way without adverse sustainable development outcomes, then there is no need to go further in the checklist.
6. If there are undesirable outcomes, then it is necessary to determine if the expected costs associated with these outcomes outweigh the expected benefits from the policy. It is also necessary to assess whether there are mitigating policies that can be implemented to compensate the undesired outcomes in one or more of the sustainable development dimensions.
7. If there are no mitigating policies, or if the expected net benefits are negative, then governments should examine alternative policy instruments to meet the desired objectives.
8. If there are mitigating policies, then this new policy mix (that is, the transfer policy plus the mitigating policy) should be reassessed against the sustainable development checklist.

Such a checklist should comprise quantitative and qualitative analysis depending on availability and relevance of data and information. One of the most difficult issues in implementing a sustainable development framework is that of measurement as it is clear that not all dimensions can be expressed in the same unit of measurement for ease of comparison. This issue is not new to the study of public policy or environmental economics, and a range of techniques have been developed to address measurement challenges and a significant literature exists on their use (and abuse). It is beyond the scope of this project to review such methodologies in detail (see the collection of papers on the topic in Markandya and Richardson (1992) and Bomley (1995)). However, it is clear from the literature that there are advantages and disadvantages to trying to reduce all impacts to a common unit and that, in the end, some judgement is needed about how tradeoffs are to be made between quantifiable and non-quantifiable effects of policies.

Where quantitative data are not available, or are too costly to gather relative to the expected benefits from the additional information, then it is necessary to rely on qualitative assessments of the relevant effects of transfers. The paucity of the available literature on the empirical effects of transfers suggests that analysts and policy makers may frequently have to rely on a qualitative rather than quantitative approach. At the very least, this situation highlights a need for further empirical research.

There are some quantitative approaches to multiple objective problems, such as sustainable development, that may complement the checklist approach. The use of sustainable development indicators will help assess progress towards sustainable development goals. A sustainable development reference system (SDRS) has been developed by the FAO for such a purpose, based on a hierarchical framework designed to take into account indicators and reference points in organising information and objectives (FAO 1999). Techniques of multi-criteria decision-making have also been employed, albeit to a limited extent, in analysis of fisheries management options (see Mardle and Pascoe 2003 for an overview). This class of techniques appears to be most relevant at the individual fishery level. Both these approaches require value judgements to be made about the relative weighting to be given to different objectives within the system. This has the advantage of being able to reflect stakeholder views, particularly if the weightings are publicly known, but may suffer from being seen as being less than objective by some stakeholders. Nevertheless, they may also assist in improving transparency in particular areas.

Figure 2.2. A Sustainable Development Checklist Approach to Assessing Fisheries Subsidies



Source: OECD.

The Economic Dimension of GFTs

Three levels of assessment are important when considering the economic effects of GFTs. These relate to the effects at the level of the fishery (microeconomic effects), the economy-wide effects (or macroeconomic effects), and the effects on international trade. These are discussed in turn below.

Fishery-level effects of GFTs

The effect of GFTs on some key variables in the industry - revenues, costs, profits, fishing effort, fleet size, fish abundance, sustainable yield, and resource rent - depends critically on two conditions:

- the status of the stocks being fished, i.e., whether they are overfished or underfished,
- the fishery management regime in place.

The terms "overfished" or "underfished" indicate whether or not fish stocks are above or below the level providing maximum sustainable yield. These terms are based on biological, and not on economic, criteria.[2] Using the biological definition of overfishing and underfishing has the advantage, however, of neatly separating the cases where an increase in fishing effort leads to an increase *versus* decrease in sustainable yield, an effect of major importance. Note also that sustainable yield is a long term concept. Even if an increase in fishing effort leads to a decline in sustainable yield, it will always increase fish catches in the short term.[3]

The introduction of a transfer will initially increase the profits of fishing enterprises. This will occur either through increased revenue (such as when governments support fish prices or provide revenue enhancing transfers) or decreased costs (such as through effort enhancing transfers or transfers to fixed costs). The reaction of the industry will depend on the fishery management regime, that is, whether there are any controls at all, whether the catch is being controlled, whether the effort is being controlled, and whether there is a property rights structure accompanying those controls. The analytical approach undertaken here is often referred to as the "matrix approach" and was initially proposed by the Committee in the early 1990s (OECD 1991) and then developed by Hannesson (2001) for the OECD study on liberalising fisheries markets (OECD 2003a). The method has also been applied in UNEP (2004).

In the case of ***no controls,*** if a transfer is introduced where there was none before, it will initially raise the profits of the industry.[4] When there are no controls in place this will lead to increased fishing effort through investment in new fishing boats and possibly also

2. It is well known that the economically optimal level of a fish stock depends on factors such as the price of fish, the cost per unit of fish and its dependence on the stock level, and the discount rate. The economically optimal stock level can be either above or below the maximum sustainable yield level, depending on the constellation of the said economic parameters.

3. The length of the "short" term varies from one stock to another, depending on the growth rate and expected life time of the fish; for stocks consisting of many different age groups the effect on the sustainable yield will take several years to materialize.

4. In the Annex to Chapter 5 of this report, the effects of GFTs in the absence of controls (open access) are discussed using a simple bioeconomic model.

a more intensive use of existing boats. In the short term, catches may increase in response to this increased effort. A new, long term equilibrium with the transfer will be established when the profit of the marginal enterprise has been eroded to a level where only normal costs of capital are being covered. The erosion of profits is caused by a falling catch per unit of effort, via a depletion of fish stocks because of increased effort. Hence, the long term effect of a transfer on aggregate profits in the industry will be small, or none at all if all enterprises are identical; the only positive effect will be through increased profits of enterprises which for some reason enjoy some cost advantage over the marginal enterprise. It may also be noted that in the short to medium term the expansion of fishing effort could be a good deal greater than consistent with a long term equilibrium, because in the short term capital costs are fixed; they become relevant only when the enterprise needs to renew its boats. If high fixed costs bring the enterprise into bankruptcy, the fishing equipment will be sold at a loss and capital costs will fall accordingly, until the equipment has to be renewed. If the fishery is initially over-fished, fish catches will decline and the fish stock will be lower in the long term. Conversely, if the fishery is initially under-fished, fish catches will increase initially but will eventually settle at a lower level in the long term due to extra effort flowing to the fishery.

In the case where there are ***catch controls***, transfers will not have any effect on fish stocks or catches of fish, provided that the target catch is set independently of what happens in the industry and that the controls are fully and effectively enforced. If there is no control of fishing effort (*i.e.*, the number of boats in the fleet and how they are used), the higher profits initially caused by transfers will lead to increased fishing effort in much the same way and for the same reasons as when there is no control of the catch. The erosion of profits will in this case not be caused by a falling catch per unit of effort; by assumption the catch is under control, and the fish stocks will not be affected. Instead the erosion of profits would be caused by a shorter fishing season and less efficient use of capital, as more boats compete for a given amount of fish. With the catch remaining the same, the revenues would also remain the same unless the price of fish changes. Competition for a given total catch has in fact often led to a lower price of fish because of worse treatment of the fish at sea or because markets have become saturated.

As with all the results in the analysis presented in this section, there is an assumption that the management regulations are fully and effectively enforced. This is a very strong assumption and, while it is a useful pedagogical device, it masks the complexities and difficulties of fisheries management in the real world. There are many examples of cases where the best-designed fisheries management regimes break down due to poor enforcement of the regime's parameters and regulations. Historical experience has shown that the overcapitalisation of the fishing fleet likely to result from a catch control regime would increase pressure on fisheries management authorities to either raise the allowable catch or, at least, not to reduce it. There are also potential issues regarding discarding and high-grading as fishers attempt to maximize the value of their catch in an increasingly competitive fishery. Poor enforcement of catch limits will mean that the effects of transfers will be closer to those under open access. The extent to which this is the case in OECD fisheries has not been empirically tested as yet.

In a number of fisheries, the main management tool used is ***effort controls***. Fishing effort is generally defined as the number of vessels of a given specification times the amount of time they spend fishing. In all fisheries there are fishing vessels of many different shapes and sizes, using different kinds of equipment and fishing gear. To obtain a meaningful expression of fishing effort, the effort of various kinds of boats must be standardized. If total fishing effort were effectively controlled, the increase in profits due to the introduction of a transfer would not lead to increased effort and hence have no effect on fish catches or fish stocks (to the extent that the level of fishing effort is directly related to fish catches).[5]

Despite the best efforts of regulators, it is not always possible to identify and control all the variables that determine the effort that fishers can bring to bear on fish stocks and it is possible that fishers can expand their effort along uncontrolled dimensions to increase effective effort. For example, the effort regulations in a particular fishery may specify restrictions on boat size, engine power and days at sea, which still leaves scope for fishers to expand fishing effort by increasing the use or effectiveness of other inputs such as labour and the amount or type of fishing gear. This problem in turn makes it difficult for fisheries managers to set the appropriate level of effort controls as the effect of a given level of effort on catches and fish stocks necessarily remains uncertain. Moreover, the effect is unlikely to remain constant over time as the industry adapts to new restrictions, thereby potentially resulting in a race between the development and application of new regulations on one hand and the implementation of effort-increasing measures by fishers on the other. The problems of input stuffing associated with effort regulations are highlighted in a number of studies, including Beddington and Rettig (1984) and OECD (1997, pp. 112-7).

In the Annex to Chapter 5, the effects of an imperfect effort control egime are discussed in a formal model. The transfer would cause uncontrolled effort components to expand. This would reduce fish stocks, but whether sustainable yield would rise or not depends on whether the stocks are initially overexploited or underexploited. The costs of the industry would rise and limit the increase in profits, although profits would still rise (otherwise the incentive to expand effort would vanish). The resource rent would fall, however, as resource rent is most appropriately accounted for exclusive of transfers.[6]

The above discussion on catch and effort controls presume that these controls are not accompanied by individual rights of any sort; fishing enterprises have no individual quota allocation under catch control, and no rights to a specific number of fishing days or whatever measure under effort control. ***Rights based regimes*** would radically change the outcome, especially with individual quota rights. When fishing enterprises have individual shares of a total quota there is no need for them to race to catch the fish before anyone else. Instead they can catch the fish at their own convenience, which in all likelihood means that the catch will be spread throughout the fishing season, which avoids glutting markets. Furthermore, there is no incentive for the fishing enterprises to increase the fishing power of their boats beyond what is needed to catch their allocation of fish at a minimum cost, contrary to what happens when firms race for the fish; in that case they have incentives to increase the fishing power of their boats to win the race. With individual quotas the total catch will therefore be taken at a lower cost than with a race for the fish, although there are potential problems of high-grading and discarding of catch. Transfers will raise the profits in the industry, which will raise the market value of the individual quotas if these are transferable. The quotas themselves would act as barriers to entry into the industry, as fishing would be impossible unless by having access to an individual quota, either by holding it directly, or by leasing it from somebody else if

5. Effort controls only exert an indirect control over fish catches through assumptions about the catch per unit of effort. Effort controls are generally employed where it is difficult to specify catch limits for biological or historical reasons.

6. Resource rent is the value of production less all costs necessary to obtain it. Subsidies artificially inflate market values or reduce costs and should therefore be excluded from resource rent.

such arrangements are permitted (in some countries practicing individual quotas the leasing of quotas is not permitted).

Individual rights can also be defined for fishing effort, and in some countries a variant of this regime is practiced (for example, in the Faeroe Islands and in Spain for the 300s fleet). The definition of such rights is a good deal more complicated than in the case of individual fish quotas, because of the multi-dimensionality of effort. For practical reasons, effort rights must be defined with respect to a single or perhaps a few key dimensions of effort. In the Faeroe Islands effort rights are defined in terms of fishing days, and the fishing must take place in designated areas. This does not remove the incentive to increase effort by putting in additional equipment or gear. Furthermore, when boats are renewed their fishing power will most likely increase, even if there are rules in place preventing the new boat from being much larger than the old one. Individual rights with respect to fishing effort are likely, therefore, to be much less effective than individual quotas and would be of interest particularly when it is impractical to control a fishery with an overall catch quota. Initially, transfers would, under this regime, raise the profits in the industry and the market value of effort rights, but they would also strengthen the incentives to expand effort along uncontrolled dimensions. The expansion of effort by individual enterprises would make it necessary to cut back the existing effort rights, in order to keep the total effort within the set limits. This would erode the market value of the effort rights, although not by as much as it was raised by the transfers in the first place (otherwise the incentive to expand effort would vanish). The market value of effort rights excluding the transfers would, however, be lower than if there were no transfers. Since the market value of effort rights excluding transfers reflects the resource rent, transfers would diminish the resource rent if effort expands, as with effort controls in the absence of property rights.

The long term effects of transfers and how they depend on the state of fish stocks and the management regime in place are summarised in Table 2.1. Note that the long term effects of transfers on the catches of fish may be the opposite of the short term effects, depending on the status of fish stocks and the management regime applied. In the short term, the increased profitability resulting from transfers will result in more effort and larger catches of fish, unless there are controls in place limiting effort or fish catches, or property rights regimes with incentives to limit effort. Note that the clear-cut dividing line between overfished and underfished stocks holds only for infinitesimally small changes. Any real world transfer would of course be more substantial than that and cause a discrete change in stock size. This means that an underfished stock which is close enough to being fully fished will become overfished and hence possibly provide a smaller sustainable yield than before, but whether this happens depends on how far above the sustainable yield level it was before the transfer, the size of the transfer, and how strong the effect of the transfer is.

Table 2.1. Long Term Economic Effects of GFTs

Management regime→ Status of fish stock↓	**Property rights**		**No property rights**		**No property rights No controls**
	Catch controls	**Effort controls**	**Catch controls**	**Effort controls**	
Overfished	No effect on catch or stock No effect on effort Higher value of fish quotas	Same effects as with no property rights except that the value of effort rights will increase.	No effect on catch or stock Greater effort and more boats Same revenue or lower Higher costs and lower industry profits Negative resource rent	No effect on effort, if it is effectively controlled. Higher revenues Higher profits Incentive to expand uncontrolled components of effort. If effort expands • smaller stocks • lower catches • less increase in revenue • higher costs • less increase in profits • lower resource rent	Greater effort and more boats Smaller fish stocks Lower fish catch Lower revenue Higher costs Higher intra-marginal rents Negative resource rent
Underfished	Same as for overfished stocks	Same effects as with no property rights except that the value of effort rights will increase.	Same as for overfished stocks	No effect on effort, if it is effectively controlled. Higher revenues Higher profits Incentive to expand uncontrolled components of effort. If effort expands • smaller stocks • larger catches • higher revenue • higher cost • less increase in profits • lower resource rent	Greater effort and more boats Smaller fish stocks Greater fish catch Higher revenue Higher costs Higher intra-marginal rents Negative resource rent

Note: In this table, it is assumed that the management regulations that are in place are fully and effectively enforced. The impacts on key variables are the expected effects in the face of perfect enforcement of existing regulations.

Source: OECD.

Economy-wide effects of GFTs

The economy-wide effects of transfers to the fishing sector have received little attention in the policy debate to date. With some notable exceptions (such as Iceland), the fishing sector is relatively small in most OECD economies, often accounting for less than 1% of GDP and an even smaller proportion of the total workforce. However, the sector often plays a more significant role in terms of trade, with many countries having significant export and imports of fish and fisheries products. The industry is also significant for regions within many OECD countries, accounting for a high proportion of employment and income in coastal areas (European Commission (2004)). The multiplier effects of transfers in these fishery-dependent regions can be particularly important considerations in public policy towards fisheries management.

In general, the provision of transfers to the fishing sector distorts the incentive structure facing agents in the economy, in particular the attractiveness of investment in the fishing sector relative to other sectors. This will draw human and other resources into the fishing industry where they yield a lower real rate of return than they would if they were employed in the economy at large. Indeed, the long term contribution of these additional resources may even be negative, as will happen when transfers exacerbate the depletion of fish stocks that results from the poor or ineffective management of the sector.

It is easy to demonstrate that, other things being equal, the provision of transfers represent a net welfare loss to society, even in the presence of effective management. Whether this welfare loss is compensated for by an increase in welfare arising from the achievement of the objectives of the transfer programs (such as for social objectives or management of fish resources) is an open question that remains to be addressed. Yet it is a central question that goes to the heart of the tradeoff that is inherent in the sustainable development paradigm: "Under what conditions do transfer policies result in a net welfare gain to society?"

Empirically determining the magnitude of the linkages between the fishing sector and the rest of the economy, and the resulting resource shifts requires detailed analysis of the input-output relationships in the economy. Very little of this work has been undertaken for the fishing sector, either in the OECD or elsewhere. Some studies have been undertaken in Europe, particularly to examine the socio-economic importance of fishing and aquaculture in fisheries-dependent regions (European Commission 2004). More recently, regional input-output modeling has been undertaken for the Galician region in Spain (Garcia-Negro *et al.* 2004) and the Salerno area in Italy (Floros and Failler 2004, Cella, Placenti and Spagnolo n.d.). In the United States, regional input-output models were used to assess the economic contributions of Hawaii’s fisheries (Leung 1999) and of Florida’s commercial fisheries and aquaculture industries (Hodges *et al.* 2000). In principle, these types of modeling exercises could be used to determine the economy-wide effects of transfers. To date, however, such an application has not been undertaken.

Trade effects of GFTs

The trade effects of GFTs have been the focus of much discussion in the WTO negotiations on fisheries subsidies. Countries engaged in these negotiations have been wrestling with the difficulty inherent in analysing trade and trade policy distortions in a renewable natural resource. A particular issue relates to whether an empirical link between subsidies and trade distortions can be demonstrated. Given that the impacts of transfers on catches and stocks are highly conditional on the management regimes of importing and exporting countries, it is perhaps not surprising that few definitive answers have been forthcoming in the literature to date. One of the key findings from the literature on trade and renewable resources is that free trade in the presence of an open access renewable resource may disadvantage one of the trading partners, and that, when one or both trading partners is able to effectively manage the resource sector, both countries may gain from trade (Brander and Taylor 1997a, 1997b, 1998). The important role played by the management regime was further demonstrated by Amemi and Johnston (2000) who highlighted the complexity of trade models in trying to determine the consequences of resou4rce management in a sector that produces a tradable, renewable resource good. While it is difficult to generalise, the analysis showed that there are some circumstances where resources management by one country could lead to harvest reductions that, while generating rents, have more than offsetting terms-of-trade effects. Hannesson (2002) further elaborated on the likely trade effects of GFTs under alternative management regimes in his work for the OECD's study on *Liberalising Fisheries Markets*.

The role of management is therefore central to the question of trade effects of transfers. If fisheries management regimes which aim to constrain catches and effort are effectively enforced, then transfers are unlikely to result in a supply response that will affect either domestic or international markets. Fishers have a vertical supply curve and, while the transfer will increase the profits of fishers (by increasing incomes or reducing costs), they have no incentive to undercut the world price for their output (see Box .2.1). This assumes that they are, in fact, price-takers in the market (that is, they cannot influence the world price), and that there is a reference world price (that is, that the output market is fairly homogeneous). Both these assumptions are discussed further below.

If there is open access or if management regulations are not effectively enforced, then transfers may well result in those fishers receiving the transfers being able to expand supplies to the domestic and world markets (at least in the short term and as long as the MSY level has not been reached), thereby affecting trade flows and prices in the short term (Box 2.1). Expansion of supply can also arise if transfers are applied to under-exploited fisheries or to aquaculture operations (and the latter may place pressure on the harvest sector to also expand production or, alternatively, to seek government support). The extent of any trade distortion depends on the management regimes in importing and exporting countries, relative prices in the domestic and international markets, transport costs between the producer and the international markets, and the relative price responsiveness of international markets. Over the longer term, trade expansion induced by transfers, which is not underpinned by effective management, will be counter-productive in terms of reductions in catches and fish stocks in the country providing the support.

In addition to the effectiveness of management, the incidence of the transfer in the value chain and the structure of the industry will also influence the extent to which income-enhancing and cost-reducing transfers flow through to the world market. If the transfer is provided to fishers who sell their catch directly via auction or to a wholesaler, then they will have little influence over the price they receive; the transfer just increases the profits of fishers. If, on the other hand, the transfer is provided to industry participants further along the value chain, say at the wholesale or retail level (for example, support for handling, processing and transport facilities), then there may be scope for these agents to alter the prices they receive if they are able to manipulate supplies to the market through inventory management (available only for frozen products), brand discrimination, or market segmentation.

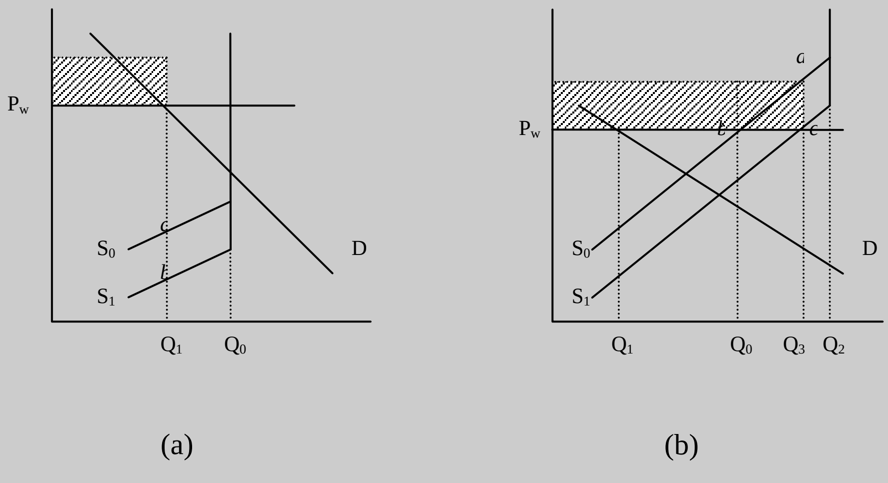
Market structure will also have an influence. A high degree of vertical integration (where one firm owns fishing, processing and retailing facilities) will mean that the benefits of support will be passed along the value chain and may affect the prices at which the final products are traded. Support to processing and marketing may also be passed upstream and affect the harvesting part of the value chain. On the other hand, where the industry is not integrated, and if each point in the value chain is competitive, then such behaviour is unlikely to occur.

The analysis of the trade effects of financial support to renewable resources to date has focused primarily on the long term effects of such support but there is little guidance on the expected trajectory to the long-term equilibrium. Given the heterogeneous nature of the world fish market, the existence of many niche markets, and the role of transport costs in determining competitiveness, there may be scope for short term market advantages to be gained from the application of transfers to the sector. This transition path issue requires further analysis, together with the influence of market structure and the incidence in the value chain on the impacts of transfers.

Box 2.1. A Graphical Analysis of the Trade Effects of Transfers

The trade effects of transfers can be illustrated using relatively simple supply and demand diagrams. In panel (a) below, the world price is represented by P_w, the domestic demand curve facing the industry is D and supply is represented by supply curve S_0 with production constrained at Q_0. In this case, the country is a net exporter with exports totalling ($Q_0 - Q_1$). Provision of a transfer will shift the supply curve downwards by the amount *ab* from S_0 to S_1. Because the production constraint is binding, there will be no supply response and domestic demand and exports will remain the same. The amount of the transfer paid by the government to the industry will be the shaded area.

In panel (b), the situation is presented where a supply response is possible. This may arise as a result of ineffective management, or because the fishery is developing or underexploited. This situation also applies to many aquaculture operations. There may be a supply constraint (at Q_2) but this is not binding. Fishers therefore have scope to change production in response to changing prices although the actual responses will depend on the elasticities of supply and demand.. The introduction of a transfer will shift the supply curve downwards by *ac* from S_0 to S_1. The world price will not change so domestic demand remains at Q_1. However, exports will increase from ($Q_0 - Q_1$) to ($Q_3 - Q_1$). The transfer received by the industry is the shaded area (equal to the quantity produced times the transfer) and the deadweight loss (the loss resulting from the expansion of domestic production beyond the optimal level) arising from the change in supply is the triangle area *abc*.



Source: OECD.

The Environmental Dimension of GFTs

The environmental effects of transfers flow directly from the economic effects and can be divided into three main sets of impacts: effects on the target fisheries; effects on associated fisheries resources (*i.e.* bycatch); and on the broader environment.

As reflected in the analysis of the fishery-level economic effects of transfers, the effects on the target fisheries resources will clearly depend both on the type of fisheries management system in place and how effectively fisheries regulations are enforced. The combination of catch controls, effort controls and rights based management will have a range of effects on target stocks (Table 2.1.). The key point is that the more effectively a management regime restricts the catch of the target stock, then the lower will be the likely effect of transfers on the stock. This becomes more complicated (and indeed largely indeterminate) when multi-species fisheries are considered with the impacts depending on the nature of species interdependence and the degree to which fishers can target different species within a fishery.

There are also potential effects on species other than the target species. Transfers which lead to increased effort and catches may result in the increased bycatch of non-target species. In recent years, many OECD countries have introduced bycatch reduction plans and these have often been accompanied by financial support for the purchase, installation and operation of more "environmentally-friendly" fishing techniques and gear (such as turtle excluder devices). These transfers will help to mitigate the external effects of fishing. At the same time, they can also reduce the operating costs of fishing as they often increase the efficiency of sorting catches, reduce labour requirements and reduce gear losses. This raises the issue of the extent to which industry should co-finance the introduction of environmentally-friendly fishing gear. Indeed, it can be argued that under the polluter pays principle, the industry should pay for the full cost of such equipment as they are responsible for imposing an external cost on society through their fishing activities. In addition, the co-existence of transfers (and management regimes) that directly or indirectly encourage increased effort with transfers that seek to reduce bycatch highlights an area of policy incoherence.

In terms of the broader environment, the provision of transfers may have more widespread environmental implications that may not necessarily be taken into account by policy makers. For example, most OECD countries provide their fleets with an exemption from fuel tax. Such transfers reduce the cost of fuel relative to other inputs and, under any management regime, will encourage fishers to use relatively more of this input. This shift in the pattern of input use may have potential consequences for marine pollution and carbon dioxide emissions, depending on factors such as engine efficiency and fuel price levels, that are generally not considered by those responsible for developing sectoral transfer policies. Careful consideration of the broader environmental impacts of transfers is therefore required under the sustainable development paradigm.

The Social Dimension of GFTs

The social dimension is the least explored of the three pillars of sustainable development. Yet it is a central consideration in the analysis of the impacts of GFTs. Social objectives are implicit in the fisheries policies of many OECD countries (and explicit in a few), with transfer programs playing a central role. For example, transfers are often linked to the need to maintain employment in the industry, develop and support regional communities, retraining fishers, maintain cultural and heritage values, and so on.

As was recognised by the UK in its recent review of their fishing industry, the fact that these types of objectives often remain implicit, and are not translated into transparent objectives, can inhibit the effectiveness of government policy in addressing social issues (United Kingdom Cabinet Office 2004). Social policy tools, rather than fisheries management tools, should be the main mechanism to meet social objectives or at least they should be mutually supportive and coherent. Transfer policies which are directed either implicitly or explicitly at social objectives need to be analysed to ensure that they do not hamper the good management of stocks, the competitiveness of the industry or create transfer-dependent communities.

However, analysing the effects of GFTs on the social dimension of sustainable development is an empirically daunting task. What is meant by social sustainability is a much debated question (Box 2.2). A review of recent work on the social pillar of sustainable development highlights the fact that it is neither feasible nor desirable to rely on a single measure or a single framework for analysing the interaction of the social pillar with the economic and environmental pillars in the context of GFTs (see Chapter 7). The social pillar is complex and multidimensional in character, making it difficult to analyse in isolation from the economic and environmental contexts. The social dimension is also relational and not easily defined in absolute terms. This feature contributes to the significant measurement problems often encountered, particularly when dealing with social concepts which are relatively loosely defined and non tangible.

Box 2.2. Social Sustainability

Social sustainability focuses on maintaining or enhancing overall long-term socioeconomic welfare, including measures of individual well-being and the well-being of human communities reliant on the fishery. This includes goals of generating long-term sustainable net benefits and distributing those benefits amongst fishery participants in a way that maintains or enhances the system's overall viability within local and global economies and enhances community sustainability. These goals need to be extended by recognizing that the concept of sustainability must be looked at in parallel with that of resilience. Resilience refers to the ability of a system to absorb and recover from naturally-occurring or human-induced fluctuations (that is, the ability to "bounce back" or find a new equilibrium). Along with other aspects of government policy, transfers can have a major influence on the resilience of communities.

*Source:*OECD.

A pragmatic approach

While the task is daunting, it is not unfeasible. One of the main lessons from the OECD work on the social dimension of sustainable development is the need to adopt a simple and pragmatic approach that focuses attention on a limited number of key policy issues that are both of particular policy relevance and are relatively easy tractable. In recent years, the OECD has focused on cross-sectoral issues of health, education, poverty, sustainable retirement policies and development, and the social policy dimensions of these issues were analysed drawing on economic and social data, as well as on concepts such as human capital and social capital. The cost-effectiveness of the particular policies used to meet social objectives formed an important part of the analysis, highlighting the link between the social and economic pillars.

In the case of GFTs, a similarly pragmatic approach is also appropriate. By focusing on how different types of transfer policies affect core concepts from the social pillar, key social policy issues in the fisheries sector can be analysed. Drawing on the reviews of the social dimension in Chapter 7 and 8, the core analytical concepts that are most relevance to the issue of the social effects of GFTs are those relating to:

- Individual capabilities and human capital;
- Social capital; and
- Cost-effectiveness.

The concept of *individual capabilities* is based on the capability approach developed by Sen (and expanded by other analysts) in analysing poverty and inequality in developing countries (Sen 1999; OECD 2001c). The capability approach assesses people's welfare in terms of their functionings and capabilities, which are defined as an individual's actual activities and states of being (their "functionings") and the various combinations of potential states of being that they can achieve (their "capabilities"). The concept highlights the importance of non-market goods and services, heterogeneity of individuals and the intrinsic value of choice (that is, the individual's freedom to choose between different ways of living). The approach is also characterised by the predominance of philosophical and conceptual reasoning instead of modelling and formalisations, partly explaining its relatively limited impact to date in mainstream welfare economics.

Analysing different types of fisheries transfers in terms of their impacts on individual capabilities will provide insights into the social effects of the policies at the individual level. In practical terms, the analysis can most readily be cast in terms of effects on human capital (with its focus on education and skills), health outcomes and reductions in poverty.[7] For example, transfers for the retraining of fishers who are faced with declining fish stocks will generally have a positive effect through expanding the range of capabilities that individual fishers are able to bring to bear on choices in their future lives (although this may, of course, be limited by available opportunities). Alternatively, transfers that encourage increased dependency on fishery activities (for example, income support) may be seen as reducing the choices available to fishers by tying them to the fishery. While such support may be seen as being necessary to, say, reduce poverty, it is questionable whether a specific fishery policy is the appropriate policy mechanism for achieving such a goal.

The concept of *social capital* is discussed in Chapter 8 of this report and in OECD (2001e). Social capital is defined as "networks together with shared norms, values and understandings which facilitate co-operation within or among groups" (OECD 2001e, p. 41) (Box 2.3). Social capital can lower transactions costs, increase creativity and innovation, and improve the well-being of individuals and communities. While measuring social capital is problematic and still in its infancy, most empirical work has focused on proxy measures of levels of inter-personal trust and engagement or interaction in social or group activities. Despite the measurement difficulties, a range of studies suggests that social capital can deliver important benefits. However, when viewed from a political economy perspective, social capital can also undermine social harmony and impair

7. The United Nations has adopted the basic ideas of the capability approach in its annual *Human Development Reports*, which measure the state of development of a country by analysing people's life expectancy at birth, education (literacy and enrolment rates), and adjusted real GDP per capita. Although these indices are generally regarded as a crude application of the capability approach, comparisons of rankings of these indices with GNP per capita show significant differences (see extensive discussion in UNDP 2004).

economic performance, when, for example, networks are used to pursue narrow group interests.

In the specific case of fisheries, participatory decision-making process and devolution of management can potentially play a role in enhancing social capital. Institutional settings, such as co-management, may help to strengthen the bridging, bonding and linking dimensions of social capital and may assist in increasing compliance, reducing enforcement costs, and increasing the sustainability of fish stocks. The dual role of transfers and institutional settings in this regard is fairly clear. Government financial transfers for management can be directed to increasing levels of stakeholder involvement in decision-making on issues such as research directions and priorities, catch settings and the introduction of management changes. On the other hand, as noted above, social capital can also inhibit management and policy reform if the strong networks within and among communities, and between a community and regulators, work to entrench their own positions at the expense of overall improvements in economic and environmental outcomes.

Box 2.3. Social Capital and Fisheries

Social capital is a narrower concept relevant to the social dimension of sustainable development that has attracted increasing attention in recent years. Social capital is defined as an all-encompassing term for the norms and the social networks that facilitate co-operation among individuals and between groups of individuals. As a type of ‘capital’, social capital can be added to (by volunteering) and subtracted from (by criminal behaviour) on an individual level, by collective actions (such as public education) and is affected by a range of socio-economic factors (such as per capita income, age structure, ethnolinguistic divisions, rule of law, etc). Unlike reproducible, human or natural capital, social capital can only exist at a group or community level.

To date, the concept of social capital has not been applied to the fisheries sector. Social networks help determine levels of trust and co-operation in society and can have a major impact on outcomes in fisheries. In particular, social connections in the form of ‘strong ties’ within communities, ‘weak ties’ across communities and links between fishers and the regulator are important in ensuring successful fisheries management outcomes. One of the key conclusions is that social capital can be nurtured to support and improve management outcomes and possibly reduce management costs. Such a ‘win-win’ outcome in the reform of transfer policies requires explicit consideration of social capital in the policy making process. It also highlights the potential benefits from a redirection in priorities and funding away from ‘top-down’ fisheries management towards ‘co-management’ where fishers have both rights and responsibilities to be effective partners in ensuring sustainable fisheries. As a result, the institutions governing fisheries and fishery communities are particularly important.

Source: OECD.

Finally, OECD countries have in place a number of social and fishery objectives that may entail costs for the economic pillar of sustainable development. *Cost-effectiveness* then becomes a concern that must also be addressed in analysing the social effects of fisheries transfers. Where transfers are used to meet social goals in ways which intersect with fishery-specific policies, it is important that the objectives be met in a cost-efficient way. This will necessarily entail examination of both the design of transfer policies and the appropriateness of the policy relative to other policy instruments. For example, transfers to fishing fleets or to vessel construction and modernisation to maintain coastal communities may not be the most cost-efficient way of achieving regional development objectives. Transfers provided directly to target communities may be more cost-effective, allowing them to make their own choices about how to best arrange their financial affairs, and may reduce the potential for adverse environmental effects to arise from capacity expansion.

Using these core concepts as a frame of reference, the effects of GFTs on the key social policy issues in the fisheries sector can be addressed. In canvassing the range of social policy issues in the fisheries sector, three key issues emerge as the concerns occupying most government attention: income distribution; fisheries labour markets; community resilience; and institutions and decision making structures.

The issue of income distribution is particularly significant because transfers are generally directed, intentionally or not, at certain components of the fishery sector altering relative incomes within the sector and between the sector and the rest of the economy. So, distributional impacts arise naturally. In addition, the question of distributional impacts is a factor in the political decision to provide or remove particular transfers. Identifying those who benefit from or are affected by a transfer is an important step in determining the likely effects of a transfer, the effectiveness of a transfer program in meeting its objectives, and the potential obstacles to policy reform. However, the issue has rarely been dealt with in the fisheries sector in a comprehensive fashion. This is in stark contrast to the situation in other sectors, notably the agriculture sector, where distributional analyses have played an important part in the reform of agricultural policies, including transfer policies.

The broad concept of resilience refers to the ability of a fishery, and its ecological, economic and social (including fishers, fishing communities and institutions) components, to absorb and 'bounce back' from perturbations caused by natural or human actions, without collapsing, self-destructing or otherwise entering an undesirable state. While it is clearly a concept that is most broadly applied to a fishery system, it can also be applied to a sub-component of the system (for example, ecological resilience). In terms of the social effects of GFTs, resilience is of direct relevance to the social or community component of the system and is most readily apparent in the impact of transfer policies on communities involved in fishery activities (harvesting, processing and aquaculture), and on aspects of the institutions governing community participation in the fishery. For example, transfers in the form of income support in the face of declining or overfished stocks increase the transfer-dependence, and reduce the resilience, of communities, particularly if the transfers are not accompanied by appropriate management or capacity adjustment measures. The impacts of transfers on income distribution between and within communities can also be assessed in terms of the impact of community resilience and community cohesion.

Fisheries labour markets are a concern for several reasons. First, there is often an implicit objective of maintaining a certain level of employment in the sector, either at a national or regional level, and transfer policies directed at, for example, income support, infrastructure development and industry development, are often developed with this objective in mind (at least partly). This raises potential concerns regarding the coherence between fisheries management objectives and the desire to maintain employment. As will be discussed later, there is evidence of such policy incoherence arising in several OECD countries. Second, the necessary adjustments, usually contractions, that have occurred in some OECD fishing sectors in the face of declining fish stocks, necessitates transfers directed at increasing the diversity of economic and employment opportunities in fisheries-dependent areas and at providing support for retraining of fishers. Third, providing income support to fishers reduces the cost of labour in the industry, thereby creating a self-reinforcing system whereby the industry tends to substitute cheaper labour for other inputs of production.

The role of human and social capital in the institutions and decision making structures that underpin fisheries management and enforcement is often overlooked. Transfer policies can promote or inhibit the extent to which individuals and communities interact with the management regimes governing their industry. For example, transfers to support fisher involvement in co-management arrangements may help to build up the capability of fishers to meaningfully engage in these processes. This is, of course, inexplicably linked to the type of management regime in place for particular fisheries, and the degree of devolvement of real decision making power.

These issues and questions form the basis of the checklist which would then be analysed in terms of the core concepts discussed above. This is presented in Table 2.2 together with a cross-matching of the issues and concepts to aid the visualisation of the framework.

Table 2.2. Checklist on Key Issues in Analysis of the Social Dimension of GFTs

Policy issue	Conceptual dimension		
	Individual capabilities / human capital	Social capital	Cost-effectiveness
Income distribution			
What is the effect on rent generation?			x
What is the effect on rent distribution?	x	x	x
Who are the beneficiaries of transfers and are they the intended beneficiaries?	x	x	x
What is the effect on household income (including on sources of income and indebtedness)?	x	x	x
What are the impacts on the various production units?	x	x	x
Are there equity considerations that need to be addressed (both income and gender equity)?	x	x	x
Fisheries labour markets			
What are the effects on labour mobility?	x		x
What are the effects on labour supply?			x
How are the social and opportunity costs of labour altered, both in absolute and relative terms?	x	x	x
What are the effects on training and education in the sector?	x		x
Community resilience			
What are the effects on economic diversity?	x	x	x
Does the transfer create a culture of dependence?	x	x	x
Institutions and decision making			
How does the transfer interact with institutions and decision-making structures?	x	x	x
How do transfers alter incentives of participants in the co-management and devolved arrangements?		x	x

Source: OECD.

Chapter 3

Analysis of Specific Government Financial Transfer Categories

This chapter presents a detailed analysis of the effects of different types of government financial transfers on the fisheries sector based on the sustainable development framework elaborated in the previous chapter.

The major findings from the analysis are that:

- *All transfers distort the economic incentives facing the fishing sector, masking the real costs of fishers' operational decisions and drawing in more resources to the sector than is economically optimal.*
- *Some types of transfers, such as support for vessel construction and modernisation, operating costs (including for fuel, insurance, bait) and price support, have more direct and potentially more distorting impacts on the economic incentives facing the sector than other types of transfers, such as management expenditures.*
- *While some transfers are necessary to ensure the sustainability of fish stocks (such as management, research and enforcement expenditures, and some types of infrastructure expenditures), other transfers have the potential to adversely affect the short and long term viability of the sector from an economic, environmental and social perspective.*
- *The environmental effects of transfers depend critically on the ability of fisheries managers to control catches, effort and entry into the sector. The extent to which such control is evident in OECD countries is yet to be fully assessed.*
- *Most forms of financial support tend to reduce industry flexibility and community resilience in the face of exogenous economic and environmental shocks. This is particularly the case for many types of income support programmes which often serve to increase community dependence on government support rather than creating sustainable and diversified communities.*

Management, research and enforcement expenditure

Key points

These transfers are essential for ensuring that publicly-owned fisheries resources are appropriately managed, research is undertaken to underpin management settings, and regulations are enforced. If the management regime is poorly developed or ineffectively enforced, then the effectiveness of these transfers is open to question.

The public good arguments often used in support of management, research and enforcement expenditures do not necessarily hold for many types of transfers within the category as a defined beneficiary or set of beneficiaries can often be identified (particularly for some management and research services).

Depending on the degree and type of stakeholder participation within a country's or fishery's institutional setting, management expenditures can help increase social capital in fisheries communities by providing a meaningful stake in the decision-making process and may increase compliance and reduce enforcement costs.

It is well recognised that governments need to intervene in fisheries in order to ensure an efficient use of common fishery resources. Government intervention is necessary in order to conserve stocks, manage adverse impacts from fishing, restrict access to the resource and provide opportunities for an economically profitable industry to exist. The absence of such intervention will generally lead to overexploitation of fish stocks and reduced returns to the sector in the longer term, with consequent impacts on the economic, environmental and social sustainability of the sector.

To facilitate this, governments provide a range of services to the sector including management, research and enforcement. Management consists of establishing and administering management regimes and adapting existing regimes to ensure that conservation goals and industry objectives are met. This entails developing regulations to restrict access to the resource and applying them within an institutional framework to ensure that they lead to the desired outcomes. Research is required to underpin management as the success of government intervention depends on the managers having an adequate knowledge about the status of fish stocks and the linkages with the ecosystem. The success of management is also critically dependant on the monitoring, surveillance and enforcement of fisheries rules and regulations. It is worth noting that there is a significant likelihood of diminishing marginal returns in this type of transfer, with increased expenditures on management, research and enforcement services not necessarily leading to commensurate increases in expected returns to the sector (OECD 2003b).

In OECD countries, management, research and enforcement services are generally provided free of charge to the fishing sector with governments both funding and providing the services. Several countries, including New Zealand, Australia and Iceland, are now recovering a sizable portion of the costs from industry. Other countries, such as Canada, the United States and Norway, charge user fees for some aspects of management (although not as part of a broader cost recovery programme). Neither the cost recovery programs nor the user fees are related to the amount of fish caught in particular fisheries, but are set to recover the actual administrative costs (or part thereof) involved in the government management of the fishery. By decoupling cost recovery and user charging from effort or catch, the incentives structure facing industry and government is altered and a more objective assessment of management needs and priorities can potentially be obtained.

In addition, the provision of an increasing number of fisheries services (particularly some research and enforcement functions) is being outsourced to private providers or provided through joint ventures between public and private agents, reflecting a shift away from exclusive government provision of management, research and enforcement in some countries (OECD 2003b). Such developments reflect the implementation of a beneficiary pays principle in the provision of services in those countries, the continuing search for increased efficiency in service provision, increasing general budget pressures on governments, and the increased use of co-management (much of which has accompanied the introduction of management shifts towards instruments such as individual transferable quotas).

As noted in Chapter 1, expenditure on management, research and enforcement accounted for 38% of the GFTs provided annually to the sector. Previous work in the Committee for Fisheries has shown that the provision of enforcement services accounts for around 40% of the total costs of these services, with research and management expenditures accounting for 34% and 26%, respectively (OECD 2003b, p. 51).

If fisheries are effectively managed, then the government provision of management, research and enforcement services without recovering the costs will confer benefits on the industry and raise its potential profit (although not necessarily its actual profit) in two ways. First, costs are reduced as the industry does not have to face costs that it would otherwise have to pay for such services.[1] Second, effective enforcement of management regulations increase the incomes of fishers in the long-term (not always in the short term) through more sustainable exploitation of fish stocks and restrictions on competition for the available catch. The economic and environmental effects of this category of transfer are summarized in Table 3.1 and are broadly similar to the effects flowing from transfers generally (Table 2.1).

On the other hand, if fisheries are not effectively managed despite the provision of management services, then the effects are close to those of open access. As a result, it is the effectiveness of management, as well as the type of management regime, that will determine whether the fishing industry actually benefits from the government provision of research, management and enforcement services.

The usual justification for the public provision of management, research and enforcement services is that such services provide a public good. Public goods are distinguished from private goods in two ways. First, if a public good is provided for one person, it is automatically provided for all because it is not feasible to exclude anyone from using it (known as 'non-excludability' in use). Second, the use of a public good by one person does not diminish the amount available for others ('non-rivalry' in consumption) (Cornes and Sandler 1996). Most fisheries services lie on the spectrum between public and private goods, and it remains questionable how many have the characteristics of a pure public good. This was discussed in the OECD's study on fisheries management costs (OECD 2003b) which concluded that many of the services have characteristics of club goods where the benefits of the service are non-rival (*i.e.*, the

1. This is a "Catch-22" situation as fisheries are the classic common pool problem where individual fishers have no incentive to act collectively if there is no means of "closing the commons", hence the need for government intervention to develop and enforce catch and access restrictions.

amount of the service is fixed irrespective of degree of use) but it is feasible to exclude potential beneficiaries (*i.e.*, benefits can be restricted to those in the 'club').

Prime examples of club goods in the fisheries sector include research into improved gear technology, gear selectivity and so on which is primarily directed at improving the productivity of fishing operations. Much of this research benefits the industry directly and it is technically feasible to restrict the benefits from the research to the sector. So it is clear that the public good arguments usually associated with publicly funded research do not necessarily apply (Arnason and Sutinen 2003; Cox 2003). General research into, say, improving stock assessments is more subtle. It benefits the industry by improving the knowledge base on which management settings are based, but it also benefits the broader community in terms of an improved understanding of the marine resources of the community. Moreover, it is hard to exclude anyone from the benefits of such research and, once undertaken, it is generally available to whoever can make use of it.

Given the twofold nature of fisheries management – to conserve publicly owned resources and provide the foundation for a profitable industry – their public provision raises the question of who should pay for management, research and enforcement. The increased popularity of cost recovery programs may be a reflection that the public good arguments underlying government provision of some of these services are not necessarily accepted by some countries. However, requiring users to pay for services also requires that the services actually provide benefits, that is, that the management regime is well defined, that research priorities are set appropriately, and that enforcement is effective. If such conditions are met, then it may be argued that the fishing industry stands to benefit from the generation of resource rent and should contribute to the costs of providing the services. If the conditions are not met, then there must be questions about whether the transfers are effectively meeting their objectives.

This category of transfers can have important implications for some aspects of the social dimension of sustainable development, particularly in terms of building social capital. However, the extent to which this occurs depends very much on the institutional framework within which the fisheries in question operate with the degree of stakeholder involvement in decision making processes being the key determinant. It is not necessarily dependant on the type of management regime in place (*i*.e., whether or not there are property rights, catch controls or effort controls), as long as there is some form of management in place; open access will quickly erode social capital.

The bridging, bonding and linking dimensions of social capital can be enhanced through the expenditure of government resources on management services, but only if provided in conjunction with meaningful stakeholder participation in decision making. This, in turn, can increase acceptance of and compliance with management regulations and serve to reduce enforcement costs amongst the industry participants. On the other hand, there is empirical evidence suggesting that increased levels of co-management tend to lead to higher up-front costs to governments, relative to the more traditional top-down approach to management (see OECD 1997). There is, therefore, a tradeoff between the short and long term costs of different models of stakeholder involvement.

In summary, governments have an obligation to manage fisheries resources in order to ensure an efficient use of scarce resources. However, the public good argument often invoked as a justification for these transfers may not necessarily hold for many types of transfers within the category as a defined beneficiary or set of beneficiaries can often be identified. This is particularly the case for some management services (such as quota registries) and research services (particularly applied research directly affecting the costs and prices facing the industry). However, depending on the degree and type of stakeholder participation within the institutional setting, management expenditures can help increase social capital in fisheries communities by providing a meaningful stake in the decision-making process and may increase compliance and reduce enforcement costs. A more holistic approach to assessing the effectiveness of management expenditures highlights the role of institutional settings and governance arrangements, in addition to the type of management regime, in determining the effectiveness of management. It also demonstrates that an integrated approach is required to the effectively manage fisheries; the mere fact that money is spent on managing fisheries does not necessarily mean that the objectives of management are being met, and therefore if the transfers are cost-effectively applied.

Table 3.1. Effects of Government Provision of Management, Research and Enforcement

Dimension	Management regime				
	Property rights		No property rights		
	Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Economic effects	Reduced costs, increased incomes	Reduced costs, increased incomes in short term; long term effect dependent on changes in uncontrolled aspects of effort	Reduced costs, increased incomes in short term. Long term decline in profits as effort enters fishery.	Reduced costs, increased incomes in short term. Long term effect dependent on changes in uncontrolled aspects of effort; effort creep will reduce profits.	Reduced profits as stocks decline. Resource rent to zero.
Environmental effects	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled. If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks
Social effects	Potential increase in social capital depending on the degree of stakeholder involvement in decision making processes on management, research and enforcement. Higher involvement can contribute to greater compliance with regulations, reduce costs of enforcement, but may involve higher up-front costs to government.				

Note: The listed effects of the GFT assume that all regulations are effectively enforced.

Source: OECD.

Fisheries infrastructure expenditure

Key points

The free provision and operation of harbour and landing facilities, navigation services, search and rescue support and other infrastructure for the fishing sector is a feature of most OECD countries.

In the absence of user charges for the government provision of infrastructure, the costs of fishing are reduced and the profits of the industry are increased, irrespective of the management regime in place. In the absence of effective management, this could increase pressure on stocks by making fishing more attractive and drawing resources into the sector.

This can also have an impact on community resilience by sending mixed signals to the industry and the fishing community about the sustainability and profitability of fishing activities.

Expenditure on fisheries infrastructure includes payment for the construction and maintenance of harbours and fishing ports, construction of peripheral harbour infrastructure (roads, water, sewerage, etc), installation and maintenance of landing equipment, construction of auction halls, lighthouse and navigation facilities and search and rescue facilities. Much infrastructure used by fishing vessels is also used by other activities and often built primarily for such activities. The GPS-system was not designed for fishing activities, even if it has become extremely useful for fishers. Many harbor facilities are, on the other hand, primarily designed for fishing boats and hardly if at all used for other purposes.

OECD governments have traditionally paid for fisheries infrastructure, with expenditures accounting for 35% of total GFTs in 2003. This figure is, however, an underestimate as data are available for only a few countries. While a number of OECD countries levy a user charge on the industry for the use of facilities, the amounts and extent of such charging is not known with great certainty.

As with expenditures on management, research and enforcement services, fisheries infrastructure is generally regarded as having the characteristics of public goods. In reality, however, only a limited range of infrastructure facilities have the characteristics of pure public goods, namely lighthouses and navigation equipment. Other types of infrastructure can suffer from congestion (for example, as a result of large numbers of vessels in a harbour competing for space at wharves or off-loading facilities) or exhibit a degree of excludability so that the benefits are enjoyed by a restricted group (such as auction halls and landing facilities) or may be insufficient to meet all demands (such as at-sea rescue operations). So large categories of infrastructure can more appropriately be labelled club goods.

Determining the degree of support attached to the free provision of infrastructure is contentious and revolves around three key issues. The first issue concerns whether other users of such infrastructure (for example, charter boat operators, commercial cargo companies) are required to pay for access. If they do, then the free provision of such facilities to the fishing sector amounts to a transfer. The second issue focuses on whether the fishing industry is the primary beneficiary from the provision of the infrastructure and whether other users can be feasibly excluded. If this is the case, then an element of support occurs. Third, the general infrastructure charging policy of some countries may not require industries to contribute to the costs of constructing and maintaining ports, airports, railways, roads and so on. They may regard such projects as general development to be funded out of general tax revenue. At the same time, many countries have introduced, or are introducing, user pays principles as a means of rationing use of facilities and relieving congestion (for example, through road charging, airport taxes, etc), raising the question of consistency in dealing with land-based and ocean-based activities.

The pricing of such access is difficult and complicates the process of determining the degree of support provided. Infrastructure, such as harbours and wharves, are generally characterised by high fixed costs of construction relative to the low variable costs associated with operations and maintenance. As a result, average costs are declining over the relevant range of demand for the facilities. In this situation, private provision of the facilities may lead to allocative inefficiency as the natural monopoly nature of the infrastructure would allow operators to charge users at average cost, whereas the economically efficient price is equal to marginal cost (which is below average cost). In practice, there are many land-based excludable non-rivalrous goods that are privately provided (for example, bridges, roads, airports) where the stream of revenues from user fees covers the cost of construction and operation.

When governments provide fisheries infrastructure without charging for its use, fishing enterprises will be saved some costs which they would otherwise have to pay in the form of user fees or for the provision of the infrastructure on their own account. The fact that the industry is spared some costs does not necessarily mean that the profits of the fishing enterprises will be higher than otherwise. If there are no controls on catch or effort the cost saved by having the infrastructure provided free of charge will be replaced by additional fishing costs in the form of excess fishing effort and boats. This is perhaps best explained by considering the effects of removing this transfer and introducing user fees for infrastructure. This would lead to losses in the industry, and some firms would contract their operations or leave. The pressure on the fish stocks would be reduced, the stocks would recover, the catch per unit of effort would rise, and eventually a new equilibrium would be reached when the revenues of the marginal firm had risen to become equal to its costs. The aggregate profits of the industry would be zero as in the case when they paid nothing for the infrastructure, provided all firms are identical or lower in case some firms have lower unit costs of fish than others and obtain some intra-marginal rent.

The economic and environmental effects of providing infrastructure free of charge are largely analagous to the case of the government provision of fisheries services and the results are summarized in Table 3.2. A key difference, however, is that infrastructure provision does not serve to increase the potential incomes of fishers in the long term as is the case with management expenditure to conserve stocks. Rather, it may serve to reduce income in the long-term if fisheries management does not effectively conserve stocks as the industry is artificially supported and is not facing the true cost of its operations.

In the absence of user charges for the use of government provided infrastructure, the costs of the fishing industry are reduced and potential profits increased. The results in terms of the effects on fish stocks under the various combinations of management parameters are analogous to the results for the government provision of management, research and enforcement services.

In terms of the social dimension, the free provision of infrastructure services can have an impact on community resilience by sending mixed signals to the industry and the fishing community about the sustainability and profitability of fishing activities. This highlights the potential dynamic effects of the free provision of infrastructure services that are more subtle and long-term. Under-pricing of infrastructure distorts the relative prices of inputs to the sector and the industry may develop false expectations about the future profits from operations and reduce their flexibility to respond to external economic and environmental challenges. This could then place more pressure on the government to continue supporting the industry either through further financial support or delaying necessary management changes and industry rationalisation.

A somewhat different case can be found in Japan where a proportion of their infrastructure expenditure goes towards the provision of roads, housing and sewerage for fishing villages. This is provided through the Japan Fishing Agency rather than through another government agency which may be responsible for the provision of such facilities elsewhere in the community.

Table 3.2. Effects of Government Provision of Fisheries Infrastructure[1]

Dimension	Management regime				
	Property rights		No property rights		
	Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Economic effects	Reduced costs, increased incomes	Reduced costs, increased incomes in short term; long term effect dependent on changes in uncontrolled aspects of effort	Reduced costs, increased incomes in short term. Long term decline in profits as effort enters fishery.	Reduced costs, increased incomes in short term. Long term effect dependent on changes in uncontrolled aspects of effort; effort creep will reduce profits.	Reduced profits as stocks decline. Resource rent to zero.
Environmental effects	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks
Social effects	Can reduce community resilience by sending mixed signals about the sustainability and profitability of fishing activities.				

Note: The listed effects of the GFT assume that all regulations are effectively enforced.

Payments for Access to Other Countries' Waters

Key points

Payments for access to other countries' waters involve direct payments, transfer of technology, assistance with improving fisheries management institutions, the provision of market access, or some combination of all of these.

Fisheries access agreements are unlikely to result in any adverse effects on the fish stocks of the distant water country, and in fact may well improve the stock status, fleet profitability and social outlook in those countries.

On the other hand, the effects on the fish stocks of the host country will depend on whether the incoming capacity displaces or adds to existing capacity in the host country and on the effectiveness of the management and enforcement in the host country. Unless they are carefully designed and well-enforced, fisheries access agreements can have adverse economic, environmental and social effects on the host country.

Access to fishing in the exclusive economic zone of any given country is restricted to vessels flying that country's flag or to vessels which are explicitly authorised by the country in question. A number of countries, mostly distant water fishing states, negotiate agreements with coastal states which involve the granting of access to fish resources within the exclusive economic zone (EEZ) of the coastal state. Sometimes countries may see their interests being better served by authorizing vessels from another country to fish in their zone than by doing so themselves.

The payment for access to the fish resources may involve an explicit monetary transfer, the transfer of fishing technology, assistance with improving fisheries management institutions, the provision of market access in the fishing country, or some combination of these. In some cases the explicit monetary transfers are quite transparent. For example, the European Union makes provision in its annual budget for payments for access to other countries' economic zones, and details of the agreements are publicly available. An example of the evolution of a typical EU access agreement is provided by that between the EU and the Seychelles (see Box 3.1). Under this arrangement, the Seychelles government will receive EUR 4.125 million a year in return for allowing access to 40 tuna seiners and 12 longliners over the period 2006-2011. The fishing possibilities are around 55 000 tonnes a year.

Payments can also be more implicit and be couched in terms of cooperation in a range of areas outside the fishing sector such as defence, development aid and so on. For example, Country *X* may undertake to support activities in Country *Y* which are unrelated to fishing while it is understood (and perhaps never put on paper) that Country *X* will get access to fish in Country *Y*'s economic zone. Needless to say, such arrangements are difficult to identify and quantify, with a resulting loss in transparency. In summary, access agreements vary widely and the full extent and types of the payments are not well known.

Determining the value of support provided to the fleet of the country providing the support is problematic, especially when governments recoup a proportion of the value of the access agreement from the companies benefiting form the agreement. This currently occurs in the European Union and the United States. In principle, the company would be willing to pay up to the market value of the access right, as determined in an open market (such as through an auction). If the company is required to pay less than this amount, then there is an element of support. If it pays more, then it is, in effect, being taxed by its government. However, determining the market value of access is difficult as market forces are not much in evidence in this area.

Determining the effects of access agreements is also complicated as it involves two parties, the "distant water" country and the country host to the distant water fleets. Agreements to provide access for foreign fishing fleets represent a transfer of effort between the two countries. The effect of paying for access to another country's waters depends on the status of the fish stocks and the management regimes in both countries.

Consider, first, the **distant water country** providing the transfer to its own fleet. If that country has no control in place in its own fisheries and its fisheries are in a long term equilibrium, then the effect on its own fisheries would be nil; whatever vessels were taken out of the country's own fisheries would be replaced by new vessels coming in; removing some vessels from the fishery would lead to some stock recovery, which would attract new vessels, and the fishery would return to the original equilibrium. A possible exception to this is when the distant water country's fishery is in a short term equilibrium with excess vessels that do not leave the fishery because they cover their operating costs but would not be replaced when they become obsolete because new vessels would not cover their capital costs. In a situation like that the government could relieve some of the pressure on its own fish stocks by providing support for some of its own vessels to leave without risking that these vessels would be replaced by new ones.

With catch control but no control on effort this policy would not make much sense; new vessels would enter the fishery to replace the vessels being removed, unless there is a short term equilibrium of the kind described in the previous paragraph where it is not profitable to enter the fishery with new vessels. With effort controls this would make better sense, provided the effort really is effectively controlled, but note the earlier discussion of the difficulties of controlling all components of effort and the incentives any stock recovery would generate to expand effort.

With property rights in place, especially in the form of individual transferable quotas, the transfer would not be effective unless the profits from fishing in the distant waters, including the transfer, were greater than the profits from continuing in the fishery where one has property rights. This would create an excess supply of quotas, their market price would fall, and the vessels leaving for the distant waters would in all probability be replaced by other vessels, so the effect on the distant water country's fishery would be nil; one vessel would be replaced by another. With property rights to effort the results would be similar, but they would depend on the effectiveness with which effort is controlled.

Box 3.1. The Fisheries Agreement between the Seychelles and the European Union

A fisheries access agreement between the European Commission and the government of the Seychelles has been in place since 1984. Over the years, a number of protocols to the agreement have been agreed for short periods of time (usually 2-3 years), covering the conditions of access for EU fleets and the payments received by the Seychelles. The most recent protocol covered the period 2001-2004 and allowed for the licensing of 40 ocean-going tuna vessels a year. The financial contribution to the Seychelles for the three year period was EUR 3 480 000 a year and included:

– EUR 1 230 000 for the development of local fisheries

– EUR 1 000 000 for the setting up and development of a monitoring, control and surveillance system, including appropriate technical assistance

– EUR 950 000 for scientific and technical programmes aiming at greater knowledge of fish stocks

– EUR 300 000 for training courses in the various scientific, technical and economic fields linked to fishing and for attending international meetings

The agreement also requires a contribution from the vessels owners, payable to the European Commission. The amounts for a seine vessel are EUR 10 000 per vessel per year, with an allowance of 400 tons. A longline vessel over 150 GT pays EUR 2 000 per vessel per year, and is allowed to fish 80 tons, while a longline vessel under 150 GT pays EUR 1 500 per vessel per year, and is allowed to fish 60 tons This payment is independent of the catches, and if the catches exceed the allowable limit, then the owners pay EUR 25 per ton.

In October 2004, a new was agreed for the period 2005-2011. This protocol reflects the EU move from traditional fisheries agreements to fisheries partnership agreements based on cooperation and dialogue to achieve sustainable fisheries in the waters of the partner country. Under this protocol, the Seychelles will reduce the fishing effort of tuna long liners by 15% by 2006. The EU financial compensation will increase from EUR 3.4 million to 4.125 million a year. Almost 40% of this amount has been earmarked for promoting responsible fishing, particularly through control, monitoring and enforcement activities. Licence fees paid by vessel owners have been increased by 50% to EUR 15 000 for seiners, and to EUR 2 250 and 3 000 for long liners. The number of tuna seiners remains the same at 40 while the number of long liners will be reduced from 27 to 12, reflecting the targeted cut in fishing effort by this category of vessels. Fishing possibilities increase, on the average over the last three years, from 46 000 to 55 000 tonnes.

Source: Chapter 10 of this report.

Then consider the effect on the **host country**. If there is no control of the fisheries in the host country the fisheries would presumably be in equilibrium, with the marginal fishing enterprise just breaking even. The introduction of the foreign vessels will have an impact on catches as they will enjoy a cost advantage over the host country fishing fleet – if no such advantage exists, then the foreign vessels would have no incentive to operate in the host country's EEZ. Cost advantages could arise in a number of ways: more recent technology, higher labour productivity, better targeting of stocks, better on-board handling and storage facilities, etc. It could also be the case that the foreign vessels are currently operating in a situation of excess capacity in their own EEZs, in which case the vessels are a sunk cost and fishers are only seeking to recover their variable costs. This could be exacerbated if the foreign vessels also get transfers for, say, capital and variable costs. If such cost advantages exist, then the effect on the host country fish stocks would be to reduce them over the longer term. In the short term, catches would rise if the host country fishery was initially under-fished (and decline if it were over-fished), with the fish stocks eventually declining to a lower level. The result then would be an expansion of effort in the host country, and some of the vessels in the host country would be out-competed. The net result would be increase in effort in the host country's fisheries, and the effect on sustainable yield would depend on whether or not the stocks were overfished or underfished, as discussed above for transfers in general.

With catch control without property rights in the host country, the vessels from the distant water country would further aggravate the competition for the total catch, and if they have lower costs than host country's own vessels some of the latter might be forced out of the fishery. With effort control the question is whether the foreign vessels would just be additional to the previous level of effort or whether the effort of the host country's fleet would be cut back, in order to make place for the foreign vessels. If the effort control is to be anything like effective the latter would have to be the case. If, on the other hand, total effort expands, the effect on total catches will depend on whether the stock is overfished or underfished. As the distant water county's vessels are likely to be different from the host country's vessels and might also use different equipment and gear, it will be difficult to exactly match the distant water country's new effort with displaced effort from the host country. However, if the stocks were under-fished, then it may be perceived that the total allowable catch could be increased to accommodate the foreign vessels and still provide for the domestic vessels. The under-exploitation of fish stocks is one of the reasons given for shifting capacity between countries. In this case, there will not be a long-term effect on fish stocks. If the host country has effort controls in place and the foreign vessels displace some (or all) of the domestic vessels, then total effort will remain the same and (subject to the remarks made earlier about input stuffing) there will be no effect on stocks. If the foreign vessels represent additional capacity, then the fish stocks in the host country will be reduced in the long term.

Finally, with property rights, making room for the foreign vessels would have to occur through purchasing or leasing such rights. In the case of fish quotas the overall effect would simply be a diversion of catches and rents from the host country to the distant water country, *i.e.,* a transfer from the taxpayers of the distant water country to the quota owners in the host country. The purchasing of rights by the distant water country would increase the market value of these rights. With effort rights, some of these would have to be purchased by the distant water country, which would raise the market value of those rights. Some of the host country vessels would be out-competed and some if its catches replaced by the distant water fleet. Some expansion of effort along uncontrolled dimensions is likely to take place if the effort costs of the distant water fleet are lower than that of the host country.

The social effects of these types of transfers will also differ considerably between the country providing the transfer and the host country. Much depends on the initial state in each country at the time the access agreements are struck. This is a very contentious area and there has been considerable policy debate about the impacts of access agreements, particularly on the host countries. To many host countries, access agreements provide a source of foreign exchange earnings or access to developed country markets that they may otherwise not be able to obtain. They tend to view the trade of fisheries access for money or market access as being integral to the development of their economies (see, for example, Grynberg 2003). However, concerns have been raised that the benefits may not necessarily be flowing to the fishing regions, that domestic fishers are being displaced, and that the management of fisheries in the host country is either not sufficiently well-developed or the enforcement is lacking.

To the distant water countries, the social effects flowing from access agreements are generally positive. Access agreements provide an additional source of income, often in situations where there is excess capacity and declining fishing opportunities in their own waters. However, to the extent that the development of access agreements is a response to excess capacity or overfishing in the distant water countries' fisheries, then the use of such agreements may be merely delaying necessary adjustment to fleet size or to the economic structure of the fishery-dependant regions (given that many of the distant water fleets are from such regions).

In summary, fisheries access agreements are unlikely to result in any adverse effects on the fish stocks of the country to which the distant water fleet belongs, and in fact may well improve the stock status in those countries. Moreover, the agreements will boost the profitability of the distant water fleets, with positive outcomes for the fishing communities that depend on the fleets. On the other hand, the effects on the fish stocks of the host country will depend on whether the incoming capacity displaces or adds to existing capacity in the host country and on the effectiveness of the management and enforcement in the host country. Unless they are carefully designed and well-enforced, fisheries access agreements can have adverse economic, environmental and social effects on the host country. The results for the distant water and host country are summarised in Table 3.3.

Table 3.3. Effects of Payments for Access to Other Countries' Waters

Dimension	Management regime				
	Property rights		No property rights		
	Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Economic effects on distant water country	Lower value of quotas if transfers entice boats to leave.	Lower value of effort rights if subsidies entice boats to leave. New vessels will probably enter and replace those that leave, with uncertain effect on uncontrolled components of effort.	Fewer boats and less competition for the catch, if boats do not recover their capital costs. Same or higher revenue Lower costs Higher profits. Number of vessels increase in the long term.	Less effort, but greater incentives for the remaining fleet to expand uncontrolled effort, and lower sustainable catch if this happens. Greater/lower revenues if overfished/underfis hed Lower costs Higher profits	May assist adjustment to long-term equilibrium if fleet initially too large, but will not generate resource rent
Economic effects on host country	Higher market value of rights. Some of the host country's vessels will be out-competed by the distant water vessels. Catches, revenues and profits fall in the host country.	Higher market value of rights. Some effort in host country displaced, so that catches, revenues and profits fall for host country. Total effort might change, uncertain in which direction. Catch will change in opposite direction to effort if overfished, and in the same direction in underfished.	Increased competition for catches if host country has higher costs. Some boats from host country might be displaced, with less catches, revenues and profits in host country.	If distant water country's effort is additional will lead to smaller stocks and lower catch if overfished and smaller stocks and larger catch if underfished. Some of host country fleet likely to be displaced so that catches, revenues and profits in the host country fall.	Increased effort if host country has higher costs. Smaller stocks Lower/greater catches if overfished/underfis hed. Some boats in host country may be displaced. If so, smaller catch, lower revenues, costs and profits for host country.
Environmental effects on distant water country	No effect on stocks or catches if new vessels replace those who leave.	No effect on stocks. If effort expands, catches will fall/rise if overfished/underfis hed. Vice versa if effort falls.	No effect on stocks. If effort expands, catches will fall/rise if overfished/underfis hed. Vice versa if effort falls..	No effect on stocks	No effect on stocks. Reduced stocks if new vessels entering the domestic fishery are more efficient
Environmental effects on host country	No effect on stocks	No effect on stocks	No effect on stocks	Reduced stocks if distant water effort is additional	Reduced stocks
Social effects in distant water country	May increase income if distant water fleet able to recoup greater than variable costs, although market value of any rights will decline. Effective expansion of fishing opportunities may delay any adjustment in fishing dependant communities that may be required.				
Social effects in host country	Increase in income to country, but alters income distribution (depending on use of payments). Can increase regional income if processing undertaken within the region. Can increase employment opportunities if foreign fleet employs local fishers. If foreign fleet displaces domestic fleet, reduction in income, employment and social capital.				

Note: The effects listed assume that all regulations are effectively enforced.

Payments for vessel decommissioning and license retirement

Key points

Decommissioning schemes are promoted as providing a "win-win" outcome with expectations of reductions in capacity, improved profitability and less pressure on stocks. However, the available empirical evidence suggests that the majority of vessel decommissioning schemes fail to reach their objectives from an economic and environmental perspective.

The key requirement for effective decommissioning and licence retirement schemes is that the management regimes must effectively constrain effort leaking back into the fishery from which vessels or licences are being withdrawn. This has proven to be difficult to achieve in many OECD countries, as decommissioning schemes have helped to inject new capital into the fisheries sector and their provision has become embedded in the expectations of fishers.

Decommissioning schemes should be implemented in conjunction with management changes to reduce catches or effort if the fishery is initially over-fished. Caution is also needed to ensure that the social effects of the transfers are not counter-productive and that the transfers are provided as part of a larger package of social adjustment measures.

Transfers for vessel decommissioning and licence retirement take the form of payments for permanent vessel withdrawal through buy-back programs, permanent licence withdrawal and transfer of vessels to other fisheries (either domestically or internationally). It is one of the largest items of government financial transfers in OECD countries after expenditures on management, research, enforcement and infrastructure. The popularity of decommissioning schemes and licence retirement programs has been increasing in OECD countries in recent years in response to excess capacity and over-exploitation in many fisheries. Such payments are introduced with the objectives of reducing overcapacity, increasing economic efficiency and alleviating pressure on fish stocks.

The design and implementation of decommissioning and licence schemes varies significantly both between and within countries. Some countries require that decommissioning payments be tied to the physical scrapping of vessels while others allow vessels to be shifted to another fishery (in which case the payment is for the removal of capacity from a particular fishery rather than reducing the overall capacity in the country). Some schemes are intended to remove latent capacity or effort instead of capacity or effort that is currently engaged in fishing so that potential pressure on particular fisheries is reduced.

Buy-back programs have also included adjustment grants for fishers (Holland *et al.*, p. 62). For example, the adjustment program the Canadian government put together in the wake of the collapse of the Northern cod in 1993 included a component for buying fishing licenses from individual fishers as well as a retraining and adjustment program for fishers and labour in the processing industry. In return for a compensation, a fisherman would give up his fishing license and be barred from fishing ever after. Over 6 000 fishers in Atlantic Canada were eligible for this program but few were attracted by the offer; only 7% of over 5 000 fishers eligible in Newfoundland accepted. The reason for this low number has been attributed to small sums of money involved and optimistic expectations about the return of the Northern cod (Schrank, 2002).

The outcome of decommissioning and licence retirement schemes depends critically both on their design and on the management of the capacity and effort that remains in the fishery. If there are no controls in place in a fishery, then decommissioning payments will have no effect on fish stocks as new vessels will enter the fishery to replace the scrapped vessels. Indeed, the effects may be negative on stocks as decommissioned vessels would be replaced by new vessels which are typically more efficient than older ones. An exception to this may arise if the capacity of the fleet and the level of effort have expanded beyond the long term equilibrium level, but vessels are remaining in the fishery as revenues may still be sufficient to still cover their variable costs. In this case, decommissioning transfers may assist in the adjustment to the long term equilibrium; fish stocks would recover, but the effect on the long term catch would depend on whether or not the stocks were overfished initially.

Under a regime where only the catch is controlled a decommissioning program would have no effect as, in the absence of barriers to entry, the vessels being decommissioned would be replaced by new vessels (unless the fleet capacity is above the long term equilibrium as discussed in the previous paragraph). If the fishery is initially over-fished, then the transfers will have no effect on stocks unless the allowable catch is also reduced. Such a combination of policy changes would have the effect of reducing capacity, reducing catches and increasing stocks.

A decommissioning program will increase stocks if there are effort controls in place, provided that the controls are an effective barrier to new vessels entering the fishery. To an extent, there will still be an incentive for the vessels remaining in the fishery to engage in input stuffing in response to the lower level of effort, increased stocks and greater profits. However, given that most effort controls are defined with vessels as one of the main control parameters, this impact may not fully offset the increase in stocks resulting from the initially decommissioning scheme. The problem of effort control remains as new vessels are typically more effective than old vessels.

In the case where there are property rights, the effects of vessel decommissioning or licence retirement schemes on fish stocks would be negligible. The owners of the quota or effort rights receive the benefits from capacity leaving the fishery and so there is merely a transfer from taxpayers to those leaving the industry and those remaining behind. It is difficult to see the justification in a decommissioning scheme in this case, especially if it is an individual quota regime. With individual transferable quotas the quota holders have incentives to achieve optimal effort and capacity through market processes. In a fishery with too many vessels, some vessel owners would find it attractive to sell their quotas rather than renewing their boats, while other vessel owners would find it attractive to buy quotas to improve the profitability of their own operations. In a regime like that, the industry would on its own initiative and at its own expense restructure itself. A decommissioning scheme would speed this process up and raise the value of the rights (quotas) in the industry, but it would have no effect on catches or stocks.[2]

Decommissioning of vessels in a system with property rights to effort would not make sense unless there are too many vessels. It is possible to distinguish between two situations: (i) the total effort is adequate but is spread among too many vessels, so that

2. This internal restructuring process may not work perfectly when the crew is paid by a share in the catch value of the vessels. See Hannesson (2000).

profits are lower than they need be; (ii) not only are there too many vessels, but the total effort is too large.

In the first case, it would be possible to raise the profits of the fleet by getting rid of redundant vessels and transfer their effort allowance to the remaining vessels. As with individual transferable quotas, there would be an incentive for the industry itself to buy out the redundant vessels and add their effort quota on some previously underutilized vessels. Decommissioning grants would speed up this development and raise the value of the fishing rights.

In the second case, it would be necessary to reduce the total effort. Effort allowances of decommissioned vessels would have to be nullified, until enough vessels have been withdrawn to make the effort rights of remaining vessels equal to the warranted effort. The necessary effort reduction would require collective action in the industry, or a government financed buyout where the effort allocations of decommissioned vessels are nullified.

Despite their increasing popularity, there has been significant theoretical and empirical debate about the design and effectiveness of these schemes (Arnason 1999 Holland, Godmundsson and Gates 1999; Clark, Munro and Sumaila 2005). Four issues stand out. First, many of these schemes do not appear to be effective in achieving their objectives both from an environmental and economic perspective. A review of some of these programs is provided by Holland *et al.* (1999). They point out that such programs have invariably arisen from a "crisis", typically a depletion of fish stocks due to open access and the resulting excess fleet capacity and fishing effort. Three main goals of such programs can be identified: (i) saving vessel owners or license holders from losses they would otherwise incur, because of the unavoidable adjustment in a fishery in crisis; (ii) improving the profitability of the rest of the industry, and (iii) rebuilding fish stocks. The schemes clearly have mitigated the losses of some fishers and vessel owners, although it is debatable whether the expenditures have covered total losses. Whether such programs have had a positive effect on the profits of the remainder of the industry is not always clear. At the very least there must be some controls on investment in the industry or incentives to prevent them from taking place on too large a scale. However, in many programs the money spent on buy-backs apparently leaked back into the industry or removed capacity that was not very important in any case. In some cases the reduction in the number of vessels has been neutralized by increased effort by the remaining vessels (Holland et al., 1999, p. 58). As to resource conservation, these authors point out that all the programs they considered had other measures in place to deal with this problem. The buy-back programs therefore seem to have been motivated mainly by the desire to increase profitability and to mitigate losses.

Second, the provision of decommissioning transfers has an impact on the risk faced by fishers in their investment and production decisions. The existence of vessel and licence buy-back programs can create expectations in the industry that the government will cover losses that may arise from excess investment in vessels, thereby reducing the risk-adjusted discount rate used in making investment decisions. Vessel owners would expect to keep whatever profits resulting from their investment decisions while being spared the losses resulting from overfishing. This would in general promote overinvestment in the fishing industry. This reduces the usefulness of decommissioning payments as tools to promote a desirable structural change and might even annihilate it altogether. Indeed, Munro and Sumaila (2001, p. 25) conclude that transfers used in vessel buyback schemes, if they come to be widely anticipated by industry, "can, and will, have a decidedly negative impact" on resource management and sustainability.

Third, the co-existence of decommissioning schemes and payments for vessel construction and modernisation highlights a potential area of policy incoherence. For example, the European Union has for over twenty years had a program[3] in place giving grants to decommissioning fishing vessels. At the same time the European Union provided grants for construction of new vessels and modernisation of existing ones (see Box 3.2). It is not unlikely that the decommissioning grants have found their way back into the industry and stimulated investment in new vessels, in which case these grants have in effect become grants to investment. Such "leakage" has been alleged to have taken place in the United Kingdom (Banks, 1999, p. 204). As part of its package of reforms to the Common Fisheries Policy, support for the construction of new vessels in the EU ceased at the end of 2004. Japan has spent money on upgrading its existing vessels and on retiring old vessels from its tuna fishing fleet, in order to make way for new ones (Weber undated).

Box 3.2. Decommissioning Grants in the European Fishing Fleet

The decommissioning grants have probably had an impact on the size of the European fishing fleet; from 1991 to 1996 it fell from about two million GRT to 1.6 million, and from 8.3 million kW (engine power) to 7.3. The much lesser fall in engine power is by some commentators taken as evidence that the reduction in fishing capacity has been much less than indicated by the fall in GRT; naval architects have been clever in finding ways to reduce a vessel's GRT while maintaining or increasing its fishing power. These measures also ignore technological progress, and it is therefore conceivable that the capacity of the fleet did not fall over this period. Over time the emphasis of the EU grants has turned from grants for new investment to grants for decommissioning; in 1983-85 ECU 111 million were granted for new construction and modernisation and only ECU 20.7 million for decommissioning, while the expenditures for 1986-93 were ECU 375.4 million (construction and modernisation) and ECU 496.2 million (permanent withdrawals).[4] The emphasis on decommissioning was further increased after 1993 (Hatcher, 1999, pp. 54-55).

The seemingly incoherent combination of grants to vessel construction and decommissioning is undoubtedly the outcome of inconsistent political goals. Proposals by the European Commission have been ignored or changed by the Council of Ministers, and the policy itself has been subject to repeated criticism by the European Court of Auditors (Hatcher, 1999, pp. 61-62). Some of this may be due to different views in different member states. Some may be due to an objective to transfer funds to disadvantaged areas, and in areas where the fishing industry is predominant it may seem self-evident to direct any economic support to this industry. Such measures will, however, be short-sighted and self-defeating if they result in excessive fishing capacity eroding the profits of the industry and depleting fish stock.

Source: Chapter 5 of this report.

Fourth, it has been observed that decommissioning schemes have the greatest chance of being successful when they are implemented in conjunction with significant management changes. Usually, this has involved the introduction of rights-based regimes

3. Or, rather, a sequence of programs where the objectives have been redefined as one program has replaced another.

4. Calculated from Hatcher (1999), p 56.

which have helped to resist the tendency for remaining vessel owners to increase effort unnecessarily or for new effort to enter the fishery. The Australian experience in the northern prawn and southern fisheries bears this out (see Chapter 12). Similarly, Norway's buy-back programs have resulted in improved profits due to the presence of an individual quota regime under which vessels are tied to the quota (Box .3.3.).

Box 3.3. Buy-back Programs in Norway

In Norway, buy-back programs for fishing vessels have been implemented since 1979, except for a brief interlude 1996-97. These programs have been targeted at different types of vessels in different periods. They have involved grants both for scrapping fishing vessels and for selling them for other uses, including to other countries. These buy-backs have been particularly successful in the purse seine fleet where the number of vessels has been substantially reduced and the profitability improved, although this improvement is also due to other factors (see Chapter 11)

The reason why the Norwegian buy-back programs have resulted in improved profits is that the vessels involved have been under an individual quota regime. Scrapped or transferred vessels have been stripped of their fishing licenses; *i.e.*, their rights to participate in specific fisheries such as purse seining for pelagic species, cod trawling, etc. Licenses involve a right to a certain portion of the total quota for one or more fish stocks and so, by nullifying the license, the quotas of the remaining vessels and their profitability could be raised. The early buy-back arrangements covered larger vessels, *e.g.* purse seiners and trawlers, whose licenses were withdrawn when decommissioned. The arrangement in the late 1990s was for vessels between 10 and 34 metres, and in addition to the regular scheme, a so-called combined decommissioning scheme was introduced; when scrapping a vessel and relinquishing fish license(s), an owner would obtain new fish license(s) in the same fishery if they had a modern replacement vessel. The main purpose of the combined scheme was therefore modernisation of the fleet.

Source: Chapter 5 of this report.

In terms of the social effects of decommissioning schemes and license retirement, the intention of such programs is often to provide a means for individuals to exit the industry with dignity and some return on their investment in the fishery over the years. Because of the low or non-existent value of assets in many fisheries that find themselves in crisis, it is usually not possible for fishers to sell up in order to exit the industry. As a result, the government steps in to buy the assets (which may, in fact, be some form of access rights such as licenses, but with low or zero value), allowing the fishers concerned to either relocate or retrain. Many of the same issues arise as previously discussed. Providing decommissioning grants in the absence of other policy measures to assist economic diversification may not lead to sustainable social outcomes, particularly in fishery-dependant areas. The experience of Canada in the 2003 closure of three cod stocks in northwest Atlantic provides an illustration of a policy response that recognized the potentially adverse effects of a license retirement program and decided to pursue a more effective package of policy measures (Box 3.4 and Chapter 9).

Box 3.4. Canada's Response to the 2003 Cod Fishery Closure

In early 2003, scientists and fisheries managers from Fisheries and Oceans Canada, participants from the Atlantic fishing industry and academics from Canada, the United States, the United Kingdom and Iceland concluded that the northern and Gulf of St. Lawrence cod stocks were in very poor shape and imminent recovery was unlikely. The group also concluded that the southern Gulf spawning stock biomass would decline and that rebuilding was unlikely over the next few years, even in the absence of fishing. In response to the scientific assessment, the Canadian Minister for Fisheries and Oceans re-introduced a closure of the stocks that had previously been instituted in 1992-93. The government concluded "that there will not be a prompt recovery in any of these stocks in the near future" and predictions and planning were for a lengthy closure.

Despite the removal of 3,686 licences through the three retirement programs 1992-2002, there remained 6 380 groundfish licence holders entitled to fish for cod from these three cod stocks in 2000. Of this number, 3 882 actually fished for cod – mostly in small quantities. The areas that were most affected by the closure of the cod fishery tended to have lower average incomes, fewer economic opportunities, an existing high unemployment rate, and lower education level. Accordingly, the Government introduced a two year response program comprising: a CAD 44 million community-based economic development assistance program to provide assistance for short-term job creation; a CAD 6 million program to expand on current activities to evaluate and assess the impact of seals on fish stocks; and a CAD 27 million Temporary Fisheries Income program to provide temporary financial assistance to fishers and plant workers whose employment insurance benefits expired before the community-based economic development measures could be implemented.

Significantly, no licence retirement program (LRP) was made available as part of the package. While past LRPs (coupled with various management changes) did remove a considerable number of licences, they did not result in the removal of a significant amount of harvesting capacity. Past LRPs attempted to reduce capacity to a level appropriate for the TAC level anticipated upon reopening. Cod stock rebuilding occurred at a level lower than expected, and thus overcapacity would have remained even if the LRPs had removed the intended level of capacity Atlantic-wide.

The sole justification for a LRP in the context of a long term closure would be a transfer payment to licence holders in order to realize social adjustment. However, previous Canadian experience with LRPs in the 1992-93 cod stock closure illustrated why LRPs are not particularly well suited to this objective:

Input stuffing: unless entry and effort controls are in place, removal of capacity through a LRP may be met with capacity increases for the remaining fleet, reducing the program's effectiveness. As a related issue, the removed vessels could transfer capacity to other fisheries, leading to overcapacity or resource pressure.

Expectations for future assistance: although assistance may have the very best intentions, the response to a fishery decline creates the expectation of assistance in any decline, perpetuating the dependency of certain parts of the fishing industry on government transfers. The Canadian Fisheries Adjustment and Restructuring program of the early 1990s was announced as the last opportunity for fishers to leave the industry with government assistance. A costly government response for a small portion of the groundfish fishery would establish a prohibitively expensive precedent in the case of a downturn in a shellfish species.

Perverted incentives: related to the issue of expectations, government support of LRP can reduce the incentive fishers have to conserve or self-adjust to regular increases and decreases in TAC to maintain economic efficiency and resource sustainability.

Expensive: LRP are invariably expensive. In the case of a closed fishery, the government is purchasing an asset with no earning value. Furthermore, if the value of a licence includes not only the value of the catch, but access to other government programs (such as employment insurance, or favourable tax treatment), then the payment for the licence would include the present value of all future associated benefits. This can drive the price of a licence to a figure many times the value of fish caught. Finally, vessels and gear were not purchased; as past LRPs required a permanent exit from the industry, this certainly had a significant impact on the cost of retiring a licence.

As a result of these major drawbacks of LRPs, transition income assistance was provided to individuals affected by the closure to reduce the social cost, and economic development funding was provided to create non-fishing employment opportunities for displaced fishers and plant workers.

Source: Chapter 9 of this report.

Similarly, if the payments become integrated into the expectations of fishers, then there is less incentive to find durable solutions to the diversification issue. The consequent impacts on comunity resilience can be significant and can retard necessary adjustments that are triggered by the need for decommissioning schemes.

In summary, the primary economic effects of decommissioning schemes are to speed adjustment of fleet capacity and effort towards long term equilibrium and to improve the potential profits of the vessels remaining in the fishery. However, the effects of these transfers on fish stocks will generally be negligible unless the decommissioning schemes are implemented in conjunction with management changes to reduce catches or effort if the fishery is initially over-fished. Caution is also needed to ensure that the social effects of the transfers are not counter-productive and that the transfers are provided as part of a larger package of social adjustment measures. The effects of decommissioning schemes are summarized in Table 3.4.

Table 3.4. Effects of Payments for Vessel Decommissioning and License Retirement

Dimension	Management regime				
	Property rights		No property rights		
	Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Economic effects	Speedier adjustment of any fleet over-capacity, higher value of quota rights.	More efficient utilization of remaining vessels, higher value of effort rights.	Initially, fewer boats and less competition for the catch, if boats do not recover their capital costs, which would increase profits. Increased effort in response to profits and reduced resource rent in long term.	Less effort, but effectiveness depends on how well effort is controlled. Lower costs and higher profits and resource rent.	No effect unless fleet is larger than in a long term equili-brium: less effort; fewer boats; and more rapid approach to long term equilibrium, but no resource rent.
Environmental effects	No effect on stocks.	If total effort is reduced, stocks will recover.	No effect on stocks.	If total effort is reduced, stocks will recover.	No effect on stocks. Reduced stocks if new vessels entering fishery are more efficient.
Social effects	Provides potential for fishers to leave the industry with capital to relocate or retrain, depending on conditions under which industry adjustment funding provided. Can reduce community resilience and incentive for economic diversification if payments incorporated into expectations and therefore influence investment decisions.				Increases community dependence on government funding.

Note: The listed effects assume that all regulations are effectively enforced.

Transfers for Investment and Modernisation

Key points

Government support for vessel construction in the form of grants, interest subsidies and soft loans has been relatively common in many OECD countries over the years and has contributed to the problems of excess capacity that currently exist in many of the world's fisheries.

Many OECD countries have recently changed their funding priorities away from vessel construction, although transfers for vessel modernisation are still widely provided.

Where well-defined and effectively enforced rights regimes are in place, the value of the support will become capitalized into the value of the rights, representing a transfer from the government to rights holders. In some cases, this value of the transfer may be realized by shipyards rather than fishers.

Where fisheries management is poorly enforced or the access regime is poorly defined, these transfers will lead inevitably to overcapitalization of a fishery with adverse consequences for stocks, profitability and fishing communities.

Transfers to capital construction and modernisation can increase regional income if investment is undertaken within the region (e.g. at local shipyards). However, the dependence of regional communities on support for capital costs can reduce community resilience and increase dependence of regions on government support.

This category of transfers covers government payments for the construction and modernisation of fishing vessels, loan guarantees, accelerated depreciation rules for fishing vessels, loan restructuring schemes, and tax preferences for investment in and modernisation of fishing vessels. Government support for vessel construction has been relatively common in many OECD countries over the years and is widely recognised to have contributed to the problems of excess capacity that currently exist in many of the world's fisheries (see, for example, FAO 2003; Greboval and Munro 1999; Cunningham and Greboval 2001). The original impetus for such support was primarily for industry development and fleet expansion following the expansion of the EEZ to 200 nm (although support was also provided before that time). In recent years, there has been strong political pressure to reduce or halt vessel construction financing by governments as a response to excess fleet capacity. However, many countries have only recently changed their funding priorities away from vessel construction.

While many countries are reducing transfers for the construction of new vessels, transfers to vessel modernisation are still widely provided. Vessel modernisation can cover a wide range of possible activities, including almost completely rebuilding the above-deck infrastructure of a vessel, improving landing and on-board processing facilities, installing improved tracking and communication equipment, health and safety improvements and so on. As a result, the economic effects of modernisation grants on will almost replicate the effects that are observed with construction grants especially when increasing fishing capacity. In many cases, this category also includes support provided for modernisation of equipment to incorporate environmentally friendly gear, such as bycatch reduction devices, into fishing operations. The use of government support for assisting the introduction of such equipment into particular fisheries is often justified on environmental grounds, as there may be some externalities in the improved environmental outcomes. However, there are often ancillary effects in terms of reducing the costs of operations for fishers, such as through improving on-deck sorting facilities, reducing net maintenance costs, etc.

The transparency of this category of transfers is mixed and so it is difficult to quantify the amount of support provided. On one hand, grants to vessel building and modernisation of existing vessels are usually fairly transparent, since they involve budgeted and disbursed sums of money. This also applies to grants in the form of lower rates of interest, as the difference is either paid explicitly or there are public institutions involved whose favourable interest rates can be compared with market interest rates for loans in a comparable risk class. On the other hand, loan guarantees and tax preferences are more difficult to evaluate since they do not necessarily involve any disbursement of money. Loan guarantees reduce the risk lenders otherwise would face and hence the interest they would charge for providing the loan, while tax preferences reduce the costs faced by investors and increases the attractiveness of investment in new construction and modernisation of vessels.

Investment and modernisation transfers have the opposite effects of transfers to decommissioning. The effects of supporting capital costs under open access are discussed in more detail in the Appendix to Chapter 5. These transfers encourage investment in fishing boats and lead to an expansion of fishing effort and higher intra-marginal rents. With no controls the effect on the long term catch depends critically on whether or not stocks are over- or underfished. When stocks are overfished the sustainable catch declines and the revenue falls. The transfers are absorbed partly by declining revenues and partly by increased costs through an expansion of effort, but in an industry with heterogeneous firms they would raise intra-marginal rents.

With catch controls, the effect of supporting capital costs would be particularly aggravating. They would lead to more vessels, or more effective vessels, in the industry and shorten the time in which the total catch would be taken. Total revenue would be the same, except that an increased competition for the total catch might lead to a lower price of fish because of a glut in the market or poorer treatment of fish at sea. The costs of fishing would be higher, but intra-marginal rents would rise.

Effort controls would be more difficult to enforce in the presence of support for capital costs. If the number of vessels is an integral part of the effort control regime the transfers should in principle not lead to any increase in the number of vessels. Transfers to refitting and replacement of existing vessels might still be in place, however, and would speed up these activities by making them less expensive. This would be likely to put the effort control regime under increased strain, as it is typically difficult to prevent some increase in fishing power when vessels are refitted or renewed. To the extent that some allowance is made for this, the result would be tighter effort restrictions on the existing fleet, such as a reduction in fishing days permitted. If total effort expands, the stocks will be reduced but the sustainable yield would fall or increase, depending on whether the stocks are overexploited or not. In any case the profit of individual vessels would fall, with the possible exception of the new or refitted vessels.

The case of transfers to vessel modernisation is slightly different as the expansion of effort takes place through the updating of existing capital to improve capacity and effort, rather than through the creation of additional vessels. So while the number of vessels may not increase as a result of the transfer, the effort that is applied can increase, perhaps significantly. Some countries restrict transfers for vessel modernisation to those expenditures designed to improve on-board occupational health and vessel safety.

However, it is often the case that such restrictions have a wide interpretation, and open the possibility of effort enhancement.

With individual transferable quotas there are, as already stated, incentives in place for the industry to attain an optimal effort and fleet capacity. Transfers to capital costs would then have no other effect than to raise the value of the property rights (i.e. the individual quotas). Which firm is the marginal firm under this regime is in this case determined by which firm has the lowest ability to pay for a quota while still finding a willing supplier. Transfers of capital costs would only increase the profit of the firms, including the marginal firm, and this would be reflected in a higher market value of the quotas. The transfer will, however, alter the relative prices of capital and other inputs (such as labour, fuel, etc) and, in the absence of transfers to these other inputs, will encourage a greater use of capital than would otherwise have been the case. In the longer term, this may create problems of excess capitalisation in the fishery with the attendant problems of capacity shifting and calls for government assistance to reduce the excess.

When property rights are defined as rights to effort, new vessels would not be able to enter the industry unless by buying an effort allocation. Transfers to capital costs would increase the amount a prospective entrant is willing to pay for the effort he needs and so raise the market value of effort quotas. Due to the difficulty, already discussed, of controlling the effective fishing power of new fishing vessels these transfers might put the effort control regime under stress, making it necessary to reduce the effort quotas of existing vessels, which would to some extent reverse the positive effect on the market value of effort rights.

A general effect that is likely to occur under all management regimes is the substitution of capital for other effort components. As boats become cheaper, it will become increasingly profitable to acquire a more expensive vessel incorporating a lower labour requirement.

There could be cases where grants to boatbuilding would not in fact amount to support for capital costs in fishing but rather would result in a transfer to shipyards. This would happen if the grants are reserved for domestic shipyards and if it is possible for vessel owners to buy vessels on the international market at a given price. The international price of vessels would then set a ceiling for how much domestic shipyards could charge for new vessels. If the grants are given to the shipyards, they could then charge the international price and pocket the grant. The buyers of vessels, being aware of this, might however be able to negotiate a price lower than the international price and get a share of the grant. The extent to which the benefit of the transfer is passed through to the fishing vessel buyer has not been empirically tested, but it will certainly be less than 100%.

The social effects of transfers to vessel construction and modernisation are potentially significant. By reducing the capital costs of operations, such transfers artificially inflate the incomes of fishers and the local communities in which they live and operate. This has the effect of reducing community resilience to economic and environmental fluctuations and, by increasing dependence on government support, diminishing the flexibility of fishers to adjust to changing circumstances. Within the sector as a whole, there is also the possibility that the relative income distribution can change if the transfers are made differentially available to portions of the industry. This can draw resources in to the favoured sectors placing further pressure on regulators to ensure that catch levels are maintained to provide employment and income for the industry. As noted above, however, investment support can increase regional income if the capital construction is undertaken in the region, such as through local shipyards. This would not be of major benefit to the fishers though, as the shipyard owners will scoop the rents from the transfers.

Many governments have provided support for building new fishing vessels over the years. The programs of the European Union have been mentioned in connection with the decommissioning grants. In addition to the support obtainable from the EU's FIFG (Financial Instrument for Fisheries Guidance), the individual countries also had their own programs and in fact were required to match grants from the EC. Historically, the size of the grants involved could be substantial, with one study from the Netherlands calculating the value of support at more than 40% of the vessel cost (de Wilde 1999, p. 131).

The depletion of the fish stocks in the waters of the European Union, particularly the North Sea, have often been ascribed to excessive fishing effort stimulated by support provided by the Community. The picture is likely to be more complicated than that, however. Since 1983 the Community has applied a regime of catch controls, with catch quotas being portioned out among the member states. If effective, this regime should mean that excessive fishing capacity is of no consequence for the fish stocks, only eating into the companies' profits. But the quota regime has not been fully effective, particularly not in the beginning, as member states have routinely overfished their quota. In addition to making that possible, the excess fishing capacity certainly provided political pressure on member states' fisheries ministers to obtain large quotas for their own countries, which often meant a larger overall quota for the stock in question. There is little doubt even in this case about the detrimental effect of many types of fisheries transfers on fish stock conservation, but the situation appears to have improved in later years.

The Norwegian government has over the years provided subsidies to new vessels and for modernisation of existing ones. Even if on a small scale, at least in later years, this squares badly with the buy-back programs. The buy-back program in the purse seine fishery initiated in 1979 was in fact partly caused by previous and ill-conceived subsidies to boat building. In the mid-1970s subsidies were provided for the building of new purse seiners. The purpose was to maintain employment in the shipyards, which were hit by the world recession initiated by the energy crisis in 1973. This subsidy program was put in place despite an analysis made public at about the same time showing that the purse seine fleet was already troubled by overcapacity, and in case the government wanted to maintain employment in the fishery it should promote double crews rather than more boats (Hansen 1979).

Specific tax exemptions for capital costs also fall in this category of subsides. One example is the Capital Construction Fund in the United States, whereby up to 100% of the profits generated by fishing can be placed in an interest earning fund exempt from income tax, provided the money is used for vessel replacement or refitting within ten years (Schrank 2003). Subsidies of capital costs could also take the form of equity infusion by government, which presumably would mean lower capital costs than soliciting equity via the marketplace. An example of this is the government refinancing of the trawl sector in Atlantic Canada after the economic crisis in the early 1980s (Schrank 2003).

Table 3.5. Effects of Payments for Vessel Construction and Modernisation

<table>
<tr><th rowspan="3">Dimension</th><th colspan="5">Management regime</th></tr>
<tr><th colspan="2">Property rights</th><th colspan="3">No property rights</th></tr>
<tr><th>Catch controls</th><th>Effort controls</th><th>Catch controls</th><th>Effort controls</th><th>No catch or effort controls</th></tr>
<tr><td>Economic effects</td><td>Higher value of fish quotas</td><td>Higher market value of effort rights. Total effort may expand, with effects as with effort control.</td><td>No effect on catch or stock. Greater effort and more boats
Same revenue or lower
Higher costs and lower industry profits
Negative resource rent</td><td>Effort expansion likely, which would reduce stocks and catches and vessel profit except perhaps for new and refitted vessels. Lower, possibly negative, resource rent. Catches increase if underfished.</td><td>Greater effort and more boats
Smaller fish stocks
Lower fish catch, lower revenue, if overfished, greater catch, greater revenue if underfished
Higher costs
Higher intra-marginal rents
Negative resource rent</td></tr>
<tr><td>Environmental effects</td><td>No effect on stocks, if catch limits effectively enforced.</td><td>No effect on stocks, if effort effectively controlled
If effort increases, reduced stocks</td><td>No effect on stocks, if catch limits effectively enforced.</td><td>Reduced stocks</td><td>Reduced stocks</td></tr>
<tr><td>Social effects</td><td colspan="5">Reduces community resilience. Alters income distribution. Can increase regional income if investment undertaken within the region (e.g. at local shipyards).</td></tr>
</table>

Note: The effects listed assume regulations are effectively enforced.

Income support and unemployment insurance

Key points

OECD countries provide transfers for income support and unemployment insurance to participants in the sector to top up fishers incomes in cases of resource and weather fluctuations, in response to seasonal variations in income, in conjunction with stock recovery plans, and due to the lack of alternative income opportunities in regions where fishing is the major activity.

Forms of support include direct payments to employees in the fishing industry, direct payments to vessel owners, industry specific unemployment insurance schemes, specific tax rules for fishing firms and employees, and payments for temporary cessation of fishing.

Providing income support to employees has the effect of reducing the wages that firms need to pay employees to keep them in the industry, thereby reducing the costs of fishing operations. As a result, income support will not necessarily raise wages in the sector, but in fact may do the opposite (depending on the elasticity of labour supply and demand), and will promote labour-intensive operations relative to capital-intensive ones.

The social dimension of income support is particularly significant because provision of this type of transfer is often motivated by social concerns such as objectives to maintain regional employment or to provide minimum levels of income to fishery-dependent regions during difficult periods. The extent to which income support actually achieves its objectives is open to question and empirical evidence suggests that such support can often work to inhibit adjustment away from unsustainable levels of fishing, increase community dependence on the industry and government support, and reduce community resilience.

Transfers to income include direct payments to employees in the fishing industry, direct payments to vessel owners, industry specific unemployment insurance schemes, specific tax rules for fishing firms and employees, and payments for temporary cessation of fishing (also known as “laying-up” or “tying-up” premiums). A range of more general transfers which serve to support income, such as regional aid programs, small-scale fisheries aid and development aid, can be classed as community support. Many OECD countries provide, or have provided, income support, often as a response to resource fluctuations, excess capacity and declining stocks. They are generally intended to smooth out income fluctuations in an industry that can have significant seasonal and annual variations in catches. They also often have the objective of maintaining fleet and labour capacity in the event that stocks and catches recover, particularly in fishery-dependant regions where alternative sources of income may be limited.

Providing income support to employees has the effect of reducing the wages that firms need to pay employees to keep them in the industry (in order to prevent them from leaving to higher paying occupations), thereby reducing the costs of fishing operations. Targeting income support to fishers has the effect of reducing the remuneration the industry would have to pay to fishers in order to prevent them from seeking the next-best occupation. Generous unemployment insurance schemes in seasonal fisheries make it easier for fishers to achieve an annual income comparable to other and less seasonal occupations and hence reduce the amount that a seasonal fishery has to offer to keep them employed in that industry. Income support can also take the form of specific and generous tax rules for labour employed on fishing vessels, again with the same effect.

Income support does not necessarily mean that fishers' incomes are increased above what they would have been in the absence of the support. Fishing is typically just one of many occupations and accounts for a small fraction of a national labour market. The incomes of fishers under such circumstances are determined by their potential income in alternative occupations, which is determined by the conditions in the labour market at large. Income support will serve to reduce the remuneration vessel owners would have to pay to keep the fishers on their vessels, with the effect of increasing employment but at a lower wage rate. Only if the supply of fishers is unresponsive to changes in remuneration (fishers have nowhere else to go and few others want to be fishers) and there is sufficient demand for their labour would these measures do much to raise the take-home pay for fishers.

Unemployment insurance schemes for fishers which are either government funded and underwritten by the government are run by a number of countries. These can take the form of either schemes intended solely for the fishing industry or more generous provisions for the sector nested within a more general unemployment insurance scheme.[5] The objective of such payments is usually to help smooth out fluctuations in income that may result from seasonal factors or other environmental perturbations in the fishery.

Laying-up premiums work in a similar fashion by providing income for vessel owners when fishing is not possible for resource availability reasons. Such premiums have been increasingly used as part of stock recovery plans whereby compensation is provided by the government for the reduced activity of a particular fleet during the stock recovery phase. This assumes that the stock will recover to a level that justifies the same size fleet as was operating prior to the stock recovery plan. In general, this is unlikely to be the case as the recovered stock is likely to settle at an equilibrium with a lower sustainable yield.

In the shipping industry in many industrially developed countries (Norway, for example), the use of labour is supported by the government, both directly through special tax rules and indirectly through rebates given to the shipping companies. The purpose is to prevent the flagging of vessels to countries with low wages. This does not appear to be widespread in the fishing industry, probably because the access of vessels with foreign flags to the exclusive economic zone is restricted. Conditions are different on the high seas, however, and fishing in this area is to some extent conducted with vessels under foreign flags and with crews from countries with low wages.

The economic and environmental effects of transfers for income support are a variant of the effects for capital costs and the general effects of transfers already discussed and are not repeated here. The results are summarised in Table 3.6. In summary, income support reduces the variable cost of fishing and provides an incentive to increase the use of labour relative to other factors of production. Support of labour will therefore promote labour intensive operations relative to capital intensive ones. This will lead to a higher demand for fishers than otherwise would be the case and may increase employment in the fishing industry.

5. As is the case in infrastructure expenditure, the extent of support will depend, at least in part, on whether the fishing industry receives special consideration relative to other sectors.

The fishery transfers applied in Norway over many years were motivated as income support for fishers, although they targeted income only indirectly. But there are cases of transfers which target income more directly. One such is the tax exemptions of Icelandic fishers; their incomes are taxed at a lower rate than the incomes of other wage and salary earners in Iceland. Removing this exemption would have no effect on the fish catches in Iceland, which are controlled by quotas, but it would certainly cause disagreement between vessel owners and fishers. The latter would demand a higher remuneration from the vessel owners, in order to maintain their after tax incomes, but to what extent they would succeed in this would depend on the labour market situation in Iceland. The vessel owners would have to comply in case the labour market situation is tight enough to make it difficult for them to crew their vessels unless fishers maintain their take-home pay after tax. In an individual transferable quota regime as in Iceland, this would be at the expense of the companies' profits and not have any effect on fish stocks and fish catches. In this scenario, this tax exemption is primarily a transfer of company profit, boosting the market value of the quota rights.

The most well known and widely discussed case of unemployment insurance specific to fishers is the unemployment insurance scheme that the Canadian government applied in Newfoundland before 1996. This made fishers eligible to a full year's employment insurance even if they have fished for only 15 weeks. There is little doubt that this kept up the employment in the fishing industry, not least among self-employed fishers in the inshore fishery which is highly seasonal, and thus contributed to a greater pressure on fish stocks than otherwise would have prevailed. After 1996 the system was changed to one based on a minimum income earned over a certain period, but it still appears generous; in Newfoundland, earnings must exceed CAD 2 500 within a 31 week period.

The social dimension of income support is particularly significant because provision of this type of transfer is often motivated by social concerns such as objectives to maintain regional employment or to provide minimum levels of income to fishery-dependent regions during difficult periods. The extent to which income support actually achieves its objectives is open to question and empirical experience to date suggests that such support can often work to inhibit adjustment away from unsustainable levels of fishing in particular fisheries, increase community dependence on the industry and government support, and reduce community resilience. The experience of Canadian cod fishing industry is a case in point as unemployment insurance was used to support the industry for a prolonged period in the face of severe challenges to stock recovery. One of the key issues is the extent to which income support is linked to the continued involvement of the recipients in the fishing industry. Such conditionality of support reduces both the incentive for fishers to seek alternative sources of income and the likelihood that economic diversification opportunities will be forthcoming on a regional basis.

Balanced against this is the desire for participants in the sector to achieve a minimum standard of living. However, such an objective is most effectively pursued through the more general social support policy of the government and should be decoupled from involvement or the maintenance of a certain level of activity in fishing activities. This reduces pressure on fisheries managers to provide levels of fishing opportunities that may not otherwise be appropriate given the status of available stocks. The use of regional aid for economic diversification is likely to reduce dependence on fishing opportunities and increase the potential resilience of communities and individuals.

Table 3.6. Effects of Income Support and Unemployment Insurance

Dimension	Management regime				
	Property rights		No property rights		
	Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Economic effects	No effect on catch or stock No effect on effort Higher value of fish quotas	Same effects as with no property rights except that the value of effort rights will increase.	No effect on catch or stock Greater effort and more boats Same revenue or lower Higher costs and lower industry profits Negative resource rent	No effect on effort, if it is effectively controlled. Higher revenues Higher profits Incentive to expand uncontrolled components of effort. If effort expands - smaller stocks - lower catches -less increase in revenue - higher costs - less increase in profits - lower resource rent	Greater effort and more boats Smaller fish stocks Lower fish catch Lower revenue Higher costs Higher intra-marginal rents Negative resource rent
Environmental effects	No effect on catches or stock	No effect on catches or stock, if uncontrolled components of effort do not expand	No effect on catches or stocks	No effect on catches or stock, if uncontrolled components of effort do not expand	Reduced stocks
Social effects	Increased employment in the short run, lower wages. Increased dependence on government support, may reduce community resilience Can inhibit adjustment if fishers' expectations of continued support become embedded.				

Note: The effects listed assume all regulations are effectively enforced.

Other cost-reducing transfers and direct payments

Key points

A number of other cost-reducing transfers and direct payments are also provided by OECD countries. The key transfers discussed in this section are support for labour retirement, fuel tax exemptions and price support mechanisms. These transfers will have the effect of increasing incomes or reducing variable costs, and will more directly affect the competitive position of fishers in international trade and maintain their profits in the short term, with the long term effects dependant on the management regime in place.

In addition to the major categories of GFTs discussed in this chapter, OECD governments provide a range of other transfers that serve to reduce costs and increase incomes. While these are of a lower order of magnitude (to the extent that they can be identified and measured), they can be significant in influencing fishery adjustment, fishery operating costs and the prices received on the market for fish products. This section discusses three types of such transfers: payments for labour retirement; fuel tax exemptions; and price support mechanisms.

Support for labour retirement

The effects of supporting withdrawal of labour from fisheries are in many ways similar to the effects of decommissioning fishing vessels. Having such programs accompany programs for decommissioning would indeed seem to be a logical step. The decommissioning of fishing vessels, if effective, means that some fishers lose their jobs. The human capital that fishers have built up through training and experience can be specific and immobile, just as real capital in the form of fishing boats. Fishers would therefore be likely to suffer some losses when leaving the fishery for some other occupation, just as vessel owners who have invested in fishing vessels for which there is little or no need will suffer losses if they leave the industry. When the demand for labour in the fishery falls because vessels are being withdrawn, it would not be necessary to support the withdrawal of labour in order to reduce employment in the fishery; that reduction would happen anyway, but transfers that finance retraining or in other ways speed up the movement towards a new occupation would reduce the social and economic costs associated with unemployment of fishers. Support of labour withdrawals would then have little or no effect on fishing effort and hence on fish stocks and fish catches.

Would support for labour retirement make sense in the absence of other measures such as decommissioning schemes? Supporting labour retirement, whether it is movement to other occupations or final retirement, would reduce the supply of labour available to the fishing industry and raise the cost of labour. This would raise the variable costs of fishing and hence act as a negative subsidy of variable costs. The results would be the opposite of those in Table 3.6. Some kind of licensing regime for individual fishers would have to be imposed in order to make such transfers effective. This would erect barriers to entry into the fishing profession and thus raise the cost of employing fishers. It may, however, be more difficult to control the supply of fishers than to control the number of boats. There are many examples of strict licensing regimes for fishing boats, but few if any of such regimes being applied to fishers only.

Some buy-back programs have included adjustment grants for fishers (Holland et al., p. 62). The adjustment program the Canadian government put together in the wake of the collapse of the Northern cod included a retraining and adjustment program for fishers and labour in the processing industry. This program also included a component for buying fishing licenses from individual fishers. In return for a compensation, a fisherman would give up his fishing license and be barred from fishing ever after. Over 6000 fishers in Atlantic Canada were eligible for this program but few were attracted by the offer; only 7% of over 5 000 fishers eligible in Newfoundland accepted. The reason for this low number has been attributed to small sums of money involved and optimistic expectations about the return of the Northern cod (Schrank 2002).

Fuel tax exemptions

Fuel tax exemptions lower the variable costs of fishing boats (cost of fishing effort) compared with what would be the case in the absence of such support and are discussed more formally in the Annex to Chapter 5, where they are shown to be broadly analogous to the effects of price support and transfers to capital costs. An interesting difference compared to transfers to capital costs is that the latter would tend to increase effort primarily through encouraging the entry of boats and in fact lead to a reduction in the effort of the individual boats. Transfers to variable costs would increase the rents of intra-marginal firms, as their effect is exactly analogous to the effect of raising the price of fish. The increased effort will lead to a further depletion of fish stocks, but the effect on sustainable yield will depend on whether or not the stocks are overexploited. The resource rent, evaluated at costs exclusive of subsidies, will turn negative, being zero in the absence of transfers.

With catch controls these transfers would stimulate competition for the given catch, with consequences similar to those already discussed for transfers to fixed costs, except that this would occur primarily through the expansion of effort by individual vessels and not through more boats entering the fishery.

With effort controls, the problem would primarily be the incentive the transfer would provide to increase the use of the effort components affected by the subsidy. If fuel is subsidised there would be an incentive to invest in more powerful engines or to steam further and faster. The question then is, how effectively is this effort component controlled? If the effort control pertains only to, say, fishing days and the number of boats, some effort expansion could occur through investing in more powerful engines. A similar effect occurs if there support for the purchase of fishing gear or the use of labour; the effect would depend on whether effort controls permit the use of more (or better) fishing gear or labour. The effect on stocks, catches of fish and other variables would be as already discussed with respect to transfers in general.

Under an individual transferable quota regime, the fuel tax exemption would not have any effect other than distorting the choice of factors of production compared to a cost-minimizing choice at market prices. The strength of this effect depends on to what degree different factors of production are substitutable. Is it possible to substitute fuel for manpower? Probably not directly but perhaps indirectly by going further to a richer fishing ground and using less gear and people to obtain a given catch. Otherwise the effect would be to raise the market price of quotas, as discussed in relation to other transfers.

With effort rights, the effect would be to raise the price of these rights and to distort the cost-minimizing choice of effort components, as discussed in relation to quota rights. The strain this would put on the effort control system depends on how effectively the total effort is being controlled. Would it, for example, allow the use of more powerful engines? This could raise the effort of the fleet despite the presence of the effort control system.

Fuel costs are usually responsible for a significant part of the variable costs of fishing. In Australia, for example, surveys of the economic performance of fleets in various fisheries indicate that fuel costs account for between 12 - 23% of the total cash costs of vessels, depending on the type of fishery (Galeano *et. al*., 2004, 2005). However, there are very few empirical studies of the effects of changing fuel tax exemptions on fishing operations. One such is from Senegal (UNEP, 2002). Based on operating accounts of small scale fishing units, a reduction of the fuel subsidy by one-half was predicted to cause a substantial fall in the operating profits of the boats and possibly turning them into losses. That notwithstanding, the elimination of these subsidies would not necessarily put an end to this type of fishing, but it would undoubtedly cause some boats to leave the fishery and so reduce fishing effort. The lower effort would, however, most likely result in a higher catch per unit of effort as fish stocks recover. The study shows that over time the catch per unit of effort has declined drastically for most Senegalese stocks, which most likely is due to the increase in effort and the resulting depletion of fish stocks over the same period. It is unclear, however, whether the stocks are overfished; in the years 1980-90 the fish exports from Senegal rose from 84 000 to 125 000 tonnes.

Fuel tax exemptions are widespread throughout the OECD although the transparency of the programs is mixed. Most OECD countries allow their fishing fleets to take advantage of tax-free bunkering for fuel, particularly those fleet segments that are able to obtain fuel from neighbouring countries (at tax-free prices). In the UK, for example, commercial vessels (including fishing vessels) are entitles to full duty relief on fuel used under the Marine Voyages Relief. This relief is reflected in UK legislation as a result of the EU Energy Products Directive (EPD) (2003/96/EC). Article 14 of the EPD requires all Member states to exempt from duty fuel used for the purposes of navigation within Community waters (including fishing), other than private pleasure craft. This applies to all EU countries.

The rates of fuel tax exemptions for selected OECD countries are presented in Table 3.7. It is also difficult to obtain precise estimates of the value of support provided to the sector from the fuel tax exemption. The main measurement challenge lies in the fact that the support is in the form of tax revenue foregone and this will vary according to the world oil price. In addition, exempting the industry from the tax distorts fuel use patterns in fishing operations and so it is difficult to estimate what the pattern of fuel use and fishing would have been in the event that the full cost of fuel had been paid. In one of the few estimates of the value of revenue foregone, fuel tax exemptions account for around 75% of Australia’s GFTs each year. Overall, however, the value of the support is underestimated in this study.

Table 3.7. Fuel Tax Exemptions in Selected Fishing Countries

(US cents per litre)

Country	Exemption value (rate)		Purchase price		Regulation
	Gasoline	Diesel	Gasoline	Diesel	
Korea	62.3 (70%)	32.8 (58%)	26.7	23.7	Tax Exemption Act
United States	4.9 (9.3%)	6.5 (14.8%)	48.0	39.0	Internal Revenue Code
Canada	20.1 (32.1%)	14.1 (26.7%)	43.6	40.7	Excise Tax Act
Australia	-	27.4 (34.3%)	-	52.4	Diesel Fuel Rebate System
Japan	-	JPY 32.1	-	JPY 45.1	Local Tax Act

Note: This information is sourced from Lee (2005, p. 7) and are not data officially provided to the study by the Member countries concerned. As such, they do not represent the official positions of the Member countries concerned.

The environmental impacts of a fuel tax exemption are potentially significant. Under any management regime, reducing the cost of fuel will encourage fishers to use more of this input relative to other inputs. This shift in the pattern of input use may have potential consequences for marine pollution and carbon dioxide emissions that are generally not considered by those responsible for developing fishery level transfer policies. Such broader environmental implications are unlikely to be taken into account by policy makers, yet careful consideration of the broader environmental impacts of transfers is required under an integrated approach to policy.

Price support mechanisms

These transfers raise the price of fish obtained by fishers above the market price. The price obtained by fishers need not rise by the entire amount of the support; some could be realised by the buyers of fish, depending on the elasticity of supply and demand. Price support can be applied partially, such as is done with minimum prices when fishers are guaranteed a certain price irrespective of the market price. The effect of this is to limit the downside loss of the industry while any potential upside gain is maintained. Hence the average profits of the fishing firms rise, and the firms might find it profitable to fish in periods when there is a risk of low prices that would not cover variable costs.

Both general price support and minimum price schemes raise the profit of the industry over and above what it would otherwise be. Under open access the result depends critically on whether stocks are overfished or underfished, as discussed for transfers in general. With catch control and no effort control, they would further increase the competition for a given catch. With effort control they would strengthen the incentives to expand effort to the extent it is not tightly enough controlled. This type of support does, however, not particularly encourage increased use of some particular factor of production, such as fuel tax exemptions or income support for labour would do; price support just strengthens the incentives for expanding any uncontrolled effort component.

With catch control and individual quotas, price support would simply raise the market value of quota rights, as discussed for transfers generally. With effort quota rights there would be incentives to expand effort into uncontrolled dimensions, as already discussed, but unless such response completely annihilates the effect of the subsidy it would raise the market value of effort rights.

The Norwegian government applied price transfers extensively from the mid-1950s until the 1990s; in the period 1964-90 no less than 58% of the fisheries transfers provided on the basis of the so-called “General Agreement” were price transfers. One reason is the special remuneration system in effect in the fishing industry, not just in Norway but in many countries; instead of a fixed wage fishers are remunerated by a share in the catch value. Hence, price transfers benefit not just capital owners but also fishers, so this in fact amounted to a support of the incomes of fishers at large. This is likely to have led to more fishing effort and larger fishing capacity and hence to a greater decimation of fish stock while the fisheries of Norway were still characterised by open access, a regime that has been gradually disappearing since the early 1970s.

Some countries, including the European Union, apply a scheme of minimum prices. In the 1990s the Community’s market support amounted to about ECU 30million per annum, which is about the same sum as the Community budgeted for monitoring and control in 1996 (Hatcher 1999, pp. 60-61). The scheme is ongoing.

Chapter 4

Key Policy Insights

This report highlights a number of important policy messages that may assist OECD governments (as well as non-OECD governments) in assessing the effects of financial support to the sector.

- *Transfers have an important, but limited, role to play in fisheries management.*
- *Improving the transparency of support programmes is essential and should include ex-ante and ex post evaluations of programmes.*
- *Policy makers need to take an integrated approach to assessing the full range of costs and benefits of transfers across all participants in the sector.*
- *Both the management regime and the effectiveness of enforcement are critical in assessing the impacts of support programmes.*
- *To improve economic sustainability and community resilience, financial support for the sector should be de-coupled from fishing activity.*
- *Transfers should be time-limited and subject to evaluation prior to extension.*
- *Reducing financial support to the industry, if accompanied by appropriate management changes and transition measures, can increase the profitability of the industry and the resilience of communities over the medium to long term.*

A number of themes emerged from the analysis in the previous chapter highlighting the policy challenges confronting decision makers. The analysis also provided some insights into policy development which may assist in improving the effectiveness of support programmes in meeting their objectives. The purpose of this chapter is to draw these themes together and present a set of key findings that will assist policy makers in their deliberations about support programmes in their countries.

Transfers have an important, but limited, role to play in fisheries management policy

Transfers are an important part of the government's policy toolbox for managing fisheries. As discussed in Chapter 3.1, transfers are used to provide fisheries services that otherwise may not necessarily be supplied by the market. These transfers cover many types of research, management and enforcement services as well as some forms of infrastructure services. These services comprise around two- thirds of the total value of budgetary support provided to the sector in OECD countries. However, this study has noted that the applicability of public good argument that is generally invoked to justify the government provision of services is generally limited to a subset of fisheries services. These services are mostly associated with providing basic research and management functions the benefits of which flow to the community in general and where private provision of the services is unlikely to be forthcoming. A range of other fishery and infrastructure services have characteristics of club goods, with the fisheries industry as the clearly identifiable beneficiary. Examples include the maintenance of quota registries and applied research which aims to reduce costs or increase efficiency of fishing operations. To address this dichotomy, there is scope to increase the use of cost recovery and user charging, as well as the outsourcing of some services, to reduce the public costs of service provision and improve the efficiency of service delivery.

The other major rationale for the provision of transfers is to assist the industry during times of structural change. Transition payments will ease the burden of adjustment of restructuring and smooth the adjustment path, and can help set segments of the industry on a sounder footing. However, such assistance to restructuring should be temporary; many programmes that are meant to have been temporary have a tendency to become permanent (see further below). This will have a longer term impact on both the environmental health of fisheries resources and on the social resilience of fisheries communities.

Outside these areas of clear market failure or temporary assistance, the rationale for transfers is confined to providing financial relief to the industry in the form of increasing profits. The benefits of this transfer to the industry needs to be weighed against the potential costs. As has been discussed extensively in this report, the economic, environmental and social effects of transfers can be significant in the absence of effective and enforced management. Such transfers attract resources to the sector from other sectors which may be economically sustainable and less potentially environmentally harmful. The transfers become capitaliSed in the asset values of vessels, quotas and access rights, reducing the flexibility of the industry to adjust. Depending on management settings, there may be impacts on trade patterns and pressures arising from increases in capacity, which may also have international spillover effects (for example, in IUU fishing). Cost-reducing transfers insulate the fishing industry from the real costs of their operations and artificially inflate profits, inhibiting industry adjustment to changing economic and environmental conditions.

There is a need to increase the transparency of fisheries support programmes

This study has highlighted the shortcomings in the transparency of fisheries support programmes in many OECD countries. Much of the data and information on the programmes are difficult to access and analyse, and there remain significant gaps in the data. Particular areas of concern that have been raised cover the extent of sub-national transfers (at regional and local levels) and the cost of off-budget items such as tax concessions, loan guarantees and interest subsidies. This study goes some way towards addressing the shortcomings by providing detailed inventories for a selection of OECD countries. Clearly, however, further efforts both across and within countries are required to improve on these efforts.

At the international level, the WTO notification process under the ASCM provides some measure of transparency. However, it has been noted that the there are concerns over the extent of reporting by WTO countries and there is concern over how well countries adhere to reporting obligations. Transparency could be improved by increasing the compliance with the reporting requirements under the ASCM and by increasing the use of the review process contained within the ASCM. An additional issue lies in the fact that the types of subsidies reported under the ASCM definition of subsidies is not sufficiently comprehensive to capture the full range of support programmes that may affect the sector. While the usefulness of the ASCM reporting is not question, a more concerted effort by international organizations with fisheries economics interests (such as the OECD and FAO) should be undertaken. The broad economic, environmental and social effects of transfers highlighted in this study go well beyond the trade concerns which are the focus of the ASCM process.

Transparency at the national level can be improved by an ex-ante assessment of the likely effects of programmes. In many countries, regulatory impact assessments are being increasingly regarded as a normal part of the functioning of government in an effort to improve the cost-effectiveness of policies, improve their efficiency and ensure cohesion between policy areas. It is feasible to extend such assessment processes to include assessment of the likely environmental and social impacts flowing from particular programmes. This is a corollary to the environmental impact assessments generally required of construction and development projects.

The study has also noted the relative paucity of *ex post* evaluation of transfer programmes by many OECD governments. The bulk of the analysis has been undertaken in the academic world, by non-governmental organizations (such as WWF) or in intergovernmental organisations (such as OECD, UNEP and FAO). As with ex-ante assessments, there is certainly scope for the increased use of *ex post* assessments to improve the understanding of the impacts in order to help countries improve the next round of policies.

An integrated approach to assessing support programmes identifies tradeoffs and dynamic effects

Financial support to the fisheries sector has a wide range of impacts, often reaching beyond the intended target(s) of the programmes. The key reasons for taking an integrated approach is to ensure that the full range of effects of particular programmes on the environmental, economic and social dimensions is taken into account when the programmes are designed and implemented. Failure to do so increases the potential for unintended impacts of a programme to escape detection until too late, with the result that the total costs across the economy of the programme may outweigh the benefits. Such policy inadvertence can be particularly critical in the fisheries sector where getting policies wrong has a high cost in terms of long term impacts on an often fragile resource.

Identifying the inherent trade-offs in balancing competing objectives and ascertaining the dynamic (second and third round) effects of transfers is essential to better understanding how the effects of transfers flow through the sector and the wider economy and highlighting areas of actual and potential policy incoherence. The importance of an integrated approach has been demonstrated in several areas in this study.

A prime example is that of income support programmes. The short term focus of such programmes is generally on supporting the incomes of fishing communities. In the absence of positive structural adjustment programmes to complement the income support, the resilience of both individuals and fisheries communities can decline and a culture of subsidy dependence can arise over the medium to longer term. This situation has arisen in a number of fisheries, most notably in the Newfoundland cod fishery in the mid 1990s. Importantly, the Canadian government learnt the lessons from that episode and responded quite differently to the 2003 cod closure with temporary income support and industry adjustment measures. The environmental effects of such a situation are potentially significant, as the income support becomes a *de facto* mechanism for maintaining latent fishing capacity while not addressing the root cause of the problem; income support merely delays the adjustment pressure rather than dealing with it. There is often strong pressure from fishers to commence fishing once signs of a stock recovery begin to appear, and so the cycle continues.

At the same time, the economy-wide costs of open-ended income support can be significant, representing a drain on government budgets. The costs of delaying action on addressing the underlying fisheries management problem can accumulate over time. The key lesson from the analysis is that income support needs to be of a temporary nature, providing sufficient support to cover the transition costs as the sector or community moves to a new, more sustainable, level and mode of operation (see below). Importantly, adjustment of fishing management regimes and structural adjustment programmes (retraining, etc) need to be integral to income support packages.

The advantage of taking an integrated approach was also evident when the issue of transfers for vessel construction and modernization was considered. These transfers contribute directly to the expansion of fishing capacity as, even where access to such transfers is conditional upon the scrapping of an equivalent vessel, the new vessels can increase effective fishing power (although in some cases authorities make an allowance for such increases in their scrapping requirements). Support for modernisation can also lead to an increase in the effective fishing power and efficiency of vessels and reductions in the costs of handling, storing and processing catches. Modernisation grants are also used in some cases to improve the health and safety conditions on vessels. The integrated analysis has pointed to the potential for policy incoherence to arise in those countries where vessel construction and modernization receive public financial support at the same time as decommissioning programmes are in place. This not only sends conflicting signals to the industry, but also can serve to inject capital into the sector from both programmes, potentially compounding adverse environmental and social effects.

The effectiveness of the management regime and its enforcement is critical

It has been a fundamental tenet of the OECD’s work on fisheries policy analysis that fisheries management is at the heart of almost all the policy challenges facing the sector. Instituting effective management regimes will go a long way towards solving many of the problems facing the sector. This report has demonstrated that the issue of GFTs is no different in that the effects of transfer programs need to be assessed against the background of the management system in place for particular fisheries.

However, the analysis in this report using the sustainable development framework takes this tenet a step further and has refined it to make it more applicable in the real world of fisheries policy. This is evident in several areas. First, even with perfectly enforced management, some support programmes will still have economic, environmental and social effects. For example, the provision of income enhancing or cost reducing transfers can result in the expectations of continued government support becoming embedded in the minds of fishers and fisheries communities irrespective of the management regime in place. This alters the relative prices of inputs and the evaluations of risk in the production and investment decisions of fishers. It also tends to reduce the resilience of both individuals and communities, compromising their flexibility to respond to external changes in economic and environmental conditions.

Second, anything less than perfect enforcement will generally result in adverse impacts on all dimensions and under all management regimes. Whether these adverse impacts lead to a net welfare loss as a result of the transfer policy is an open empirical question which will vary according to the conditions applicable in different fisheries settings. However, there are some types of management regimes which tend to be more robust than others. For example, management regimes which are characterized by stronger access rights will tend to be more self-enforcing as the industry has a greater incentive to cooperate with enforcement measures. A higher degree of stakeholder participation is likely to reinforce this incentive.

So, in summary, the oft-quoted conclusion needs to be qualified to some extent: it is the effectiveness of the management regime in enforcing rules and securing rights that is a key factor, just as much as the type of management regime itself. The extent to which fisheries in OECD countries are effectively managed is therefore critical to determining the effects of transfers. The effectiveness of management in OECD countries has not been examined empirically as yet and there is scope for addressing such a monitoring and evaluation exercise in the future work of the OECD.

Financial support for the sector should be de-coupled from fishing activity

The analysis has highlighted the problems that arise when financial support is linked to fishing activity. This occurs in OECD countries both directly and indirectly. Transfers such as fuel tax exemptions, bait subsidies, crew cost subsidies and underwriting of investment and insurance directly reduce the cost per unit of effort of fishing operations. This has direct flow-on effects to the economic incentives facing fishers and the environmental outcomes of fishing activity. A range of other transfers, in particular income support programmes, are less directly linked to fishing activity, but are conditional upon the beneficiary participating in the fishing industry. Such transfers are often introduced to achieve social objectives or regional development goals yet tend to increase dependence on financial support, reduce individual and community resilience and inhibit adjustment to changing conditions. The longer term dynamic effects of such transfers are too often ignored in the policy debate.

Decoupling financial support for the sector from fishing activity will help ensure that fisheries management policies are not used as the primary means to achieve social and regional development objectives. While there is clearly a need for government intervention to address pressing issues in these areas, using fisheries management as the major mechanism carries a significant risk that one of the fundamental objectives of sustainable fisheries – stock conservation – will be compromised and will send blurred policy messages to sector participants. Financial transfers through the social policies as part of the income redistribution objectives of the government are more likely to be better targeted and efficient than trying to achieve the goals through fisheries management tools.

Similarly, regional development objectives are more likely to be achieved through development policy tools than through fisheries policy. Linking assistance directly or indirectly to fishing activity can send inappropriate signals to fishers and their communities. At the same time, it is important to maintain coherence between the different policy areas to ensure that inadvertent policy outcomes are avoided.

Time limits on support programmes will improve their effectiveness and increase community and individual resilience

One of the major concerns over the provision of financial support to the fisheries sector is that expectations of government assistance tend to become embedded in the decision making processes of fishers. From an economic perspective, ongoing financial support changes the expected costs and revenues of fishers who then base their production and investment decisions on the future stream of expected profits. This then alters their perceptions of risk related to investments, leading to excess investment, and the relative costs of inputs, altering their pattern of input use. Without clear, enforced time limits to government support programmes, such a situation can lead to increased pressure for the maintenance of transfers, perhaps even when their original objective has been achieved.

The role of expectations in influencing investment decisions was most evident in the discussion of decommissioning schemes. There is a strong argument for making decommissioning schemes both time limited and one-off programmes, as well as linking the schemes to management changes that reinforce the capacity reduction and internalise adjustment within the management regime (rather than being externally driven).

The need for time limits on transfers also arises from the social dimension, particularly in the case of income support programmes. Expectations of ongoing government support reduce the flexibility of individuals and communities to respond to fluctuations in economic and natural conditions. The incentives to invest in diversified economic activities are likely to be reduced where there is an expectation that continued government support will insulate the sector from necessary adjustments. This is likely to have further environmental implications where the support is linked to the need to engage in fishing activity. This reflects the point made above concerning the need to decouple financial support from fishing activity. As was also noted above, there are some cases where economic diversification is not feasible, in which case there is a need to ensure that regional support and development goals are not achieved through fisheries management policies.

Reducing sectoral dependence on government financial support can increase profitability and community resilience

The analysis highlighted the fact that the reduction of financial support in the form of income-enhancing and cost-reducing transfers does not necessarily spell doom and gloom for the industry. The evidence from the experiences of Norway, New Zealand, Iceland and Australia point to the increased profitability and reduced dependence that results over the medium to longer term from reducing financial support. Reduction in financial support was not the only factor in the evolution of the industries in these countries. Each country undertook the adjustment as part of a broader package of management changes designed to set in train structural changes that put the industry on a more sustainable footing from an economic, environmental and social perspective. In each case, stronger access rights were instituted, generally with the active cooperation of the industry.

Ineffective firms disappeared, improving the balance between the available resources and the fishing fleet, helped by improved management regimes which helped to internalise the dynamic process of fleet capacity adjustment.

While there were adjustment costs in the short term, the benefits over the medium to long term were sufficiently clear to the countries to convince them to embark on the reforms. Transition measures were put in place to ease adjustment, but these were temporary and so avoided the trap of becoming entrenched.

Concluding Remarks

The issue of government financial support to the fisheries sector is one of the most hotly debated topics in fisheries policy. It is an issue at play at national, supranational and international levels and is likely to remain at the forefront of the policy debate in fisheries for some years to come. The pressures for reform at all levels arising from the WSSD and Doha commitments have been a major driving force for the increased political attention being paid to the issue. This pressure has also highlighted the relative paucity of analysis to underpin the process of reform. This report is aimed at improving the information base that policy makers can draw upon in their deliberations in national and international forums.

The policy challenge confronting policy makers is a complex one as it lies at the interface of the economic, environmental and social dimensions of sustainable development. Achieving sustainable fisheries, encompassing sound management policies, sustained economic value-added and improved community resilience, requires all dimensions of sustainable development to be addressed in an integrated framework. For this reason, this study has adopted the sustainable development paradigm as the basis for the analysis. This paradigm ensures that the effects of policy interventions, in this case the provision of transfers, incorporate the full range of costs and benefits across all participants in the sector. Success in achieving the goal of sustainable fisheries is dependent on identifying short-run and longer-run tradeoffs and synergies, finding cost-effective policy solutions, and developing integrated decision-making mechanisms for achieving government objectives in fisheries.

The key findings of the report reinforce the need to take an integrated approach to the analysis of transfers. Government transfers to the sector have consequences that go beyond the immediate impacts on the profitability of fishing operations and will often affect the sustainability of fish stocks and the social resilience of individuals and communities. There are also significant, and sometimes counterintuitive, differences between the short-term and long-term effects of transfers that often go unnoticed or unacknowledged for a range of reasons (including the length of the political cycle and the governance arrangements for the sector). The report has also observed that the way ahead for improving the efficiency and targeting of transfer programmes requires a holistic approach. Placing the industry and dependent communities on a sounder economic, environmental and social footing requires a package approach to policy development. Changes in the provision of financial support to the sector should be part of a broader programme of management changes designed to increase the profitability and flexibility of the industry, provide transition assistance to individuals and increase the sustainability of communities.

The report also highlights a number of areas where further work may assist policy makers in their deliberations on the design, implementation and evaluation of GFT programmes. First, and perhaps the most pressing, continued efforts are required to improve the transparency of GFTs. There are a number of ways in which this could be pursued. For example, the OECD will continue to collect data on GFTs as part of its annual statistical survey of Member countries. It is also possible to use the existing WTO ASCM notification procedure as a basis for improving transparency.

Second, there is a need to undertake *ex post* evaluations of programmes and make the results publicly available. Amongst other things, such evaluations should address the efficiency of programmes, the distribution of costs and benefits from the programmes, and ways in which current or future programmes can be better targeted. This will help improve the understanding of the full range of impacts as well as contribute to improved transparency.

Third, there is clearly scope for undertaking further analysis of the social dimension of both GFTs and other fisheries policies. As has been noted in this report, quite a few transfers are introduced to meet social objectives, most notably regional development and community support goals. However, the report also concluded that transfers are not necessarily the most effective mechanism for meeting such goals, particularly when such transfers are not decoupled from fishing activity. Further work could address how social objectives in fisheries could be met in cost-effective ways and within a sustainable development framework.

Fourth, developing processes and mechanisms for assessing the effectiveness of fisheries management across OECD countries should be a priority area for further work. This report has emphasized that the type of management regime and the effectiveness of implementation and enforcement are critical to achieving the goal of sustainable development in fisheries. While considerable work has been done on the types of management regimes that are likely to result in improved outcomes for the sector, little effort has gone into assessing how existing management arrangements perform across the sustainable development dimensions. Most attention has been devoted to assessing the status of fish stocks, but as highlighted several times in this report, this is only one dimension of fisheries policy and the challenge is now to expand the assessment process to encompass the other dimensions of the sustainable development paradigm. This would be a timely exercise in light of the WSSD commitment to restore fish stocks by 2015.

Finally, there is likely to be continued pressure for countries to reform their support programmes to the sector and there is a significant information gap on how such reforms can be successfully undertaken. There is scope for research on the process of policy reform and identifying the characteristics of successful reform experiences. This would require, amongst other things, analysis of the the political economy of reform including the drivers for and obstacles to policy reform, how governance arrangements hinder or help policy reform, and the role of stakeholders in reform. Sharing experiences on successful reform can improve the information base and assist the momentum for reforms which improve the sustainable development of fisheries.

BIBLIOGRAPHY

Banks, R. (1999), "Subsidizing EU Fleets: Capacity Reduction or Capital Subsidization?", in A. Hatcher and K. Robinson (eds.), *Overcapacity, Overcapitalization and Subsidies in European Fisheries*, CEMARE Misc. Publication No. 44, University of Portsmouth, pp. 200-211.

Brander, J.A. and M.S. Taylor (1997a), "International Trade and Open Access Renewable Resources: The Small Open Economy Case", *Canadian Journal of Economics*, Vol. 30 (August), pp. 526-52.

Brander, J.A. and M.S. Taylor (1997b), "International Trade between Consumer and Conservationist Countries", *Resource and Energy Economics*, Vol. 19 (November), pp. 267-97.

Brander, J.A. and M.S. Taylor (1998), "Open Access Renewable Resources: trade and Trade Policy in a Two-Country Model", *Journal of International Economics*, Vol. 44 (April), pp. 181-209.

Bromley, D.W. (ed.) (1995), *The Handbook of Environmental Economics*, Blackwell.

Campbell, D. and J. Haynes (1997), *Resource Rent in Fisheries*, ABARE Discussion Paper 90.10, Canberra.

Clark, C.W.., G.R. Munro and U.R. Sumaila (2005), "Subsidies, Buybacks and Sustainable Fisheries", *Journal of Environmental Economics and Management*, Vol. 50, No. 1, pp. 47-58.

Conrad, J.M. (1999), *Resource Economics*, Cambridge University Press, Cambridge.

Cox, A. (2002), "OECD Work on Subsidies to the Fishing Sector", Background Paper prepared for the OECD Workshop on Environmentally Harmful Subsidies, Paris, 2-3 November,

Cox, A. (2003), "Cost Recovery in Fisheries Management: The Australian Experience" in W.E. Schrank, R. Arnason and R. Hannesson (eds), *The Cost of Fisheries Management*, Ashgate, Aldershot, pp. 242-256.

de Wilde, J.W. (1999): "Effects of Subsidies on the Distant Water and Coastal Fisheries of the Netherlands", *in* A. Hatcher and K. Robinson (eds., 1999), pp. 126-137.

Emami, A. and R.S. Johnston (2000), "Unilateral Resource Management in a Two-Country General Equilibrium Model of Trade in a Renewable Fishery Resource", *American Journal of Agricultrual Economics*, Vol. 82, pp. 161-172.

FAO (1999), *Indicators for Sustainable Development of Marine Capture Fisheries*, FAO Technical Guidelines for Responsible Fisheries, No. 8, FAO, Rome.

FAO (2000), *Report of the Expert Consultation on Economic Incentives and Responsible Fishing*, 28 November-1 December, FAO Fisheries Report No. 638, Rome.

FAO (2003), *Report of the Expert Consultation on Identifying, Assessing and Reporting on Subsidies in the Fishing Industry*, 3-6 December 2002, FAO Fisheries Report No. 698, Rome.

Galeano, D., D. Langenkamp, W. Shafron, and C. Levantis (2004), *Australian Fisheries Surveys Report 2003: Economic Performance of Selected Fisheries in 2000-01 and 2001-02*, ABARE Report to the Fisheries Resources Research Fund, Canberra, February.

Galeano, D., W. Shafron, and P. Newton (2005), *Australian Fisheries Surveys Report 2004: Economic Performance of Selected Fisheries in 2001-02 and 2002-03*, ABARE Report to the Fisheries Resources Research Fund, Canberra, August.

Grynberg, R. (2003), "WTO Fisheries Subsidies Negotiations: Implications for Fisheries Access Arrangements and Sustainable Management", *Marine Policy*, vol. 27, pp. 499-511.

Hannesson, R. (2000), "A Note on ITQs and Optimal Investment" *Journal of Environmental Economics and Management*, Vol. 40, pp. 181–88.

Hannesson, R. (2001), "Effects of liberalizing trade in fish, fishing vessels and investment in fishing vessels", OECD Papers Offprint No. 8, Paris.

Hannesson, R. (2002), *The Development of Economic Institutions in World Fisheries*, Background Paper for the World Development Report 2003, World Bank, Washington DC.

Hansen, T. (1979): "The Relationship between Aggregate Costs, Employment and Cargo Capacity of the Norwegian Purse Seiner Fleet". *Scandinavian Journal of Economics.*

Hatcher, A. (1999) "The European Community's Structural Policy for the Fishing Industry", in A. Hatcher and K. Robinson (eds.), *Overcapacity, Overcapitalization and Subsidies in European Fisheries*, CEMARE Misc. Publication No. 44, University of Portsmouth, pp. 50-68.

Hatcher, A. and K. Robinson (eds) (1999), *Overcapacity, Overcapitalization and Subsidies in European Fisheries*, CEMARE Misc. Publication No. 44, University of Portsmouth.

Hermansen, O. and O. Flaaten, *Government Financial Transfers to the Fish Harvesting, Processing and Aquaculture Industries, Norway, 1990-2002*, NORUT Samfunnsforskning AS Rapport nr SF 09/2004.

Holland, D., E. Guðmundsson and J. Gates (1999), "Do Fishing Vessel Buyback Programs Work? A Survey of the Evidence", *Marine Policy*, Vol. 23, No. 1, pp. 47-69.

Lee, J.O. (2005), "Korean Government's Policy Dilemma in Abolishing Fisheries Subsidies", paper presented to the 2nd Korea Council of Economic and Social Research Institutes - OECD Seminar on Korean Economic Issues, Paris, 3-4 February.

Lehtonen, M. (2004), "The Environmental-Social Interface of Sustainable Development: Capabilities, Social Capital and Institutions", *Ecological Economics*, Vol. 49, pp. 199-214.

Mardle, S. and S. Pascoe (2003), *Multiple Objectives in the Management of EU Fisheries: The Methodology*, CEMARE Report No. 63, University of Portsmouth, UK.

Markandya, A. and JU. Richardson (eds) (1992), *The Earthscan Reader in Environmental Economics*, Earthscan, London.

Milazzo, M. (1998), *Subsidies in World Fisheries: A Re-Examination*, World Bank Technical Paper No. 406, Washington.

Munro, G.R. and U.R. Sumaila (2001), “Subsidies and their potential impact on the management of the ecosystems of the North Atlantic”, in T. Pitcher, U.R. Sumaila and D. Pauly (eds), *Fisheries Impacts on North Atlantic Ecosystems: Evaluations and Policy Explorations*, University of British Columbia Fisheries Centre Research Report 9(5), Vancouver, pp. 10-27.

Myers, N. and J. Kent (2001), *Perverse Subsidies: How Tax Dollars Can Undercut the Environment and the Economy*, Island Press, Washington.

OECD (2000): "The Impact on Fisheries Resource Sustainability of Government Financial Transfers". OECD, Paris.

OECD (2000), *Transition to Responsible Fisheries: Economic and Policy Implications*, OECD, Paris.

OECD (2001), *Final Communiqué, OECD Council at Ministerial Level*, 17th May, Paris.

OECD (2001), *Sustainable Development: Critical Issues*, OECD, Paris.

OECD (200), *Final Communiqué, OECD Council at Ministerial Level*, 16th May, Paris.

OECD (2003a), *The Costs of Managing Fisheries*, OECD, Paris.

OECD (2003b), *Liberalising Fisheries Markets: Scope and Effects*, OECD, Paris.

OECD (2005), *Review of Fisheries in OECD Countries: Country Statistics 2001-2003*, OECD, Paris.

Porter, G. (1998), *Fisheries Subsidies, Overfishing and Trade*, United Nations Environment Programme, Geneva.

Porter, G. (2002), *Fisheries Subsidies and Overfishing: Towards a Structured Discussion*, United Nations Environment Programme, Geneva.

Schrank, W.E. (2002): The North Atlantic Cod Fisheries of Norway, Iceland and Newfoundland: Management, Buyback Programs and Subsidies. Paper Prepared for the World Wildlife Fund - United States.

Schrank, W.E. (2003): Introducing Fisheries Subsidies. Paper prepared for the FAO, February 2003.

Schrank, W.E., R. Arnason and R. Hannesson (eds) (2003): *The Cost of Fisheries Management*. Ashgate, Aldershot.

Sneddon, C., R.B. Howarth and R.B. Norgaard (2005), “Sustainable Development in a Post-Brundtland World”, *Ecological Economics*, vol. xx, No. xx, pp. xx-xx.

Steenblik, R.P. (2003), “Subsidy Measurement and Classification: Developing a Common Framework”. In *Environmentally Harmful Subsidies*: *Policy Issues and Challenges,* Organisation for Economic Cooperation and Development (OECD), Paris.

Steenblik, R.P. and P.F. Wallis (2001), "Subsidies to marine capture fisheries: the international information gap", in *Fishing in the Dark: A Symposium on Access to Environmental Information and Government Accountability in Fishing Subsidy Programmes*, held in Brussels 28-29 November 2000, World Wildlife Fund, Endangered Seas Campaign, Washington DC, pp. 17-39.

Stone, C. (1997), "Too many fishing boats, too few fish: can trade laws trim subsidies and restore the balance in global fisheries?", *Ecology Law Quarterly*, Vol. 24, pp. 505-44.

United Kingdom Cabinet Office (2004), *Net Benefits: A Sustainable and Profitable Future for UK Fishing*, Prime Minister's Strategy Unit, March.

UNEP (United Nations Environment Programme) (2002): *Integrated Assessment of Trade Liberalization and Trade-Related Policies: A country Study on the Fisheries Sector in Senegal*. United Nations Environmental Programme, New York and Geneva.

UNEP (United Nations Environment Programme) (2004a), *Analyzing the Resource Impact of Fisheries Subsidies: A Matrix Approach*, UNEP/ETB/2004/10, Geneva.

UNEP (United Nations Environment Programme) (2004b), *Incorporating Resource Impact into Fisheries Subsidies Disciplines: Issues and Options: A Discussion Paper*, UNEP/ETB/2004/10, Geneva.

Van Beers, C. and A. de Moor (2001), *Public Subsidies and Policy Failures: How Subsidies Distort the Natural Environment, Equity and Trade, and How to Reform Them*, Edward Elgar, Cheltenham UK.

Weber, M.L. (undated): Effects of Japanese Government Subsidies of Distant Water Tuna Fleets, in *Subsidies and Depletion of World Fisheries*, World Wildlife Fund, pp. 119-135.

WCED (World Commission on Environment and Development) (1987), *Our Common Future*, Oxford University Press, Oxford.

WWF (World Wide Fund for Nature) (2001a), *Hard Facts, Hidden Problems: A Review of Current Data on Fishing Subsidies*, WWF Technical Paper, Washington.

WWF (World Wide Fund for Nature) (2001b), *Fishing in the Dark: A Symposium on Access to Environmental Information and Government Accountability in Fishing Subsidy Programmes*, Proceedings of a Workshop held in Brussels 28-29 November 2000, WWF, Washington DC.

WWF (World Wide Fund for Nature) (2004), *Healthy Fisheries, Sustainable Trade: Crafting New Rules on Fishing Subsidies in the World Trade Organization*, WWF Position Paper and Technical Resource, Washington DC.

WTO (World Trade Organisation) 1999, "Agreement on Subsidies and Countervailing Measures", in *the Legal Texts: The Results of the Uruguay Round of Multilateral Trade Negotiations*, Cambridge University Press, Cambridge, pp. 231–74.

WTO (World Trade Organisation) 2001,

WTO (2004a), "Summary report of the Meeting Held on 26 and 28 April 2004", Negotiating Group on Rules, TN/RL/M/14, 18 May.

WTO (2004b), "Summary report of the Meeting Held on 28 September 2004", Negotiating Group on Rules, TN/RL/M/18, 15 October.

Wyatt, N. (2003), "Cost Recovery in Fisheries: The New Zealand Experience", in Schrank, W.E., R. Arnason and R. Hannesson (eds) (2003): *The Cost of Fisheries Management*. Ashgate, Aldershot.261-276.

Annex I.1

Historical Data 1996 - 2003

These data are for government financial transfers to the marine capture fisheries in OECD countries and exclude transfers to the aquaculture and processing sectors. The data have been obtained from the annual statistical returns from OECD Member countries. In some cases, gaps in the data for particular years have been filled by OECD Secretariat estimates.

AUSTRALIA

	1996e	1997e	1998e	1999e	2000e	2001e	2002e	2003e
	Total	Total	Total	Total	Total	Total	Total	Total
AUD thousand								
Marine Capture Fisheries	98 400	111 800	110 000	114 900	119 330	124 250	136 367	125 160
Direct Payments		6 700				2 140		
Cost Reducing Transfers	88 000	90 000	92 000	95 000	97 430	98 010	101 480	98 000
General Services	37 900	39 000	41 000	42 900	44 900	47 100	56 887	49 160
Cost Recovery Charges	-27 500	-23 900	-23 000	-23 000	-23 000	-23 000	-22 000	-22 000
USD thousand								
Marine Capture Fisheries	76 875	82 815	69 182	74 129	68 977	64 046	74 113	81 273
Direct Payments		4 963				1 103		
Cost Reducing Transfers	68 750	66 667	57 862	61 290	56 318	50 521	55 152	63 636
General Services	29 609	28 889	25 786	27 677	25 954	24 278	30 917	31 922
Cost Recovery Charges	-21 484	-17 704	-14 465	-14 839	-13 295	-11 856	-11 957	-14 286

e Includes OECD estimates for some data.

BELGIUM

	1996	1997	1998e	1999	2000	2001	2002	2003
	Total	Total	Total	Total	Total	Total	Total	Total
EUR thousand								
Marine Capture Fisheries	3 926	4 354	4 200	4 100	8 143	4 870	3 177	3 670
Direct Payments			2 500	2 400	6 443	3 170	1 477	1 070
Cost Reducing Transfers	2 380	2 639						900
General Services	1 546	1 716	1 700	1 700	1 700	1 700	1 700	1 700
Cost Recovery Charges								
USD thousand								
Marine Capture Fisheries	4 969	4 948	4 719	4 362	7 471	4 348	2 997	4 124
Direct Payments			2 809	2 554	5 911	2 830	1 393	1 202
Cost Reducing Transfers	3 012	2 999						1 011
General Services	1 957	1 950	1 910	1 809	1 560	1 518	1 604	1 910
Cost Recovery Charges								

e Includes OECD estimates for some data.

CANADA

	1996	1997e	1998e	1999	2000	2001	2002	2003
	Total	Total	Total	Total	Total	Total	Total	Total
CAD thousand								
Marine Capture Fisheries	693 870	552 800	559 150	740 000	712 500	749 400	728 900	733 000
Direct Payments	462 800	343 700	316 250	463 300	315 600	330 800	321 200	362 600
Cost Reducing Transfers	23 180	24 600	31 550	38 500	103 100	112 900	81 800	47 600
General Services	255 630	234 000	258 050	282 100	341 800	354 800	374 600	372 800
Cost Recovery Charges	-47 740	-49 500	-46 700	-43 900	-48 000	-49 100	-48 700	-50 000
USD thousand								
Marine Capture Fisheries	510 199	397 698	377 804	496 644	478 188	483 484	464 268	523 571
Direct Payments	340 294	247 266	213 682	310 940	211 812	213 419	204 586	259 000
Cost Reducing Transfers	17 044	17 698	21 318	25 839	69 195	72 839	52 102	34 000
General Services	187 963	168 345	174 358	189 329	229 396	228 903	238 599	266 286
Cost Recovery Charges	-35 103	-35 612	-31 554	-29 463	-32 215	-31 677	-31 019	-35 714

e Includes OECD estimates for some data.

DENMARK

	1996	1997	1998	1999	2000	2001e	2002	2003
	Total	Total	Total	Total	Total	Total	Total	Total
DKK thousand								
Marine Capture Fisheries	497 470	541 400	606 400	420 700	368 900	558 850	703 900	603 485
Direct Payments	71 700	132 700	229 300	72 900	50 700	207 400	364 100	188 498
Cost Reducing Transfers		2 000	2 200					
General Services	425 770	406 700	374 900	347 800	333 900	351 450	383 791	414 987
Cost Recovery Charges								
USD thousand								
Marine Capture Fisheries	85 771	82 030	90 507	60 272	45 600	67 169	89 327	91 715
Direct Payments	12 362	20 106	34 224	10 444	6 627	24 928	46 206	28 647
Cost Reducing Transfers		303	328					
General Services	73 409	61 621	55 955	49 828	39 333	42 242	43 122	63 068
Cost Recovery Charges								

e Includes OECD estimates for some data.

FINLAND[a]

	1996	1997	1998	1999	2000	2001	2002	2003
	Total	Total	Total	Total	Total	Total	Total	Total
EUR thousand								
Marine Capture Fisheries	22 894	23 054	23 929	12 969	12 155	15 765	14 805	17 908
Direct Payments	1 912	1 943	1 496	212	54			1 700
Cost Reducing Transfers	2 839	2 969	3 512	5 002	4 395	5 770	3 559	3 377
General Services	18 142	18 142	18 922	7 755	7 707	9 995	11 246	12 831
Cost Recovery Charges								
USD thousand								
Marine Capture Fisheries	28 979	26 197	26 887	13 797	11 152	14 076	13 967	20 121
Direct Payments	2 421	2 207	1 680	225	49			1 910
Cost Reducing Transfers	3 594	3 373	3 946	5 321	4 032	5 152	3 358	3 794
General Services	22 965	20 616	21 261	8 250	7 070	8 924	10 609	14 417
Cost Recovery Charges								

a. This table shows the main elements of transfers associated with the Common Fisheries Policy and Finland's fishery policies (including those to Aland County), and is not necessarily comprehensive. With the exception of general services, the figures refer to the amount paid out to the beneficiaries.

FRANCE

	1996	1997	1998e	1999	2000	2001	2002	2003
	Total	Total	Total	Total	Total	Total	Total	Total
EUR thousand								
Marine Capture Fisheries	124 981	123 911	89 616	67 365	170 300	143 800	152 600	159 100
Direct Payments	19 797	19 797	10 629	1 460	54 300	26 600	22 200	23 100
Cost Reducing Transfers	12 043	12 043			9 500	15 700	15 000	10 600
General Services	93 140	92 070	78 988	65 905	106 500	101 500	115 400	125 400
Cost Recovery Charges								
USD thousand								
Marine Capture Fisheries	158 203	140 807	100 692	71 665	156 239	128 393	143 962	178 764
Direct Payments	25 060	22 497	11 942	1 553	49 817	23 750	20 943	25 955
Cost Reducing Transfers	15 245	13 685			8 716	14 018	14 151	11 910
General Services	117 889	104 625	88 750	70 112	97 706	90 625	108 868	140 899
Cost Recovery Charges								

e Includes OECD estimates for some data.

GERMANY

	1996	1997	1998e	1999e	2000e	2001	2002	2003e
	Total	Total	Total	Total	Total	Total	Total	Total
EUR thousand								
Marine Capture Fisheries	64 438	55 629	67 474	70 351	75 259	78 141	40 614	41 500
Direct Payments	14 930	6 954	6 187	5 266	869	1 074	600	2 000
Cost Reducing Transfers	2 914	2 372	8 487	6 084	8 590	4 602	4 500	4 500
General Services	46 594	46 303	52 800	59 000	65 800	72 466	35 514	35 000
Cost Recovery Charges								
USD thousand								
Marine Capture Fisheries	81 567	63 214	75 814	74 841	69 045	69 769	38 315	46 629
Direct Payments	18 898	7 902	6 951	5 6012	797	959	566	2 247
Cost Reducing Transfers	3 689	2 696	9 536	6 473	7 880	4 109	4 245	5 056
General Services	58 980	52 617	59 326	62 766	60 367	64 702	33 504	39 326
Cost Recovery Charges								

e Includes OECD estimates for some data.

GREECE

	1996	1997	1998	1999	2000	2001	2002	2003
	Total	Total	Total	Total	Total	Total	Total	Total
EUR thousand								
Marine Capture Fisheries	41 323	41 323	23 947	40 448	68 044	71 487	88 001	105 378
Direct Payments	10 079	10 079	10 266	27 014	19 249	17 925	14 086	48 244
Cost Reducing Transfers			12 359	12 068	15 903	15 729	23 532	18 463
General Services	31 244	31 244	1 323	1 366	32 892	37 833	50 383	38 671
Cost Recovery Charges								
USD thousand								
Marine Capture Fisheries	52 307	46 958	26 907	43 030	62 425	63 828	83 020	118 402
Direct Payments	12 758	11 453	11 535	28 738	17 659	16 004	13 288	54 207
Cost Reducing Transfers			13 886	12 839	14 590	14 044	22 200	20 745
General Services	39 549	35 504	1 486	1 454	30 176	33 779	47 531	43 451
Cost Recovery Charges								

IRELAND

	1996	1997	1998e	1999e	2000e	2001e	2002e	2003e
	Total	Total	Total	Total	Total	Total	Total	Total
EUR thousand								
Marine Capture Fisheries	89 012	87 013	99 391	111 055	95 523	79 992	64 460	60 810
Direct Payments	4 198	3 912	2 908	1 905	2 656	3 408	4 160	5 710
Cost Reducing Transfers	2 273	2 286	3 000	3 000	3 000	3 000	3 000	3 000
General Services[1]	82 541	80 816	93 483	106 150	89 867	73 584	57 300	52 100
Cost Recovery Charges								
USD thousand								
Marine Capture Fisheries	112 673	98 879	111 675	118 143	87 636	71 421	60 811	62 326
Direct Payments	5 314	4 446	3 268	2 026	2 437	3 043	3 925	6 416
Cost Reducing Transfers	2 877	2 597	3 371	3 191	2 752	2 679	2 830	3 371
General Services[1]	104 482	91 836	105 037	112 926	82 447	65 700	54 057	58 539
Cost Recovery Charges								

e Includes OECD estimates for some data.

ITALY

	1996	1997	1998e	1999	2000	2001	2002	2003e
	Total	Total	Total	Total	Total	Total	Total	Total
EUR thousand								
Marine Capture Fisheries	128 474	80 795	108 274	135 753	163 753	259 482	127 904	132 128
Direct Payments	80 266	20 763	40 960	61 157	100 878	190 666	99 043	112 846
Cost Reducing Transfers	3 822	4 028	5 888	7 747	7 747			
General Services	44 386	56 003	61 426	66 849	55 128	68 817	28 861	19 282
Cost Recovery Charges								
USD thousand								
Marine Capture Fisheries	162 625	91 812	121 656	75 469	150 232	231 681	120 664	148 458
Direct Payments	101 602	23 594	46 022	60 671	92 549	170 237	93 436	126 793
Cost Reducing Transfers	4 838	4 578	6 615		7 107			
General Services	56 185	63 640	69 018	14 798	50 576	61 444	15 310	21 665
Cost Recovery Charges								

e Includes OECD estimates for some data.

THE NETHERLANDS

	1996	1997	1998e	1999e	2000e	2001e	2002	2003
	Total	Total	Total	Total	Total	Total	Total	Total
EUR thousand								
Marine Capture Fisheries	31 542	31 547	31 547	31 547	1 092	11 768	13 190	5 498
Direct Payments	3 512	3 512	3 512	3 512	92	11 018	9 745	3 814
Cost Reducing Transfers								
General Services	28 030	28 035	28 035	28 035	1 000	750	3 445	1 684
Cost Recovery Charges								
USD thousand								
Marine Capture Fisheries	39 927	35 849	35 446	33 560	1 002	10 507	12 443	6 178
Direct Payments	4 446	3 991	3 946	3 736	84	9 838	9 193	4 285
Cost Reducing Transfers								
General Services	35 841	31 857	31 499	29 824	917	670	3 250	1 892
Cost Recovery Charges								

e Includes OECD estimates for some data.

PORTUGAL

	1996	1997	1998e	1999	2000	2001	2002	2003
	Total	Total	Total	Total	Total	Total	Total	Total
EUR thousand								
Marine Capture Fisheries	56 759	57 268	38 052	26 954	27 879	28 074	26 392	23 902
Direct Payments	27 822	27 822	15 270	2 718	1 841	964	570	583
Cost Reducing Transfers								
General Services	28 937	29 446	22 781	24 236	26 039	27 109	25 822	23 319
Cost Recovery Charges								
USD thousand								
Marine Capture Fisheries	71 846	65 077	42 755	28 675	25 577	25 066	24 898	26 856
Direct Payments	35 218	31 616	17 158	2 892	1 689	164	538	655
Cost Reducing Transfers								
General Services	36 638	33 461	25 597	25 783	23 889	22 658	24 361	26 201
Cost Recovery Charges								

e Includes OECD estimates for some data.

SPAIN

	1996	1997	1998	1999	2000	2001	2002	2003
	Total	Total	Total	Total	Total	Total	Total	Total
EUR thousand								
Marine Capture Fisheries	194 715	303 231	264 010	278 683	311 400	301 443	197 989	448 387
Direct Payments	131 129	179 995	92 930	67 176	118 248	101 431	56 666	248 868
Cost Reducing Transfers	30 215	70 715	113 649	156 416	142 786	127 546	69 498	96 037
General Services	33 370	52 521	57 432	55 092	50 366	72 466	71 826	103 482
Cost Recovery Charges								
USD thousand								
Marine Capture Fisheries	246 475	344 581	296 641	296 472	285 688	269 145	186 782	503 806
Direct Payments	165 987	104 540	104 416	71 464	108 484	90 563	53 458	279 627
Cost Reducing Transfers	38 247	80 358	127 695	166 400	130 996	113 881	65 564	107 907
General Services	42 241	59 683	64 530	58 608	46 208	64 702	67 760	116 272
Cost Recovery Charges								

SWEDEN

	1996	1997	1998	1999	2000	2001	2002	2003
	Total	Total	Total	Total	Total	Total	Total	Total
SEK thousand								
Marine Capture Fisheries	418 170	407 840	214 330	219 248	193 300	196 300	225 100	247 600
Direct Payments	122 500	65 420	29 600	34 952	7 800	900	49 200	27 000
Cost Reducing Transfers					21 600	34 300	11 100	17 800
General Services	295 670	342 420	184 730	184 296	163 900	161 100	164 800	202 800
Cost Recovery Charges								..
USD thousand								
Marine Capture Fisheries	62 230	53 452	26 960	26 543	21 103	18 985	23 158	30 644
Direct Payments	18 256	8 574	3 723	4 231	852	87	5 062	3 342
Cost Reducing Transfers					2 358	3 317	1 142	2 203
General Services	44 064	44 878	23 236	22 312	17 893	15 580	16 955	25 099
Cost Recovery Charges								

UNITED KINGDOM [a]

	1996	1997	1998	1999	2000	2001	2002e	2003e
	Total	Total	Total	Total	Total	Total	Total	Total
GBP thousand								
Marine Capture Fisheries	73 830	78 120	54 500	47 100	45 800	45 369	1 295	1 807
Direct Payments	10 200	14 000						
Cost Reducing Transfers	4 000	2 200	4 700	3 400	2 000	1 669	204	103
General Services	59 630	61 920	49 800	43 700	43 800	43 700	43 091	42 894
Cost Recovery Charges							0	0
USD thousand								
Marine Capture Fisheries	115 359	128 066	90 833	75 968	69 394	65 752	64 619	70 487
Direct Payments	15 938	22 951						
Cost Reducing Transfers	6 250	3 607	7 833	5 484	3 030	2 419	304	169
General Services	93 172	101 508	83 000	70 484	66 364	63 333	64 315	70 318
Cost Recovery Charges								

a. This table shows the main elements of support (combining the EU and UK contributions), and is not necessarily comprehensive. e Includes OECD estimates for some data.

ICELAND

	1996	1997	1998	1999	2000	2001	2002	2003
	Total	Total	Total	Total	Total	Total	Total	Total
ISK million								
Marine Capture Fisheries	2 757	2 573	2 630	2 556	2 420	2 652	2 513	2 741
Direct Payments								
Cost Reducing Transfers	1 466	1 284	1 206	1 162	1 233	1 221	1 216	1 267
General Services	1 453	1 461	1 424	1 586	2 077	2 548	2 492	2 644
Cost Recovery Charges[1]	-162	-172		-192	-890	-1 117	-1 195	-1 170
USD thousand								
Marine Capture Fisheries	41 345	36 253	36 954	35 289	30 691	27 153	27 437	35 741
Direct Payments								
Cost Reducing Transfers	21 982	18 092	16 945	16 043	15 637	12 501	13 277	16 521
General Services	21 789	20 585	20 008	21 897	26 341	26 088	27 208	34 476
Cost Recovery Charges[1]	-2 246	-2 424		-2 651	-11 287	-11 436	-13 047	-15 256

1. Cost recovery to the Directorate of Fisheries. Example: Quota holders pay annually a fishing inspection fee. Vessels owners pay for transfers of quota between vessels etc.

JAPAN

	1996	1997	1998	1999	2000	2001	2002	2003
	Total	Total	Total	Total	Total	Total	Total	Total
JPY million								
Marine Capture Fisheries	346 740	356 440	279 574	289 000	308 806	307 612	291 031	268 014
Direct Payments	3 000	3 000		3 000	2 050	2 050	3 393	2 101
Cost Reducing Transfers	2 940	2 640		4 000	4 043	3 909	3 806	2 963
General Services	340 800	350 800	279 574	282 000	302 713	301 653	283 832	262 950
Cost Recovery Charges								
USD thousand								
Marine Capture Fisheries	3 186 363	2 954 785	2 135 946	2 537 536	2 863 557	2 532 203	2 323 601	2 311 661
Direct Payments	27 568	24 793		26 341	19 010	16 875	27 090	18 121
Cost Reducing Transfers	27 017	21 818		35 122	37 491	32 178	30 387	25 556
General Services	3 131 777	2 899 174	2 135 946	2 476 073	2 807 057	2 483 149	2 266 124	2 267 983
Cost Recovery Charges								

KOREA

	1996	1997	1998	1999	2000	2001	2002	2003
	Total	Total	Total	Total	Total	Total	Total	Total
KRW million								
Marine Capture Fisheries	295 860	360 238	296 800	532 400	352 500	531 800	602 310	589 867
Direct Payments	16 250	28 430	30 900	236 900	33 300	254 500	98 911	20 853
Cost Reducing Transfers	51 900	60 270	42 300	61 600	76 700	60 300	85 537	72 047
General Services	227 710	271 538	223 600	233 900	242 500	217 000	417 862	496 967
Cost Recovery Charges								
USD thousand								
Marine Capture Fisheries	367 703	378 994	211 927	448 635	311 781	412 117	481 444	495 287
Direct Payments	20 201	29 910	22 064	199 628	29 453	197 224	79 062	17 509
Cost Reducing Transfers	64 519	63 408	30 204	51 908	67 840	46 729	68 372	60 495
General Services	283 074	285 676	159 660	197 100	214 488	168 164	334 009	417 283
Cost Recovery Charges								

MEXICO

	1996	1997	1998e	1999e	2000e	2001e	2002e	2003e
	Total	Total	Total	Total	Total	Total	Total	Total
MXN thousand								
Marine Capture Fisheries	107 930	133 120	152 696	178 146	195 765	207 511	219 256	231 667
Direct Payments								
Cost Reducing Transfers								
General Services	107 930	133 120	152 696	178 146	195 765	207 511	219 256	231 667
Cost Recovery Charges								
USD thousand								
Marine Capture Fisheries	14 201	16 808	16 688	18 654	20 716	22 217	22 697	21 471
Direct Payments								
Cost Reducing Transfers								
General Services	14 201	16 808	16 688	18 654	20 716	22 217	22 697	21 471
Cost Recovery Charges								

e Includes OECD estimates for some data.

NEW ZEALAND

	1996	1997	1998	1999	2000	2001	2002	2003
	Total	Total	Total	Total	Total	Total	Total	Total
NZD thousand								
Marine Capture Fisheries	22 000	26 000	19 000	25 000	33 000	36 000	41 000	32 000
Direct Payments								
Cost Reducing Transfers								
General Services	54 000	61 000	55 000	56 000	60 000	65 000	72 000	66 000
Cost Recovery Charges	-32 000	-35 000	-36 000	-31 000	-27 000	-29 000	-31 000	-34 000
USD thousand								
Marine Capture Fisheries	15 172	17 219	10 160	13 228	15 000	15 126	18 981	18 605
Direct Payments								
Cost Reducing Transfers								
General Services	37 241	40 397	29 412	29 630	27 273	27 311	33 333	38 372
Cost Recovery Charges	-22 069	-23 179	-19 251	-16 402	-12 273	-12 185	-14 352	-19 767

NORWAY[a]

	1996	1997	1998	1999	2000	2001	2002b	2003b
	Total	Total	Total	Total	Total	Total	Total	Total
NOK thousand								
Marine Capture Fisheries	1 115 600	1 155 500	1 155 500	1 411 500	920 161	894 189	1 240 454	1 006 941
Direct Payments	37 900	22 700	49 000	92 000	14 000	83 300	19 800	31 400
Cost Reducing Transfers	383 800	438 900	262 000	413 000	158 000	71 698	63 572	89 285
General Services	693 900	693 900	844 500	906 500	748 161	739 191	1 157 082	886 256
Cost Recovery Charges								
USD thousand								
Marine Capture Fisheries	172 693	163 437	153 046	180 962	104 564	99 464	155 250	142 223
Direct Payments	5 867	3 211	6 490	11 795	1 591	9 266	2 478	4 435
Cost Reducing Transfers	59 412	62 079	34 702	52 949	17 955	7 795	7 956	12 611
General Services	107 415	98 147	111 854	116 218	85 018	82 224	144 816	125 177
Cost Recovery Charges								

a. The table shows the main transfers, and is not comprehensive. b. Data for 2002 and 2003 are provisional.

POLAND

	1996	1997	1998e	1999e	2000e	2001e	2002e	2003e
	Total	Total	Total	Total	Total	Total	Total	Total
PLN thousand								
Marine Capture Fisheries	22 000	26 000	29 079	31 132	34 211	35 921	36 605	37 303
Direct Payments								
Cost Reducing Transfers								
General Services	22 000	26 000	29 079	31 132	34 211	35 921	36 605	37 303
Cost Recovery Charges								
USD thousand								
Marine Capture Fisheries	8 148	7 927	8 332	7 862	7 868	8 761	8 972	9 589
Direct Payments								
Cost Reducing Transfers								
General Services	8 148	7 927	8 332	7 862	7 868	8 761	8 972	9 589
Cost Recovery Charges								

e Includes OECD estimates for some data.

TURKEY[a]

	1996	1997	1998e	1999e	2000	2001	2002	2003
	Total	Total	Total	Total	Total	Total	Total	Total
TRL million								
Marine Capture Fisheries	2 329 890	2 291 140	1 079 750	1 135 000	15 965 000	20 966 000	22 700 000	29 005 000
Direct Payments								
Cost Reducing Transfers	31 890	166 140						
General Services	2 298 000	2 125 000	1 079 750	1 135 000	15 965 000	20 966 000	22 700 000	29 005 000
Cost Recovery Charges								
USD thousand								
Marine Capture Fisheries	28 655	15 114	4 145	2 709	25 572	17 070	15 010	19 304
Direct Payments								
Cost Reducing Transfers	392	1 096						
General Services	28 272	14 018	4 145	2 709	25 572	17 070	15 010	19 304
Cost Recovery Charges								

a. Data refer to the budget of the Ministry of Agriculture and Rural Affairs. e Includes OECD estimates for some data.

UNITED STATES

	1996	1997	1998	1999	2000	2001	2002	2003
	Total	Total	Total	Total	Total	Total	Total	Total
USD thousand								
Marine Capture Fisheries[1]	546 210	626 980	663 800	1 084 400	805 130	875 940	1 130 810	1 290 440
Direct Payments		59 700	54 800	120 700	66 800	49 900	81 280	175 600
Cost Reducing Transfers	250	19 000	13 000	12 300	12 250	51 800	3 500	3 500
General Services	545 960	548 280	596 000	584 100	726 080	774 240	1 046 030	1 111 340
Cost Recovery Charges								

1 The United States changed the budget structure in FY 2002. This results in a break in the details of the categories between the period prior to and post 2002.

PART II

ANALYSING THE PILLARS OF SUSTAINABLE DEVELOPMENT IN FISHERIES

Chapter 5

The Economic Effects of Transfers to the Fisheries Sector[1]

This chapter reviews the economic effects of government financial transfers. Using a model of fisheries, it applies a matrix approach to determine the effects of transfers under different combinations of management parameters (including whether or not there are property rights over the resource and whether catch or effort controls are used).

The analysis found that transfers serve to raise the net incomes of participants in the fishing industry and distort the prices and costs facing fishers. This can lead to economic inefficiency in the sector and distorts decision-making by fishers with adverse impacts on investment and operational aspects of the sector. Transfers will tend to artificially attract human and capital resources to the sector where they will likely lead to a lower return than if the resources had been employed in the wider economy, leading to a deadweight loss for society.

The type of management system in place will determine the extent to which the economic distortions affect incentives and decision making by fishers. The effectiveness with which the management is enforced will have an equally important role in determining the effects of transfers.

Discussions of transfers or subsidies often arouse controversy, even to the point of disagreement on the definition of the term.[2] Such disagreements are often rooted in opposite interests. Subsidies benefit some but harm others. Fishers benefit, or are meant to benefit, from subsidies in the fishing industry, but the costs are borne by taxpayers at large. Subsidies may affect trade flows and cause harm to one party and benefit another. Subsidies need not be explicit in the sense of sums of money being budgeted and paid out to easily identified recipients; there are many economic measures that have the same effect without any explicit payments from government budgets. Such implicit or "hidden" subsidies are almost bound to be controversial and to give rise to disputes as to

1. This chapter was prepared by Mr. Rögnvaldur Hannesson from the Centre for Fisheries Economics, The Norwegian School of Economics and Business Administration. The views expressed in the chapter are those of the author and do not necessarily reflect the views of the OECD or its Member countries.

2. As discussed in Chapter 2, the terms subsidies and transfers are often used interchangeably. In this chapter, the term, subsidies, has been used by the author.

appropriate definitions. Those who benefit from subsidies will be prone to seek narrow definitions of subsidies while those who are harmed will take the opposite position.

It is appropriate, therefore, at the outset to emphasize that subsidies are neither good nor bad in and of themselves. Their effects may be helpful or harmful, depending on the circumstances in each particular case. Economic theory provides examples both of helpful and harmful subsidies and provides arguments for or against subsidies on the basis of the merits of each case. Economic theory supports the use of subsidies where markets would undersupply a particular good or service. This happens for public goods, which typically are supplied or paid for by governments (although this would not ordinarily be called subsidies).[3] It happens as well for goods or services which have positive spillover effects, such as education, health care, and many others. Such goods and services are sometimes fully provided for by governments, and in other cases governments pay a part of the costs, *i.e.*, subsidise. On the other hand there are goods or services with harmful spillover effects. Such goods should be taxed (negatively subsidised), as they would otherwise be too generously supplied by the market. Examples are industrial production causing pollution and open access fisheries which tend to expand further than they ought to do, depleting fish stocks and possibly causing fish production to decline.

For the purpose of the discussion in this paper, let us clarify what we mean by subsidies. A subsidy is an undertaking by the government which increases the profitability of the production of a commodity or service over and above what it would be in unregulated market transactions, or if the government applied its ordinary rules to the industry or firm involved. Usually this means a transfer of money; a government makes payments that in some way are conditional on the activity one seeks to support. The payment may be a bonus on the volume of production or a rebate of some costs of production. In any event, the outcome is to raise the profitability of the activity in question over and above what it would otherwise be. The purpose is to raise the incomes of those who work in the industry or firm in question or to increase the volume of production. The latter could be a part of an industrial or trade strategy.

Direct transfers of money need not be involved, however. If the government underprices its own services, or applies a more lenient tax regime than it ordinarily does, the outcome is exactly the same as if it had applied normal fees and taxes and instead handed over money. These are often referred to as hidden or indirect subsidies, as they are not directly observable from government budgets. A great deal of analytical and "detective" work may be required in order to unearth such subsidies.

Establishing what a government "ordinarily" does can, needless to say, invite disagreement on whether there is a subsidy or not, as this may involve an element of judgment. In the case of tax rebates the matter is probably quite clear, but what are we to make of grants or payments for infrastructure like fishing harbors, navigation equipment, and suchlike? Governments pay for much infrastructure on land which benefits land based industries, so why should it not do the same for activities that take place at sea? Infrastructure which is exclusive for fisheries can be seen as comparable to logging roads

3. Public goods are goods which can be used simultaneously by many individuals without interfering with one another, such as (uncongested) highways, navigation equipment like lighthouses and GPS, etc. Often it is difficult to collect payments from those who use such goods, which is why they tend to be undersupplied. Merit goods are such as are deemed to have utility beyond that which the individual derives from them, such as education and vaccination, and they are typically financed, partly or wholly, by governments

on land, which the logging companies typically would have to provide themselves. Much, and perhaps most, infrastructure for fishing activities is also useful, however, for general navigation including recreational interests and may in fact have been put in place primarily for activities unrelated to fisheries even if useful for the latter. Again we see that it can be difficult to draw an unambiguous line between what should and what should not be paid for by government.

General international practice can also affect what would be appropriately regarded as subsidies. The cost of fisheries management--stock assessment, biological research, catch monitoring and rule enforcement--has typically been paid for by governments. Recently some countries have begun to recover some of the cost of these activities from the industry, or to have the industry undertake them at its own expense, on the grounds that the industry is the main beneficiary. These governments have begun to argue that paying for these activities with public money in fact amounts to subsidization. If this practice becomes widespread it is possible and indeed likely that this will become the prevailing view in the international arena.

Different Types of Subsidies

Subsidies can be classified in various ways, such as whether they imply budgetary outlays or not, and to what kind of activities they are targeted. In this paper we will follow the latter approach and discuss subsidies targeted at the following:

- Fishery infrastructure
- Management, research and enforcement
- Access to other countries' waters
- Decommissioning of vessels and license retirement
- Labour retirement
- Subsidies of capital costs
- Subsidies of variable costs
- Income support and unemployment insurance
- Price subsidies
- Subsidies to fish processing and marketing

Fishery infrastructure has already been briefly mentioned. By fishery infrastructure we mean facilities which have the character of a public good; i.e., facilities that can be used by more than one firm simultaneously, such as fishing harbors, navigation equipment, rescue at sea operations, etc. The public good character need not be total; there can be congestion in fishing harbors, and the capacity of rescue at sea operations could be insufficient on certain occasions to meet all demands, but the point is that these activities benefit more than just a single company, unless that company is identical with the industry itself. Only lighthouses and navigation equipment such as GPS would seem to always have the characteristics of a public good.

As was also discussed above, much infrastructure used by fishing vessels is also used by other activities and often built primarily for such activities. The GPS-system was not designed for fishing activities, even if it has become extremely useful for fishers. Many harbor facilities are, on the other hand, primarily designed for fishing boats and hardly if at all used for other purposes.

The question whether the provision of such facilities free of charge for the fishing industry amounts to subsidization involves the following considerations:

- Do other activities (shipping, for example) pay for the use of such infrastructure? If they do, and the fisheries are exempt, this would clearly amount to a subsidy. Evaluating this subsidy could be difficult, however. Such user fees as might be involved need not be related to actual use of the infrastructure, which could be difficult to monitor (GPS, for example), but rather determined on the basis of simple rules of thumb. Exactly how to apply such rules to the fisheries compared to shipping for example, might be contentious.
- Is the infrastructure primarily used by the fishing fleet? If so, the fisheries would clearly be the main or perhaps exclusive beneficiary. Paying for this with public money would seem to amount to a subsidy for the industry as a whole. The question needs, however, to be seen in relation to government policy with regard to infrastructure in general. Governments typically provide such infrastructure as roads, which for land based activities fulfil a function somewhat analogous to fishing harbours and navigation equipment for the fisheries. Similarly, governments build airports and subsidise railroads. It would seem reasonable that the fishing industry should pay for the infrastructure it uses to the same extent as land based activities pay for infrastructure such as roads, railways and airports. Again, evaluating the subsidy element in a free use of fisheries infrastructure could be difficult, *inter alia* because governments are seldom entirely consistent in the user fee approach they take towards recovering the costs of roads, railways and airports.

Management, research and enforcement. The fisheries are somewhat unique in that they depend critically on resources (fish stocks) that are common to many firms. An efficient utilization of such common resources requires coordination and planning for the entire industry, or that part of the industry which utilizes a given fish stock. Furthermore, many fish stocks are shared between different sovereign states, implying that some questions of coordination and management must be resolved at the intergovernmental level.

Any successful fisheries management plan must be based on knowledge about the fish stocks involved and the ecosystem in which they are embedded. This requires research where better results can be obtained at an increasing cost, but probably with decreasing returns. The better the research the greater is the potential success of the fisheries management plan. Finally, the success of any fishery management plan requires monitoring of key activities of the industry and judicial proceedings if the rules and regulations are broken. Also here better results imply rising costs, with diminishing returns.

Traditionally, all the costs of fisheries management, research and enforcement have been paid for with public money. This is now beginning to change. Some governments, such as in Australia and New Zealand, recover a substantial part of these costs through user fees. In other countries, such as Canada and the United States, fisheries that have been put under individual fish quota regimes are required to pay the costs associated with these regimes.

It can be argued that paying the costs of fisheries management, research and enforcement amounts to a subsidization of the industry. The profits of the industry depend critically on how well the fishery is managed; as already stated, better management comes at a cost, and if it is worthwhile it should raise the profits of the industry by a greater amount than it increases costs. Good research of fish stocks and their environment is a part of good fisheries management; research in fisheries biology, marine ecology and oceanography is for the fishing industry what geology is for the oil companies. The oil companies have large and expensive research divisions in geology to evaluate their oil fields, and they pay large amounts of money for access to geological surveys of areas where they plan to make bids for extraction licenses. The difference between the fishing industry and the petroleum industry is that knowledge of the fish stocks and their environment is a public good (or a club good[4]) for the fishing industry while geological research is a private good for an oil company once it has acquired ownership of or extraction license for a given oil field. The similarity is that the fishing industry would gain from a better knowledge and management of fish stocks, but due to the public good character of fisheries research, any payment for these activities would have to be undertaken by the industry as a whole.

At the present time there is disagreement on whether or not paying for the cost of management, research and enforcement with public money amounts to subsidization of the industry. This is undoubtedly grounded in the varying practice of governments; few governments recover such costs from the industry on a significant scale. If, however, the opposite practice becomes widespread it is indeed likely that paying for these expenditures with public money will be generally regarded as subsidization.

Access to other countries' waters. Access to fishing in the exclusive economic zone of any given country is restricted to vessels flying that country's flag or to vessels which are explicitly authorized by the country in question. Sometimes countries may see their interests being better served by authorizing vessels from another country to fish in their zone than by doing so themselves. The benefits a country could perceive from allowing foreign fleets rather than its own vessels (or perhaps in addition to its own vessels) access to its economic zone could consist in explicit or implicit payments for the access, payments that its own fleet would not be in a position to make. In some cases distant water fishing nations have offered market access in exchange for fishing allowances, but in other cases monetary transfers have been involved. In some cases these subsidies are quite transparent; the European Union budgets for payments for access to other countries' economic zones, while in other cases the subsidies are implicit and hence more difficult to assess or even to identify. Country *X* may, for example, undertake to support activities in Country *Y* which are unrelated to fishing while it is understood (and perhaps never put on paper) that Country *X* will get access to fish in Country *Y*'s economic zone. Needless to say, such subsidies are difficult to assess or even to identify.

Decommissioning of vessels and license retirement. Several countries have paid grants to owners of fishing boats for removing them from a fishery. Sometimes a physical destruction of the vessel has been required. In other cases it has been acceptable to sell the boat out of the country granting the subsidy, and even to relocate the boat from a fishery affected by the program to another fishery. Such subsidies are transparent and identifiable, to the extent government accounts are transparent and detailed enough.

Labour retirement. If there is excess capacity in the fishing fleet, there will be too many people employed as well. Yet there appear to be much fewer examples of grants to labour to move out of the fishery. The reason may be greater mobility of labour than of capital "frozen" in the form of fishing boats; labour previously employed in fishing could be absorbed by many different industries whereas a fishing boat is not very useful for anything other than fishing. Such subsidies involve retraining of labour in order to

4. A club good is a public good (cf. definition in a previous footnote) which benefits only certain members of society, distinguished, for example, by occupation, like fishers.

facilitate the movement out of the fishery and into other occupations, or they may involve grants for permanent retirement. Again, such subsidies would be transparent and identifiable to the extent government accounts are transparent and detailed enough.

Subsidies of capital costs. Subsidies of this kind are widespread. Many countries have provided grants for building fishing boats or provided loans below the market rate of interest for the same purpose. Loan guarantees are another example, reducing the charge that the capital markets would otherwise make for risk. Grants could be given in the form of tax breaks, such as generous depreciation rules or tax exemptions for profits earmarked for investment in fishing boats.

Grants to boatbuilding and modernization of existing boats are usually fairly transparent, since they involve budgeted and disbursed sums of money. This also applies to grants in the form of lower rates of interest, as the difference is either paid explicitly or there are public institutions involved whose favorable interest rates can be compared with market interest rates for loans in a comparable risk class. Loan guarantees are more difficult to evaluate, since they do not necessarily involve any disbursement of money, but such guarantees reduce the risk lenders otherwise would face and hence the interest they would charge for providing the loan. Some detective work may be involved in finding even budgeted and disbursed grants; grants to boatbuilding might be provided to shipyards and not to fishing firms.

Subsidies to variable costs. Some governments have subsidised fishing costs other than capital costs, usually in the form of tax exemptions for certain cost items. Several countries have provided tax exemptions for the use of fuel in fishing. In Newfoundland bait has been subsidised by the government since early last century (Schrank 2003). Another example of subsidisation of variable costs is government financed insurance schemes, which presumably make a lower charge for risk than market based insurance would do. These subsidies are either identifiable disbursements or possible to calculate through revenues forgone (rate of tax exemption times the amount bought).

Income support and unemployment insurance. Income support can be targeted at capital owners or at labour, as well as both. Targeting income support to fishers has the effect of reducing the remuneration the industry would have to pay to fishers in order to prevent them from seeking the next-best occupation. Generous unemployment insurance schemes in seasonal fisheries make it easier for fishers to achieve an annual income comparable to other and less seasonal occupations and hence reduce the amount that a seasonal fishery has to offer to keep them employed in that industry. Income support can take the form of specific and generous tax rules for labour employed on fishing boats, again with the same effect.

In the shipping industry in many industrially developed countries (Norway, for example), the use of labour is subsidised by the government, both directly through special tax rules and through rebates given to the shipping companies. The purpose is to prevent the flagging of vessels to countries with low wages. This does not appear to be widespread in the fishing industry, probably because access of vessels with foreign flags to the exclusive economic zone is restricted. Conditions are different on the high seas, however, and fishing in this area is to some extent conducted with vessels under foreign flags and with crews from countries with low wages.

Price subsidies. Some governments have subsidised the price of fish, i.e., paid the industry a certain sum per kg. of fish, thereby raising the price received by fishers above the market price. This obviously boosts the revenues of the fishing firms and increases their profits. One particular form of a price subsidy is a guaranteed minimum price.

Subsidies to processing and marketing. Not just fishing operations, but fish processing and the marketing of fish, can be and are subsidised. Subsidizing the processing industry or the marketing of fish ultimately translates into a greater ability of the processing industry to pay for the fish and is thus equivalent to subsidizing the price of fish.

Effects of the Various Kinds Of Subsidies

In this section we discuss the effect of the subsidies identified in the previous section on some key variables in the industry; revenues, costs, profits, fishing effort, fleet size, fish abundance, sustainable yield, and resource rent. As we shall see, the effect depends critically on two conditions:

- the status of the stocks being fished, i.e., whether they are overfished or underfished,
- the fishery management regime in place.

By "overfished" or "underfished" we mean whether or not fish stocks are above or below the level providing maximum sustainable yield. Several caveats are appropriate in this context. First, note that these terms are based on biology but not on economic criteria. It is well known that the economically optimal level of a fish stock depends on factors such as the price of fish, the cost per unit of fish and its dependence on the stock level, and the discount rate. The economically optimal stock level can be either above or below the maximum sustainable yield level, depending on the constellation of the said economic parameters. Using the biological definition of overfishing and underfishing has the advantage, however, of neatly separating the cases where an increase in fishing effort leads to an increase *versus* decrease in sustainable yield, an effect of major importance.

Secondly, it needs to be noted that sustainable yield is a long term concept. Even if an increase in fishing effort leads to a decline in sustainable yield, it will always increase fish catches in the short term. The length of the "short" term varies from one stock to another, depending on the growth rate and expected life time of the fish; for stocks consisting of many different age groups the effect on the sustainable yield will take several years to materialize.

Thirdly, the concept of sustainable yield as a steady catch of fish year after year is a pedagogical device and not an accurate description of reality. All fish stocks are subject to fluctuations generated by environmental factors independently of fishing, although fishing may ameliorate or enhance those fluctuations. Sustainable exploitation of a fish stock which fluctuates for reasons unrelated to the fishery is unlikely to mean that the catch taken from the stock should be the same year after year. Sustainability means that the reproductive capacity of the stock will not be endangered, and it is highly likely that the catch will have to vary with the stock in order to ensure sustainability. In some cases it would undoubtedly be possible to stabilize the catch from a fluctuating stock without endangering its sustainability, but the basic point that needs to be made is that sustainability does not automatically imply stable catches and perhaps rather the contrary. In the real world of fluctuating stocks, maximum sustainable yield most likely means a fishing strategy that maximizes the average of catches that vary over time due to environmental effects.

General effects of subsidies under different management regimes

The effect of subsidies on fish stocks and catches depends critically on the fisheries management regime in place. If a subsidy is introduced it will initially augment the profits of fishing enterprises. The reaction of the industry will depend on the fishery management regime, that is, whether there are any controls at all, whether the catch is being controlled, whether the effort is being controlled, and whether there is a property rights structure accompanying those controls.

No controls. In the Annex the effects of subsidies in the absence of controls (open access) are discussed using a simple bioeconomic model. Subsidies may affect the economic result of the industry through the following channels:

- the price of fish
- the variable cost of fishing
- the fixed cost of fishing

Sometimes the price of fish is subsidised directly, *i.e.,* the government pays a bounty on each kg. of fish landed. In other cases subsidies may be equivalent to a price subsidy; this happens when the alternative to the government paying some industry-related cost (infrastructure or fisheries management, say) is a fee on fish landings, which would depress the price received by the industry. Sometimes some element in variable cost (cost of fishing effort) is subsidised; the industry may be permitted to buy fuel at a lower cost than other sectors of the economy, through tax rebates for example, or fishers may be taxed at a lower rate than wage earners in general, which could mean that the industry would pay less for labour than otherwise would be the case. The effect of the government paying industry-related costs such as the cost of management might play out through this channel if the alternative is a recovery of these costs through a fee on fishing effort. Finally, the fixed costs of the firms in the industry can be subsidised. This happens when loans to fishing boats are provided below the market rate of interest or the government pays out grants for building new fishing vessels. The effect of paying industry-related costs could also play out through this channel; this would happen if the recovery of those costs were to take place through a fee on fishing boats unrelated to how they are used or how much they catch.

It does not matter very much, however, which one of these three kinds of subsidies are provided; as shown in the Annex they all have qualitatively the same effect on fishing effort and the sustainable catch of fish. If a subsidy is introduced where there was none before, it will initially raise the profits of the industry. When there are no controls in place this will lead to increased fishing effort through investment in new fishing boats and possibly also a more intensive use of existing boats. A new, long term equilibrium with the subsidy will be established when the profit of the marginal enterprise has been eroded to a level where only normal costs of capital are being covered. The erosion of profits is caused by a falling catch per unit of effort, via a depletion of fish stocks because of increased effort. Hence, the long term effect of a subsidy on aggregate profits in the industry will be small, or none at all if all enterprises are identical; the only positive effect will be through increased profits of enterprises which for some reason enjoy some cost advantage over the marginal enterprise. It may also be noted that in the short to medium term the expansion of fishing effort could be a good deal greater than consistent with a long term equilibrium, because in the short term capital costs are fixed; they become relevant only when the enterprise needs to renew its boats. If high fixed costs bring the enterprise into bankruptcy, the fishing equipment will be sold at a loss and capital costs will fall accordingly, until the equipment has to be renewed.

Catch control. If the fish catch is effectively controlled, subsidies will not have any effect on fish stocks or catches of fish, provided that the target catch is set independently of what happens in the industry. If there is no control of fishing effort (i.e., number of boats in the fleet and how they are used), the higher profits initially caused by subsidies will lead to increased fishing effort in much the same way and for the same reasons as when there is no control of the catch. The erosion of profits will in this case not be caused by a falling catch per unit of effort; by assumption the catch is under control, and the fish stocks will not be affected. Instead the erosion of profits would be caused by a shorter fishing season and less efficient use of capital, as more boats compete for a given amount of fish. With the catch remaining the same, the revenues would also remain the same unless the price of fish changes. Competition for a given total catch has in fact often led to a lower price of fish because of worse treatment of the fish at sea or because markets have been glutted. When individual quotas were introduced in the Pacific halibut fishery, more of the fish was channeled to the fresh fish market instead of being frozen, which meant a higher ex-vessel price of fish. Subsidies that encourage increased competition for a given catch might thus lead to lower industry revenues even if they have no effect on the total catch.

It may be noted that the assumption of an effective catch control may be a strong one in this context; the poor utilization of an oversized fishing fleet is likely to lead to a pressure from the industry to increase the permitted catch, in order to improve the economic situation of the fleet. The fishery management authority may find it difficult to withstand such pressure, and if it cannot do so, the effect could be similar to what happens when there are no controls at all. Furthermore, fishing fleets that could catch much more than they are allowed to do will raise the costs of monitoring the catch and make it easier to cheat.

Effort control. Fishing effort is the number of vessels of a given specification times the amount of time they spend fishing. In all fisheries there are fishing vessels of many different shapes and sizes, using different kinds of equipment and fishing gear. To obtain a meaningful expression of fishing effort, the effort of various kinds of boats must be standardized. This is a formidable task and unlikely to be fully achieved. If the size and specification of the fishing fleet could be somehow “frozen” at any given point in time, the effort could be controlled simply by controlling the fishing time of the vessels. This is unlikely to happen, and indeed undesirable, because it would mean forgoing the benefits of technological progress. First, it would be possible to change the equipment, amount of fishing gear, engine power, people on board, and perhaps other factors, in order to increase the effectiveness of any given time fishing. Unless fishery managers have a very tight control over all these components they will not be able to exercise effective control over total fishing effort.

Secondly, fishing boats can be modernized, and they have to be replaced at more or less regular intervals. Usually, new or modernized boats are more powerful than the boats they replace, because of more modern equipment and design, and any given fishing time will consequently be more effective for the new vessels than for the old ones. Experience has shown that it can be difficult to make an adequate allowance for technological progress. A tight control of the design and equipment of new and modernized vessels would therefore also be necessary to keep effort under control, but also undesirable if it stifles technological progress.

Hence, an effective control of fishing effort is a formidable task and unlikely to be fully accomplished. Examples of effort controls are control of the number of vessels and the amount of time they are allowed to fish, sometimes with some rudimentary allowance for technological progress embedded in new vessels but seldom very detailed with respect to equipment, gear or manpower used. These controls typically leave some, and perhaps a large, leeway for boatowners to expand their effort along uncontrolled, and perhaps uncontrollable, dimensions.

If, by hypothesis, total fishing effort were effectively controlled, the increase in profits due to the introduction of a subsidy would not lead to increased effort and hence have no effect on fish catches or fish stocks. This, as has been argued, is unlikely to happen as regulators are not able to control each and every aspect of fishing effort. Boatowners can expand their effort in three ways, not all of which and perhaps none is fully controlled: (i) through investment in new boats, (ii) through upgrading of existing boats through replacement or refitting, and (iii) adding gear or equipment to existing boats or using them more intensively. Subsidies that initially increase the profits in the industry would give rise to pressure to enter the industry through investing in new boats, and the political authorities have often yielded to such pressure. The rules pertaining to the replacement of boats have often been lax, or naval architects have found ways of circumventing rules of design such as length or tonnage limits, packing more fishing power than there used to be into a hull of a certain length or tonnage. New equipment and gear can add considerably to the fishing power of a boat; examples are fish finding equipment, GPS equipment, computer controlled lines, new design of hooks, nets and ropes made of new materials, etc. Some of these changes may be of a once and for all character, but there is little reason to expect technological progress and human ingenuity to come to a standstill, neither in the fishing industry nor in other facets of life. Effort controls are thus likely to be less effective than they appear at first glance.

In the Annex the effects of an imperfect effort control are discussed in a formal model. The subsidy would cause uncontrolled effort components to expand. This would reduce fish stocks, but whether sustainable yield would rise or not depends on whether the stocks are overexploited or underexploited. The costs of the industry would rise and limit the increase in profits, although profits would still rise (otherwise the incentive to expand effort would vanish). The resource rent would fall, however, as resource rent is most appropriately accounted for exclusive of subsidies.[5]

Rights based regimes. The above comments on catch and effort controls presume that these controls are not accompanied by individual rights of any sort; fishing enterprises have no individual quota allocation under catch control, and no rights to a specific number of fishing days or whatever measure under effort control. Rights based regimes would radically change the outcome, especially with individual quota rights. When fishing enterprises have individual shares of a total quota there is no need for them to race to catch the fish before anyone else. Instead they can catch the fish at their own convenience, which in all likelihood means that the catch will be spread throughout the fishing season, which avoids glutting markets. Furthermore, there is no incentive for the fishing enterprises to increase the fishing power of their boats beyond what is needed to catch their allocation of fish at a minimum cost, contrary to what happens when firms race for the fish; in that case they have incentives to increase the fishing power of their boats to win the race. With individual quotas the total catch will therefore be taken at a

5. Resource rent is the value of production less all costs necessary to obtain it. Subsidies artificially inflate market values or reduce costs and should therefore be excluded from resource rent.

lower cost than with a race for the fish. Subsidies will raise the profits in the industry, which will raise the market value of the individual quotas if these are transferable. The quotas themselves would act as barriers to entry into the industry, as fishing would be impossible unless by having access to an individual quota, either by holding it directly, or by leasing it from somebody else if such arrangements are permitted (in some countries practicing individual quotas the leasing of quotas is not permitted).

Individual rights can also be defined for fishing effort, and in some countries a variant of this regime is practiced (the Faeroe Islands is one such case). The definition of such rights is a good deal more complicated than in the case of individual fish quotas, because of the multi-dimensionality of effort. For practical reasons, effort rights must be defined with respect to a single or perhaps a few key dimensions of effort. In the Faeroe Islands effort rights are defined in terms of fishing days, and the fishing must take place in designated areas. This does not remove the incentive to increase effort by putting in additional equipment or gear. Furthermore, when boats are renewed their fishing power will most likely increase, even if there are rules in place preventing the new boat from being much larger than the old one. Individual rights with respect to fishing effort are likely, therefore, to be much less effective than individual quotas and would be of interest particularly when it is impractical to control a fishery with an overall catch quota. Initially, subsidies would, under this regime, raise the profits in the industry and the market value of effort rights, but they would also strengthen the incentives to expand effort along uncontrolled dimensions. The expansion of effort by individual enterprises would make it necessary to cut back the existing effort rights, in order to keep the total effort within the set limits. This would erode the market value of the effort rights, although not by as much as it was raised by the subsidies in the first place (otherwise the incentive to expand effort would vanish). The market value of effort rights excluding the subsidies would, however, be lower than if there were no subsidies. Since the market value of effort rights excluding subsidies reflects the resource rent, subsidization would diminish the resource rent if effort expands, as with effort controls in the absence of property rights.

Long term effects

The long term effects of subsidies and how they depend on the state of fish stocks and the management regime in place are summarised in Table 5.1. The reader is again alerted to the fact that the long term effects of subsidies on the catches of fish may be the opposite of the short term effects, depending on the status of fish stocks and the management regime applied. In the short term, the increased profitability resulting from subsidies will result in more effort and larger catches of fish, unless there are controls in place limiting effort or fish catches, or property rights regimes with incentives to limit effort. Note that the clear-cut dividing line between overfished and underfished stocks holds only for infinitesimally small changes. Any real world subsidy would of course be more substantial than that and cause a discrete change in stock size. This means that an underfished stock which is close enough to being fully fished will become overfished and hence possibly provide a smaller sustainable yield than before, but whether this happens depends on how far above the sustainable yield level it was before the subsidy, the size of the subsidy, and how strong the effect of the subsidy is.

Effects of Different Kinds of Subsidies - More Detailed Considerations

Fisheries infrastructure. When governments provide fisheries infrastructure without charging for its use, fishing enterprises will be saved some cost which they would otherwise have to pay in the form of user fees or for the provision of the infrastructure on it on their own account. These costs could be charged to the industry in a variety of ways; through a landings fee, through a fee on fishing boats, or even through a fee on fishing effort, although the latter seems impractical. In any case, as shown in the Annex and argued above, it does not much matter for the final outcome how these costs would be recovered, the effect of this implicit subsidy is much the same in any case.

The fact that the industry is spared some costs does not necessarily mean that the profits of the fishing enterprises will be higher than otherwise. If there are no controls on catch or effort the cost saved by having the infrastructure provided free of charge will be replaced by additional fishing costs in the form of excess fishing effort and boats. This is perhaps best explained by considering the effects of removing this subsidy and introducing user fees for infrastructure. This would lead to losses in the industry, and some firms would contract their operations or leave. The pressure on the fish stocks would be reduced, the stocks would recover, the catch per unit of effort would rise, and eventually a new equilibrium would be reached when the revenues of the marginal firm had risen to become equal to its costs. The aggregate profits of the industry would be zero as in the case when they paid nothing for the infrastructure, provided all firms are identical or lower in case some firms have lower unit costs of fish than others and obtain some intra-marginal rent.

The effects of providing infrastructure free of charge are as summarized in Table 5.1 above for subsidies in general.

Management, research and enforcement. The provision for management, research and enforcement out of public funds is analogous to the case of infrastructure. Both cases involve services which confer benefits on the industry and raise its potential profit, although not necessarily its actual profit. Having the industry pay for these services in principle involves the same alternatives as for infrastructure, although in practice it appears that existing recovery programs for management costs involve fees on landings or fish quotas. Seen in that light, the provision of these services from public funds would amount to a price subsidy, but as we discussed for the general case of subsidies it does not matter greatly whether we are dealing with a price subsidy, a subsidisation of variable costs or of fixed costs. Again the results are as summarized in Table 5.1 (at the end of this chapter).

Access to other countries' waters. This is a complicated case, as it involves two parties, the "distant water" country and the country host to the distant water fleets. The effect of subsidising access to another country's waters depends on the status of the fish stocks and the management regimes in both countries.

Consider first, the **distant water country** providing the subsidy to its own fleet. If that country has no control in place in its own fisheries and its fisheries are in a long term equilibrium the effect on its own fisheries would be nil; whatever boats were taken out of the country's own fisheries would be replaced by new boats coming in; removing some boats from the fishery would lead to some stock recovery, which would attract new boats, and we would end up in the original equilibrium. A possible exception to this is when the distant water country's fishery is in a short term equilibrium with excess boats that do not leave the fishery because they cover their operating costs but would not be replaced when they become obsolete because new boats would not cover their capital costs. In a situation like that the government could relieve some of the pressure on its own fish stocks by providing subsidies for some of its own boats to leave without risking that these boats would be replaced by new ones.

With catch control but no control on effort this policy would not make much sense; new boats would enter the fishery instead of the ones being removed, unless there is a short term equilibrium of the kind described in the previous paragraph where it is not profitable to enter the fishery with new boats. With effort controls this would make better sense, provided the effort really is effectively controlled, but note the earlier discussion of the difficulties of controlling all components of effort and the incentives any stock recovery would generate to expand effort.

With property rights in place, especially in the form of individual transferable quotas, the subsidy would not be effective unless the profits from fishing in the distant waters, including the subsidy, were greater than the profits from continuing in the fishery where one has property rights. This would create an excess supply of quotas, their market price would fall, and the boats leaving for the distant waters would in all probability be replaced by other boats, so the effect on the distant water country's fishery would be nil; one vessel would be replaced by another. With property rights to effort the results would be similar, but they would depend on the effectiveness with which effort is controlled, as discussed above in relation to effort control. These effects are summarized in Table 5.2 (at the end of this chapter).

Then consider the effect on the **host country**. If there is no control of the fisheries in the host country the fisheries would presumably be in equilibrium, with the marginal fishing enterprise just breaking even. If the vessel owners in the distant water country find it worthwhile to enter the fisheries of the host country under those circumstances, it would mean that they have lower costs than at least some of the fishing enterprises in the host country. If the distant water country uses its subsidies not just to pay for access to the other country's economic zone but to subsidise the fishing costs of its own fleet, this could give a cost advantage to the distant water country fleet. The result then would be an expansion of effort in the host country, and some of the vessels in the host country would be out-competed. The net result would be increase in effort in the host country's fisheries, and the effect on sustainable yield would depend on whether or not the stocks were overfished or underfished, as discussed above for subsidies in general.

With catch control without property rights in the host country the boats from the distant water country would further aggravate the competition for the total catch, and if they have lower costs than the host country's own boats, some of the latter might be forced out of the fishery. With effort control the question is whether the foreign boats would just be additional to the previous level of effort or whether the effort of the host country's fleet would be cut back, in order to make place for the foreign vessels. If the effort control is to be anything like effective the latter would have to be the case. If, on the other hand, total effort expands, the effect on total catches will depend on whether the stock is overfished or underfished. As the distant water county's boats are likely to be different from the host country's boats and might also use different equipment and gear, it will be difficult to exactly match the distant water country's new effort with displaced effort from the host country.

Finally, with property rights, making room for the foreign vessels would have to occur through purchasing or leasing such rights. In the case of fish quotas the overall effect would simply be a diversion of catches from the host country to the distant water country. The purchasing of rights by the distant water country would increase the market value of these rights. With effort rights, some of these would have to be purchased by the distant water country, which would raise the market value of those rights. Some of the host country vessels would be out-competed and some if its catches replaced by the distant water fleet. Some expansion of effort along uncontrolled dimensions is likely to take place if the effort costs of the distant water fleet are lower than that of the host country. The discussion of the effects on the host country is summarised in Table 5.3 (at the end of this chapter).

Decommissioning of vessels and license retirement. These subsidies differ from the other types in that they are explicitly targeted at reducing fishing effort and fleet capacity but, needless to say, their effectiveness will depend critically on how well the remaining effort and capacity are controlled. In a regime with no control of catch or effort it is difficult to see any point in such subsidies; decommissioned vessels would be replaced by new vessels and the net effect would be nil or perhaps negative, since new vessels typically are more efficient than older ones. The only exception would be when the capacity of the fishing fleet and the level of effort have expanded beyond the long term equilibrium level but vessels are nevertheless not withdrawn from the industry even if revenues are not high enough to justify the renewal of vessels, because variable costs are being covered. We discussed this case above in connection with subsidies of fishing in other countries' waters. In this case subsidies to decommissioning of vessels would reduce fishing effort and the capacity of the fishing fleet without attracting new entrants. This would speed up the adjustment to the long term equilibrium; fish stocks would recover, but the effect on the long term catch would depend on whether or not the stocks were overfished.

Under a regime where only the catch is controlled a decommissioning program would have no effect, unless we have a situation of a kind already discussed where fishing effort has expanded beyond the long term equilibrium and the fleet does not contract because the variable costs are being covered although fixed costs are not. A decommissioning scheme would then speed up the adjustment towards the long term equilibrium and raise the profit of the remaining vessels, until it would reach a level where it covers the capital costs of new vessels.

A decommissioning scheme would be more to the point if there is effort control. For a decommissioning program to work there must be a barrier against the entry of new vessels. With new vessels replacing the decommissioned ones the effects of removing vessels from the fleet would be nullified, and effort might even expand if the new vessels are more effective than the ones they replace. A successful decommissioning program under effort control would reduce effort, fish stocks would recover, and the profits of remaining vessels would rise. This would provide incentives to expand the effort of remaining vessels, to the extent the effort control is not fully effective.

It is difficult to see the point in a decommissioning scheme in case there is a property rights regime in place, especially if it is an individual quota regime. With individual transferable quotas the quota holders have incentives to achieve optimal effort and capacity through market processes. In a fishery with too many boats, some boatowners would find it attractive to sell their quotas rather than renewing their boats, while other boatowners would find it attractive to buy quotas to improve the profitability of their own operations. In a regime like that the industry would on its own initiative and at its own expense restructure itself. A decommissioning scheme would speed this process up and raise the value of the rights (quotas) in the industry, but it would have no effect on catches or stocks.[6]

Decommissioning of vessels in a system with property rights to effort would not make sense unless there are too many vessels. We may distinguish between two situations: (i) the total effort is adequate but is spread among too many vessels, so that profits are lower than they need be; (ii) not only are there too many vessels, but the total effort is too large.

In the first case, it would be possible to raise the profits of the fleet by getting rid of redundant vessels and transfer their effort allowance to the remaining vessels. As with individual transferable quotas, there would be an incentive for the industry itself to buy out the redundant vessels and add their effort quota on some previously underutilized vessels. Decommissioning grants would speed up this development and raise the value of the fishing rights.

In the second case, it would be necessary to reduce the total effort. Effort allowances of decommissioned vessels would have to be nullified, until many enough vessels have been withdrawn to make the effort rights of remaining vessels equal to the warranted effort. The necessary effort reduction would require collective action in the industry, or a government financed buyout where the effort allocations of decommissioned vessels are nullified. The effects of decommissioning subsidies are summarized in Table 3.4.

Finally, a caveat: grants to decommissioning might have an undesirable side effect by way of creating expectations that the government will always cover the losses resulting from overfishing. This would give rise to overoptimistic expectations; boatowners would expect to keep whatever profits resulting from their investment decisions while being spared the losses resulting from overfishing. This would in general promote overinvestment in the fishing industry. This reduces the usefulness of subsidies to decommissioning as tools to promote a desirable structural change and might even annihilate it altogether.

Labour retirement*.* The effects of subsidizing withdrawal of labour from fisheries are in many ways similar to the effects of decommissioning fishing vessels. Having such programs accompany programs for decommissioning would indeed seem to be a logical step. The decommissioning of fishing vessels, if effective, means that some fishers lose their jobs. The human capital that fishers have built up through training and experience can be specific and immobile, just as real capital in the form of fishing boats. Fishers would therefore be likely to suffer some losses when leaving the fishery for some other occupation, just as boatowners who have invested in fishing vessels for which there is little or no need will suffer losses if they leave the industry. When the demand for labour in the fishery falls because vessels are being withdrawn, it would not be necessary to subsidise the withdrawal of labour in order to reduce employment in the fishery; that reduction would happen anyway, but subsidies that finance retraining or in other ways speed up the movement towards a new occupation would reduce the social and economic costs associated with unemployment of fishers. Subsidization of labour withdrawals would then have little or no effect on fishing effort and hence on fish stocks and fish catches.

6. This restructuring process may not work perfectly when the crew is paid by a share in the catch value of the vessels. See Hannesson (2000).

Would subsidies of labour retirement make sense in the absence of other measures such as decommissioning schemes? Subsidizing labour retirement, whether it is movement to other occupations or final retirement, would reduce the supply of labour available to the fishing industry and raise the cost of labour. This would raise the variable costs of fishing and hence act as a negative subsidy of variable costs, to be discussed below. The results would be the opposite of those in Table 5.1 (at the end of this chapter). Some kind of licensing regime for individual fishers would have to be imposed in order to make such subsidies effective. This would erect barriers to entry into the fisherman's profession and thus raise the cost of employing fishers. It may, however, be more difficult to control the supply of fishers than to control the number of boats. There are many examples of strict licensing regimes for fishing boats, but few if any of such regimes being applied to fishers only.

Subsidies to capital costs (including vessel construction and modernisation). These subsidies have the opposite effects of subsidies to decommissioning. The effects of subsidizing capital costs when there are no controls are discussed in the Annex. These subsidies encourage investment in fishing boats and lead to an expansion of fishing effort and higher intra-marginal rents. With no controls the effect on the long term catch depends critically on whether or not stocks are over- or underfished. When stocks are overfished the sustainable catch declines and the revenue falls. The subsidies are absorbed partly by declining revenues and partly by increased costs through an expansion of effort, but in an industry with heterogeneous firms they would raise intra-marginal rents.

With catch controls, the effect of subsidizing capital costs would be particularly aggravating. They would lead to more boats, or more effective boats, in the industry and shorten the time in which the total catch would be taken. Total revenue would be the same, except that an increased competition for the total catch might lead to a lower price of fish because of glut in the market or poorer treatment of fish at sea. The costs of fishing would be higher, but intra-marginal rents would rise.

With effort controls, subsidies to capital costs would make these controls more difficult. If the number of boats is an integral part of the effort control regime the subsidies should in principle not lead to any increase in the number boats. Subsidies to refitting and replacement of existing boats might still be in place, however, and would speed up these activities by making them less expensive. This would be likely to put the effort control regime under increased strain, as it is typically difficult to prevent some increase in fishing power when boats are refitted or renewed. To the extent allowance is made for this, the result would be tighter effort restrictions on the existing fleet, such as a reduction in fishing days permitted. If total effort expands the stocks will be reduced but the sustainable yield would fall or increase, depending on whether the stocks are overexploited or not. In any case the profit of individual vessels would fall, with the possible exception of the new or refitted vessels.

With individual transferable quotas there are, as already stated, incentives in place for the industry to attain an optimal effort and fleet capacity. Subsidies to capital costs would then have no other effect than to raise the value of the property rights; i.e., the individual quotas. Which firm is the marginal firm under this regime is in this case determined by which firm has the lowest ability to pay for a quota while still finding a willing supplier. Subsidies of capital costs would only increase the profit of the firms, including the marginal firm, and this would be reflected in a higher market value of the quotas.

When property rights are defined as rights to effort, new boats would not be able to enter the industry unless by buying an effort allocation. Subsidies to capital costs would increase the amount a prospective entrant is willing to pay for the effort he needs and so raise the market value of effort quotas. Due to the difficulty, already discussed, of controlling the fishing power of new fishing vessels these subsides might put the effort control regime under stress, making it necessary to reduce the effort quotas of existing boats, which would to some extent reverse the positive effect on the market value of effort rights.

A general effect that is likely to occur under all management regimes is the substitution of capital for other effort components. As boats become cheaper, it might become profitable to acquire a more expensive boat which saves the use of labour.

A summary of the effects of capital subsidies, except for the substitution effect just mentioned and which could occur in all regimes, is shown in Table 5.5 (at the end of this chapter).

There could be cases where grants to boatbuilding would not in fact amount to a subsidy of capital costs in fishing but rather to a subsidization of shipyards. This would happen if the grants are reserved for domestic shipyards while it would be possible for boatowners to buy boats on the international market at a given price. The international price of boats would then set a ceiling for how much domestic shipyards could charge for new boats. If the grants are given to the shipyards, they could then charge the international price and pocket the grant. The buyers of boats, being aware of this, might however be able to negotiate a price lower than the international price and get a share of the grant. The same argument applies to modernization, to the extent there is an international market for this and the grants to modernization are reserved for domestic shipyards.

Subsidies to variable costs (including tax exemptions). These subsidies lower the variable costs of fishing boats (cost of fishing effort) compared with what would be the case in the absence of such subsidies. The effects with no controls are discussed more formally in the Annex, where they are shown to be broadly analogous to the effects of price subsidies and subsidies of capital costs. An interesting difference vis-à-vis subsidies of capital costs is that the latter would tend to increase effort primarily through encouraging the entry of boats and in fact lead to a reduction in the effort of the individual boats. Subsidies to variable costs would increase the rents of intra-marginal firms, as their effect is exactly analogous to the effect of raising the price of fish. The increased effort will lead to a further depletion of fish stocks, but the effect on sustainable yield will depend on whether or not the stocks are overexploited. The resource rent, evaluated at costs exclusive of subsidies, will turn negative, being zero in the absence of subsidies.

With catch controls these subsidies would stimulate competition for the given catch, with consequences similar to those already discussed for subsidies to fixed costs, except that this would occur primarily through the expansion of effort by individual vessels and not through more boats entering the fishery.

With effort controls, the problem would primarily be the incentive the subsidy would provide to increase the use of the effort components affected by the subsidy. If fuel is subsidised there would be an incentive to invest in more powerful engines or to steam further and faster. The question then is, how effectively is this effort component controlled? If the effort control pertains only to, say, fishing days and the number of boats, some effort expansion could occur through investing in more powerful engines. A similar effect occurs if there are subsidies of fishing gear or the use of labour; the effect would depend on whether effort controls permit the use of more (or better) fishing gear or labour. The effect on stocks, catches of fish and other variables would be as already discussed with respect to subsidies in general.

Under an individual transferable quota regime the subsidies to variable costs would not have any effect other than distorting the choice of factors of production compared to a cost-minimizing choice at market prices. The strength of this effect depends on to what degree different factors of production are substitutable. Is it possible to substitute fuel for manpower? Probably not directly but perhaps indirectly by going further to a richer fishing ground and using less gear and people to obtain a given catch. Otherwise the effect would be to raise the market price of quotas, as discussed in relation to other subsidies.

With effort rights the effect would be to raise the price of these rights and to distort the cost-minimizing choice of effort components, as discussed in relation to quota rights. The strain this would put on the effort control system depends on how effectively the total effort is being controlled. Would it, for example, allow the use of more powerful engines? This could raise the effort of the fleet despite the presence of the effort control system.

The effects of subsidies to variable costs are as summarized in Table 5.1 (at the end of this chapter), except for the incentive to substitute subsidised effort components for other ones, which would not occur with other subsidies.

***Income support and unemployment insurance**.* This is a variant of a subsidy of variable costs. Usually such subsidies are tied to one particular factor of production, such as fuel or bait, and in this case we are dealing with subsidization of labour. In order to attract labour, the industry must be able to pay a remuneration equal to what fishers would be able to earn in an alternative occupation, plus (minus) a premium due to the alternative employment being more (less) attractive than fishing. Income support targeted at fishers will reduce the amount the industry would have to pay to attract labour and so reduce the variable cost of fishing. The effect of this was discussed in the preceding paragraphs.

It is worth while pointing out that measures such as these will not necessarily do much to raise the income of fishers. Fishing is typically just one of many occupations and accounts for a small fraction of a national labour market. The incomes of fishers are under such circumstances determined by their potential income in alternative occupations, which is determined by the conditions in the labour market at large. A higher take-home pay for fishers would raise the supply of labour to the fishing industry and weaken the bargaining position of fishers vis-à-vis boat owners. Under these circumstances, income support to fishers is likely first and foremost to reduce the remuneration boat owners would have to pay to keep the fishers on their boats. Only if the supply of fishers is unresponsive to changes in remuneration (fishers have nowhere else to go and few others want to be fishers) and there is sufficient demand for their labour would these measures do much to raise the take-home pay for fishers.

As pointed out in the discussion of subsidies to variable costs, there will be an incentive to increase the use of the particular factor of production being subsidised. Subsidisation of labour will therefore promote labour intensive operations relative to capital intensive ones. This will lead to a higher demand for fishers than otherwise would be the case and increase employment in the fishing industry. Whether or not the wage rate in general would be affected depends on the fishing industry's share in the labour market. Typically this share would be far too low for these subsidies to have any effect, but in regions where the fishing industry employs a large share of the total labour available and labour is not very mobile these subsidies could raise the wage rate in general.

Price subsidies. These subsidies raise the price of fish obtained by fishers above the market price. The price obtained by fishers need not rise by the entire subsidy; some could be pocketed by the buyers of fish, depending on the elasticity of supply and demand. Price subsidies can be applied partially, such as is done with minimum prices when fishers are guaranteed a certain price irrespective of the market price. The effect of this is to limit the downside loss of the industry while the upside gain is maintained. Hence the average profits of the fishing firms rise, and the firms might find it profitable to fish in periods when there is a risk of low prices that would not cover variable costs.

Both general price subsidies and minimum prices raise the profit of the industry over and above what it would otherwise be. Under open access the result depends critically on whether stocks are overfished or underfished, as discussed for subsidies in general. With catch control and no effort control, they would further increase the competition for a given catch. With effort control they would strengthen the incentives to expand effort to the extent it is not tightly enough controlled. This type of subsidy does, however, not particularly encourage increased use of some particular factor of production, such as fuel subsides or subsidies of labour would do; a price subsidy just strengthens the incentives for expanding any uncontrolled effort component.

With catch control and individual quotas, price subsidies would simply raise the market value of quota rights, as discussed for subsidies generally. With effort quota rights there would be incentives to expand effort into uncontrolled dimensions, as already discussed, but unless such response completely annihilates the effect of the subsidy it would raise the market value of effort rights. For all these effects we again refer the reader to Table 5.1 listing the general effects of subsidies (at the end of this chapter).

Subsidies of fish processing and marketing. As discussed above, these kinds of subsidies are equivalent to price subsidies, and we may repeat verbatim the conclusions of the previous section.

Some Empirical Examples of Subsidies

Fisheries infrastructure. To our knowledge, in all countries the government provides fisheries infrastructure such as fishing harbours. As far as we know, there is no study of to what extent the cost of this type of infrastructure is recovered through user fees and still less of what the implied subsidy might mean in terms of higher fishing effort and larger fleet capacity. As already mentioned, there probably is disagreement on whether these expenditures could legitimately be labelled a subsidy or whether the provision of fisheries infrastructure is an appropriate task for governments on par with the provision of infrastructure on land, such as roads, airports, etc. Note, however, that the cost of the latter infrastructure is at least partially recovered through user fees, sometimes implicitly such as through fuel taxes earmarked for expenditures on roads. A study of a single country's subsidy policy would raise questions of consistency in dealing with land-based and ocean-based activities.

Management, research and enforcement. There have been several studies of the costs of fisheries management. One was recently carried out by the OECD (OECD 2000).

A collection of studies was recently published in a book (Schrank *et al.* 2003). These studies show that the costs of fisheries management can be substantial; in Newfoundland they ranged from 15 to 25% of the gross value of catches in the 1990s and in Norway they were close to 10%. The recovery of these costs in both these jurisdictions is negligible, as is the case in most countries. There is no doubt that the profits of the fishing industry would be substantially affected if it had to pay for these costs. No attempt has been made to quantify what it would mean, in terms of fishing effort and fleet capacity, if the industry had to pay these costs, but in an open access regime both would certainly be lower. The inshore fishery in Newfoundland prior to the Northern cod collapse can probably be characterized as an open access fishery and possibly the trawl fishery as well; even if there were individual quotas (enterprise allocations) in place in the trawl fishery from the late 1980s they were allocated on a yearly basis and thus provided little or no incentive to cut back fleet capacity. Under catch control with an element of property rights, as the case is in Norway, the effect would primarily be on company profits and not on fleet capacity, unless the cost recovery made some companies unprofitable.

The aforementioned studies (Schrank *et al*. 2003) also show that some countries recover substantial shares of the fisheries management costs. This is primarily true in Australia and New Zealand. In the years 1995-99 the government of New Zealand recovered no less than 70% of its fisheries management costs.[7] In Australia, 34% of the costs of the Australian Fisheries Management Agency, which is responsible for the fisheries managed by the Commonwealth, were recovered in the 1990s (Cox 2003). There is no assessment of what this means in terms of fishing effort and fleet capacity. In New Zealand all important fisheries are managed by individual transferable quotas, so the cost recovery regime most likely meant just lower company profits and lower prices of quotas; there is no evidence of fish quotas not being taken because of lack of profitability. Not all Australian Commonwealth fisheries are managed by individual quotas; the important Northern prawn fishery, for example, is managed by open and closed seasons and effort controls, so here cost recovery may have meant less effort and less fleet capacity. In Canada and the United States the industry pays for the costs of individual transferable quota programs. As argued for New Zealand, this arrangement most likely means lower company profits and lower market values of quotas; there is no evidence that these cost recovery arrangements are so onerous as to make it unprofitable to take all quotas available.

Access to other countries' waters. Several countries with distant water fleets pay fees for access for their fleets to other countries' exclusive economic zone. Cases in point are Japan and the European Union, where Spain is responsible for the lion's share. A recent report on the fisheries of Senegal (UNEP 2002a, p. 26) maintains that the EU pays 80-90% of the access costs to Senegalese waters. Another recent report on the fisheries of Argentina (UNEP 2000b) discusses the EU and Japanese payments for their distant water fleets fishing in the Argentine exclusive economic zone. In the case of Japan the report acknowledges dearth of information about direct subsidies to the Japanese vessels but mentions several payments to the Argentine government alleged to be payments for access to the economic zone. There is no analysis, however, of what the foreign fleets have meant for the fish resources of Argentina and Senegal, *i.e.*, whether these have become overfished because of foreign fishing or whether domestic fleets have been

7. Wyatt (2003). These are the costs budgeted by the Ministry of fisheries. The cost of monitoring and surveillance undertaken by the New Zealand Defense Force are not included.

displaced by the foreign fleets. Making such an analysis would require a time series of catches, fish stock abundance and fishing effort.

The sums expended by the EU to secure access to other countries waters are substantial and cover a large number of countries in Africa and Latin America. In the budget for 1996, 250 million ECU were allocated to this purpose, out of a total fisheries budget of 750 million ECU (Hatcher 1999 p. 61). Japan has spent a considerable amount of money on foreign aid to Pacific island states related to access to tuna fishing in their waters, as well as on the access agreements themselves (Weber undated).

Decommissioning of vessels and license retirement. Grants to decommissioning of fishing vessels are apparently a widespread practice. A review of some of these programs is provided by Holland *et al.* (1999). They point out that such programs have invariably arisen from a "crisis", typically a depletion of fish stocks due to open access and the resulting excess fleet capacity and fishing effort. They identify three main goals of such programs; (i) saving boat owners or license holders from losses they would otherwise incur, because of the unavoidable adjustment in a fishery in crisis; (ii) improving the profitability of the rest of the industry, and (iii) rebuild fish stocks. These expenditures have mitigated the losses of some fishers and boat owners, although one could probably debate endlessly whether the expenditures have been sufficiently generous. That such programs have had a positive effect on the profits of the remainder of the industry is not always clear; at the very least there must be some controls on investment in the industry or incentives to prevent them from taking place on too large a scale, but in some programs the money spent on buy-backs apparently leaked back into the industry or removed capacity that was not very important in any case. In some cases the reduction in the number of vessels has been neutralized by increased effort by the remaining vessels (Holland *et al.* 1999, p. 58). As to resource conservation, these authors point out that all the programs they considered had other measures in place to deal with this problem. The buy-back programs therefore seem to have been motivated mainly by the first two of the three said goals.

The European Union has for over twenty years had a program[8] in place giving grants to decommissioning fishing vessels. At the same time the Union has provided grants for construction of new vessels and modernization of existing ones. This kind of policy does not seem logical, at least when both types of grants affect similar types of vessels in the same country or region. It is not unlikely that the decommissioning grants have found their way back into the industry and stimulated investment in new vessels, in which case these grants have in effect become grants to investment. Such "leakage" has been alleged to have taken place in the United Kingdom (Banks 1999, p. 204). Japan has spent money on upgrading its existing vessels and on retiring old vessels from its tuna fishing fleet, in order to make way for new ones (Weber undated).

The decommissioning grants have probably had an impact on the size of the European fishing fleet; from 1991 to 1996 it fell from about two million GRT to 1.6 million, and from 8.3 million kW (engine power) to 7.3. The much lesser fall in engine power is by some commentators taken as evidence that the reduction in fishing capacity has been much less than indicated by the fall in GRT; naval architects have been clever in finding ways to reduce a vessel's GRT while maintaining or increasing its fishing power. These measures also ignore technological progress, and it is therefore conceivable that the

8. Or, rather, a sequence of programs where the objectives have been redefined as one program has replaced another.

capacity of the fleet did not fall over this period. Over time the emphasis of the EU grants has turned from grants for new investment to grants for decommissioning; in 1983-ECU 85 111 million were granted for new construction and modernization and only 20.7 for decommissioning, while the expenditures for 1986-93 were 375.4 (construction and modernization) and 496.2 (permanent withdrawals).[9] The emphasis on decommissioning was further increased after 1993 (Hatcher 1999 pp. 54-55).

The seemingly illogical combination of grants to vessel construction and decommissioning is undoubtedly the outcome of inconsistent political goals. Proposals by the European Commission have been ignored or changed by the Council of Ministers, and the policy itself has been subject to repeated criticism by the European Court of Auditors (Hatcher 1999, pp. 61-62). Some of this may be due to different views in different member states. Some may be due to an objective to transfer funds to disadvantaged areas, and in areas where the fishing industry is predominant it may seem self-evident to direct any economic support to this industry. Such measures will, however, be short-sighted and self-defeating if they result in excessive fishing capacity eroding the profits of the industry and depleting fish stock.

In Norway, buy-back programs for fishing vessels have been implemented since 1979, except for a brief interlude 1996-97. These programs have been targeted at different types of vessels in different periods. They have involved grants both for scrapping fishing vessels and for selling them for other uses, including to other countries. These buy-backs have been particularly successful in the purse seine fleet where the number of vessels has been substantially reduced and the profitability improved, although this improvement is also due to other factors.[10]

The reason why the Norwegian buy-back programs have resulted in improved profits is that the vessels involved have been under an individual quota regime. Scrapped or transferred vessels have been stripped of their fishing concessions; *i.e.,* their rights to participate in specific fisheries such as purse seining for capelin, trawling for cod or shrimp, etc. These concessions usually involve a right to a certain portion of the total quota for one or more fish stocks and so, by nullifying the concession, the quotas of the remaining vessels and their profitability could be raised. In some cases the government withdrew the concession of the decommissioned vessel while in other cases it allowed the owner of the decommissioned vessel to sell its concession to another operator. The latter could then use the concession to acquire a new and more efficient vessel with a right to a larger quota allocation. In this way, quota allocations became transferable together with the fishing vessels to which they belonged.

Labour retirement*.* Some buy-back programs have included adjustment grants for fishers (Holland *et al*., p. 62). The adjustment program the Canadian government put together in the wake of the collapse of the Northern cod included a retraining and adjustment program for fishers and labour in the processing industry. This program also included a component for buying fishing licenses from individual fishers. In return for a compensation, a fisherman would give up his fishing license and be barred from fishing ever after. Over 6000 fishers in Atlantic Canada were eligible for this program but few were attracted by the offer; only 7% of over 5 000 fishers eligible in Newfoundland

9. Calculated from Hatcher (1999), p 56.

10. More information on the Norwegian buy-backs will be obtainable from Hannesson, working paper in progress.

accepted. The reason for this low number has been attributed to small sums of money involved and optimistic expectations about the return of the Northern cod (Schrank 2002).

Subsidies to capital costs. Many governments have provided subsidies for building new fishing vessels. The programs of the European Union have been mentioned in connection with the decommissioning grants. In addition to the subsidies obtainable from the European Commission the individual countries also had their own subsidy programs and in fact were required to come up with some money themselves. Especially in the beginning (1980-85) the grants involved could be substantial; one study from the Netherlands calculates the subsidy at more than 40% of the vessel cost (de Wilde 1999, p. 131).

The depletion of the fish stocks in the waters of the European Union, particularly the North Sea, have often been ascribed to excessive fishing effort stimulated by subsidies provided by the Community. The picture is likely to be more complicated than that, however. Since 1983 the Community has applied a regime of catch controls, i.e., catch quotas portioned out among the member states. If effective, this regime should mean that excessive fishing capacity is of no consequence for the fish stocks, only eating into the companies' profits. But the quota regime has not been fully effective, particularly not in the beginning, as member states have routinely overfished their quota. In addition to making that possible, the excess fishing capacity certainly provided political pressure on member states' fisheries ministers to get large quotas for their own countries, which often meant a larger overall quota for the stock in question. There is little doubt even in this case about the detrimental effect of fisheries subsidies for fish stock conservation, but the situation appears to have improved in later years.

The Norwegian government has over the years provided subsidies to new vessels and for modernization of existing ones. Even if on a small scale, at least in later years, this squares badly with the buy-back programs. The buy-back program in the purse seine fishery initiated in 1979 was in fact partly caused by previous and ill-conceived subsidies to boat building. In the mid-1970s subsidies were provided for the building of new purse seiners. The purpose was to maintain employment in the shipyards, which were hit by the world recession initiated by the energy crisis in 1973. This subsidy program was put in place despite an analysis made public at about the same time showing that the purse seine fleet was already troubled by overcapacity, and in case the government wanted to maintain employment in the fishery it should promote double crews rather than more boats (Hansen 1979).

Specific tax exemptions for capital costs also fall in this category of subsides. One example is the Capital Construction Fund in the United States, whereby up to 100% of the profits generated by fishing can be placed in an interest earning fund exempt from income tax, provided the money is used for vessel replacement or refitting within ten years (Schrank 2003).

Subsidies of capital costs could also take the form of equity infusion by government, which presumably would mean lower capital costs than soliciting equity via the marketplace. An example of this is the government refinancing of the trawl sector in Atlantic Canada after the economic crisis in the early 1980s (Schrank 2003).

Subsidies to variable costs. Fuel costs are usually responsible for a large part of the variable costs of fishing. It is not surprising, therefore, that the most common examples one finds of subsidies of variable costs involve prices of fuel below market prices, usually accomplished through tax exemptions. One such is from Senegal (UNEP, 2002a). Based on operating accounts of small scale fishing units, a reduction of the fuel subsidy by one-half was predicted to cause a substantial fall in the operating profits of the boats and possibly turning them into losses. That notwithstanding, the elimination of these subsidies would not necessarily put an end to this type of fishing, but it would undoubtedly cause some boats to leave the fishery and so reduce fishing effort. The lower effort would, however, most likely result in a higher catch per unit of effort as fish stocks recover. The study shows that over time the catch per unit of effort has declined drastically for most Senegalese stocks, which most likely is due to the increase in effort and the resulting depletion of fish stocks over the same period. It is unclear, however, whether the stocks are overfished; in the years 1980-90 the fish exports from Senegal rose from 84 000 to 125 000 tonnes.

Income support and unemployment insurance. The fishery subsidies applied in Norway over many years were motivated as income support for fishers, although they targeted income only indirectly. But there are cases of subsidies which target income more directly. One such is the tax exemptions of Icelandic fishers; their incomes are taxed at a lower rate than the incomes of other wage and salary earners in Iceland. Removing this exemption would have no effect on the fish catches in Iceland, which are controlled by quotas, but it would certainly cause disagreement between boatowners and fishers. The latter would demand a higher remuneration from the boatowners, in order to maintain their after tax incomes, but to what extent they would succeed in this would depend on the labour market situation in Iceland. The boatowners would have to comply in case the labour market situation is tight enough to make it difficult for them to man their boats unless fishers maintain their take-home pay after tax. In an individual transferable quota regime as in Iceland this would be at the expense of the companies' profits and not have any effect on fish stocks and fish catches. In this scenario, this tax exemption is primarily a subsidy of company profit, boosting the market value of the quota rights.

The most well known and widely discussed case of unemployment insurance specific to fishers is the unemployment insurance scheme that the Canadian government applied in Newfoundland before 1996. This made fishers eligible to a full year's employment insurance even if they have fished for only 15 weeks. There is little doubt that this kept up the employment in the fishing industry, not least among self-employed fishers in the inshore fishery which is highly seasonal, and thus contributed to a greater pressure on fish stocks than otherwise would have prevailed. After 1996 the system was changed to one based on a minimum income earned over a certain period, but it still appears generous; in Newfoundland earnings must exceed CAD 2 500 within a 31 week period.

Price subsidies. The Norwegian government applied price subsidies extensively from the mid-1950s until the 1990s; in the period 1964-90 no less than 58% of the fisheries subsidies provided on the basis of the so-called "General Agreement" were price subsidies.[11] One reason is the special remuneration system in effect in the fishing industry, not just in Norway but in many countries; instead of a fixed wage fishers are remunerated by a share in the catch value. Hence, price subsidies benefit not just capital owners but also fishers, so this in fact amounted to a support of the incomes of fishers at large. This is likely to have led to more fishing effort and larger fishing capacity and hence to a greater decimation of fish stock while the fisheries of Norway were still characterized by open access, a regime that has been gradually disappearing since the early 1970s.

11. St.meld. nr. 58 (1991-92): Om struktur- og reguleringspolitikk overfor fiskeflåten, pp. 81-82.

Some countries, including the European Union, apply a scheme of minimum prices. In the 1990s the Community's market support amounted to about 30 million ECU per annum, which is about the same sum as the Community budgeted for monitoring and control in 1996 (Hatcher 1999, pp. 60-61).

Subsides of processing and marketing. Many countries, including Norway and the European Union, support their fish processing industry and the marketing of fish. In Norway the fish processing industry in the north has from time to time got financial aid when it has run into economic problems. For the period 1994-99 a total of 850 million ECU was allocated to port infrastructure, the processing industry, and marketing activities (Hatcher 1999, p. 60). As already discussed, these types of subsidies are equivalent to price subsidies to the catching sector of the industry, even if it is not the initial recipient.

Concluding Comments

Subsidies to the fishing industry are widespread and of various kinds. Some are explicit in the form of price support, cost reductions, and grants to building new fishing vessels as well as decommissioning old ones. Others are implicit subsidies such as provision of infrastructure and fish stock management, but whether and to what extent they count for subsidies is controversial.

The purpose of these subsidies, in probably all cases, is to raise the incomes of people in the fishing industry, both fishers working as crew and boatowners (and often these are the same persons). The efficacy of these measures can be called into question, however. They are often self-defeating, in that they cause a further depletion of fish stocks which ultimately translates into a further fall in incomes. They are often detrimental for the economy overall, as they divert human and other resources into the fishing industry where they yield a lower return than in the economy at large, and their long term contribution can even be negative, as happens when the depletion of fish stocks results in lower catches.

Not all fisheries subsidies have these detrimental effects; there are subsidies which stimulate the withdrawal of vessels and manpower from the fishery. Ironically, such subsidies are sometimes rooted in earlier subsidy programs encouraging overcapitalization in the industry. To the extent subsidies for downsizing the industry succeed in their goal they would promote the recovery of fish stocks and improve the allocation of resources overall in the economy. But there is often a problem of preventing them from spilling over into new investment in fishing boats and increased fishing effort. One subtle way in which this may occur is through shaping expectations in the industry; if entrepreneurs see losses being covered, they may expect this kind of policy to be continued in the future and hence not factor potential losses sufficiently into their calculations.

Table 5.1 Long term effects of subsidies

Management regime→ Status of fish stock↓	Property rights		No property rights		No property rights No controls
	Catch controls	**Effort controls**	**Catch controls**	**Effort controls**	
Overfished	No effect on catch or stock No effect on effort Higher value of fish quotas	Same effects as with no property rights except that the value of effort rights will increase.	No effect on catch or stock Greater effort and more boats Same revenue or lower Higher costs and lower industry profits Negative resource rent	No effect on effort, if it is effectively controlled. Higher revenues Higher profits Incentive to expand uncontrolled components of effort. If effort expands • smaller stocks • lower catches • less increase in revenue • higher costs • less increase in profits • lower resource rent	Greater effort and more boats Smaller fish stocks Lower fish catch Lower revenue Higher costs Higher intra-marginal rents Negative resource rent
Underfished	Same as for overfished stocks	Same effects as with no property rights except that the value of effort rights will increase.	Same as for overfished stocks	No effect on effort, if it is effectively controlled. Higher revenues Higher profits Incentive to expand uncontrolled components of effort. If effort expands • smaller stocks • larger catches • higher revenue • higher cost • less increase in profits • lower resource rent	Greater effort and more boats Smaller fish stocks Greater fish catch Higher revenue Higher costs Higher intra-marginal rents Negative resource rent

Note: It is assumed that the management regulations that are in place are fully and effectively enforced. The impacts on key variables are the expected effects in the face of perfect enforcement of existing regulations.

Table 5.2 Effect on the subsidising country of subsidising access to other countries' waters

Management regimefi Status of fish stockfl	**Property rights**		**No property rights**		**No property rights No controls**
	Catch controls	**Effort controls**	**Catch controls**	**Effort controls**	
Overfished	Lower value of quotas if subsidies entice boats to leave. No effect on stocks or catches if new vessels replace those who leave.	Lower value of effort rights if subsidies entice boats to leave. New vessels will probably enter and replace those that leave, with uncertain effect on uncontrolled components of effort. If effort expands, catches will fall, and *vice versa*.	Fewer boats and less competition for the catch, if boats do not recover their capital costs. Same or higher revenue Lower costs Higher profits.	Less effort, but greater incentives for the remaining fleet to expand effort, and lower sustainable catch if this happens. Greater revenues Lower costs Higher profits	If fleet is larger than in a long term equilibrium • Less effort • Fewer boats • More rapid approach to long term equilibrium with larger catch and higher revenues, lower costs and higher profits, but no resource rent
Underfished	Same as for overfished.	Same as for overfished, except that the catch would change in the opposite direction.	Same as for overfished stocks	Less effort, but greater incentives for the remaining fleet to expand effort, and larger sustainable catch if this happens. Lower revenues Lower costs Higher profits.	If fleet is larger than in a long term equilibrium • Less effort • Fewer boats • More rapid approach to long term equilibrium with smaller catch and lower revenues, lower costs and higher profits, but no resource rent

Note: It is assumed that the management regulations that are in place are fully and effectively enforced. The impacts on key variables are the expected effects in the face of perfect enforcement of existing regulations.

Table 5.3 Effect on the host country of subsidising access to other countries' waters

Management regime→ Status of fish stock↓	Property rights		No property rights		No property rights No controls
	Catch controls	**Effort controls**	**Catch controls**	**Effort controls**	
Overfished	Higher market value of rights. Some of the host country's vessels will be out-competed by the distant water vessels. Catches, revenues and profits fall in the host country.	Higher market value of rights. Some effort in host country displaced, so that catches, revenues and profits fall for host country. Total effort might change, uncertain in which direction. Catch will change in opposite direction to effort.	Increased competition for catches if host country has higher costs. Some boats from host country might be displaced, with less catches, revenues and profits in host country.	If distant water country's effort is additional • Smaller stocks • Lower catch Some of host country fleet likely to be displaced so that catches, revenues and profits in the host country fall.	Increased effort if host country has higher costs. • Smaller stocks • Lower catches. • Some boats in host country may be displaced. If so, smaller catch, lower revenues, costs and profits for host country.
Underfished	Same as for overfished	Same as for overfished stocks, except that if effort changes, total catch will change in same direction as effort.	Same as for overfished stocks.	If distant water country's effort is additional • Smaller stocks • Greater catch Some of host country fleet likely to be displaced so that catches, revenues and profits in the host country fall.	Increased effort if host country has higher costs. • Smaller stocks • Greater catches. • Some boats in host country may be displaced. If so, smaller catch, lower revenues, costs and profits for host country.

Note: It is assumed that the management regulations that are in place are fully and effectively enforced. The impacts on key variables are the expected effects in the face of perfect enforcement of existing regulations.

Table 5.4 Effect of subsidising decommissioning and license retirement

Management regime→ Status of fish stock↓	Property rights		No property rights		No property rights No controls
	Catch controls	Effort controls	Catch controls	Effort controls	
Overfished	Speedier adjustment of fleet overcapacity, higher value of quota rights. No effect on stocks or catches.	More efficient utilization of remaining vessels, higher value of effort rights. If total effort is reduced, stocks will recover and catches will be greater, and so will profits and the value of effort rights.	Fewer boats and less competition for the catch, if boats do not recover their capital costs, which would increase profits.	Less effort, but effectiveness depends on how well effort is controlled. Stock recovery and increased catches and revenues. Lower costs and higher profits and resource rent.	If fleet is larger than in a long term equilibrium • Less effort • Fewer boats • More rapid approach to long term equilibrium with larger catch and higher revenues, lower costs and higher profits, but no resource rent.
Underfished	Same as for overfished stocks.	More efficient utilization of remaining vessels, higher value of effort rights. If total effort is reduced, stocks will recover but catches will be lower. Profits will rise and so will the value of effort rights.	Same as for overfished stocks	Less effort, but effectiveness depends on how well effort is controlled. Stock recovery but lower catches and revenues. Lower costs and greater profits and resource rent.	If fleet is larger than in a long term equilibrium • Less effort • Fewer boats • More rapid approach to long term equilibrium with smaller catch and lower revenues, lower costs and higher profits, but no resource rent.

Note: It is assumed that the management regulations that are in place are fully and effectively enforced. The impacts on key variables are the expected effects in the face of perfect enforcement of existing regulations.

Table 5.5 Effect of subsidising capital costs

Management regimefi Status of fish stockfl	Property rights		No property rights		No property rights No controls
	Catch controls	Effort controls	Catch controls	Effort controls	
Overfished	No effect on catch or stock No effect on effort Higher value of fish quotas	Higher market value of effort rights. Total effort may expand, with effects as with effort control.	No effect on catch or stock Greater effort and more boats Same revenue or lower Higher costs and lower industry profits Negative resource rent	Effort expansion likely, which would reduce stocks and catches and vessel profit except perhaps for new and refitted vessels. Lower resource rent and possibly negative.	Greater effort and more boats Smaller fish stocks Lower fish catch Lower revenue Higher costs Higher intra-marginal rents Negative resource rent
Underfished	Same as for overfished stocks.	Higher market value of effort rights. Total effort may expand, with effects as with effort control.	Same as for overfished stocks	Same as for overfished stocks, except that catches would increase.	Greater effort and more boats Smaller fish stocks Greater fish catch Higher revenue Higher costs Higher intra-marginal rents Negative resource rent

Note: It is assumed that the management regulations that are in place are fully and effectively enforced. The impacts on key variables are the expected effects in the face of perfect enforcement of existing regulations.

BIBLIOGRAPHY

Banks, R. (1999): Subsidizing EU Fleets: Capacity Reduction or Capital Subsidization? *in* Hatcher and Robinson (Eds.), pp. 200-211.

Cox, A. (2003): Cost Recovery in Fisheries Management: The Australian Experience, *in* Schrank et al., pp. 242-256.

de Wilde, Jan Willem (1999): Effects of Subsidies on the Distant Water and Coastal Fisheries of the Netherlands, *in* Hatcher and Robinson (Eds., 1999), pp. 126-137.

Hannesson, R. (2000): A Note on ITQs and Optimal Investment. *Journal of Environmental Economics and Management*, Vol 40, pp. 181 – 188.

Hansen, T. (1979): The Relationship between Aggregate Costs, Employment and Cargo Capacity of the Norwegian Purse Seiner Fleet. *Scandinavian Journal of Economics.*

Hatcher, A. (1999): The European Community's Structural Policy for the Fishing Industry, in Hatcher and Robinson (Eds.), pp. 50-68.

Hatcher, A. and Robinson (eds.) (1999): Overcapacity, Overcapitalization and Subsidies in European Fisheries. *CEMARE Misc. Publication* No. 44, 1999, University of Portsmouth.

Holland, D., E. Guðmundsson and J. Gates (1999): Do Fishing Vessel Buyback Programs Work? A Survey of the Evidence. *Marine Policy*, Vol. 23, pp. 47-69, pp. 47-69.

OECD (2000): The Impact on Fisheries Resource Sustainability of Government Financial Transfers. Organization for Economic Cooperation and Development, Paris.

Schrank, W.E. (2002): The North Atlantic Cod Fisheries of Norway, Iceland and Newfoundland: Management, Buyback Programs and Subsidies. Paper Prepared for the World Wildlife Fund - United States.

Schrank, W.E. (2003): Introducing Fisheries Subsidies. Paper prepared for the FAO, February 2003.

Schrank, W.E., R. Arnason and R. Hannesson (2003): *The Cost of Fisheries Management*. Ashgate, Aldershot.

UNEP (2002a): *Integrated Assessment of Trade Liberalization and Trade-Related Policies: A country Study on the Fisheries Sector in Senegal*. United Nations Environmental Programme, New York and Geneva.

UNEP (2002b): *Integrated Assessment of Trade Liberalization and Trade-Related Policies: A country Study on the Fisheries Sector in Argentina*. United Nations Environmental Programme, New York and Geneva.

Weber, M.L. (undated): Effects of Japanese Government Subsidies of Distant Water Tuna Fleets, in *Subsidies and Depletion of World Fisheries*, World Wildlife Fund, pp. 119-135.

Wyatt, N. (2003): Cost Recovery in Fisheries: The New Zealand Experience, *in* Schrank et al., 261-276.

ANNEX 5.A. Methodology

In this Annex we use a simple fisheries model to discuss how subsidies affect fishing effort and the long term (sustainable) catch of fish under open access and under an imperfect effort control. The model is based on the well-known logistic growth function and the Schaefer catch function. There are four endogenous variables in the model, namely

e = fishing effort of an individual fishing firm,
N = number of (identical) fishing firms,
S = size of the exploited fish stock,
y = the catch of fish by an individual firm.

Total effort and catch are given simply by multiplying individual effort by the number of firms.

The model contains the following economic parameters, all of which can be affected by subsidies:

p = the price of fish
a = fixed costs of an individual firm, such as capital costs
b = the intercept of an individual firm's marginal cost function
g = slope of the marginal cost function.

In addition there are two biological/technological parameters, q and r.

The Schaefer catch function is

(1) $y = eqS$

The cost function for an individual firm is specified as

$$c = a + be + ge^2$$

Using (1), we can find cost as a function of catch:

$$c = a + b\frac{y}{qS} + g\frac{y^2}{(qS)^2}$$

from which we can find the marginal cost

$$\frac{dc}{dy} = \frac{b}{qS} + \frac{2gy}{(qS)^2}$$

Setting the marginal cost equal to the price of fish, *p*, we can find the firm's equilibrium effort

$$(2)\quad e = \frac{pqS - b}{2g}$$

The equilibrium effort and the marginal cost depend on the size of the exploited stock, *S*. In equilibrium this will be determined by the catch being equal the surplus growth. Using the logistic growth function, we get

$$NeqS = rS(1 - S)$$

where we have implicitly put the carrying capacity of the environment (the stock size in natural equilibrium) equal to 1, or in other words, measured the stock as a fraction of the natural equilibrium value. From this we find the equilibrium size of the stock

$$(3)\quad S = 1 - \frac{Neq}{r}$$

In equilibrium with open access, the marginal firm (here, every firm, since all firms are identical) will not obtain any profit in excess of fixed costs. The profit of the individual firm is

$$p = py - a - be - ge^2$$

Setting this equal to zero and using (1), (2) and (3), we get the equilibrium number of firms

$$(4)\quad N = \frac{r}{pq^2}\left[\frac{pq - b}{\sqrt{a/b}} - 2g\right]$$

We now have four equations to determine the four endogenous variables.

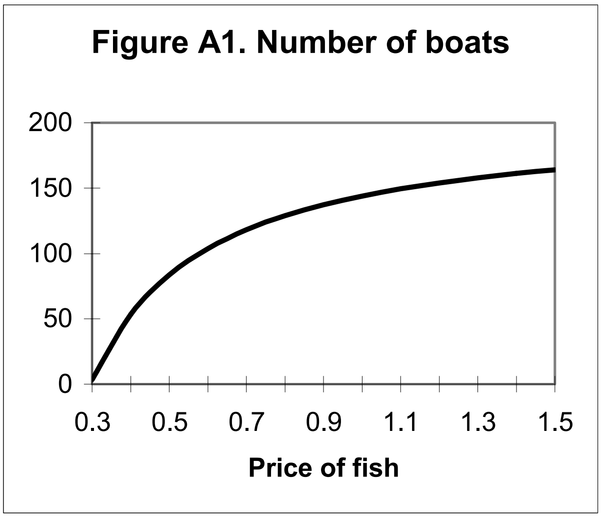
How effort and catches depend on fish price

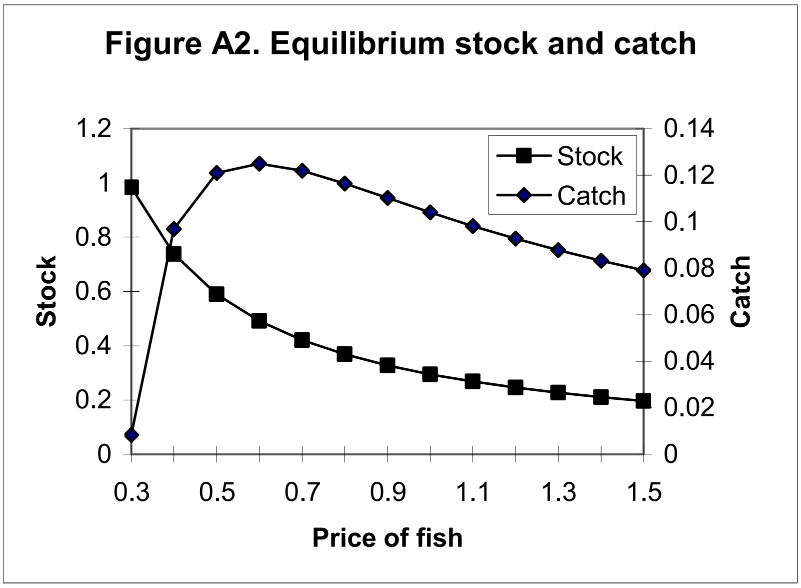
Figures A1 and A2 show how the equilibrium effort, stock level and catch depend on the price of fish.[12] In this particular model the equilibrium effort of a single firm is in fact independent of the price. A higher price leads to a larger number of firms, which leads to a depletion of the fish stock displacing the marginal cost curve of the individual firm upwards by a sufficient distance to keep its effort constant despite a higher price. The total effort is therefore proportional to the number of firms, which in Figure A1 is seen to rise at a decreasing rate as the price rises.

Figure A2 shows that the equilibrium stock level declines uniformly as the price of fish rises. The sustainable yield rises as the price rises from some low level and reaches a maximum as the stock has been depleted to the level giving the maximum sustainable yield and then declines as the price rises further and the stock becomes biologically overfished (is depleted below the level giving the maximum sustainable yield).

12. The base values of the parameters from which they are varied one at a time are as follows: $p = 1$, $a = 0.0003$, $b = 0.05$, and $g = 50$. The values of the remaining parameters are $q = 1$ and $r = 0.5$.

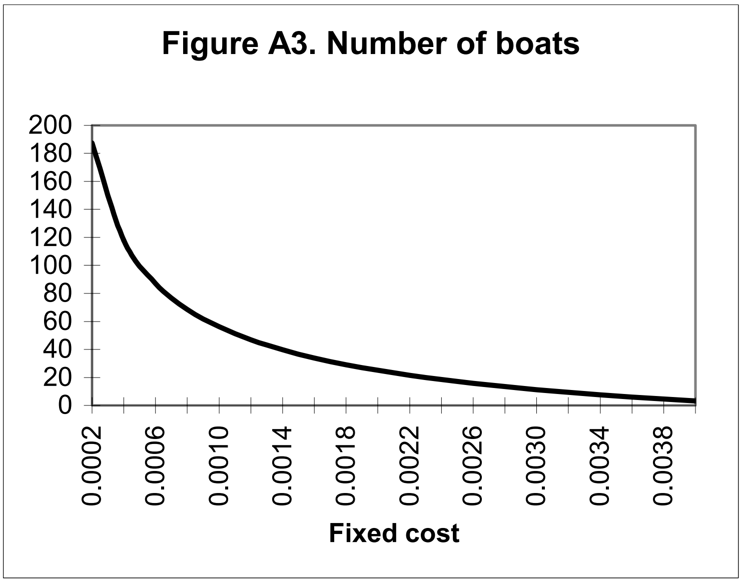
From this we see that subsidies which raise the price of fish received by the fishing firms lead to a greater fishing effort and a smaller fish stock while the effect on sustainable yield is ambiguous, raising it if the stock is biologically underexploited and reducing it otherwise.

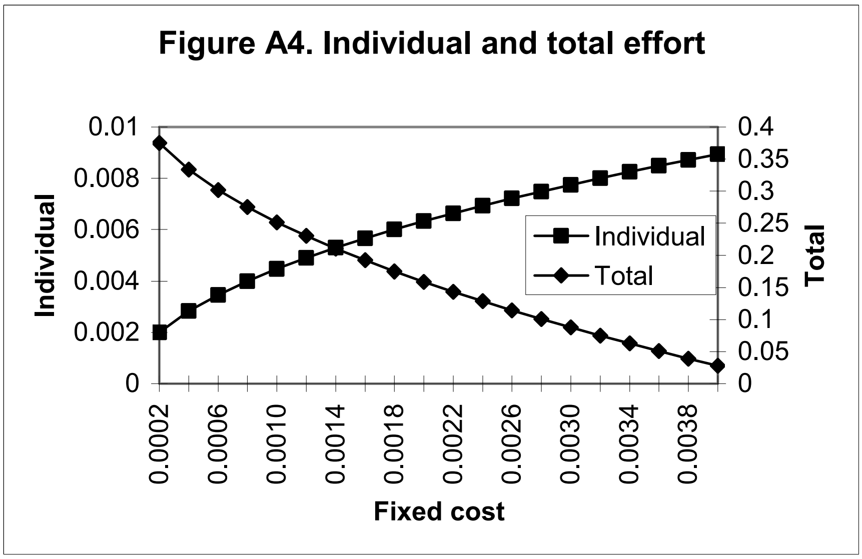


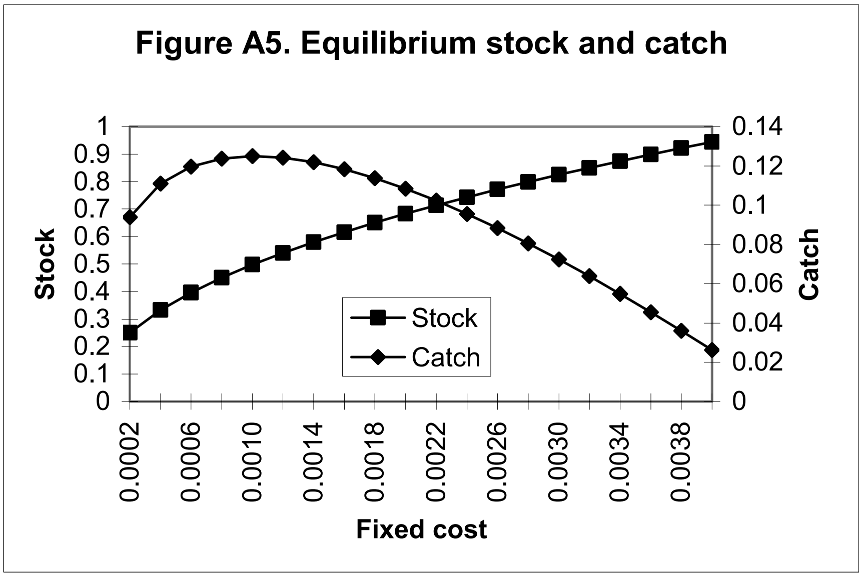


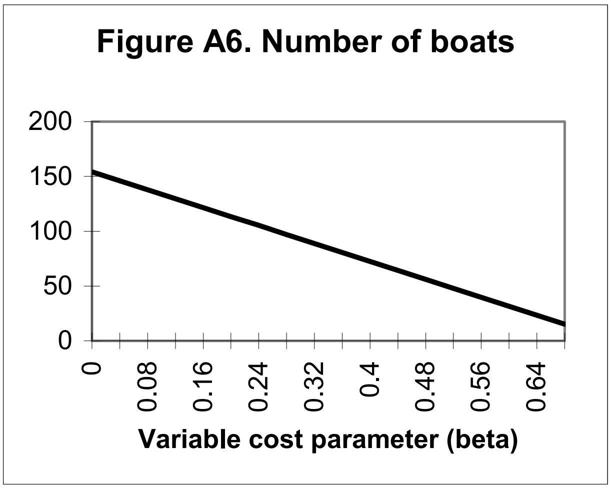
Figures A3, A4 and A5 show what happens when the fixed cost is varied. Raising the fixed cost of each boat strongly affects the number of boats (Figure A3), and the equilibrium stock increases sufficiently to displace the marginal cost of each firm downwards, which leads to an expansion of the effort of the individual firm. The decline in the number of firms outweighs the effort expansion of the individual firms, so that the total effort declines (Figure A4). The effect on stock and yield is exactly the same as when the price of fish changes; a lower fixed cost of boats leads to a decline of the fish stock and the total catch increases if the stock is underfished and falls if it is overfished

(Figure A5). Hence, subsidies that lead to lower fixed costs of boats will in the long term raise catches from underfished stocks and reduce catches from overfished stocks.



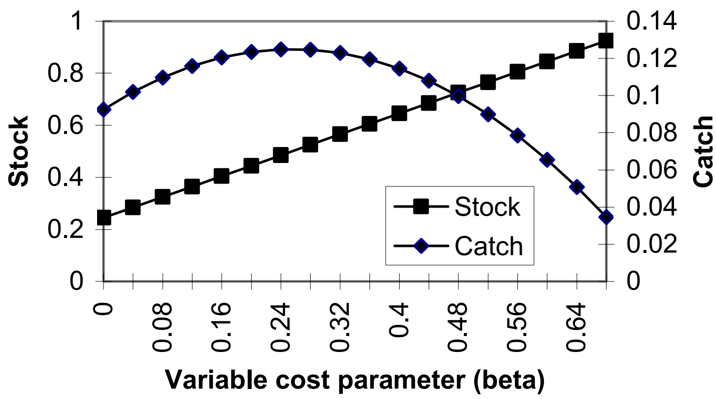






Finally, consider the effect of changing the variable cost of effort. We consider a change in the parameter *b*, which would be the cost per unit of effort in case it were constant (we ignore the parameter *g* which determines the slope of the marginal cost function, although it is conceivable that subsides would affect fishing effort in a non-linear fashion). Figures A6 and A7 show what happens when the parameter *b* is varied. As in the case of varying the price of fish, the fishing effort of the individual firm is constant, so that the effect on effort is proportional to the effect on the number of firms. Higher variable cost leads to a decline in fishing effort, and the effect on the fish stock and the fish yield is exactly analogous to what happens when the price of fish or the fixed cost of each boat are varied (Figure A7). Hence, subsidies that lower the variable cost of fishing will lead to an expansion of fishing effort and a decline of the fish stock, causing the long term catch to increase if the stock is underfished and to rise if the stock is overfished. The effect of these kinds of subsidies are summarised in Table 5.1 in the main text.

Figure A7. Equilibrium stock and catch



Intra-marginal rents

When firms are heterogeneous, *i.e.*, are characterised by different capital costs or costs of effort (variable costs), the more efficient firms will obtain some profit by virtue of their lower costs while the marginal firm breaks even. These profits are usually called intra-marginal rents.[13] These rents increase as the price of fish goes up or the cost of effort falls, provided that the number of firms in the industry is an approximately continuous variable. Below we demonstrate this, using the model developed in this Annex but with the cost function calibrated so as to allow only a few numbers of firms in the industry, for convenience (in reality the industry would ordinarily be characterized by a much larger number of firms, and this would also be necessary to accommodate a competitive solution). The parameter values used are $b = 0.1$ and $g = 2$, while a (the fixed cost) varies between firms to allow for heterogeneity.

Table A1 shows what happens to the number of boats, fishing effort, and intra-marginal rent as the price of fish varies (due to subsidies, for example; note that the effect on subsidizing variable costs is analogous). Compare, first, the results with $p = 1$ and $p = 2$. The number of firms increases from 2 to three as the price goes up. The effort of the individual firm falls slightly but the total effort goes up, but the increase in the number of firms is more than enough to compensate for that. The catch of the individual firm goes down and so does the total catch, because the increase in effort pushes the stock way below the maximum sustainable yield level, which is 0.5.

The model is so calibrated that Firm Two exactly breaks even when $p = 1$, and the intra-marginal rents of both firms that are active in the industry at $p = 1$ goes up. The price $p = 2$ is exactly high enough to make it worthwhile for Firm Three to operate, so at this price Firm Three breaks even.

13. Firms do also differ in terms of productivity; i.e., some firms obtain a larger catch per day at sea or per dollar invested in fishing boats. But if we measure effort in homogeneous units, as is necessary when relating the catch to the stock being fished, these differences translate into differences in the cost of effort.

Variables: p = price of fish, N = number of firms, e = effort of the individual firm, E = total effort, y = catch of the individual firm, Y = total catch, S = fish stock, π = profit of the individual firm (intra-marginal rent). The values of the fixed cost parameter are $\alpha_1 = 0.02$, $\alpha_2 = 0.0253$, and $\alpha_3 = 0.0282$.

Table 5.A1

	***p* = 1**	***p* = 1.5**	***p* = 2**
N	2	2	3
e	0.1125	0.14	0.11075
E	0.2250	0.28	0.35625
y	0.061875	0.0616	0.034141
Y	0.123750	0.1232	0.0102422
S	0.55	0.44	0.2875
π_1	0.005312	0.0192	0.008203
π_2	0	0.0139	0.002891
π_3			0

The table also shows what happens with $p = 1.5$. Both Firm One and Two enjoy intra-marginal rents and Firm Three would get its fixed costs covered, provided the fish stock would not change. But this would not be an equilibrium solution; the entry of Firm Three would reduce the stock further and cause it to make losses. The intra-marginal rents for Firms One and Two are much higher with $p = 1.5$ than with $p = 2$ but this is caused by the discontinuity of the number of firms and their fixed costs; as these variables become more like continuous variables the range for which we can get solutions like the one for $p = 1.5$ becomes narrower and narrower and in the limit it would disappear.

Effort controls

We can use the above model to study the effects of imperfect effort control. Note that imperfect effort control means than not all components of effort can be controlled. Here we have two components of effort, the number of vessels (N), which we identified with the number firms, and the intensity with which they are used and which we have called effort (e). We now suppose that it is possible to control the number of vessels but not the intensity with which they are used.[14]

Using Equations (2) and (3), we can find the number of boats (N) as a function of the size of the fish stock (S):

$$N = \frac{2\gamma r(1 - S)}{q(pqS - \beta)}$$

14. The reader may be disturbed by the identification of N and not of e with effort control, given that we referred explicitly to e as effort above. The most rudimentary effort controls would probably control both the number of vessels and some measure of effort such as fishing days. Imperfect effort control means that e really consists of several components, of which only some can be effectively controlled. We could have dealt with this by making e a vector (having it consist of several components) rather than just a scalar (a single variable). The model would, however, have become considerably more complicated and we chose the easier route.

Suppose now that the fisheries managers have succeeded in limiting the number of boats in such a way that the maximum sustainable yield is close to being realized. Setting S = 0.525 and using the same reference values of the parameters as in the open access solution,[15] we would get N = 45. This results in e = 0.00475 and a profit per boat of π = 0.000828. This profit is due exclusively to the rising cost of effort for each boat; effort is expanded until the last unit just barely pays for itself, but the others are cheaper and yield a profit.

Now suppose that a subsidy is introduced which raises the price of fish from 1 to 1.25. With the number of boats under control we still have N = 45. But there is now an incentive to increase the effort (e) of each boat. Again we can use Equations (2) and (3) but this time to find the new equilibrium stock, as the number of boats is the same as before. This gives

$$S = \frac{2\gamma r + Nqb}{2\gamma r + Npq^2}$$

which gives S = 0.4667. The increased effort has pushed the equilibrium stock below the maximum sustainable yield level (and reduced catches). The new effort level is e = 0.005333, and the profit per boat is π = 0.001122.

What about resource rent? The resource rent is equal to the price less the marginal cost of fishing times the amount caught. In the first solution, with p = 1, the marginal cost is also equal to one. This follows from the profit maximization of the firms; they choose their effort level so as to equate marginal cost to price, which implies that there is no resource rent; the rent is all eaten up by excessive effort. The profit that nevertheless is obtained is due, as stated earlier, to the rising marginal cost of effort and thus consists of intra-marginal rents to effort but with no rents for the resource itself.

How should we reckon the resource rent with the subsidy? The subsidy artificially inflates the price of the fish and is not an element of rent, so to calculate the rent we should use the old price less the new marginal cost and multiply by the quantity caught. The new marginal cost will be equal to the new price, which is 1.25, and so we get a negative resource rent of -0.25 per unit of fish caught, which would yield a negative resource rent per boat of -0.00062.

15. The stock level giving maximum sustainable yield is S = 0.5. This does not give N as a whole number, which is a bit awkward.

Chapter 6

The Environmental Effects of Transfers to the Fisheries Sector[1]

The environmental effects of GFTs provided to the fisheries sector closely follow from the economic effects analysed in the previous chapter. This chapter presents the analysis from a different perspective using the checklist approach developed for the environmentally harmful subsidies

Transfers can result in increased catches in the short run but, over the long term, they will generally lead to lower fish stocks. However, it is clear that the type of management regime in place will strongly influence the extent to which transfers adversely affect the sustainability of fish stocks. One of the key findings of this report is that the effectiveness of enforcement is just as big a determinant of the environmental effects as the type of management regime.

This chapter analyses the environmental effects of transfers by applying the checklist methodology for identifying and assessing environmentally harmful subsidies that has been developed as part of a horizontal program in the OECD (OECD 2003c, 2005). As will be seen, this approach is essentially the same as the "matrix approach" used by the OECD in its earlier work on fisheries trade liberalisation where the effects of policy changes have to be assessed in the context of the policy setting in which they are provided (OECD 2003a).

The focus in the chapter is on the impacts of transfers on fishery resources and the impact of transfer removal is assessed in terms of the effect on the relevant fish stocks. The chapter does not cover the effects of changes in financial support on other aspects of the marine ecosystem that may be affected by fishing activity (such as incidental catch, the marine benthos, pollution from fishing vessels and so on). While such effects are important, their inclusion in the analysis at this stage would obscure the most important and direct environmental effect. In addition, the key environmental variable in much of the policy debate over the provision of fishing transfers is primarily the target fish stocks, rather than the accompanying environmental issues.

1. This chapter was prepared by the Fisheries Division of the OECD Directorate for Food, Agriculture and Fisheries. An earlier version of the chapter was presented to the OECD Workshop on Environmentally Harmful Subsidies held in Paris, 3-4 November 2003.

A Brief Review of the Checklist Approach[2]

The checklist approach developed for the OECD workshop builds on earlier OECD work undertaken on subsidy reform which examined the employment and income effects of subsidies, as well as on the environmental effects (OECD 1998, 1999). The narrower environmental focus arose in an effort to isolate the environmental aspects of subsidy removal from the other impacts of policy reform in the analysis. Pieters (2003) provides a detailed explanation of the checklist approach developed for the OECD workshop. In brief, the objective of the checklist is to help identify those subsidies the removal of which would lead to an environmental improvement, other things being equal. It is intended as a "quick scan" which will provide an indication of the relative magnitude of the impact that the subsidies actually, or potentially, impose on the environment. It is designed to equip policy makers with an understanding of the key issues involved in the removal of subsidies. Importantly, it is not intended to be a substitute for more detailed analysis of the economic, environmental and social effects of subsidy removal (or provision). Rather, the checklist serves to provide a signpost on directions for policy makers to concentrate further analytical efforts – it is a guiding tool for identifying priority areas for policy reform.

The checklist addresses two interrelated issues:

- the effects that subsidies have on consumer and producer decisions; and
- the link between these decisions and the environment.

The effects of subsidy removal on producer and consumer decisions will depend crucially depend on the overall policy framework within which the transfer is given, the availability of alternatives and the nature of competition in factor and product markets. The policy setting in which a subsidy is provided is particularly important in the case of the fisheries sector as fisheries are generally subject to some form of management by governments, usually in the form of restraints on the catch, allowable effort, entry to the industry, and so on. Such a "policy filter" will largely determine the potential responsiveness of producers to changes in subsidy regimes. In the context of the fisheries sector, the policy filter is primarily the management regime under which the transfer is provided.

The link between producers' and consumers' decisions and rates of environmental harm also depends on the conditionality of the subsidy. The concept of conditionality arises because the provision of subsidies is usually conditional on some conditions being met. The more obtaining a subsidy is contingent on attaining certain levels of input or output, the deployment of a particular technology or the use of a particular input, the more direct will be the link between the subsidy and its environmental effects. The main mechanism for determining the strength of the link is by identifying the points of impact of the subsidies. The points of impact refer to the points at which a transfer leads to different responses of producers and consumers with respect to their modes of production, production and consumption levels. This conditionality will then have different impacts on the rates of exploitation of fisheries resources. While all subsidies translate into either revenue increases or cost reductions, it is useful to highlight some important differences in transfer transmission. Usually the following broad points of impact are distinguished:

2. As with the other chapters in this Part of the report, the terms subsidy and transfer are used interchangeably.

output (where revenue increases are conditional on the volume of production), input (production cost reductions) and profits and income (where revenue increases irrespective of volumes produced) (Pieters 2003).

The simplified version of the checklist is presented schematically in Figure 6.1. The key steps in the checklist are:

1. Provide a description of the subsidy, focusing on the structure of the incentives provided to producers and consumers from provision of the transfer.

2. Determine the extent to which the policy filter limits the negative consequences of the subsidy.

3. Determine the availability of alternative products or methods to those being subsidised. The key issue here is whether the implementation of more environmentally benign alternatives is being hampered by the subsidy under scrutiny.

4. Determine the extent to which the conditionality of the subsidy leads to higher volumes of production or consumption or to higher levels of use.

5. Identify the degree of market power that exists in the market.

Applying the Checklist to the Fisheries Sector

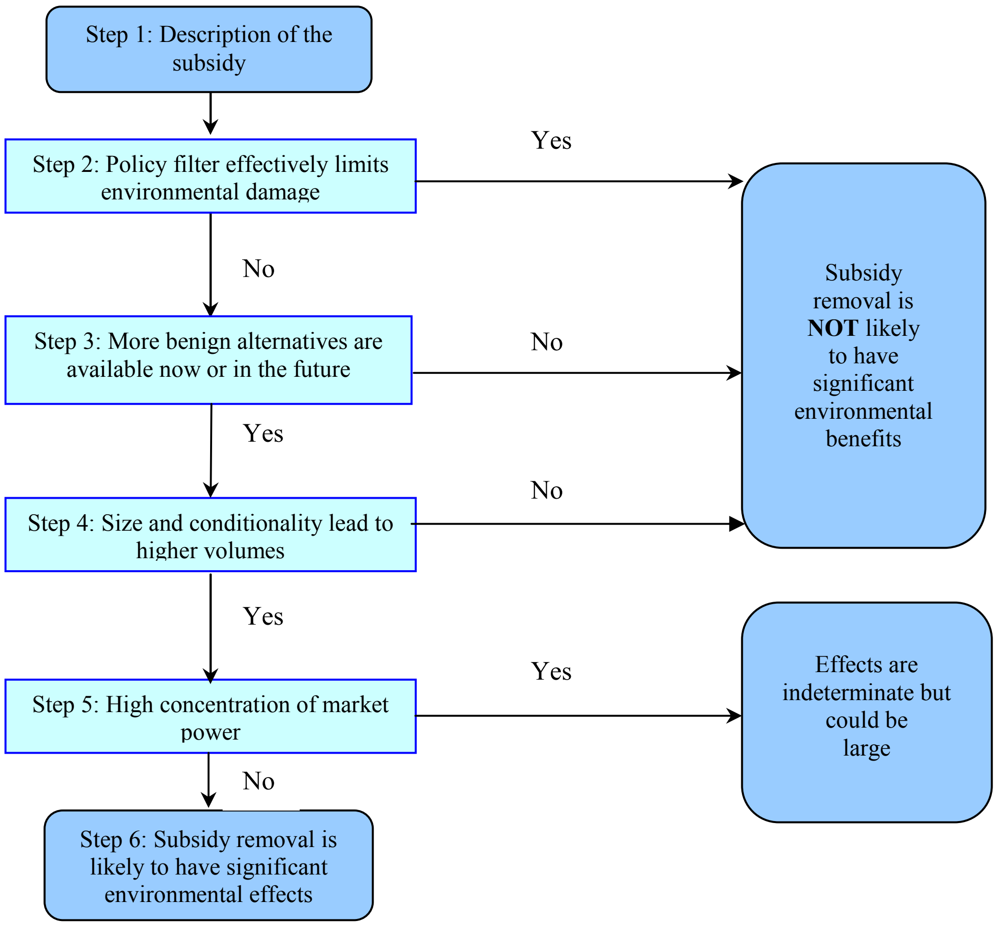
The checklist consists of a number of stages which can be summarised as:

- The policy filter;
- Availability of substitutes;
- Conditionality of the transfer; and
- Extent of market power.

The *policy filter* is the key determinant of the environmental impact of transfers to the fishing sector. The policy filter primarily refers to the management regime governing the fisheries sector, in particular to the extent to which fish catches are effectively restricted. This determines the ability of fishers to respond to policy changes such as the provision or removal of transfers. The better the incentives are aligned to ensure that economic and environmental outcomes are mutually reinforcing, the less scope there is for transfers to be environmentally harmful. This can be illustrated with a simple example. If production is constrained by, say, an effectively enforced quota then a transfer to fisheries production may have little or no effect on fish stocks. It will merely represent an internal transfer within the economy from the government to the fishing sector, albeit with the associated deadweight losses and economic inefficiencies that arise from such transfers. So removing the transfer, while maintaining the quota, will leave exploitation and stock levels unchanged. Alternatively, if fish production is not constrained in some manner, then the transfer will have an effect on either incomes or costs of fishers and, by increasing profits (at least in the short term), will provide an incentive for increased exploitation of fish resources with adverse environmental consequences.[3]

3. This result holds in the long term even for those fish stocks that are currently under-exploited (see Clark 1990; Hannesson 2001).

Figure 6.1. Schematic representation of the checklist



Source: Pieters 2003.

The *availability of substitutes* raises several interesting issues, but remains a secondary consideration to the policy filter in terms of the checklist. This stage determines what technologies and products are likely to replace the previously subsidised products and modes of production and whether these substitutes are more environmentally benign. In principle, the provision of transfers to the construction of fishing vessels and to the use of particular types of fishing gear or techniques can have the effect of locking in specific technologies and hampering the implementation of alternatives. In some cases, transfers are given to assist the introduction of fishing gear that is considered to be more environmentally friendly than current technologies (such as bycatch reduction devices). The key questions here are whether transfers are the most appropriate policy instrument to be employed in this situation and whether there is a net social benefit, taking all aspects into account, from the provision of the transfer.

Conditionality is not really an issue in the fisheries sector. As will be seen in the next section when discussing the different types of transfers, almost none of the broad categories of transfers are conditional on the maintenance of any given level of production or input use. This characteristic of fisheries transfers differentiates the sector from some other sectors where a number of transfers are tied to production volumes (that is, a certain amount per unit of output). The only exception to this may be the use of certain price guarantee schemes where governments pay fishers an amount per kilogram of fish if the price falls below a certain level. These schemes are generally triggered in times of declining domestic demand, increasing competition from imports, declining world prices or increasing domestic supplies. The schemes have the effect of insulating fishers from market signals and can serve to encourage fishers to maintain production levels in the face of economic signals that may indicate that such a course may be economically and environmentally unsustainable. In this regard, they have very similar effects as market price support measures such as tariffs and other border protection schemes.[4]

Similarly, the question of *market power* does not generally arise in the case of transfers to the fisheries sector. The input and output markets are relatively competitive, although this does vary from country to country. In some parts of the sector, there is a high degree of vertical integration between fishing and processing. The provision of transfers to the various stages of production in highly integrated firms can compound the environmental effects of transfers. Integrated firms can shift costs and income around within their corporate structure to maximise profits in response to changes in relative costs resulting from policy measures (such as transfers).

Applying the Policy Filter

Management regimes

Management regimes can be defined and classified in a number of ways. In an earlier version of the kind of approach used here, Hannesson (2001) identified three stylised management regimes: open access; catch control; and effective management. The characteristics of the three stylised regimes are summarised in Table 6.1. The three regimes are readily recognised as situations that, while highly simplified, reflect the key features of management regimes in the real world. Most OECD countries fall between the catch control and effective management regimes. While there has been a gradual shift in many OECD countries from catch control towards effective management, as more and more restrictions are placed on entering particular fisheries, most countries remain closer to catch control than effective management.

In this study (as in Hannesson 2003), an expanded version of the stylised management regimes is used. This focuses on four key aspects of management regimes:

- whether there are any controls on fishers (that is, open access);
- extent of catch controls;
- extent of effort controls; and
- the existence of any property rights structure.

4. The distinction needs to be made between price guarantee schemes which operate within countries (or groups of countries such as the EU) and border price support such as tariffs.

Table 6.1. Attributes of Stylised Management Regimes Used in Hannesson (2001)

	Open access	Catch control	Effective management
Catch level	Outcome of competition among firms ignoring fish resource constraints	Limit set by management authority	Limit set by management authority
Number. of vessels	Same as above	Outcome of competition for a maximum share of a given catch	Limited by cost minimisation of industry firms or by management authority
Other capacity elements (gear, technology, etc.)	Same as above	Same as above	Limited by cost minimisation by fishing companies. Can be partially limited by management authority.

Source: Hannesson (2001, p. 6).

Where there is **no control** of the fishery in terms of either the amount of fish caught, fishing effort or property rights, fishers compete for the resource and no regulatory effort is exercised. In general, the expected effects of transfers are observed over the longer term – overexploitation of stocks, longer-term decline in catches, higher intramarginal profits, increased capital and labour attracted to the industry, and resource rents competed away to zero. Depending on the starting point (whether the fishery is above or below the maximum sustainable yield), catches may rise in the short term as transfers increase the profitability of the industry before falling as the stock is exploited beyond the maximum sustainable yield.

In a management regime where there is **catch control**, transfers will not have an effect on fish stocks or catches of fish (by definition), provided that the catch is set at a sustainable (equilibrium) level and effectively enforced. If there is no control on fishing effort (through restrictions on the number of boats or how they are used), then the intramarginal profits will increase, attracting additional labour and capital to the sector with the result that resource rents are still competed away. In addition, the overcapitalisation of the fishing fleet would increase pressure on fisheries management authorities to raise the allowable catch. There are also potential issues regarding discarding and high-grading as fishers attempt to maximize the value of their catch.

Effort controls primarily take the form of restrictions on the number of vessels that are allowed to operate in a fishery, the amount of time they are allowed to fish and restrictions on the fishing gear and techniques that may be used. Despite the best efforts of regulators, it is not always possible to identify and control all the variables that determine the effort that fishers can bring to bear on fish stocks and it is possible that fishers can expand their effort along uncontrolled dimensions to increase effective effort. For example, the effort regulations in a particular fishery may specify restrictions on boat size, engine power and days at sea, which still leaves scope for fishers to expand fishing effort by increasing the use or effectiveness of other inputs such as labour and the amount or type of fishing gear. This problem in turn makes it difficult for fisheries managers to set the appropriate level of effort controls as the effect of a given level of effort on catches and fish stocks necessarily remains uncertain. Moreover, the effect is unlikely to remain constant over time as the industry adapts to new restrictions, thereby potentially resulting in a race between the development and application of new regulations on one hand and the implementation of effort-increasing measures by fishers on the other. The problems of input stuffing associated with effort regulations are highlighted in a number of studies, including Beddington and Rettig (1984) and OECD (1997, pp. 112-7).

The addition of regimes based on **property rights** to the use of catch and effort controls adds a further dimension to the available menu of management regimes. Property rights can be used in conjunction with either catch controls or effort controls, with the most common form of property right being individual quota rights (which may or may not be tradable). Rights based regimes significantly alter the incentive structure facing fishers. They no longer have the incentive to race for fish as they can concentrate their efforts on catching their allowable catch in order to maximise profits (although this can lead to problems of high-grading and discards, as in the case of catch control regimes). Nor do they have an incentive to increase the fishing power of their boats beyond that which is needed to catch their allocation at minimum cost. Individual rights can also be defined for fishing effort, although this is less common in practice. It is also more problematic in terms of effective enforcement as the incentive to increase effort along uncontrolled dimensions remains; effort rights can generally only be defined along limited key dimensions (such as boat length, gross tonnage, days at sea, power, etc).

As noted in Hannesson (2001, 2003) and OECD (2003), the effect of transfers on the actions of the fishers, and hence on the fish stocks, will also depend on whether the fish stock is under-exploited or over-exploited (that is, whether fish stocks are above or below the level providing maximum sustainable yield). This distinction is particularly significant when considering the short term and long term effects of particular types of transfers under different management regimes. However, for most of the transfers under consideration, there is no difference in the long-term effects on fish stocks whether the stocks are initially under-fished or over-fished. The exceptions will be addressed in the following discussion of individual transfer categories.

Management, research and enforcement expenditure

Description

It is well recognised that governments need to intervene in fisheries in order to ensure an efficient use of common fishery resources. The absence of such intervention will generally lead to overexploitation of fish stocks and reduced returns to the sector in the longer term. To facilitate this, governments provide a range of services to the sector including management, research and enforcement (OECD 2003b). Management consists of establishing and administering management regimes and adapting existing regimes. Research is required to underpin management as the success of government intervention depends on the managers having an adequate knowledge about the status of fish stocks and the linkages with the ecosystem. The success of management is also critically dependant on the monitoring, surveillance and enforcement of fisheries rules and regulations. It is worth noting that, in the case of research and enforcement in particular, there is a significant likelihood of diminishing marginal returns, with increased expenditures on research and enforcement services not necessarily leading to commensurate increases in expected returns to the sector (OECD 2003b).

In OECD countries, governments generally pay for the costs of management, research and enforcement. However, a number of countries, including New Zealand, Australia and

Iceland, are now recovering a sizable portion of the costs from industry. Other countries, such as Canada and Norway, charge user fees for some aspects of management (although not as part of a broader cost recovery programme). Moreover, the provision of a number of fisheries services (particularly some research and enforcement functions) are being outsourced to private providers or provided through joint ventures between public and private agents, reflecting a further shift away from exclusive government provision of management, research and enforcement (OECD 2003b). Such developments reflect the implementation of a beneficiary pays principle in the provision of services in those countries, more general budget pressures on governments and the increased use of co-management (much of which has accompanied the introduction of management shifts towards instruments such as individual transferable quotas).

Points of impact

In general, the government provision of management services reduces the production costs of the industry. While the main point of impact is on the input side, it is also the case that industry benefits from effective management through more sustainable exploitation of fish stocks and increased returns to the industry. As a result, these expenditures can have an impact on the income side in the longer term through increasing the sustainability of fish stocks, although the effect is primarily through reduced input costs. Table 6.2 shows the main point of impact for this transfer category as well as for the other transfers in the typology.

Similarly, research expenditures reduce the costs of the industry as they would otherwise have to bear the costs themselves. A usual justification for the public provision of research is that it is a public good and that the benefits from the research flow beyond the fishing sector to the broader community. While this is true for many kinds of research (such as general research into ecosystem functioning, etc), it is not necessarily universally the case. Some forms of research may have a significant impact on the input costs of fishing operators. For example, research into improved gear technology, gear selectivity and so on is primarily directed at improving the productivity of fishing operations. Much of this research benefits the industry directly and it is not clear that the public good arguments usually associated with publicly funded research necessarily apply (Arnason and Sutinen 2003; Cox 2003). The extent to which research can be classed as a public good is a grey area.[5]

As with management expenditure, government payment of enforcement services has an impact on the input costs of fishing firms and, to a lesser extent, incomes.

5. Research aimed at improving stock assessments is such a grey area. It benefits the industry by improving the knowledge base on which management settings are based. It also benefits the broader community in terms of an improved understanding of the marine resources of the community. Moreover, it is hard to exclude anyone from the benefits of such research and, once undertaken, it is generally available to whoever can make use of it.

Table 6.2. Typology of fisheries transfers and their main points of impact

Category	Description	Input	Output	Income
Management, research and enforcement expenditure	Management (administration, international obligations)	X		X
	Research (stock and economic assessment, productivity improvements, etc)	X		X
	Enforcement	X		X
Infrastructure expenditure	Community infrastructure (lighthouses, navigation facilities, search and rescue services)	X		
	Fishery sector specific infrastructure (landing quays, auction halls, fishing ports)	X		
Payments for access to third country waters	Government to government payments (not recouped from the fishing fleet)	X		X
Transfers for vessel decommissioning and licence retirement	Permanent capacity retirement (vessel scrapping, licence withdrawal)			X
	Permanent capacity transfer			X
Transfers to labour retirement and retraining	Permanent labour retirement (aid to retraining and pre-retirement)			X
	Temporary labour retirement			X
Transfers to capital costs	Construction (direct payments, loan guarantees, interest transfers)	X		
	Modernisation (direct payments, loan guarantees, interest transfers)	X		
Transfers to variable costs	Direct payments, loan guarantees, fuel tax exemptions	X		
Income support and employment insurance	Community income support (regional aid, small scale fisheries aid, development aid)			X
	Individual income support (direct payments to boat owners and employees)	X		X
	Employment insurance			X
	Temporary capacity retirement (laying up payments)			X
Direct price support	Market stabilisation schemes price guarantee schemes (other than border measures)		X	X
	Marketing and promotion schemes	X		X

Source: OECD.

Application of the policy filter

Government provision of management, research and enforcement services without charging for their use reduces the costs faced by fishing firms and raises their potential profits. In the absence of property rights and catch or effort controls (that is, effectively open access), this leads to increased profits in the industry in the short term and to greater effort being applied to the fishery (both by existing vessels and by new entrants). In the long term, the profits and resource rent in the industry will decline to zero, or may be negative. The long term effect on stocks is the same whether or not the fishery is over-fished or under-fished at the time the transfer is introduced. If the fishery is initially over-fished, fish catches will decline and the fish stock will be lower in the long term. Conversely, if the fishery is initially under-fished, fish catches will increase initially but will eventually settle at a lower level in the long term due to extra effort flowing to the fishery.

When catch controls are effectively applied to the fishery, then the transfer will not have any effect on fish catches or the fish stock, by definition. When, even with catch controls, there are no constraints on effort there is a strong incentive to increase effort due to the higher potential profits initially caused by the transfer. With more effort being applied to catch the same quantity of fish, profits will decline and there may be extra pressure on the management regime to increase the allowable catch. If this occurs, then the effect will be the same as if there were no controls at all.

When effort controls are applied to a fishery, then the free provision of management, research and enforcement services will not have an effect on stocks, provided that the effort controls are effective in restraining catches. In the absence of effective effort controls, fishing firms have an incentive to engage in input stuffing and fish stocks will be reduced in the long term due to the effort creep in the fishery. As with the case of no controls above, the short term response in terms of catch levels will differ depending on whether the fishery is initially under-fished or over-fished.

The introduction of property rights in addition to the use of catch or effort controls adds a further dimension to the analysis. Under the combination of catch controls and property rights, the introduction of transfers in the form of free provision of management, research and enforcement services will not have an effect on fish stocks (provided that the catch level is set at a sustainable yield). With individual catch rights, fishing firms have no incentive to become involved in a race for fish or to increase effort or capital or variable inputs above the minimum cost level to catch their quota. As a result, the transfer will increase the returns to the industry as it represents a transfer from taxpayers to the industry.

In principle, the combination of effort controls and property rights will mean that there will be no long-term effect of transfers in the form of the free provision of management, research and enforcement services on fish stocks. However, unlike individual catch rights, individual effort rights do not reduce the incentive for fishers to engage in input stuffing. As a result, the effectiveness of such a regime in restricting overall effort expansion and catches is reduced, relative to individual catch rights. If there is effort creep, there will be a long-term reduction in fish stocks. The pattern of fish catches in the move to lower fish stocks will, once again, depend on whether the fish stocks are initially under-fished or over-fished.

Table 6.3. Effects of Free Provision of Management, Research and Enforcement

Transfer category	State of fish stock	Management regime				
		Property rights		No property rights		
		Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Management, research and enforcement expenditure	Over-fished/ under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks

Source: OECD.

Infrastructure expenditure

Description

Expenditure on fisheries infrastructure includes payment for the construction and maintenance of harbours and fishing ports, construction of peripheral harbour infrastructure (roads, water, sewerage, etc), installation and maintenance of landing equipment, construction of auction halls, lighthouse and navigation facilities and search and rescue facilities. OECD governments have traditionally paid for fisheries infrastructure. While a number of OECD countries levy a user charge on the industry for the use of facilities, the extent of such charging is not known with great certainty.

Fisheries infrastructure is generally regarded as having the characteristics of public goods: they can be used by more than one user at a time (non-rivalry) and it is either physically difficult or economically infeasible to exclude users from benefiting from the facilities (non-exclusivity) (Cornes and Sandler 1996).[6] In reality, only a limited range of infrastructure facilities have the characteristics of pure public goods, namely lighthouses and navigation equipment. Other types of infrastructure can suffer from congestion (for example, as a result of large numbers of vessels in a harbour competing for space at wharves or off-loading facilities) or exhibit a degree of excludability so that the benefits are enjoyed by a restricted group (such as auction halls and landing facilities).[7]

Determining the degree of subsidisation attached to the free provision of infrastructure is contentious and revolves around three key issues. The first issue concerns whether other users of such infrastructure (for example, charter boat operators, commercial cargo companies) are required to pay for access. If they do, then the free provision of such facilities to the fishing sector amounts to a transfer. The second issue focuses on whether the fishing industry is the primary beneficiary from the provision of the infrastructure. If this is the case, then an element of subsidisation occurs. Third, the general infrastructure charging policy of some countries may not require industries to contribute to the costs of constructing and maintaining ports, airports, railways, roads and

6. Footnote on the technical aspects of public goods.

7. The latter are usually referred to as club goods.

so on. They may regard such projects as general development to be funded out of general tax revenue. At the same time, many countries are introducing user pays principles as a means of rationing use of facilities and relieving congestion (for example, through road charging, airport taxes, etc). The pricing of such access is difficult and many of the issues are common with other sectors with significant infrastructure requirements.

Points of impact

The main point of impact from the provision of infrastructure is on the production costs of fishing firms. Without government funding for these facilities, the industry would clearly have to pay for them themselves.

Application of the policy filter

In the absence of user charges for the use of government provided infrastructure, the costs of the fishing industry are reduced and potential profits increased. The results in terms of the effects on fish stocks under the various combinations of management parameters are analogous to the results for the government provision of management, research and enforcement services.

Table 6.4. Effects of Free Provision of Infrastructure

Transfer category	State of fish stock	Management regime				
		Property rights		No property rights		
		Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Infrastructure expenditure	Over-fished/ under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks

Source: OECD.

Payments for access to third country waters

Description

A number of countries, mostly distant water fishing states, negotiate agreements with coastal states which involve the granting of access to fish resources within the exclusive economic zone (EEZ) of the coastal state. The payment for access to the fish resources may involve an explicit monetary transfer, the transfer of fishing technology, assistance with improving fisheries management institutions, the provision of market access in the fishing country, or some combination of these. Payments can also be more implicit and be couched in terms of cooperation in a range of areas outside the fishing sector such as defence, development aid and so on. The transparency of these access agreements varies widely and the full extent and types of the payments is not well known.

Points of impact

The transfer element arises from the fact that these payments are primarily made by the government of the fishing country to the government of the host country and are not usually recouped from the fishing industry. This therefore reduces the costs of fishing for the industry for gaining access to resources outside their own EEZ.[8]

Application of the policy filter

The effects of payments for access on fish stocks will differ between the country providing the payments (the subsidising country) and the country providing the access to its resources (the host country). Agreements to provide access for foreign fishing fleets represent a transfer of effort between the two countries. The effects on fish stocks will depend on the state of fleet capacity and fish stocks in both countries as well as on the management regimes in place.

Looking first at the subsidising country, if there are no controls in place in its fisheries, then paying for its fishing fleet to have access to the host country's EEZ will result in the shift of capacity out of its own EEZ. This displaced capacity will then be replaced by new capacity in the subsidising country's EEZ. The mechanism for this is relatively simple: as fishing vessels leave the domestic fishery to fish in the host country, stocks will recover as less effort is applied, leading to increased potential profits and an incentive for more capacity to enter the fishery. There would then be no net effect on the subsidising country's fleet capacity or fish stocks in the longer term. This outcome holds regardless of whether the fishery was initially over-fished or under-fished.

If there are catch or effort controls in the subsidising country, then the effect on the subsidising country's fish stocks would also be zero for a similar reason as for the case of no controls. The removal of capacity would either not have an impact on catches or fish stocks or would be replaced by new capacity/effort so that the net effect would be zero. Similarly, in the case where there are property rights, the net effect would be zero: the subsidising country's fleet would have no incentive to leave their EEZ unless the expected profits from operating in the host country's EEZ were greater than those from operating in their own EEZ. If this was the case, then the departing capacity would be replaced by new capacity as there will be an excess supply of quota in the subsidising country's fisheries and quota prices will be driven down, thereby allowing for new entrants.

The impacts on the fish stocks of the host country will be different, particularly in the cases where there are no property rights. If there are no controls in the host country, the introduction of the foreign vessels will have an impact on catches if they enjoy a cost advantage over the host country fishing fleet – if no such advantage exists, then the foreign vessels would have no incentive to operate in the host country's EEZ. Cost advantages could arise in a number of ways: more recent technology, higher labour productivity, better targeting of stocks, better on-board handling and storage facilities, etc. It could also be the case that the foreign vessels are currently operating in a situation of excess capacity in their own EEZs, in which case they are only seeking to recover their variable costs. This could be exacerbated if the foreign vessels also get transfers for, say, capital and variable costs. If such cost advantages exist, then the effect on the host country fish stocks would be to reduce them over the longer term. In the short term,

8. There is some contradiction, however, in that most countries do not charge their domestic fishing industry for access to fish resources in their own EEZs.

catches would rise if the host country fishery was initially under-fished (and decline if it were over-fished), with the fish stocks eventually declining to a lower level.

If the host country has catch controls in place in its fisheries, then the introduction of foreign vessels would increase competition for the total catch and, depending on the extent of cost advantages enjoyed by the foreign vessels, would displace some of the host country's fishing vessels. This could then place pressure on the fisheries managers to increase the allowable catch to compensate for the reduced fishing opportunities of the host country fleet. This would clearly be an inappropriate response if the host country fish stocks were over-fished. However, if the stocks were under-fished, then it may be perceived that the total allowable catch could be increased to accommodate the foreign vessels and still provide for the domestic vessels. The under-exploitation of fish stocks is one of the reasons given for shifting capacity between countries. In this case, there will not be a long-term effect on fish stocks. If the host country has effort controls in place and the foreign vessels displace some (or all) of the domestic vessels, then total effort will remain the same and (subject to the remarks made earlier about input stuffing) there will be no effect on stocks. If the foreign vessels represent additional capacity, then the fish stocks in the host country will be reduced in the long term.

In the case of property rights in the host country, the subsidising country would be buying up the rights in the host country and providing them to its fishing vessels free of charge. This represents a transfer from the taxpayers of the subsidising country to the quota owners in the host country and would have no effect on fish stocks.

In summary there are unlikely to be any effects on the fish stocks of the subsidising country. The effects on the fish stocks of the host country will depend on whether the incoming capacity displaces or adds to existing capacity and the effectiveness of the management and enforcement in the host country.

Transfers for vessel decommissioning and licence retirement

Description

Transfers for vessel decommissioning and licence retirement can take the form of payments for permanent vessel withdrawal through buy-back programs, permanent licence withdrawal and transfer of vessels to other fisheries (either domestically or internationally). It is one of the largest items of government financial transfers in OECD countries (OECD 2000). Governments generally introduce such payments to address problems of excess capacity and over-exploitation in their fisheries with the objectives of reducing overcapacity, increasing economic efficiency and alleviating pressure on fish stocks. The design and implementation of decommissioning and licence schemes varies significantly both between and within countries. For example, some countries require that decommissioning payments be tied to the physical scrapping of vessels while others allow vessels to be shifted to another fishery (in which case the payment is for the removal of capacity from a particular fishery rather than reducing the overall capacity in the country). Some schemes are intended to remove latent capacity or effort instead of capacity or effort that is currently engaged in fishing.

Points of impact

Transfers in this category have an impact on incomes in the industry. They represent a direct transfer from the government to fishers leaving the fishery (or the industry). They will also have an effect on the incomes of the fishers who remain in the fishery as both competition and congestion in the fishery are reduced and stocks recover.

Table 6.5. Effects of payments for access to third country waters

Transfer category	State of fish stock	Management regime				
		Property rights		No property rights		
		Catch controls	**Effort controls**	**Catch controls**	**Effort controls**	**No catch or effort controls**
Payments for access to third country waters – subsidising country	Over-fished/ under-fished	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks Reduced stocks if new vessels entering the domestic fishery are more efficient
Payments for access to third country waters – host country	Over-fished	No effect on stocks	No effect on stocks	No effect on stocks if catch level appropriately set Reduced stocks if TAC increases	No effect on stocks, if no additional effort applied to fishery If effort increases, reduced stocks with reduced catches in the short term	Reduced stocks
	Under-fished	No effect on stocks	No effect on stocks	No effect on stocks if catch level appropriately set Catches may increase if TAC increased	No effect on stocks, if no additional effort applied to fishery If effort increases, reduced stocks with increased catches in the short term	Reduced stocks

Source: OECD.

Application of the policy filter

This group of transfers is intended to reduce capacity and effort in a fishery. The outcome of such schemes depends heavily on their design and on the management of the capacity and effort that remains in the fishery. There has been significant debate about the efficacy of many of these schemes in achieving their objectives both from an environmental and economic perspective (Arnason 1999 Holland, Godmundsson and Gates 1999; Munro and Sumaila 1999). If there are no controls in place in a fishery, then such transfers will have no effect on fish stocks as new vessels will enter the fishery to replace the scrapped vessels. Hannesson (2003) notes that an exception to this may arise if the capacity of the fleet and the level of effort have expanded beyond the long term equilibrium level, but vessels are remaining in the fishery as revenues may still be sufficient to still cover their variable costs. In this case, decommissioning transfers may assist in the adjustment to the long term equilibrium.

If there are catch controls, the effect on fish stocks will be zero as, in the absence of barriers to entry, the vessels being decommissioned would be replaced by new vessels (unless the fleet capacity is above the long term equilibrium as discussed in the previous paragraph). If the fishery is initially over-fished, then the transfers will have no effect on stocks unless the allowable catch is also reduced. Such a combination of policy changes would have the effect of reducing capacity, reducing catches and increasing stocks. A decommissioning program will increase stocks if there are effort controls in place, provided that the controls are an effective barrier to new vessels entering the fishery. To an extent, there will still be an incentive for the vessels remaining in the fishery to engage in input stuffing in response to the lower level of effort, increased stocks and greater profits. However, given that most effort controls are defined with vessels as one of the main control parameters, this impact may not fully offset the increase in stocks resulting from the initially decommissioning scheme.

In the case where there are property rights, the effects of vessel decommissioning or licence retirement schemes on fish stocks would be negligible. The owners of the quota or effort rights have benefit from capacity leaving the fishery

The provision of decommissioning transfers also has an impact on the risk faced by fishers in their investment and production decisions. The existence of vessel and licence buy-back programs can create expectations in the industry that the government will cover losses that may arise from excess investment in vessels, thereby reducing the risk-adjusted discount rate used in making investment decisions. Munro and Sumaila (2001, p. 25) conclude that transfers used in vessel buyback schemes, if they come to be widely anticipated by industry, 'can, and will, have a decidedly negative impact' on resource management and sustainability. This effect will flow through a reduction in the expected capital costs of firms.

Table 6.6. Effects of transfers to decommissioning and licence retirement

Transfer category	State of fish stock	Management regime				
		Property rights		No property rights		
		Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Transfers to decommissioning and licence retirement	Over-fished	No effect on stocks	If total effort reduced, stocks recover	No effect on stocks	If total effort reduced, stocks recover	No effect on stocks Reduced stocks if new vessels more efficient
	Under-fished	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks Reduced stocks if new vessels more efficient

Source: OECD.

In summary, the primary effects of decommissioning schemes are to speed adjustment of fleet capacity and effort towards a long term equilibrium and to improve the potential profits of the vessels remaining in the fishery. However, the effects of these transfers on fish stocks will generally be negligible unless the decommissioning schemes are implemented in conjunction with management changes to reduce catches or effort if the fishery is initially over-fished.

Transfers to labour retirement and retraining

Description

Transfers to labour retirement and retraining primarily take the form of payments to fishers to ease the transition out of the industry, either as a lump sum payment to exit the industry or, more usually, as funding for retraining for movement into other occupations. Some governments also provide payments for temporary labour retirement from particular fisheries where there are fluctuations in the fish abundance. Payments for labour retirement and retraining generally arise in response to excess capacity in the fishery. In principle, labour is more mobile than capital in the fishery sector and can more easily be employed in other sectors, although the human capital involved in fishing sector can be highly specific. The transition can be more difficult in regions where fisheries are the dominant industry and alternative occupations are relatively scarce. Regional adjustment schemes that seek to respond to excess capacity or declining fish stocks often include payments to ease the transition of the excess labour.

Points of impact

The main point of impact for this category of transfers is through incomes and payments are not tied to any output requirements.

Application of the policy filter

Transfers for labour retirement are generally provided for the same reasons as for the provision of transfers for vessel decommissioning and licence retirement, and often in conjunction with capacity reduction schemes. As a result, the effects of these transfers might be expected to be generally similar to the effects from vessel decommissioning and licence retirement transfers. However, the effects of the transfer will depend on the marginal rate of substitution between labour and capital inputs in the production function of the fishing firm. If, for example, there is a fixed relationship between capital and labour then there will be no opportunities for reductions in effort to flow from labour retirement schemes implemented without accompanying capital retirement schemes.[9] New employees would merely be hired to replace those leaving the industry.

On the other hand, if there are substitution possibilities between labour and capital, then the effects of labour retirement transfers will depend on the elasticity of substitution between labour and capital and on the relative prices of the factor inputs. Experienced labour leaving the industry may have the effect of forcing up wage rates and increasing the use of capital inputs in production (and possibilities for increased effort stuffing). However, the extent to which this will occur is unclear because, unlike transfers to decommissioning where physical scrapping of vessels may be required, it is much more

9. This situation arises in a Leontief or input-output production function where the marginal rate of substitution is zero. See Varian (1978).

difficult to stop fishers re-entering the industry after being paid to retire or retrain if they so desire.

In summary, the net effects of this category of transfers on fish stocks are expected to be zero, irrespective of the management regime in place.

Table 6.7. Effects of transfers to labour retirement and retraining

Transfer category	State of fish stock	Management regime				
		Property rights		No property rights		
		Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Transfers to labour retirement and retraining	Over-fished/ under-fished	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks

Source: OECD.

Transfers to capital costs

Description

Transfers to capital costs cover government payments for the construction and modernisation of fishing vessels, loan guarantees, and accelerated depreciation rules for fishing vessels, loan restructuring schemes and tax preferences for investment in and modernisation of fishing vessels. Provision of this type of transfer has been relatively common in many countries over the years and is widely recognised to have contributed to the problems of excess capacity that currently exist in many of the world's fisheries (see, for example, Greboval and Munro 1999; Cunningham and Greboval 2001). While many countries appear to be reducing transfers to the construction of new vessels, transfers to vessel modernisation are still widely provided. Vessel modernisation can cover a wide range of possible activities, including almost completely rebuilding the infrastructure of a vessel, improving landing and on-board processing facilities, installing improved tracking and communication equipment, health and safety improvements and so on. The quantity of total transfers under this category can be difficult to determine; while some transfers are budgeted and, in principle, easily identified, others are classed as "off-budget" transfers (tax exemptions and loan guarantees) and may be harder to quantify.

Points of impact

Transfers to capital clearly have an impact on both the inputs of the firm in terms of reduced fixed costs (and usually lower operating costs as well due to updated technology) and the risk of capital. Loan guarantees, tax preferences, etc reduce the risks faced by lenders and so loans for vessel construction and modernisation can be made at interest rates that are below market rates.

Application of the policy filter

In the absence of catch or effort controls, transfers to capital costs decrease the cost of investment and lead to more vessels and greater effort being used in the fishery. This will reduce stocks in the long term. The short term effect on catches will depend on whether or not the fishery is initially overfished. If it is overfished, then catches will decline; conversely if the fishery is underfished.

With catch controls, there would be more competition for a given catch but, in principle, there would be no effect on stocks or catches. However, as with other transfers that increase capacity, the excessive capitalisation in the sector that results from the encouragement of the use of capital can place significant pressure on regulatory authorities to relax catch limits (or not to tighten them if the fishery is overfished) to enable the individual boats to earn at least some revenue. The effect on catches and stocks will then depend on the ability of regulators to withstand such pressures.

As effort controls generally prescribe the number of fishing vessels in an industry (among other factors), decreasing the cost of capital should not increase effort or have an impact on stocks. However, this may not necessarily reflect the full picture as transfers to capital lower the cost of boat replacement and increase the rate of boat replacement in the fishery. New vessels are generally able to bring more effective effort to bear on a fishery as they include improvements in technology and power. As has already been noted, it is almost impossible for authorities to regulate all the variables in the effort calculus and so it is highly likely that effort will expand and that fish stocks will be reduced even in the presence of effort controls. The case of transfers to vessel modernisation is slightly different as the expansion of effort takes place through the updating of existing capital to improve capacity and effort, rather than through the creation of additional boats. So while the number of vessels may not increase as a result of the transfer, the effort that is applied can significantly increase.

The existence of individual catch rights is not expected to have an impact on fish stocks as fishing firms have no incentive to increase effort above that necessary to catch their quota. The transfer will, however, alter the relative prices of capital and other inputs (such as labour, fuel, etc) and, in the absence of transfers to these other inputs, will encourage a greater use of capital than would otherwise have been the case. In the longer term, this may create problems of excess capitalisation in the fishery with the attendant problems of capacity shifting and calls for government assistance to reduce the excess. The case of effort rights is similar to the outcomes for effort controls in the absence of property rights.

In summary, the results for the provision of transfers to capital costs are broadly analogous to those for the government provision of infrastructure and management, research and enforcement services. However, there are key differences in the directness of the link between the transfer and the environmental harm and in the transmission mechanism. Transfers to capital costs are generally payments made directly to fishers whereas the transfer element arising out of the free provision of infrastructure arises as a result of the government not charging user fees.[10] The latter arguably represents a much less direct link than a direct payment. The directness of the link is also evident in the way

10. Exceptions to this arise when the subsidies for vessel construction are paid directly to shipyards. In this case, it is the shipyards that are appropriating at least a portion of the subsidy rather than the fishing industry (Hannesson 2003).

that incentives for fishers and the pressures on regulators are more directly affected with transfers to capital.

Table 6.8. Effects of transfers to capital costs

Transfer category	State of fish stock	Management regime				
		Property rights		No property rights		
		Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Transfers to capital costs	Over-fished/ under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	Reduced stocks	Reduced stocks

Source: OECD.

Transfers to variable costs

Description

In addition to subsidising capital costs, some countries also provide transfers to the costs of variable factors of production in the fishing sector. This includes tax exemptions for fuel, the subsidised provision of bait services, government-backed vessel insurance and reinsurance programs and interest deductions for liquidity loans.

Points of impact

The main point of impact of these transfers is to reduce the costs of inputs.

Applying the policy filter

The results for transfers to variable costs are broadly similar to those for transfers for capital costs, although the effects will obviously be transmitted through the increased use of variable inputs (fuel, bait, etc) rather than through capital. Transfers to variable costs encourage the excessive use of variable inputs to production and can lead to input stuffing (as opposed to capital stuffing). As has been discussed, this will lead to problems under management using catch controls, effort controls and effort rights as fishers seek to increase effective effort by increasing their use of these other inputs. However, the effect would be through the expansion of effort from the existing fleet rather than through new vessels entering the industry.[11]

It is important to note that transfers to variable inputs which are sourced from the environment (such as fuel and bait) will encourage the excessive use of those inputs as their costs to the fishers do not reflect their true cost. The provision of these transfers could have environmental consequences beyond the impact on targeted fish stocks. This issue in relation to the checklist is discussed further in above.

11. However, to the extent that reduced variable costs reduce the operating costs of new vessels, the replacement of existing vessels could be accelerated.

Table 6.9. Effects of transfers to variable costs

Transfer category	State of fish stock	Management regime				
		Property rights		No property rights		
		Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Transfers to variable costs	Over-fished/ under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks

Source: OECD.

Income support

Description

Transfers to income include direct payments to employees in the fishing industry, direct payments to boat owners, industry specific unemployment insurance schemes, specific tax rules for fishing firms and employees and payments for temporary cessation of fishing (also known as laying-up or tying-up premiums). A range of more general transfers such as regional aid programs, small-scale fisheries aid and development aid can be classed as community support. Providing income support to employees has the effect of reducing the wages that firms need to pay employees to keep them in the industry (in order to prevent them from leaving to higher paying occupations), thereby reducing the costs of fishing operations. Payments direct to boat owners directly increases their incomes.

Unemployment insurance schemes for fishers which are either government funded and underwritten by the government are run by a number of countries. These can take the form of either schemes intended solely for the fishing industry or more generous provision for the sector nested within a more general unemployment insurance scheme.[12] The objective of such payments is usually to help smooth out fluctuations in income that may result from seasonal factors or other environmental perturbations in the fishery. Laying-up premiums work in a similar fashion by providing income for boat owners.

Points of impact

The main point of impact of these transfers is on income as they serve to ensure that the incomes of fishers do not fall below a minimum level irrespective of market or resource conditions.

12. As is the case in infrastructure expenditure, the extent of subsidisation will depend, at least in part, on whether the fishing industry receives special consideration relative to other sectors.

Applying the policy filter

Income support will have the same effects on fish stocks under the various management regimes as transfers to capital and variable costs. Such support acts in the same way as transfers to capital and variable costs in encouraging the increased use of labour relative to other inputs. The directness of the link will depend on the form of the income support. The more general transfers such as community income support (through regional aid for example) are less direct than income support that is provided directly to individual fishers. Income support in the form of unemployment insurance can also work to inhibit adjustment away from unsustainable levels of fishing in particular fisheries.

Table 6.10. Effects of income support

Transfer category	State of fish stock	Management regime				
		Property rights		No property rights		
		Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Income support	Over-fished/ under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks

Source: OECD.

Direct price support

Description

Direct price support to the fishing sector takes two broad forms: price guarantee schemes; and marketing and promotion schemes.[13] Such support schemes are qualitatively different from indirect price support (arising from tariffs and other border measures) in that they operate as direct forms of intervention to maintain market prices rather than as a result of intervention in trade. Price guarantee schemes seek to ensure the industry receives a certain price above the market price either through the payment of a certain amount per kilogram of fish direct to fishers or through the intervention in the market by the government to purchase excess product. Both forms of intervention are designed to maintain a given price of fish, boost the incomes in the sector and reduce the risk of price fluctuations. In some cases, payments may be provided according to the amount of fish produced. The point of impact of these programs is thus also on output as fishers may be faced with an incentive to increase their catches in order to receive higher payments.

13. Recall that market price support provided through tariffs is not addressed in this study.

Programs to market and promote fish products are used in a number of OECD countries. The purpose of these programs is to promote the increased consumption of fish and fish products and are usually introduced to assist the fishing industry to compete with other protein sources (beef, chicken, lamb, etc) for valuable market share.

Points of impact

Price guarantee schemes have an impact on the incomes of the sector and, in some cases, on the output. Marketing and promotion programs serve to both reduce the costs of firms (as they can reduce their own marketing efforts) and to increase incomes (at least indirectly through increased demand for fish products).

Applying the policy filter

Price support subsides in the form of general price transfers and minimum price schemes raise the incomes of fishers above what they would have been in the absence of the transfer. The effects on stocks for this category of transfers are the same as for transfers in the form of free provision of infrastructure and management, research and enforcement services.

Transfers for marketing and promotion programs have the same effect as transfers for variable costs. However, these programs also serve to increase demand for fish products, so the effects on fish stocks could be exacerbated due to the combined impact of reducing the costs of marketing fish products and increasing the demand for products. The extent of this twofold impact depends on the elasticity of demand for fishery products (this will determine the responsiveness of demand to changes in price).

Table 6.11. Effects of direct price support

Transfer category	State of fish stock	Management regime				
		Property rights		No property rights		
		Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Direct price support	Over-fished/ under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks

Source: OECD.

Summary

The effects of transfers on fish stocks for all the transfer categories are summarised in Table 6.12. The common element is the importance of the management regime in determining the effect on fish stocks. The provision of transfers under management regimes involving the combination of catch controls and property rights are unlikely to have any impact on fish stocks. The further the regime is moved away from this combination on the spectrum of management instruments towards effective open access, the greater the likelihood of transfers incurring some effect on fish stocks.

Key issues

Applying a policy filter to fisheries transfers highlights the key role played by fisheries management regimes in determining the environmental effects of the different types of transfers. However, the important role played by management is not surprising; it follows from the basic models of fisheries economics and has been observed by many analysts (see, for example, OECD 2003a; FAO 2003 to name just a couple of studies). Meanwhile, the preceding analysis raises a number of significant issues which may modify or elaborate the basic results. Consideration of these issues in the application of the policy filter provides a more complete (and more complex) picture of the environmental effects of transfers. Six key issues are addressed in the remainder of this section:

1) the effectiveness of management settings, monitoring and enforcement;
2) empirical testing of the management parameters;
3) the directness of the link between particular transfers and the environment;
4) the significance of policy interactions; and
5) effects on other environmental variables.

Effectiveness of management settings, monitoring and enforcement

The analysis relies on a number of strong assumptions concerning the appropriateness of management settings and the effectiveness of monitoring and enforcement. First, it is assumed that allowable catch and effort levels are set optimally with respect to the long term equilibrium of the fishery. Second, it is assumed that the management regimes are perfectly and effectively monitored and enforced. While these assumptions have facilitated the analysis undertaken to date, relaxation of some or all of these assumptions will increase the complexity of the analysis and may alter some of the conclusions. Relaxation may also assist in better explaining real world behaviour. For example, weak enforcement of catch limits in a fishery with no property rights could mean that the effects of a transfer on the environment are closer to those associated with open access (that is, with no catch or effort controls).

Table 6.12. Summary of the Long-term Effects of Transfers on Fish Stocks

Transfer category	State of fish stock	Management regime				
		Property rights		No property rights		
		Catch controls	Effort controls	Catch controls	Effort controls	No catch or effort controls
Management, research and enforcement expenditure	Over-fished/ under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks
Infrastructure expenditure	Over-fished/ under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks
Payments for access to third country waters – subsidising country	Over-fished/ under-fished	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks Reduced stocks if new vessels entering the domestic fishery are more efficient
Payments for access to third country waters – host country	Over-fished	No effect on stocks	No effect on stocks	No effect on stocks if catch level appropriately set Reduced stocks if TAC increases	No effect on stocks, if no additional effort applied to fishery If effort increases, reduced stocks with reduced catches in the short term	Reduced stocks
	Under-fished	No effect on stocks	No effect on stocks	No effect on stocks if catch level appropriately set Catches may increase if TAC increased	No effect on stocks, if no additional effort applied to fishery If effort increases, reduced stocks with increased catches in the short term	Reduced stocks

Table 6.12. (cont.) Summary of the Long-term Effects of Transfers on Fish Stocks

Transfer category	State of fish stock	Management regime				
		Property rights		No property rights		
		Catch controls	Effect controls	Catch controls	Effort controls	No catch or effort controls
Transfers to de-commissioning and licence retirement	Over-fished	No effect on stocks	If total effort reduced, stocks recover	No effect on stocks	If total effort reduced, stocks recover	No effect on stocks Reduced stocks if new vessels more efficient
	Under-fished	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks Reduced stocks if new vessels more efficient
Transfers to labour retirement and retraining	Over-fished/ under-fished	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks	No effect on stocks
Transfers to capital costs	Over-fished/ under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	Reduced stocks	Reduced stocks
Transfers to variable costs	Over-fished/ under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks
Income support	Over-fished/ under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks
Price support	Over-fished/ under-fished	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	No effect on stocks, if catch limits effectively enforced.	No effect on stocks, if effort effectively controlled If effort increases, reduced stocks	Reduced stocks

On a related point, the political economy of transfers means that the effects of transfers are likely to be less clear cut than the stylised analysis suggests. As with most of the other literature on fisheries transfers, the analysis in this paper necessarily abstracts from key political economy aspects of the real world of transfers and fisheries. These aspects relate, among other things, to the power of interest groups to influence the outcomes of policy decisions and can be potentially significant for determining the outcomes of transfer provision, both on the environment as well as on economic and social outcomes. For example, under a catch control regime, the provision of transfers may encourage lobbying for larger TACs (Hannesson 2001, p. 28). They may also make monitoring and compliance more difficult, partly because industry has less of a stake in the health of the fish stocks and partly because the increasing participation in the industry will make it more difficult to monitor the total catch and ensure compliance of individual vessels. While this may also happen under systems with property rights, it is less likely to occur as the market value of quotas or fishing licenses depends on the long-term health of the stocks. In another example, the continued provision of transfers for income support in a particular fishery may occur for largely political reasons even though the management of the fishery is not sufficiently well-designed or enforced to ensure the sustainability of the fish stocks. In such a case, political priorities, together with poor management, may represent one of the key obstacles to the reform of environmentally harmful transfers.

Empirical testing of the management parameters

The stylised management parameters, while highly simplified, are readily recognised as reflecting the key features of management regimes in the real world. In terms of environmental impacts, it is clear that the issue is not so much whether a country provides a transfer to a fishery, but rather what management parameters govern the fishery in which the transfer is provided. While this is largely an empirical question that is beyond the scope of this paper, previous OECD studies have shed some light on this empirical question.

OECD (1997) provided a thorough review of the management regimes in place in OECD countries in the early to mid 1990s. The inventory of management focused on the type and extent of input controls, output controls, technical measures and property rights. In OECD (2003a), it was concluded that most OECD countries fall between the catch control and effective management regimes, using the categorisation of regimes devised by Hannesson (2001).[14] While there has been a gradual shift in many OECD countries from catch control towards effective management, as more and more restrictions are placed on entering particular fisheries, most countries remain closer to catch control than effective management. The report noted that this observation may moderate the view that there are few impacts of government financial transfers on marine fish stocks in OECD countries. In analysing fisheries management costs, OECD (2003b) classified OECD countries into three broad groups according to whether the countries' management was based on predominantly output controls, predominantly input controls or a mixture of input and output controls. The study found that most of the OECD countries fell into the mixed input and output controls, with relatively few in the category of predominantly output controls (Table 6.4).

While these studies provide an introduction to the types of management regimes in place in OECD countries, they fall short of the depth of analysis required to properly

14. Recall the three stylised management regimes discussed briefly in section 4.1.

assess the effectiveness of particular management regimes in terms of the checklist. It is clear that the evaluation of transfers within the checklist framework, a much more detailed assessment of management regimes is required. Such assessment would necessarily include an evaluation of the effectiveness and strength of management (including management settings, monitoring and enforcement as discussed above) and the governance/institutional settings within which management takes place.

Significance of policy interactions

The analysis assumes that the transfers are applied to the fishery in the absence of other policy interventions (except, of course, for management policies). However, this is rarely the case in the real world and governments generally apply a range of policies, including transfers, to the sector in order to meet a range of policy goals. Consider the case where several different types of transfers are applied to a given fishery. The concurrent application may either magnify or offset the environmental effects of each of the transfers. For example, the provision of transfers to both capital and variable costs will be reinforcing the environmental effects by lowering the costs of fishing more than would have otherwise have been the case with just one of the transfers. An example of offsetting transfers arises where countries provide transfers for both vessel decommissioning and vessel construction, as has been observed in a number of OECD countries.

The interaction between transfer policies and other government policies (for example, relating to tax policy or broader environmental policy) can be similarly reinforcing or offsetting with respect to the impacts on the environment. For example, many governments are providing transfers to fuel use in the form of tax exemptions while at the same time enacting legislation aimed at energy conservation or mitigation of climate change.

Effects on other environmental variables

The analysis has, of necessity at this stage, focused on the effects of transfers on fish stocks. No account is taken of the broader range of environmental variables that are of analytical and policy interest. These include, for example, the effects of transfers on by-catch, the marine benthos, marine pollution and the fuel used in fishing operations. Transfers to particular types of gear use or to fuel use will have environmental effects beyond the target fish stock and need to be taken into account in the checklist.

The analysis also assumed that the fisheries were single species fisheries, rather than multispecies fisheries. Dropping this assumption increases the complexity of the analysis, a point noted in many studies on multispecies fisheries (OECD 1997, p. 113; Clark 1990, pp. 310-342). In multispecies fisheries, operators harvest a range of fish species using a variety of gears and often in different geographical locations. There are also often a variety of management instruments applied to the different species within a particular fishery. Fishers are likely to have greater scope for shifting operations, costs and revenues between species to maximise profits. As a result, it is harder to trace and isolate the effects of transfers on fish stocks.

Concluding remarks

In summary, the checklist is a useful screening methodology when undertaking a review of particular transfer policies in the fisheries sector. It is clear that the first step in the checklist, the policy filter, is the key to the analysis: the other steps of the checklist appear to be of less immediate policy concern (although they may be significant in individual cases). By passing transfer programs through the policy filter, the environmental effects can be readily identified under alternative management parameters. While the analysis in this paper is relatively stylistic, it has shed light on the relationships between the provision of different types of transfers and environmental outcomes. Empirical application of the checklist to real world fisheries is one of the necessary next steps in this process. The use of case studies would be an appropriate means to this end.

So, with respect to environmental outcomes, the relevant observation should focus on how well particular fisheries are managed rather than purely on whether transfers are provided. Certainly, the analysis in this paper reinforces the conclusion from the bulk of the fisheries management literature that, in principle at least, the management combination of property rights and catch controls provides the most effective regime for ensuring the environmental sustainability of fish stocks. Equally important though is the effectiveness of the policy setting and monitoring and enforcement. Inappropriate management settings or ineffective enforcement can radically alter the expected effects of subsides and exacerbate environmental harm. This raises a myriad of issues relating to governance, institutional arrangements and political economy (lobbying, rent-seeking, and so on). Such issues are the key areas for future research to better understand how they fit into the checklist and how they form obstacles to the sustainable management of fisheries.

BIBLIOGRAPHY

Andersen, P. and J.G. Sutinen (2003), "Financing Fishery Management: Principles and Economic Implications" in W.E. Schrank, R. Arnason and R. Hannesson (eds), *The Cost of Fisheries Management*, Ashgate Publishing, England, pp. 45-63.

Arnason, R. (1999), "Fisheries Transfers, Overcapitalisation and Economic Losses", in A. Hatcher and K. Robinson (eds), *Overcapacity, Overcapitalisation and Transfers in European Fisheries*, Proceedings of the first Concerted Action Workshop on Economics and the Common Fisheries Policy, Portsmouth, UK, 28-30 October 1998, CEMARE Miscellaneous Publication No. 44, pp. 27–45.

Arnason, R., R. Hannesson and W.E. Schrank (2003), "The Cost of Fisheries Management: Who Should Pay?" in W.E. Schrank, R. Arnason and R. Hannesson (eds), *The Cost of Fisheries Management*, Ashgate Publishing, England, pp. 9-19.

Beddington, J.R. and R.B. Rettig (1984), *Approaches to the Regulation of Fishing Effort*, FAO Fisheries Technical Paper No. 243, Rome.

Clark, C.W. (1990), *Mathematical Bioeconomics: The Optimal Management of Renewable Resources*, 2nd ed., John Wiley, New York.

Cornes, R. and T. Sandler (1996), *The Theory of Externalities, Public Goods and Club Goods*, 2nd edition, Clarendon Press, Oxford.

Cox, A. (2003), "Public Goods, Governance and Fisheries Management", paper presented to the 15th Annual Conference of the European Association of Fisheries Economists, Brest, 14-16 May.

Cunningham, S. and D. Greboval (2001), *Managing Fishing Capacity: A Review of Policy and Technical Issues*, FAO Fisheries Technical Paper No. 409, Rome, *http://www.fao.org/DOCREP/003/Y0659E/ Y0659E00.HTM*.

FAO (2000), *Report on the Expert Consultation on Economic Incentives and Responsible Fisheries*, FAO Fisheries Report No. 638, Rome.

FAO (2003), *Report on the Expert Consultation on Identifying, Assessing and Reporting on Transfers in the Fishing Industry*, FAO Fisheries Report No. 698, Rome.

Greboval, D. and G. Munro (1999), "Overcapitalization and Excess Capacity in World Fisheries: Underlying Economics and Methods of Control", in D. Greboval (ed.), Managing Fishing Capacity: Selected Papers on Underlying Concepts and Issues, FAO Fisheries Technical Paper No. 306, Rome, *http://www.fao.org/DOCREP/003/X2250E/X2250E00.HTM*.

Hannesson, R. (2001), *Effects of Liberalizing Trade in Fish, Fishing Services and Investment in Fishing Vessels*, OECD Papers Offprint No. 8, Paris.

Hannesson, R. (2003), "The Economic Effects of Transfers in Fisheries", unpublished paper prepared for the OECD Secretariat, August.

Holland, D., E. Gudmundsson and J. Gates (1999), "Do Fishing Vessel Buyback Programs Work: A Survey of the Evidence", *Marine Policy*, vol. 23, no. 1, pp. 47-69.

Munro, G.R. and U.R. Sumaila (2001), "Transfers and their Potential Impact on the Management of the Ecosystems of the North Atlantic", in T. Pitcher, U.R. Sumaila and D. Pauly (eds), *Fisheries Impacts on North Atlantic Ecosystems: Evaluations and Policy Explorations*, University of British Columbia Fisheries Centre Research Report 9(5), Vancouver, pp. 10-27.

OECD (1993), *Measuring Economic Assistance*, Paris, *www.oecd.org/agr/fish*.

OECD (1997), *Towards Sustainable Fisheries: Economic Aspects of the Management of Living Marine Resources*, Paris.

OECD (1998), *Improving the Environment through Reducing Transfers: Part I, Summary and Policy Conclusions; Part II, Analysis and Overview of Studies*, Paris.

OECD (1999), *Improving the Environment through Reducing Transfers: Part III, Case Studies*, Paris.

OECD (2000), *Transition to Responsible Fisheries: Economic and Policy Implications*, Paris.

OECD (2001), *Final Communiqué, OECD Council at Ministerial Level*, 17 May, Paris, http://www1.oecd.org/subject/mcm/.

OECD (2002), *Final Communiqué, OECD Council at Ministerial Level*, 16 May, Paris, http://www1.oecd.org/subject/mcm/.

OECD (2003a), *Liberalising Fisheries Markets: Scope and Effects*, Paris.

OECD (2003b), *The Costs of Managing Fisheries*, Paris.

OECD (2003c), *Environmentally Harmful Subsidies: Policy Issues and Challenges*, Proceedings of the OECD Workshop on Environmentally Harmful Transfers, 7-8 November, 2002, Paris.

OECD (2005), *Environmentally Harmful Subsidies: Challenges for Reform*, Paris.

Pieters, J. (2003), "What Makes a Transfer Environmentally Harmful: Developing a Checklist Based on the Conditionality of Transfers", in OECD, *Environmentally Harmful Transfers: Policy Issues and Challenges*, Proceedings of the OECD Workshop on Environmentally Harmful Transfers, 7-8 November, 2002, Paris, pp. 143–188.

Porter, G. (2002), *Fisheries Transfers and Overfishing: Towards a Structured Discussion*, United Nations Environment Programme, Geneva.

Steenblik, R. (2003), "Transfer Measurement and Classification: Developing a Common Framework", in OECD, *Environmentally Harmful Transfers: Policy Issues and Challenges*, Proceedings of the OECD Workshop on Environmentally Harmful Transfers, 7-8 November, 2002, Paris, pp. 101–141.

United Nations (2002), *World Summit on Sustainable Development Plan of Implementation*, 5 September, Johannesburg, http://www.un.org/esa/sustdev/.

United Nations (2001), *Ministerial Declaration*, Doha Ministerial Conference, 9-14 November, WT/MIN(01)/DEC/W/1.

Varian, H.R. (1978), *Microeconomic Analysis*, 2nd ed., Norton, New York.

Chapter 7

Social Impacts of Government Financial Support of Fisheries [1]

This chapter seeks to identify the key policy and analytical issues in assessing the social effects of providing subsidies, within a sustainable development framework. A range of frameworks that can help the social analysis are identified but none are found to be ideally suited to the fisheries sector. The most relevant one of these frameworks, the fishery systems approach, is used to discuss the impacts of subsidies on the various components of the human system in the fishery, including fishers, the post-harvesting sector, fishing communities, and the broader socioeconomic environment within which the fishery is located.

This chapter has been prepared as a scoping paper for the OECD's work on the sustainable development effects of the provision of government financial support to the fishing sector. The terms of reference require a report which:

- identifies the key issues involved in assessing the social effects of fishery subsidies, within a sustainable development framework;
- identifies the broad analytical directions that may be most useful to pursue in undertaking the study;
- assesses the extent to which the broader analytical framework mentioned above is amenable to the analysis of the social effects of subsidies and of the human dimensions of sustainable development issues with respect to subsidies; and
- advises on the kinds of information that may be useful in underpinning any ensuing analysis (as part of the project we will be asking OECD countries to complete a questionnaire providing data/information on key social aspects of their fisheries).

Producing an examination of the social aspects of fishery subsidies 'from a sustainable development perspective' is a challenging task for two major reasons. First,

1 This chapter was written by Dr. Anthony Charles, Saint Mary's University of Halifax, Nova Scotia, Canada. The views expressed in the chapter are those of the author and do not necessarily reflect the views of the OECD or its Member countries.

the important task of addressing the social aspects of subsidies has received little attention previously. Most analyses of subsidies in fisheries (and other sectors for that matter) have been carried out from a classical economic perspective, although an increasing proportion takes an environmental viewpoint. Rarely, if ever, have studies of subsidies adopted a 'social' or 'socioeconomic' focus. Indeed, there is no universally accepted sense of what is meant by a social effect or social impact of subsidies.

Second, there is some 'fuzziness' to the idea of placing an analysis within a sustainable development framework. This is a laudable goal, but what exactly is involved in conducting a fishery analysis within a sustainable development framework? Clearly, such a framework must look at what is meant by a 'sustainable fishery'. Historically, the focus in this regard lay on maintaining a *sustainable yield*, perhaps through a mechanism such as setting a Total Allowable Catch (TAC). Certainly, it is crucial to ensure that catch levels lie within the renewability bounds of the resource, but it has become apparent that while the balancing of present and future catches is important, there is more to a healthy future than simply controlling catches. Concerns about sustainability arise in all aspects of the fishery, from the ecosystem, to the social and economic structure, to the fishing communities and management institutions, as well as the fish stocks themselves. For example, in some fisheries in the past, too much attention was paid to measuring biomass and catch levels, and too little to the integrity of the marine ecosystem and the ocean bottom. Pursuit of sustainable fisheries needs to consider not only the state of the fish stocks but also the *processes* underlying the fishery, including the health of the aquatic ecosystem, the integrity of ecological interactions, and the well-being of the 'human dimension'.

The latter – the state of the human system – is central to the *sustainable development* approach (World Commission on Environment and Development, WCED, 1987). Given that sustainable development requires policy "that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987), and that the needs of both the present and the future include ecological, economic, social and institutional aspects, all of these factors must be incorporated in a sustainable development framework. Thus an *integrated* perspective is needed, and accordingly such a view is taken in this report, which focuses on impacts of subsidies on sustainability of the fishery system as a whole, incorporating social, economic, institutional and ecological realities.

This integrated view of a sustainable development framework is not incompatible with the specific approach of the OECD's project "Fisheries Subsidies and Sustainable Development: Broadening the Agenda", which seeks to synthesize the present work with comparable reports written from the perspectives of two other 'pillars of sustainable development' – the environmental and the economic – so as to produce a synthesis report which will "identify key issues, tradeoffs and obstacles to reform of subsidy policies" and "assess the extent to which other policy instruments may alter the effects of subsidy provision." In the spirit of synthesis, this report attempts to go further, avoiding a focus solely on social aspects but rather taking a broad multi-disciplinary and multi-dimensional perspective throughout.

The Nature of Fishery Subsidies

There exists a wide variety of definitions and understandings of subsidies, but this report builds on the OECD concept of a subsidy as "the monetary value of government interventions associated with fisheries policies" (OECD 2000: p.129), which typically appears in the form of a government financial transfer (payment) to the fishery sector. Hannesson (2003) puts this in a broader economic context:

> "*A subsidy is an undertaking by the government which increases the profitability of the production of a commodity or service over and above what it would be in unregulated market transactions, or if the government applied its ordinary rules to the industry or firm involved. Usually this means a transfer of money; a government makes payments that in some way are conditional on the activity one seeks to support.*"

While this definition notes that, as in the OECD view, subsidies usually involve 'a transfer of money', the first part of the above definition – and those provided by some other authors (e.g., Schrank and Keithly, 1999; Westlund, 2003) – includes as subsidies any actions by government that are specific to the fishery sector and that increase fishery profitability differentially relative to other economic sectors. This would presumably include, for example, any government-led conservation measure that, as a by-product, improves net benefits for fishery participants. Since governments typically have responsibilities for marine and fish stock conservation, and thus they are not solely 'managing' an industry, it seems important to differentiate between government interventions targeting on profitability and those with other aims (which nevertheless may also increase the profitability of the fishery). Related to this is the point made by Westlund (1999):

> *"…in a country where public services are provided so to say free of user charge – because they are financed through the tax system – it would be considered normal that also the fisheries industry benefits from certain services without them being defined as subsidies."*

It is worth noting that despite the frequency with which commentators discuss subsidies in a negative light, it is generally accepted that in reality, subsidies are neither intrinsically 'good' or 'bad'. Instead, the challenge is one of weighing the positive and negative impacts of a given subsidy in a given situation, and how those impacts are distributed. For example, Munro and Sumaila (2002: p.234) summarize Schrank (2001):

> *"…individual subsidies are not to be judged on an a priori basis. While some subsidies may produce socially undesirable results, others may be neutral in their effect, while yet others may produce highly desirable results."*

Similarly, Myers and Kent (2001: p.9-10) write:

> *"Despite their distortional effects, there is nothing necessarily bad about subsidies. Sometimes we need a bit of positive distortion… Without subsidies, we might never get as much as we want of, for example, nonpolluting and renewable sources of energy, with their manifold benefits – economic, environmental, political, security, social and ethical benefits."*

This chapter explores social impacts of fishery subsidies, adopting the perspective that the balance of positive and negative impacts will depend on the particular form of subsidy, the particular context in which it is applied, and the manner by which it is put in place. In particular, a key aspect relating to the context of the subsidy is the particular fishery programme within which the subsidy is implemented. Some major fishery programme categories (OECD, 2000; Hannesson, 2003) include:

- Management, research, enforcement and enhancement
- Fisheries infrastructure (wharves, ice plants, etc.)
- Investment in and modernization of vessels and gear
- Tax exemptions for fishermen and vessel owners
- Decommissioning of vessels and license retirement
- Expenditures to obtain access to other countries
- Income support and unemployment insurance
- Labour retirement
- Subsidies of variable costs, such as fuel subsidies
- Income support and unemployment insurance
- Fish price subsidies
- Subsidies to fish processing and marketing

Whatever fishery programme a subsidy is applied within, we can envision the subsidy as fitting within one of four types identified by the OECD (Steenblik and Munro 1999, p. 257):

- Revenue-enhancing transfers in the form of market price support (i.e. financed by consumers) and marketing support;
- Revenue-enhancing transfers in the form of direct payments (from government budgets); these could include payments based on the level of production or sales, per-vessel payments, income-based direct payments, or other direct payments.
- Cost-reducing transfers, whether related to productive capital or to intermediate inputs, or of some other form.
- General services (measured as the net costs incurred by governments) for fisheries management, conservation initiatives, research or other general services.

In assessing the impacts of fishery subsidies, it is useful to understand (see, *e.g.*, Westlund 2003) the extent to which the subsidy is:

1) short-term or long-term, particularly in terms of the time frame of impacts on profitability,
2) ‘normal’ (production-increasing) or conservation-oriented,
3) positive or negative in its effect on profitability,
4) ‘cost reducing’ or ‘income increasing’,
5) one-time (e.g., in response to a particular fishery crisis such as a stock collapse) or ongoing.

These factors will be relevant to the analysis in this paper. Another important aspect to examine in classifying any given subsidy, one that does not seem to have been presented in the literature, and yet is perhaps of greatest relevance to an analysis carried out within a sustainable development framework, is the differential impacts of the subsidy on environmental, economic, social and institutional sustainability. In particular, one might categorise each subsidy on the basis of where its greatest impact lies – whether in the environmental, economic, social or institutional realm.

Also relevant to the assessing the impact of a subsidy is the spatial scale on which it applies. Fishery systems are of varying spatial scales, from a coastal community, together with its local fishery resources and the corresponding small-scale management system, to fishery systems at state, provincial and national levels, to regional multinational fishery organizations. The impact of a subsidy program in a particular fishery will depend on the extent to which the spatial scale of the subsidy matches that of the fishery management system and that of the 'natural' scale of fishery operations. For example, the evolution toward decentralization, to resolve the mis-match between the scale of fishery management and the 'natural' system, may better allow for specific local conditions in the ecosystem and human system. Indeed, if local conditions vary significantly, there may be merit in adjustments that create a local component in the management system. Given this, a subsidy might reinforce this goal of matching the natural spatial scale of a fishery and the scale at which management occurs.

Finally, a major focus of this report lies in highlighting the distributional implications of subsidies – essentially who receives the subsidy, and who does not, and over what time frame. Financial support may be provided to the fishery sector as a whole, and this might presumably reflect a specific policy direction of government, given that it is using a certain portion of its scarce revenues in this way. Financial support may, on the other hand, be targeted on a particular component of the fishery, reflecting a policy to support that fishery component over other fishery sectors. For example, the government could support 'industrialization' and 'modernization' of the fishery by providing economic support to larger, more capital-intensive parts of the fishery, or alternatively, it may support small-scale fishers through measures that encourage community-based and/or labour-intensive approaches. Thus there may well be distributional implications of fishery policy measures, and in particular of subsidy programs.

Outline

The analysis begins with a review of a range of analytical frameworks for assessing the social impacts of subsidies, including:

- a framework presented in OECD's trade liberalisation study;
- a framework for examining components of sustainability and concepts of resilience;
- a 'fishery systems' framework that focuses on interconnections throughout the fishery;
- a sociologically-oriented analytic framework for understanding a range of fishery issues;
- an analytical approach focusing on distributional aspects of subsidies;
- a 'checklist' approach for analysing the social impacts of fishery subsidies.

The following section on some of the approaches described in the framework section to provide a set of preliminary assessments of potential social impacts arising from a variety of fishery subsidies discussed in the literature. This draws from a subsidies list compiled by Westlund (2003), and focuses specifically on their distributional implications. Where possible, the subsidies are also placed within three major groupings:

- Type 1: those that benefit all in the fishery, as well as some in other sectors of society,
- Type 2: those that benefit all in the fishery, but no one outside that sector,
- Type 3: those that benefit one or more specific components of the fishery.

The subsequent section takes a different perspective, drawing on a fishery systems approach to discuss the impact of subsidies in general on the various components of the human system in the fishery:

- the harvesters (fishermen)
- the post-harvest sector (from processing through to consumers)
- the fishing communities (and households)
- the broader socioeconomic environment within which the fishery is located.

Thereafter, the next section turns to the level of fishery policy, presenting a preliminary assessment of how subsidies might interact with each of a range of fishery management and policy directions that have potentially positive sustainability and resilience implications – the idea being that subsidies shifting the fishery in these directions are more likely to fit well within a context of sustainable development than those that move the fishery in opposite directions.

Finally, the report concludes with comments on next steps in utilizing available approaches to assessing social effects of fishery subsidies.

Toward an Analytical Framework for Assessing Social Impacts of Subsidies

As noted at the outset, there is no generally-accepted framework for assessing the impacts of subsidies in the context of sustainable development, or of assessing social impacts of subsidies specifically. Furthermore, there does not appear to exist any suitably-comprehensive framework that could be adapted to properly explore the various impacts of subsidies. Accordingly, this section seeks to consolidate useful elements from a range of sources that together may provide a suitable analytical framework for assessing the impacts of subsidies. Ideas and approaches here are drawn from the following:

- a framework presented in OECD's trade liberalization study, focusing on the relation between impacts of subsidies, and the particular fishery management regime in place;
- a sustainable development framework to address fishery issues, as well as management and policy measures, in terms of impacts on sustainability and resilience;
- a 'fishery systems' framework highlighting the natural, human and management sub-systems, and that focuses the analysis on interconnections throughout the fishery;
- a social science oriented framework for addressing impacts of interventions in relation to the range of human elements and social issues in the fishery;
- an analytical approach focusing on distributional impacts of subsidies, a key element of a social analysis of fishery impacts;
- a 'checklist' approach to provide a simple mechanism for monitoring and evaluating the various social impacts of fisheries subsidies or other policy interventions.

The Analytical Framework from the Trade Liberalization Study

A framework that has been suggested for analysing fishery subsidies (Hannesson 2001) focuses on how the various types of subsidies interact with the various fishery management regimes in determining the resulting impacts of the subsidies. In other words, this framework emphasizes the role of the management regime in determining the actual impacts of a subsidy. As Hannesson (2003, p.7) puts it:

> *"The effect of subsidies on fish stocks and catches depends critically on the fisheries management regime in place. If a subsidy is introduced it will initially augment the profits of fishing enterprises. The reaction of the industry will depend on the fishery management regime, that is, whether there are any controls at all, whether the catch is being controlled, whether the effort is being controlled, and whether there is a property rights structure accompanying those controls."*

One of the objectives defined by OECD for the present report is to examine how suitable this framework is to assessing subsidies within a broader sustainable development framework, and in examining the social dimension of subsidy impacts in particular. Certainly, the fishery management regime would seem to play a significant role in affecting how subsidies impact on the fishery, from a social perspective. For example, suppose that a certain jurisdiction introduces a rights-based management measure, such as individual quotas (or ITQs). Not infrequently, this has been done by dividing fishery participants arbitrarily into two groups – say, license holders with large catch histories, on the one hand, and crew members and small-scale license holders, on the other hand – then distributing use rights free of charge to the first group, while excluding the second. This practice clearly constitutes a subsidy favouring a specific group of fishery participants, and thus one with major distributional implications. Whether or not this subsidy leads to economic or environmental benefits is unclear, but the degree of inequity inherent in such a practice suggests that it will have significant social impacts on individuals and communities. This is an example of a subsidy that was likely designed from an economic perspective without adequate attention to social impacts – in other words, without due attention to all the 'pillars' of sustainable development. This example also illustrates how, in analysing a subsidy, care must be taken to examine all 'angles' of the fishery impacts.

There seems no doubt, therefore, that the impact of a given subsidy can vary depending on the fishery management regime in place, but that the classical economic analysis applied in previous work will be insufficient to properly assess the manner by which fishery management regimes affect the social impacts of a subsidy. In particular, since social considerations may either ameliorate or aggravate the subsidy's impact, economic analysis alone may not arrive at a correct understanding of the situation, so a broader analysis is required.

Furthermore, there is no reason to believe that focusing on just one dimension in fishery systems – such as the fishery management regime – will be enough to effectively understand the nuances of how subsidies affect the fisheries. Therefore, in examining the impacts of subsidies, differences in fishery management regime should be seen as but one factor influencing the nature of the impacts, among a range of other structural or socially-oriented factors. For example, the developmental state of the coastal economy, labour market factors, and the socio-cultural reality affecting the fishery may all have considerable influence on how a subsidy impacts the fishery.

To move beyond a focus on how subsidies interact with the fishery management regime, we need to explore a number of other analytical frameworks within which impacts of subsidies can be examined. This is the subject of the remainder of the section.

A Sustainable Development Framework

As noted earlier, the sustainable development of fishery systems involves pursuing the simultaneous achievement of certain key components of sustainability. In this report, we focus on the three 'pillars' of ecological, social and economic sustainability, and add a fourth (equally important) pillar – institutional sustainability (cf. Charles 1994). These are described below:

- *Ecological Sustainability* incorporates goals that relate to individual species, to the broader resource, and to the overall ecosystem:
  1. ensuring that harvests are sustainable, in the sense of avoiding depletion of the fish stocks,
  2. maintaining the resource base and related species to avoid foreclosing future options,
  3. maintaining or enhancing the overall health of the ecosystem.
- *Social and Economic Sustainability* focus on maintaining or enhancing overall long-term socioeconomic welfare, including measures of individual well-being and the well-being of human communities reliant on the fishery, incorporating the goals of:
  1. generating significant sustainable net benefits (including resource rents),
  2. reasonably distributing those benefits amongst the fishery participants,
  3. maintaining or enhancing the system's overall viability within local and global economies,
  4. maintaining or enhancing *community sustainability* – the welfare of human communities in the fishery system, including their economic and socio-cultural well-being, overall cohesiveness, and long-term health.
- Institutional Sustainability involves maintaining suitable financial, administrative and organizational capability over the long-term, as a prerequisite for the above three components of sustainability. Institutional sustainability refers in particular to the sets of management rules by which the fishery is governed, and the organizations that implement those rules - the bodies and agencies that manage the fishery, whether at the governmental, fisher or community level. A key requirement in the pursuit of institutional sustainability is likely to be the manageability and enforceability of resource use regulations.

Recognising the multi-faceted nature of sustainable development, it must be understood that overall sustainability of the fishery system requires the simultaneous achievement of all the above components. Thus a proposed fishing activity or fishery management measure should be considered unacceptable if it produces an overly negative impact on any one component. In other words, overall system sustainability would decline through a policy that increases one element at the expense of excessive reductions in any other.

The sustainable development framework requires a further extension. Increasingly it is becoming recognized that the concept of sustainability must be looked at in parallel with that of *resilience* – which reflects the ability of a fishery, and its ecological, social, economic and institutional components, to absorb and 'bounce back' from perturbations caused by natural or human actions, without collapsing, self-destructing or otherwise entering an undesirable state (Berkes and Folke 1998). The idea of resilience was first introduced by ecologist C.S. Holling, who wrote (Holling 1973: p.17):

> *"Resilience determines the persistence of relationships within a system and is a measure of the ability of these systems to absorb changes of state variables, driving variables and parameters, and still persist. In this definition resilience is the property of the system and persistence or probability of extinction is the result."*

Resilience is relevant throughout the fishery – implying that the relevant ecosystems, and the human and management systems, are able to absorb perturbations, such that the system as a whole remains able to sustain (on average) a reasonable flow of benefits over time. Specifically, for components of the human system, such as fishing communities, it implies a capability to persist in a 'healthy' state over time, and for the management system, designing with resilience in mind seeks adequate management performance if and when something unexpected happens. A desired state of the fishery would be one characterised by resilient management institutions, resilient fishing communities, a resilient economic structure and a resilient ecosystem in which the fish live.

Unfortunately, resilience is not an entity that is simple to measure. In fact, there are no agreed upon measures of resilience, but there is an expanding body of study developing an understanding of what management and policy measures are compatible with maintaining or enhancing the resilience of the fishery: this is discussed later in the report.

Thus a sustainable development framework requires mechanisms to evaluate the nature and extent of sustainability and resilience in a fishery – an integrated, interdisciplinary, multi-dimensional 'sustainability assessment'. This can build on analogous approaches to evaluating the impact of human activities contained in environmental impact assessment and social impact assessment. The sustainability assessment approach (*e.g.,* Charles 1995c, 1997b,c) involves determining a set of quantitative *indicators* that captures key elements within each component of sustainability, and allows comparisons between these. When indicators have been determined for a given fishery, some insight can be obtained into where sustainability and resilience seem to be present or absent. The checklist below suggests some examples of relevant sustainability-related questions that might be posed, from which appropriate indicators can be deduced.

Box 7.1. A 'Sustainable Development' Checklist

Ecological Sustainability

1. Are exploitation levels (catches) on directly impacted species such that ecosystem resilience is maintained (or at least not reduced excessively)?

2. Are indirect biological impacts reasonably understood to the extent required for sustainability?

3. Are impacts on the ecosystem as a whole reasonably understood to the extent required to maintain overall resilience?

4. Are alternative systems of management and/or utilisation available so that pressures from any increased demands placed on the system do not increase beyond management capabilities?

5. Are imposed stresses and rates of change likely to be within the bounds of ecosystem resilience?

Social and Economic Sustainability

1. Will the activity increase the aggregate long-term rate of employment?

2. Will the project enhance economic viability in the local and regional systems?

3. Are possible impacts on input and output prices understood?

4. Is resource depreciation, and changes in natural capital more generally, incorporated into national accounting practices?

5. Are the current and projected levels of distributional equity in the system sufficient?

6. Will long-term food security and livelihood security be maintained or increased, as measured in both average and minimal terms?

7. Is the project likely to maintain or increase the long-term stability of affected communities?

8. Does the local population have access to the resource base?

9. Is the local population integrated into resource management and development practices, with traditional management approaches utilized to the extent possible?

10. Are traditional value systems of importance to the community maintained?

11. Are local socio-cultural factors (tradition, community decision-making, etc.) incorporated?

12. Are traditional resource and environmental management methods utilized to the extent possible?

13. Are there adverse impacts in any component of the system, that unduly affect particular components of the community (e.g. by age, gender, religion)?

Institutional Sustainability

1. Will the long-term capabilities of corresponding institutions be increased?

2. Is financial viability likely in the long term, or does the intrinsic importance of the system justify ongoing support from society regardless?

A Fishery Systems Framework

It was noted earlier that a sustainable development framework is inherently ‘integrated’ in looking simultaneously at ecological, social, economic and institutional sustainability. Such a framework must also look at the entirety of a fishery system – while it is important to understand the impact of subsidies on the ecological, social, economic and institutional sustainability of one particular gear type, or one particular fishing community, we must also look at broader impacts on the fishery as a whole, and indeed beyond the fishery.

An interesting illustration of this – drawn from one of the relatively rare analyses of fishery subsidies that have taken a broad perspective – relates to fishery subsidies in Ireland. Wiium (1999) notes that these subsidies “…are used increasingly for the purpose of employment creation in disadvantaged regions, rather than to increase capacity” and that “The fundamental objective is to prevent out-migration of people from peripheral regions of the State.”(p.157) Correspondingly, the conclusion of the study is that while “Abolishing fisheries subsidies in Ireland is therefore not likely to have huge effects on the fishing fleet…the effects on rural communities could be grave.” (p.164) Wiium makes the important observation, of relevance in a climate of subsidy removal, that “if subsidies are to be removed, it is of utmost importance to understand what underlying motives brought them about in the first place. Only then can policies be recommended that can replace the subsidies, if their removal is deemed desirable.” (p.159) What this example tells us is that to understand the impact of subsidies, we need to go beyond single-discipline analysis, and beyond a focus solely on the harvesting sector of the fishery.

There is no standard methodology involved in carrying out a ‘fishery systems’ analysis. Instead, in a manner analogous to that of applying a ‘sustainable development framework’, the key characteristic lies in the approach itself. Just as the field of ecology focuses on the structure, dynamics and overall nature of ecosystems, the broader idea of a ‘systems approach’ seeks to understand the structure and interactions within a fishery system (or an aquaculture system, etc.) from a holistic perspective. In particular, in examining the impacts of subsidies, it is relevant to take into account any impacts on each of the fishery system components:

The Natural System:

- The Fish
- The Ecosystem
- The Biophysical Environment

The Human System:

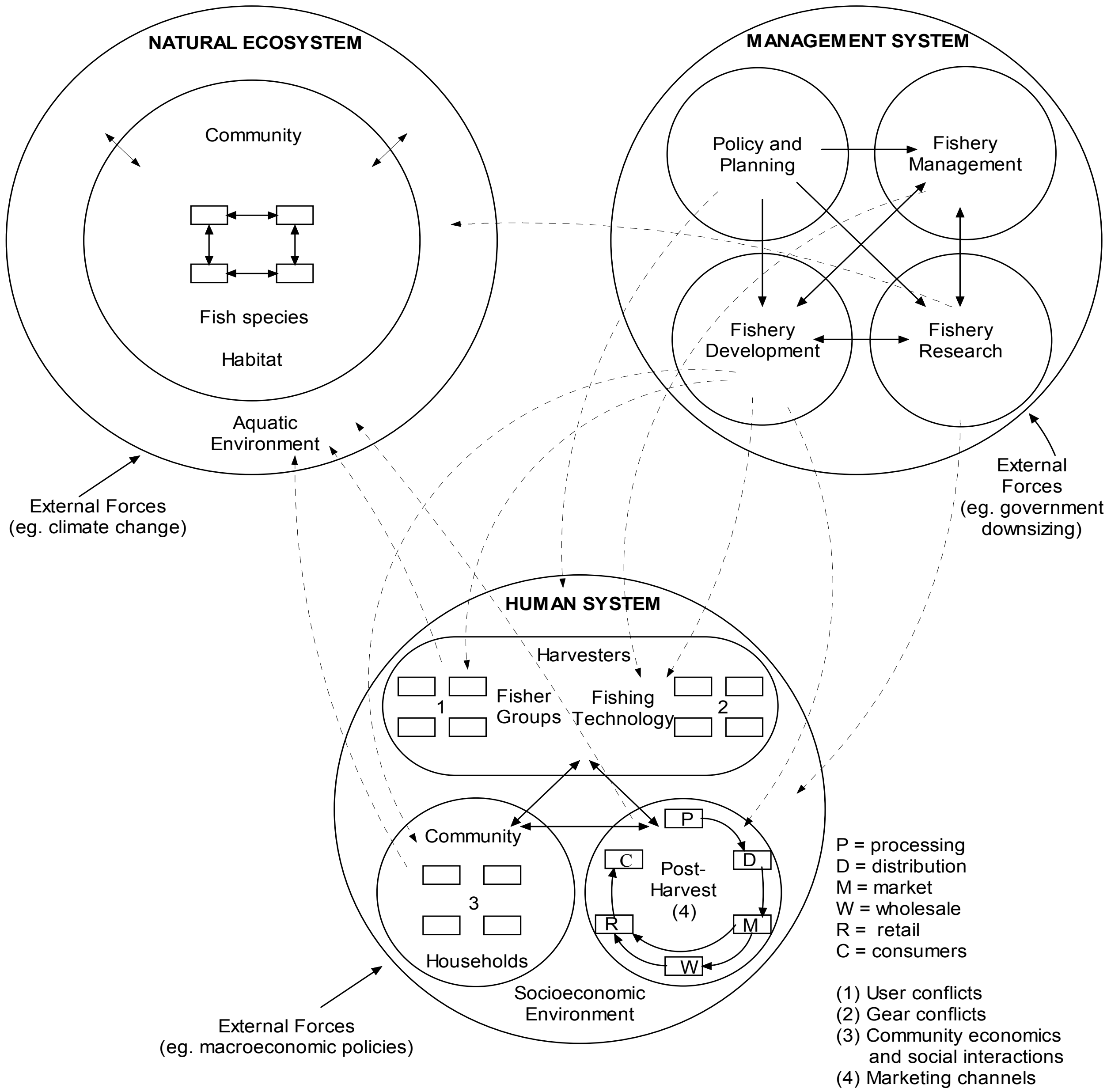
- The Fish Harvesters (Fishers)
- The Post-Harvest Sector and Consumers
- Fishing Households and Communities
- The Social/Economic/Cultural Environment

The Fishery Management System:

- Fishery Policy and Planning
- Fishery Management
- Fishery Development
- Fishery Research

The Figure below indicates these various components, some of the interactions among them, and representatives of the many external impacts on the fishery. Note that the lower circle depicts the human sub-system with emphasis on the internal structure within fisher, technology, community and post-harvest elements, and the interactions between the various elements.

Figure 7.1. The Fishery System



Social Analysis of Subsidies in Fisheries

As this author is not in a position to develop a sociological analysis of fishery subsidies, or other policy interventions, this paper draws on the work of Townsley (1998) who provides a survey of social issues in fisheries, developing an analytical framework for examining social considerations. In particular, Townsley provides two ingredients:

First, Townsley describes how social impacts may be classified demographically and organizationally. At the demographic level, he focuses on two key aspects: gender and age. The idea is that policy interventions – in this case a fishery subsidy – need to be considered through the dual lenses of age and gender. Thus one would explore how the subsidy affects different age groups in the fishery, and how it affects women and men differently. Townsley also highlights the need to examine the impacts of policy interventions on the different organizational levels in the fishery, notably:

- Community
- Household
- Production-unit

Second, Townsley provides a grouping of social issues arising in fisheries within seven major categories:

1. Stakeholder communities
2. Economic factors
3. Access and ownership
4. Labour
5. Institutions and decision making
6. History and change
7. Beliefs, knowledge and skills

Several elements in this set match closely with the categories used by Charles (1988) in reviewing the state of knowledge on fishery socioeconomics:

1. objectives, such as employment, distributional concerns and rent generation
2. income distribution
3. fishery management; property rights, co-operatives, community rights
4. social and opportunity costs for labour
5. fishery labour markets, labour supply, labour mobility
6. fishermen and fishing community decision processes, behavioural dynamics

While there are similarities, clearly there are also some differences between the above two sets. For example, Townsley's last two elements deal with more conceptual and philosophical considerations, while the two elements in the above paper that deal with fishery labour reflect a greater socioeconomic focus. In any case, a union of the sets would provide a fuller framework for analysis. Indeed, there may also be some aspects missing from the sets above – for example, the range of cultural considerations is not so clearly incorporated.

Distributional Analysis

A particularly important element above is that of the distributional impacts of subsidies. Who is affected more and who less by the subsidy? Who wins and who loses from having the subsidy in place? The matter of distributional impacts is always present –

after all, subsidies are often directed, intentionally or not, at certain components of the fishery sector, so distributional impacts arise naturally – but rarely dealt with comprehensively. Because distributional impacts cannot be easily analysed with the standard microeconomic tools, many analysts do not even acknowledge them. Munro and Sumaila (2002: p.235), on the other hand, consider distributional matters as one of two major categories of impacts: "…subsidies are to be judged in terms of their impacts. We can divide such impacts into two broad categories: (A) distributional impacts; and (B) impacts upon resource management and sustainability". Those authors then proceed to focus on the latter group of impacts – in keeping with the approach of most economic analyses, where distributional considerations are not addressed – but the emphasis they place on the relevance of such matters motivates the focus of the present report.

The need for greater attention to distributional aspects is perhaps illustrated by the fact that many definitions of subsidies or statements of the nature of subsidies do not recognise the key point of Munro and Sumaila above – that affecting distribution of fishery benefits may well be a major objective and/or impact of a subsidy. For example, Hannesson (2003: p.1) writes that the purpose of a subsidy "is to raise the incomes of those who work in the industry or firm in question or to increase the volume of production." This may well be *one* objective, but another may be to shift benefits or costs among "those who work in the industry or firm in question".

A focus on distribution is crucial to an analysis of subsidies, and an analytical framework clearly needs explicit incorporation of such considerations. (The framework developed in the trade liberalisation study needs further elaboration in order to do so.) Clearly, Myers and Kent (2001: p.9) note the importance of focusing on who receives the benefits of subsidies and who does not:

> *"If everybody receives a subsidy, nobody does. By their very nature, then, subsidies have a marked distributional effect. This means in turn that subsidies carry all manner of equity implications… It is these equity concerns that make subsidies a politically contentious issue. Whom should governments try to assist through subsidies…? The list can be long."*

There are various dimensions in looking at distributional issues. One of these is the power structure in the fishery and society – the above authors proceed to state that "experience shows that in virtually all societies, it is often the powerful who obtain subsidies by causing weaker groups to shoulder some of the costs of their activities…". Another dimension is that of scale: for example, since subsidies in the fishery sector can have a range of impacts on society beyond the fishery – *e.g.,* coastal communities, ancillary industries, etc. – it is crucial to look at larger-scale distributional implications. This is supported by the conclusion in FAO (2003: paragraph 15) that "...it may not be sufficient to note the effect on the recipient [of the subsidy] only. In order to get a grasp of the total outcomes of a policy it is necessary to look also at the economic effects on the industry and on society as a whole."

Subsidy Impact Checklists

It is undoubtedly a complex task to develop an integrated analysis of fisheries subsidies, one that (a) takes into account the various social, economic and environmental perspectives, (b) consolidates the analytical frameworks described in the present section, and (c) assesses both the positive and negative aspects of a given subsidy. A simple mechanism to attempt to capture the range of relevant considerations is through a *checklist*. Often, checklists are presence/absence in nature, with a 'check-mark' indicating a satisfactory outcome with regard to the particular item being considered. However, this can be expanded into a more open-ended set of key questions to be addressed in any given situation.

With respect to social impacts of subsidies, there is a need for 'social impact assessment' processes to examine subsidies in the same manner as such an assessment is carried out for major project proposals. If this were applied through a checklist to evaluate social impacts, it could be used in parallel with similar checklists of environmental and economic impacts. In particular, an approach of this sort could function analogously to a recent checklist approach for delineating specific elements of subsidies that produce environmentally harmful effects (cf. Cox, 2002).

Box 7.2. Some Components of a Checklist for Social Impacts of Fisheries Subsidies

[adapted from the analytical framework of Townsley (1998)]

1. What are the gender-related impacts of subsidies (e.g., gender roles, reproductive labour)?

2. What are the age-related impacts of subsidies (e.g., aspects of vulnerability, dependency)?

3. What impacts do subsidies have on the various communities involved in the fishery?

4. What impacts do subsidies have on the various households involved in the fishery?

5. What impacts do subsidies have on the various production units involved in the fishery?

6. How does the subsidy affect the interaction among stakeholder communities (relative 'stakes', historical involvement, tenurial rights, cohesion)?

7. How does the subsidy affect economic factors, such as interactions in the local economy, interdependence, diversification, indebtedness?

8. How does the subsidy affect access and ownership (women's patterns of resource use, multiple use, access vs. ownership)?

9. How does the subsidy affect aspects of labour in the fishery and in coastal communities (migration, household survival strategies)?

10 How does the subsidy interact with institutions and decision making structures (devolution, conflict management, local power and equity)?

11. How does the subsidy relate to history and change (temporary population movements, seasonal variations and long-term processes)?

12. How does the subsidy relate to beliefs, knowledge and skills (cultural significance, attitudes, levels of education, TEK)?

Synthesis

In the absence of a generally-accepted 'analytical framework' for assessing the impacts of subsidies in the context of sustainable development, there seems to be a need to 'build' such a framework by integrating a number of relevant approaches – as presented in this section – that might be useful in assessing the impacts of fishery subsidies. While each approach has its role to play, none seems sufficient on their own – what is needed, then, is a 'blend' of these approaches.

The framework presented in OECD's trade liberalization study provides a useful first step in linking the impacts of subsidies, on the one hand, and the specific fishery management regime in place, on the other. Starting the 'building process', a *fishery systems* framework, as discussed in the section above, adds on the recognition that it is not only the management system that affects the impacts of subsidies, indeed so do many elements of the fishery system. The systems framework therefore provides a systematic way to analyse interconnections throughout the fishery, within and among the natural, human and management sub-systems.

The next step, after broadening the 'trade liberalization study' framework into a fishery systems framework, lies in integrating the latter with a sustainable development framework, as discussed above. This enables a proper examination of the impacts of subsidies, and indeed other management and policy measures, in the dual context of the fishery system and of the goals of sustainability and resilience.

These steps should produce a broad framework to analyse fishery subsidies (and other interventions) from ecological, social, economic and institutional perspectives. However, for the analysis of social impacts, the framework needs to incorporate aspects of a sociological analysis. As described in the section on impacts of fisheries subsidies on the human components, Townsley (1998) provides a suitable approach to accomplishing this, involving classification of social impacts demographically (in terms of gender and age) and organizationally (in terms of community, household and production-unit), and grouping of social issues within seven major categories: (a) stakeholder communities, (b) economic factors, (c) access and ownership, (d) labour, (e) institutions and decision making, (f) history and change, and (g) beliefs, knowledge and skills. This analysis is complemented by a focus on distributional impacts of subsidies as shown below, a key element of a social analysis of impacts.

The above amalgamation of approaches may lead to a consolidated analytical framework that deals with impacts within a 'sustainable development oriented' systems approach, and that also maintains some focus on interactions with management systems. A 'checklist' approach to assessing the various impacts (drawing on a social analysis – see the section on conclusions) may then provide a simple mechanism for monitoring and evaluating the various social impacts of fisheries subsidies, and indeed other policy interventions, in the spirit of a 'rapid appraisal' approach – one that is not as in-depth as a full analysis but which focuses attention on key components of the fishery system and on key issues of relevance to the analysis of subsidies.

Assessment of Social Impacts for Specific Fisheries Subsidies

In this section, we provide a preliminary attempt to analyse the social impacts of specific fisheries subsidies, focusing on distributional aspects (reflecting the focus in this report on social impacts in terms of the distribution of benefits, costs and overall impacts). This explores (a) who are the recipients of the subsidies, and (b) how widespread these recipients are in the fishery and in society. In addition to a general discussion of distributional considerations for each form of subsidy, we also attempt to classify subsidies into the following three groups:

- Type 1: those that benefit all in the fishery, as well as some in other sectors of society;
- Type 2: those that benefit all in the fishery, but no one outside that sector;
- Type 3: those that benefit one or more specific components of the fishery.

Type 2 subsidies are easiest to analyse, since they reflect a clear case of government financial support to the fishery sector, that is not provided to others. Subsidies of Type 1 range from those, at one extreme, that apply to all economic sectors and thus really are not fishery subsidies at all, to those at the other extreme that are 'almost' Type 2 subsidies in that they apply to all in the fishery plus a very small group outside the fishery.

Subsidies of Type 3 are most in need of a distributional analysis, as they are likely to affect the division of fishery benefits and costs amongst the fishery participants. Such subsidies may well reflect implicit or explicit government policy directions. For example, financial support may be provided for fleet 'modernization' – encouraging more capital-intensive vessels, and thereby favouring participants with access to capital or lending institutions. On the other hand, subsidies may be provided as income support to small-scale fishers, as a means to maintain the integrity of a labour-intensive fishery, and the coastal communities that rely on it. Many more examples may be considered: subsidies to particular gear sectors, particular vessel categories, particular geographical locations, particular fishing areas, and so on. In this report, considerable attention will be paid to exploring the implications of Type 3 subsidies.

It should be noted as well that there is a fourth type of government intervention, one that is made available to all in the society (not just in the fishery); such public services (public goods) do not usually constitute a subsidy. For example, provision of water and sewage facilities would fit this description, as essential services provided by government. Other 'public services' could be considered as fisheries subsidies if those services are *de facto* oriented to the fishery sector. For example, a wharf paid for by government, and nominally accessible to the public, but for which usage is, say, 95% on the part of fishery participants, might be considered as a subsidy to the fishery sector. Similarly, a marine protected area may be instituted as a public good, but impacts may be differentially important to those in the fishery (particularly if there is a closing of certain areas to fishing, or a restriction of fishing within certain areas). However, they may also have significant distributional impacts, with some fishers suffering short-term negative impacts while others enjoying long-term positive impacts.

The above distribution-focused classification of subsidies is utilized in this section to examine the social impacts of specific subsidies listed by Westlund (1999). That author's list of financial transfers is organised into two groupings. First, *direct financial transfers* include investment grants, grants for equipment, and price support, as well as negative subsidies (taxes and fees, import/export duties). Second, *services and indirect financial transfers* include (a) non-tariff border measures, export promotion, etc., (b) tax and duty exemptions, fuel tax exemptions, etc., (c) differentially-beneficial government services (e.g., loan guarantees), and (d) government services to fishermen for which the full cost is not recovered. A selection of the financial transfers listed by Westlund is shown below – and a sub-set is examined in this section. Also omitted here are two groupings that Westlund includes in the list of subsidies, but which do not fit the definition of 'financial transfers': (a) 'interventions with different short and long-term effects', notably measures with a short-term cost (subsidized) but long-term benefits, such as environmental protection, gear regulations for species conservation, and protected areas (see above), and (b) 'lack of intervention' (such as not charging for access to fishing grounds, not implementing management measures or enforcement programs, etc.).

Box 7.3. Fisheries Subsidies in the form of Financial Transfers (drawn from Westlund, 2003)

Direct financial transfers:

Bad weather unemployment compensation, Disaster relief payments
Modernization/investment in vessels
Income support, UI and income guarantee
Vessel decommissioning, License and quota buyouts
Compensation for closed or reduced seasons
Price support
Direct aid to participants in specific fisheries
Grants to establish joint ventures
Support to improve economic efficiency
Grants for safety equipment
Direct export incentives
Retraining fishers for other industries
Taxes
Import/export duties
Transport subsidies

Services and indirect financial transfers:

Support to community based management, regional development
Fishers' insurance programs
Payments to foreign governments for fishery access
Fishery-specific infrastructure e.g. fish markets, landing sites
Bait services
Gear development
Fuel tax exemptions, Sales tax exemptions
Special income tax deductions for fishers
Investment tax credits, Loan guarantees
Market promotion programs
Input or output regulations
Inspection and certification services
Training and extensions services
Research and development
Sales to fishers at below-market prices
Information collection, analysis and dissemination
Promotion and development of fisheries
Exploratory fishing
Fisheries enhancement
International fisheries co-operation
Import quotas
Promotion of fish consumption
Market research

Direct Financial Transfers

Bad weather unemployment compensation / Disaster relief payments

A subsidy made available only under certain conditions of Nature, *e.g.* natural disasters and bad weather, to compensate those disadvantaged by the specific conditions, reduces the risk element that might be present in the recipient's analysis for investment and operational decisions, but is in keeping with the nature of many societies to provide care for those harmed by acts of Nature, whether droughts, hurricanes, or other such phenomena. Accordingly, this fits as a Type 3 subsidy (not provided to everyone); distributional conflicts may arise but are not likely large.

Income support, UI and income guarantee

This has the potential to fall into Type 2, i.e., subsidies that benefit all those in the fishery, but can have distributional impacts, depending on whether income support is at the same level for all participants, or varies, e.g. based on a percentage of income.

Vessel decommissioning

This Type 3 subsidy involves payments to boat owners but unlikely any compensation to crew members or ancillary sectors, and therefore there can be significant distributional implications. In addition, crew members of decommissioned vessels may re-enter other sectors of the fishery, causing possible social problems.

License and quota buyouts

As with vessel decommissioning, this Type 3 subsidy typically involves payments to boat and/or quota owners, but does not likely include any compensation to crew members or ancillary sectors. Crew members may re-enter other fishery sectors, potentially leading to social problems. What happens to vessels is not specified, so vessels may be brought into other parts of the fishery, causing over-capacity, or alternatively, vessels may be used in non-fishery sectors (e.g., tourism) for economic development.

Retraining fishers for other industries

This Type 3 subsidy may directly benefit certain fishers – *i.e.*, those who are motivated to undertake re-training, or those forced to do so – but may also serve the public interest, constituting an investment in human resources and in reducing pressure on fishery resources.

Transport subsidies

This form of subsidy could support isolated fishers and fishing communities in enabling them to market their catch; alternatively, it could reduce food supplies in such isolated areas if, as a result, more fish were to be 'exported' out of the area. Depending on how such subsidies are implemented, specifically whether they are available to benefit everyone in the fishery or are targeted on particular locations or groups (e.g., processors), they may fit as Type 2 or Type 3.

Services and Indirect Financial Transfers

Support to community management, regional development, producer organisations

To the extent that these measures support local resource management and development, they may serve to enhance stability in isolated areas. They may well be Type 1 subsidies in that their impact includes not only those in the fishery, but also the broader coastal society and economy. Support for producer organizations will generally be Type 3, in that typically not all those in the fishery benefit equally from such support.

Fishery-specific infrastructure e.g. fish markets, landing sites

These constitute 'public goods' within the fishery… the value and necessity of such subsidies depends on whether collective action could produce such infrastructure, and/or whether private sector investment can produce the infrastructure. They are Type 2 if use is restricted to fishery participants, or Type 1 if there is broader accessibility and use of the facilities.

Special income tax deductions for fishers

This would seem to be a classic Type 2 subsidy, benefiting all those in the fishery sector. However, depending on how the system is implemented, the subsidy may favour high income fishers over others (if the deduction is proportional to earnings) or may be a more egalitarian arrangement (if for example, there is a 'cap' on the level of the deduction). Social impacts may thus occur within the fishery, and may as well include the possibility of social tension in coastal communities, where some are receiving preferential tax treatment over others (non-fishers).

Investment tax credits

This subsidy may be portrayed as one of potential benefit to all fishers (Type 2) but in reality, unless the credit nears 100%, it can be taken up only by those in a position to make investments *(i.e.,* with access to capital and able to take risks with one's assets), making it of Type 3. It thus may favour wealthier fishers and/or corporate participants. On the positive side, an investment tax credit system could be envisioned that would apply only to relatively 'under-capitalised' participants, enabling them to 'catch up', and thereby improving the distribution of access to resources. This subsidy has the potential to be among the most environmentally damaging and economically wasteful, if it leads to over-capitalisation in the fishery.

Loan guarantees

These have similar features to investment tax credits, but quite likely will have a somewhat better distributional impact, in that loan guarantees may enable development by those not in a position to take substantial risks. There have been some positive social results, for example, from revolving lines of credit on a small-scale community-level of operation. Often, loan guarantees are aimed at specific fishery sectors, making them Type 3 subsidies.

Grants to establish joint ventures, Payments to foreign governments for fishery access

These subsidies are of Type 3: they may be implemented with the stated aims of fishery development – assisting fishers to access new species and/or new fishing grounds, and securing new sources of fish – but there are significant distributional implications: the benefits of such subsidies will go to those able to undertake large-scale ventures and those capable of fishing in distant waters respectively.

Inspection and certification services

Government provision of inspection and certification services is a direct support to the fishery sector, or at least that part of the sector involved in selling fish. Of course, such provision also benefits the consuming public; therefore, whether this is seen as a public good or as a (Type 2) subsidy to the fishery sector is a matter of policy.

Sales to fishers at below-market prices

Here there is a different impact depending on whether we are considering capital or operating (variable) inputs. If a certain variable input (such as fuel) is subsidized, this differentially benefits those who consume most of that input on an ongoing basis. Specifically, a fuel subsidy may encourage fleet modernization (enabling some who would otherwise retain labour-intensive vessels to switch to fuel-intensive ones), but would most directly benefit those who already invested in fuel-intensive (and capital-intensive) vessels. In other words, it is a windfall benefit to those who already made an investment in such vessels. On the other hand, subsidizing capital purchases provides a similar incentive to that of investment tax credits; the benefit goes to those in a position to take advantage of the subsidy, and not to those who already made the relevant capital expenditures, or those without the financial resources to make those expenditures in any case. For example, subsidies on electronic equipment may increase the catching efficiency of vessels that benefit from the subsidy; this would increase the overall catching power of the fleet as a whole, but distributionally, it would (a) 'even the playing field' somewhat by providing the opportunity for investment to who had not yet made those expenditures due to lack of capability to do so, but (b) be of most benefit to those who can afford to pay the (albeit-subsidized) costs for new equipment. Overall, then, these financial transfers may be portrayed as Type 2 (those available to all in the fishery) but in reality, they are *de facto* available (or of most use) to those with a certain financial/investment history (Type 3).

Research and development

It is particularly difficult to assess, or even categorise, financial support provided for research and development. For example, if it is oceanographic research, this may be of benefit to fisheries, but also to shipping, offshore mineral development, underwater cable communications, and indeed to society at large through improved knowledge of a nation's (and the world's) seas. If it is development of more environmentally-appropriate fishing gears, this may be of no benefit to the fishery sector, but of great societal benefit – or it may be seen as a low-cost alternative to costly retro-fitting of existing gear or vessels, or indeed of a prohibition against certain forms of fishing. There is also a distributional issue: *e.g.,* development of a new bottom trawl gear may benefit trawlers directly (perhaps avoiding prohibition of the gear type, or stringent regulations). There may be indirect benefits to others through improved habitat quality and potentially improved fish stocks, but the greatest benefit would go to one component of the fishery.

Information collection, analysis and dissemination

Like research and development payments, this is a difficult area to address. Three questions need to be posed: What information is being collected and analysed? For what purpose? Who has access to the information and resulting analyses? Consider for example the case of a government initiative to map the seafloor off its coast. If government funding enabled scientists to map the seafloor and provide publicly accessible information, this will provide benefits to the fishery sector, but the rationale for such efforts lies in seeking a better understanding of the ocean – very much a societal benefit rather than a fishery subsidy. This would seem to be a Type 1 subsidy. On the other hand, suppose the government partners with a private company to map the seafloor, producing information on the benthic habitat, its suitability for aquatic resource production, and the current location of such resources – information that is not released to the public and others in the fishery. This is a case of the government subsidizing a particular company in obtaining that information, implying a Type 3 subsidy with significant distributional implications.

Promotion and development of fisheries / Promotion of fish consumption

A generic promotion of seafood from the fisheries of a particular jurisdiction may seem to be of equal benefit to all in the fishery (Type 2). However, it may well have greater benefits to some than others (Type 3). For example, fishers who sell their catch locally may not benefit much from more widespread promotional efforts. In a fishery with both commercial and recreational components, clearly there is little benefit to the latter from promoting seafood consumption.

Exploratory fishing

The impact of subsidies for exploratory and experimental fisheries can be complex. There may be a rationale for such subsidies in terms of governmental policy directions – whether food supply, export promotion, employment generation or regional development. However, there are distributional impacts in the sense that benefits will go directly to those with the means to become involved in such endeavours (and of course, the capability to incur risks) – implying a Type 3 rather than a Type 2 subsidy.

Market research

Efforts to understand fish markets, supply and demand relationships, market niches, etc., can be of benefit to the entire fishery sector (Type 2), but may be particularly helpful to processors and exporters (Type 3).

Synthesis

This section of the report has taken a structured approach to examining the social impacts, and particularly the distributional implications, of fishery subsidies. The approach has drawn on the discussion of distributional issues in the frameworks section, utilising a 3-prong typology of distributional impacts, and applying this to a set of subsidies drawn from the listing of Westlund (2003). On the other hand, apart from use of the above classification scheme, the analysis for each subsidy herein has been very much *ad hoc* based on the author's understanding of the general features of each situation. An important step for the future would be a more systematic and comprehensive analytical undertaking, to fully explore the social impacts of each form of subsidy.

Impacts of Fisheries Subsidies on the Human Components of the Fishery System

Fish Harvesters

A key aspect in assessing the social impacts of a particular fishery subsidy is the potential for differential impacts on the different types of fishers. Overall categories of fishers can include subsistence, indigenous/aboriginal, recreational and commercial fishers. Within the commercial sector, it is important to differentiate between

- artisanal/small-scale fishers – those fishing commercially but at low levels, and "confined to a narrow strip of land and sea around their community, faced with a limited set of options, if any, and intrinsically dependent on the local resources" (Panayotou 1985: p.11), and
- industrial or large-scale fishers, i.e. those with "a broad spectrum of options both in terms of fishing grounds and non-fishing investment opportunities", typically corporate fleets of capital intensive vessels.

Indeed, the difference between *small-scale* and *large-scale* can be applied to the fishery system as a whole, and the impact of subsidies in a fishery will depend very much on where the fishery lies on the spectrum between small-scale and large-scale. Fisheries need to be considered as small-scale or large-scale on a case-by-case basis, depending on an assessment of a range of organizational and structural characteristics, such as the size of the typical fisher's operation (e.g., vessel size), the distance from shore the fishery operates, and aspects shown in the table below.

Table 7.1. Characteristics of Small and Largescale Fisheries

Social/Economic Factor	Small-scale Fisheries	Large-scale Fisheries
Nature of Objectives	multiple goals (social, cultural, economic, etc.)	tendency to focus on single goal (profit maximization)
Mode of production	subsistence fisheries as well as commercial ones, selling into appropriate markets	market-driven commercial fisheries, often with a focus on export
Ownership	typically individual/family; often small business in developed nations	typically corporate; often based on foreign fleets in developing nations
Mix of Inputs	labour intensive, relatively low technological level	capital intensive, emphasis on applying new technology
Rural-Urban Mix	predominantly rural; located typically outside mainstream social and economic centres	often urban or urban-tied; owners within mainstream social and economic centres
Community Connections	closely tied to communities where fishers live; integral part of those communities	relatively separate and independent of coastal communities

Subsidies relating to fishing methods, gear, etc., may affect the choices made by fish harvesters, in concert with a range of economic and social factors. These include (a) the relative importance of short-term *versus* long-term benefits in decision making, which will affect the level of concern for conserving fish and habitat (*e.g.* destructive methods can be very profitable in the short term); (b) the relative importance of private profit (market value of the catch less the cost of the fishing activity) *versus* a balance of multiple objectives (benefits of income and food production minus the time, energy and cost expended in fishing); and (c) the relevance of the selectivity of fishing gear – its capability to catch only target species and sizes of fish – which can be important given concern about the by-catch issue, dumping of low-valued by-catches and the like.

Finally, there are a number of socioeconomic and cultural distinctions that may be important in examining impacts of subsidies and other policy interventions on fish harvesters:

- Within any given group of fishers, there are variations in many social and demographic aspects, such as age, education, social status and religion. Between fisher groups, there may be differences in internal social cohesion (how attached the fishers feel to their group) and in community connections (attachment to their local community).
- In commercial fisheries, there is also variation by occupational commitment (e.g., full-time versus part-time) and the level of occupational pluralism – with some fishers specialized entirely on a single species, some utilizing a range of resources, and others drawing income from outside the fishery as well as from fishing.
- Fishers vary in their motivation and behaviour; e.g., some may be profit-maximizers (acting as stereotypical 'firms') while others may be satisficers (fishing to obtain 'enough' income).
- Gender is an important element in many fisheries, given that in much of the world, women may be involved in one or more of (a) fishing itself, (b) on-shore components of the fishery system, such as processing, in industrial contexts, or marketing, in artisanal settings, (c) organizing the community to respond to threats to the livelihood of the local fishery, and (d) building up and holding fishery and marine environmental knowledge within the community (Ruddle 1994).

Post-Harvest Sector

Subsidies in the harvesting sector may also affect the post-harvest sector, or subsidies may be directly targeted on the latter. A *sustainable development* approach implies a focus on maximising the benefits to society provided by each fish that can be caught sustainably, so that the limited quantities of fish available are used as efficiently as possible to meet societal goals. This point has particular relevance to the post-harvest sector, implying the need for attention to: (a) reducing waste and post-harvest losses, (b) maximizing the *value-added* through appropriate processing, (c) developing and/or improving distribution and marketing systems, and (d) integrating the fishery into overall rural development efforts.

Marketing and Distribution. Clearly, successful marketing and distribution of fish can make the difference between a reasonable income for fishers and others, and an untenable one. Policies, and subsidies, affecting marketing and distribution must be based on a good understanding of the complexities of the coastal system to avoid creating unexpected 'perverse' problems from a social perspective - for example, by reducing the role played by women, or reducing the stability and cohesion of the fishing communities.

Processing. Subsidies for the processing sector will presumably aim to enhance the attributes of this component of the fishery: (a) creating additional employment in fishery-based regions, (b) providing *value added* to the fish landed by harvesters, (c) providing a means to transform fish into more manageable forms (e.g., processing into canned, salted or frozen products to make distribution easier), or more marketable forms, or (d) providing better utilization of by-catch and development of new resources, leading to economic development. On the other hand, subsidies in the processing sector can have social impacts in terms of the distribution of benefits in the fishery. For example, given that some forms of processing (e.g., heading/gutting, freezing, smoking and salting) all tend to be relatively labour intensive, while others (canning and reduction) are capital intensive, the direction a subsidy favours may have dramatic effects on employment and community well-being. Finally, while most attention within the processing sector is typically paid to the material being processed, it is also important to look at those doing the work: do subsidies change the nature of who works in processing, e.g. the role of women in on-shore fish plant work?

Markets. Subsidies that support fish markets may have social implications. In particular it is useful to monitor issues of market power, intermediaries and financiers. Market power in a fishery will depend on internal social structure, such as the role played by producer organizations and co-operatives, on the fisher side, and by vertical integration and food wholesaling on the processor side. The role of middlemen can be not only as fish buyers but also as financiers, lending money to fishers, who agree to sell fish to the middlemen in return.

Consumers. Subsidies may affect the consumer sector of the fishery system, whether through consumer preferences or consumer demand. For example, a government seafood promotion campaign could affect preferences – the inherent desires that people have for seafood. Subsidies may focus on price support, affecting consumer demand. It is important to understand both consumer preferences and consumer demand in order to analyze the impacts of actions in other parts of the fishery system. For example, a subsidy designed to improve quality control in fish processing may lead to healthier fish products, but the resulting price may be higher; depending on the availability of substitutes in the marketplace, what appeared to be an obviously beneficial move to improve the desirability of a product could also lead to drastically reduced demand, and therefore lower incomes for fishers and processors. A subsidy that leads to a shift in market focus can have major social impacts: for example, the drive to maximize the value of the fish caught can lead to fish being diverted from local markets to export markets, and from use as food fish locally to use as fish meal in salmon and shrimp farms. Both of these impacts result in lower availability for local nutritional needs.

Fishing Communities

Households. Subsidies may have complex impacts on fishing households – those in which at least one member is involved in the fishery. Does the subsidy change the overall income to the household, and/or the distribution of that income across household members? Is there an impact on who in the household can join in the fishing activity? In many cases, household members not involved in harvesting may be involved on the post-harvest side, working in processing plants or marketing and distributing the catch – is this situation affected by the subsidy? Finally, the harvester and others in the household may hold jobs entirely outside the fishery system, which may have the effect of stabilizing family income and reducing the risk of major loss if a disaster in the fishery system were to occur. How is this affected by the subsidy?

Communities. In examining fishery subsidies, and indeed any fishery policy measure, it is important to broaden beyond the traditional focus on fish and fishing 'firms', to understand the broader context of where the fish and the fisher live – in the aquatic ecosystem and in coastal communities respectively. There needs to be a focus on the linkages between what goes on in the fishery itself, and how fishing communities operate - socially, economically and in terms of the functioning of community institutions. The list below shows some features of communities that are relevant in general to an understanding of the fishery system, and relevant specifically in assessing the impact of subsidies (and other government interventions) on fishing communities.

Table 7.2. Impacts of Subsidies on Fishing Communities: Some Relevant Factors

Demographic:	• community population • population trends • levels of migration • age and gender structure • education levels
Socio-cultural:	• identified community objectives • religious stratification • gender roles • social stratification and power structure • level of social cohesion • local traditions and norms
Economic:	• income levels and distribution • wealth levels and distribution • degree of dependence on the fishery • degree of fishing-related activity • diversity in livelihood opportunities • household economic structure • types and location of markets
Infrastructure:	• landing sites (e.g., beaches, wharves, etc.) • marketing, processing, distribution facilities • fishery-related facilities (e.g., boat repair) • social and cultural facilities • schools, religious centres, meeting places • roads, electricity, water and sewers
Institutional:	• pattern of community organisation • pattern of local resource management • pattern of resource ownership and tenure • level of community infrastructure • local government and legal system • regulatory and enforcement approaches • interaction with upper levels of government • use of traditional ecological knowledge • involvement of women in local institutions
Environmental:	• availability and condition of fish stocks • quality of aquatic and coastal habitat • oceanographic/environmental conditions

The Socioeconomic Environment

As noted elsewhere, a fishery subsidy may have impacts well beyond the fishery itself, moving into the fishery's socioeconomic environment – human, social and institutional elements, at the community, regional, national and global levels. To assess these impacts, it is necessary to examine the links between the fishery system and the socioeconomic environment. Some aspects of this are as follows:

- How do demographic aspects of the fishery system, such as participation by age and gender, interact with external influences, such as national population and migration trends?
- What are the broad aspects of society, culture, history and tradition that impact on decision making in the fishery system?
- How does the fishery economy interact with the economic structure and dynamics at the regional and/or national levels?
- How are the economic inputs in the fishery, notably labour and capital, affected by the broad economic environment?
- How do local fishery objectives relate to broader regional and national policy goals?
- How does the local institutional structure interact with institutions, legal arrangements, legislation and policy frameworks at national and/or sub-national levels?

Labour markets. In assessing the impacts of a fishery subsidy, an important socioeconomic consideration is how harvesters interact with their socioeconomic environment through labour markets. Wage rates or crew shares on fishing vessels will depend on the balance of labour supply and demand, and what goes on outside the fishery system *per se* - in the broader environment - can operate through the labour market to influence the fishery system. Furthermore, analysis of the social impacts of subsidies must take into account the nature of 'private' decisions made by individuals in the fishery, and the differences between these and broader community and societal objectives.

Suppose, for example, that maintaining sustainable livelihoods (stable employment at reasonable incomes) is a priority among society's objectives, as may be the case in regions of isolated fishing communities, where little alternative employment is available. This may be not just a matter of jobs in the fishery, but also of maintaining the 'engine' of the coastal economy, given the economic impact of a fishery on coastal communities. In such a situation, the *private cost of labour* may be significant (i.e., in terms of fishery wages paid by private operators) while the *social cost of labour* (the cost from a societal perspective) of employing people in the fishery may be much lower. (Indeed, depending on multiplier effects, the social cost of labour may even be negative, with employment of fishers being a positive 'good', not a cost to be minimized!)

This highlights the importance, in analysing subsidies, of recognizing the difference in impacts taken from societal and private perspectives. In the above scenario, if a specific subsidy leads to a reduction in employment levels, this may induce serious negative social impacts – the loss of fishers may lead, through a multiplier effect, to an economic *loss* to the regional economy and broader social costs may rise as well, for example, through increased crime or decreased levels of health and welfare. In such situations, it may be desirable (a) for capacity-reducing subsidies to target on capital-intensive rather than labour-intensive fishery components, and (b) for reductions in employment, if needed, to be accompanied by subsidies that support resilience of fishing communities and a transition of people and communities to new economic activities.

Fishery Policy and Management, Sustainable Development and the Impacts of Subsidies

This section focuses on the manner by which fishery subsidies interact with particular policy and management approaches that would seem to have a potentially significant effect on sustainability and resilience of the fishery system (Charles, 2001). These include (a) robust management, (b) adaptive management, (c) the use of 'diversified' management portfolios, (d) support for self-regulating fishery management institutions, (e) participatory management, (f) full utilisation of the fishery knowledge base, (g) appropriate fishery efficiency objectives, (h) managing fishery capacity, and (i) livelihood diversification. These are discussed in turn below.

Robust Management. Given that fisheries must be managed for sustainability and resilience within an uncertain environment, and with limited capability to control fishing activity, policy interventions are needed to move fishery management in directions that will produce reasonable success even in such a world of imperfect knowledge and imperfect management. This is referred to as *robust* management – approaches that seek to achieve satisfactory results in meeting their objectives, *even if* our current understanding of the fishery and its environment turns out to be incorrect, and our capability to control the fishery is imperfect. In other words, a robust management system is one that functions reasonably successfully even given unexpected changes in nature's course, or ignorance of nature's inherent structure. Examples of resilience-enhancing robust management approaches (Folke and Berkes, 1998) include traditional ecological approaches to management such as: (a) embracing small-scale disturbances to avoid major catastrophes; (b) using reserves and habitat protection measures; and (c) avoiding reliance on a single species or fishery, by encouraging multiple occupations and sources of livelihood. Other mechanisms for moving to robust management are discussed below. In examining the impacts of subsidies, it needs to be kept in mind that those shifting the fishery in such policy directions may be more likely than others to have ecological, economic, social and institutional benefits through enhancement of fishery resilience and sustainability.

Adaptive Management. No matter how successful a management system is in lessening the overall sensitivity to uncertainty, such uncertainties will not disappear. Thus it remains important to institutionalize processes for (a) continuous learning about the fishery system, through suitable monitoring, and (b) maintaining the capability and willingness to make appropriate adjustments, over both short and long time scales, by adapting in a timely manner to unexpected circumstances, so that conservation (as well as socioeconomic) goals are not compromised. This is what is meant by *adaptive* management – a crucial means to build resilience in the fishery. An adaptive approach is needed both in fishery monitoring – as for the impacts of technology and the processes of technological change – and in fishery operating and management plans, which must be flexible enough to allow for the highly uncertain nature of the fish. New information must be integrated on a regular basis, with management actions reassessed accordingly. These points imply that the use of subsidies to support improved information management, monitoring and adaptation may have additional benefits from a perspective of fishery resilience and sustainability.

Management Portfolios. A wide array of management instruments is available in fishery systems, each with its advantages and disadvantages. An over-emphasis on any one of these is unlikely to provide the desired robustness, as there will always be some situation in which any such method will fail to ensure sustainability. Thus the risk of failure can be reduced if a portfolio of management tools is utilized in the fishery. The key goal here is for the portfolio to be 'mutually-reinforcing' in that the various tools each help to rectify the shortcomings of the others. A *portfolio* of appropriate *mutually-reinforcing* management tools should take into account society's objectives, biological aspects of the resource, human aspects such as tradition and experience, the level of uncertainty and complexity in the fishery, and predicted consequences of the various instruments. Subsidies supporting the broadening of the set of management measures, reflecting an element of a shift to robust management, may well work in favour of greater fishery resilience and sustainability.

Self-Regulatory Management Institutions. Subsidies are often thought of primarily as financial transfers to *individuals* in the fishery (such as income support payments, boat-building subsidies, fuel cost subsidies, etc.) but financial transfers can also be made to support 'collective' actions and *institutions* in the fishery, such as co-operatives and local fishery management boards. This is an important distinction, since it is generally acknowledged that a key step toward greater resilience and robustness is the creation of suitable institutions for fishery management, in particular ones that can effectively 'self-regulate' the use of fishery resources. Such institutions help to 'get the incentives right' so that fishers and others have the incentive to operate in accordance with the regulations, and in particular to avoid anti-conservationist actions. Thus appropriate subsidies to support appropriate institutions can produce positive impacts. The idea is to make institutions both effective and resilient; the latter is a key characteristic of successful management institutions "so they are capable of responding to and managing processes, functions, dynamics and changes in a fashion that contributes to ecosystem resilience" (Folke and Berkes 1998, p.5). These authors further argue (Folke and Berkes 1995, p.132) that in promoting resilient institutions (such as through subsidies), "The task is to make institutional arrangements more diverse, not less so; to make natural system – social system interactions more responsive to feedbacks; and to make management systems more flexible and accommodating of environmental perturbations."

Participatory Management. An important social consideration pertaining to subsidies is the effect they may have in supporting or detracting from the effective participation of fishery participants in management. For example, an appropriate subsidy that supports an effective community-based institution as described above may serve to increase the level of participation in management, thus creating social incentives for more responsible behaviour in fishing. Co-management – the development, implementation and enforcement of management measures by a suitable combination of government, fishers, communities and the public – is rapidly expanding and evolving in fishery systems. The key ingredient is to increase the role of resource users, which serves to lessen the conflict between fishers and managers that has tended to lead to failure in top-down management regimes. As a consequence, there is a clear need to involve fishers, their organizations and their communities in managing local resources, based on sharing decision-making power and the responsibility to ensure the fishery's sustainability. In particular, development (or revitalization) of community-based management approaches can help make use of local resource knowledge and indigenous social- and culturally-based controls on resource use. This can enhance both sustainability and economic efficiency if local-level control provides more efficient and effective resource management.

Appropriate subsidies can support this trend, but others can be detrimental to participation in management (for example, this might be the case for a subsidy that targets its benefits on individuals at the expense of collective actions, fishermen's groups and institutions).

Utilising the Knowledge Base. Fishery research and data collection are in many ways 'public goods' in that understanding the sea and species therein is clearly useful to the fishing sector, but also to society as a whole. For this reason, subsidies supporting such efforts are likely to produce positive results (albeit with diminishing marginal returns). From a social perspective, it is important to note that a large base of information that already exists but has been under-utilized in fishery management is that which typically lies beyond the standard scientific apparatus, namely Traditional Ecological Knowledge (TEK). This knowledge base incorporates the accumulated information and wisdom that has been built up over time by fishers and coastal communities, through regular interaction with their environment and the natural resources therein. Berkes (1999, p23) defines TEK as " a cumulative body of knowledge, practice and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment." This includes knowledge about the natural world, but also about how to manage within that environment, what institutions work best. Such forms of knowledge clearly have the potential to improve the performance of fishery management, and at the same time to improve the interaction between fishers and communities on the one hand, and scientists and managers on the other. An examination of fishery subsidies must be cognizant of the impact such subsidies may have both in encouraging the collection and compilation of fishery knowledge, and in enhancing or detracting from the role of traditional/local knowledge.

Understanding Efficiency Objectives. In assessing the impacts of subsidies designed to affect the efficiency of the fishery, it is important to understand the concept of *efficiency*, which is a frequently mis-used but inherently simple one: to obtain the greatest benefits with the least cost. From this perspective, efficiency can be addressed at the level of a fishing vessel, a fleet, a fishery and society broadly. Unfortunately, it is often discussed only at the first of these levels, as 'harvesting efficiency' – seeking the maximum rate of harvest, or profit, obtained by a fisher (or vessel owner) at a given time. This view of efficiency – focused on the short term and on the individual – has its place, but it is not sufficient, since there is no reason to believe that what is efficient at such a level implies efficiency for the fishery system - or for communities and society. In contrast, efficiency seen from the fishery or societal perspective looks quite different. A broader and longer-term sustainable development perspective could view an 'efficient' fishery as one (a) that maximizes net benefits obtained *per fish caught*, with increases in efficiency requiring increased benefits without killing more fish, and (b) that seeks maximum net benefits measured from community or coastal economy perspectives, rather than that of the individual fisher. In such a case, efficiency is measured by incorporating all that is valued in society, e.g. a combination of profits and rents, employment, community well-being, ecological resiliency, and so on. Thus an 'efficient' subsidy might be one that moves the fishery in a direction that appropriately blends societal objectives, and provides a capability for the various fishery players to meet those objectives.

When efficiency is viewed from a wider 'fishery system' perspective, integrating the harvesting aspects of the fishery with on-shore activities and the coastal economy as a whole, the analysis of the impacts of a subsidy may shift. For example, a subsidy that shifts a fishery from being small-scale to a larger-scale might have been advocated on the basis of narrow 'harvesting efficiency' (i.e., more powerful vessels). However, a broader view of efficiency may show that not only are local small-scale fleets efficient in terms of community economics, and net benefits to the system as a whole, they may also promote efficiency in fishery management, if enhanced use of local knowledge and the community's power of moral suasion lead to increased efficiency and effectiveness. Thus the subsidy in question may have negative efficiency impacts, measured from a broad perspective.

Managing Fishery Capacity. Fishery subsidies often impact in particular on fishery capacity, whether they are oriented toward increasing or decreasing that capacity. If fishery policy involves multiple objectives - that is, if society seeks to balance a range of social, economic and conservation goals - then subsidies that increase or decrease capacity must similarly be designed to consider impacts on a range of factors, such as conservation, ecological balance, rent generation and income distribution, fishing community welfare, and institutional stability. Thus a key matter to be resolved at the outset is how subsidies interact with capacity in terms of achieving the multiple objectives set by society. Fundamentally, subsidies should be part of a planning process that moves the fishery system toward a desired configuration. This implies the possibility that capacity-altering subsidies will need to be focused selectively on certain fishery sectors or certain inputs. For example, a desired capacity adjustment scheme may be one that reduces employment to create a more capital-intensive fishery, or one that reduces capital, promoting a shift to a more labour-intensive fishery. Unfortunately, implementation of capacity-altering subsidies rarely takes an objectives-based sustainable development perspective. The simplistic view of over-capacity – "too many fishermen, chasing too few fish" – places the focus of concern on the fishers rather than on over-capitalization, and can lead to mis-guided policy measures that reduce resilience in the fishery. (For example, 'use-it-or-lose-it' policies of government force fishers to fish regularly or risk losing their fishing rights, thereby rewarding those who place the most pressure on the resource, while perversely penalizing fishers who respond to low stock abundance by shifting temporarily to other work, reducing their impact on the fish.)

Livelihood Diversification. Subsidies that support livelihood (economic) diversification seem to have positive impacts that are particularly compatible with a sustainable development framework. Such diversification is often key to the success of programs for sustainable fisheries, especially in the context of heavily exploited fisheries. A broad 'fishery system' approach is particularly crucial – inherent linkages between fishery and non-fishery aspects reinforce the need to understand connections beyond the fishery system. Diversification efforts will thus typically be composed of within-fishery and non-fishery actions. First, within the fishery itself, policy measures can encourage multi-species fishing, in which fishers utilize a range of fish resources. By diversifying across sources of fish, individual fishers reduce risks, and at the same time, the collective pressure to over-exploit is also reduced. Second, encouraging 'occupational pluralism' – the practice of fishers holding other jobs during non-fishing times – helps those fishers avoid total reliance on fishing for their income, reducing the pressure they would otherwise face to obtain a livelihood entirely from the fishery, and thus also reducing pressure on fish stocks, and boosting the resilience of the fishery. Third, diversifying the fishery-dependent economy, by creating new, sustainable economic activity outside the fishery sector, enhances the range of available livelihood choices. This is likely to increase income levels outside the fishery, making it more attractive for so-inclined fishers to leave the fishery, and reducing incentives for others to enter (increasing the *opportunity cost* of remaining in the fishery). This leads to an overall reduction in fishing capacity, and reduced pressure on the resources. Thus economic diversification, combined with conservation-oriented management restrictions within the fishery, can increase resilience.

Conclusions

This report has explored a range of policy and analytical issues involved in assessing the social effects of subsidies in fisheries, within a sustainable development framework. The first section introduced the rationale and objectives of the study, and discussed the nature and structure of fishery subsidies. The following section explored options for developing a suitable analytical framework for assessing the social impacts of subsidies. This enlarged on the 'trade liberalization study' framework by introducing: (1) a 'sustainable development' framework for examining aspects of sustainability and resilience; (2) a 'fishery systems' framework that focuses on interconnections throughout the fishery; (3) a sociologically-oriented analytic framework for understanding social issues in fisheries; (4) an analytical approach focusing on distributional aspects of subsidies; and (5) a 'checklist' approach for analysing the social impacts of fishery subsidies.

The next section elaborated on the distributional focus in providing preliminary assessments of potential social impacts arising from a variety of fishery subsidies. The following section drew on a fishery systems approach to discuss the impact of subsidies in general on the various components of the human system in the fishery, specifically the harvesters (fishermen), the post-harvest sector (from processing through to consumers), the fishing communities (and households), and the broader socioeconomic environment. The next Section turned to the level of fishery policy, and focused on sustainable development considerations, in presenting a preliminary assessment of how subsidies might interact with each of a range of fishery management and policy directions that have potentially positive sustainability and resilience implications.

In closing, it is useful to reiterate the key point, that there is no standard theory that can be applied to provide a clear path to addressing social impacts of fishery subsidies, or indeed to placing the discussion of fishery subsidies properly within a sustainable development framework. This report is but an introduction to an exploration of a topic that requires significantly greater attention. The key message of this report has been that a sustainable development framework for analysing fishery policy interventions, and subsidies in particular, requires three key ingredients: (a) an integrated view of fishery sustainability, incorporating environmental, economic, social and institutional components of sustainability, along with the related aspects of resilience, (b) a broad 'systems perspective' that looks at impacts of policy interventions throughout the fishery system, and (c) attention to social impacts arising from the distributional effects of subsidies. The present report provides a degree of integration of existing approaches, and some new ideas for exploring the above ingredients, but clearly this must be seen as just a start along the challenging road to exploring the social dimensions of fishery subsidies.

BIBLIOGRAPHY

Berkes, F. (1999) Sacred Ecology: Traditional Ecological Knowledge and Resource Management. Taylor and Francis, Philadelphia, U.S.A.

Berkes, F., and Folke, C. (Eds) (1998) *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*. Cambridge University Press. Cambridge, U.K.

Charles, A.T. (1988) "Fishery Socioeconomics: A survey", *Land Economics* 64:276-295.

Charles, A.T. (1994) Towards sustainability: The fishery experience. *Ecological Economics*, 11, 201-11.

Charles, A.T. (1995) Sustainability assessment and bio-socio-economic analysis: Tools for integrated coastal development. In: *Philippine Coastal Resources Under Stress* (Ed. by M.A. Juinio-Meñez and G. Newkirk), pp.115-25. Coastal Resources Research Network, Halifax, Canada, and Marine Science Institute, Quezon City, Philippines.

Charles, A.T. (1997a) "Sustainability Indicators: An annotated bibliography with emphasis on fishery systems, coastal zones and watersheds". *Strategy for International Fisheries Research*, Ottawa, Canada.

Charles, A.T. (1997b) "The path to sustainable fisheries". In: *Peace in the Oceans: Ocean Governance and the Agenda for Peace: The Proceedings of Pacem in Maribus XXIII, Costa Rica, 3-7 December 1995* (Ed. by E.M. Borgese), pp. 201-13. Intergovernmental Oceanographic Commission Technical Series 47. UNESCO. Paris, France.

Charles, A.T. (2001). Sustainable Fishery Systems. Blackwell Science, Oxford UK, 384p.

Cox, A. (2002). "OECD Work on Defining and Measuring Subsidies in Fisheries", Background Paper prepared for the OECD Workshop on Environmentally Harmful Subsidies, Paris 7-8 November 2002. OECD, Paris, France.

Cox, A., and C. Schmidt (2002). "Subsidies in the OECD Fisheries Sector: A Review of Recent Analysis and Future Directions", Background Paper prepared for the FAO Expert Consultation in Identifying, Assessing and Reporting on Subsidies in the Fishing Industry, Rome, 3-6 December 2002. OECD, Paris, France.

FAO (2003). Report of the Expert Consultation on Identifying, Assessing and Reporting on Subsidies in the Fishing Industry. Rome. 3-6 December 2002. FAO Fisheries Report No. 698, FAO, Rome.

Folke, C. & Berkes, F. (1995), "Mechanisms that link property rights to ecological systems". In: *Property Rights and the Environment: Social and Ecological Issues*. (Ed. by S. Hanna & M. Munasinghe), pp.121-137. Beijer International Institute of Ecological Economics and the World Bank. Washington, U.S.A.

Folke, C. & Berkes, F. (1998) *Understanding Dynamics of Ecosystem-Institution Linkages for Building Resilience*. Beijer Discussion Paper Series No.112. Beijer International Institute of Ecological Economics, The Royal Swedish Academy of Sciences. Stockholm, Sweden.

Hannesson, R. (2001). "Effects of Liberalizing Trade in Fish, Fishing Vessels and Investment in Fishing Vessels", OECD Papers Offprint No.8. OECD, Paris, France.

Hannesson, R. (2003). "The Economic Effects of Subsidies in Fisheries" Report commissioned by the OECD. OECD, Paris, France.

Hatcher, A. and K. Robinson (Editors) (1999). Overcapacity, Overcapitalisation and Subsidies in European Fisheries: Proceedings of the First Concerted Action Workshop on Economics and the Common Fisheries Policy, Portsmouth U.K. 28-30 October 1998. CEMARE Misc. Publication No. 44, University of Portsmouth.

Hollings, C.S. (1973). "Resilience and stability of ecological systems". Annual *Review of Ecology and Systematics*, Volume 4, pages 1-23.

Munro, G.R. and U.R. Sumaila (2002). "The impact of subsidies upon fisheries management and sustainability: The case of the North Atlantic". Fish and Fisheries 3:233-250.

Myers, N. and J. Kent (2001). *Perverse Subsidies: How Tax Dollars Can Undercut the Environment and the Economy*. Island Press. Washington USA.

OECD (2000). *The Impact on Fisheries Resource Sustainability of Government Financial Transfers*. Organization for Economic Cooperation and Development, Paris.

Panayotou, T. (Editor) (1985) *Small-Scale Fisheries in Asia: Socioeconomic Analysis and Policy*. International Development Research Centre, Ottawa, Canada.

Ruddle, K. (1994) Local knowledge in the folk management of fisheries and coastal marine environments. In: *Folk Management in the World's Fisheries: Lessons for Modern Fisheries Management* (Ed. by C.L. Dyer & J.R. McGoodwin), pp. 161-206. University Press of Colorado. Niwot, U.S.A.

Schrank, W.E. (2001). *Subsidies for Fisheries: A Review of Concepts*. p.11-40 in: FAO Papers Presented at the Expert Consultation on Economic Incentives and Responsible Fisheries. Rome, 28 November – 1 December 2000. FAO, Rome, Italy.

Schrank, W.E. and W.B. Keithly (1999). "The concept of subsidies". *Marine Resource Economics* 14:151-164.

Steenblik, R.P. and G.R. Munro (1999). "Current international work on subsidies in fisheries: a survey" in: Hatcher and Robinson (Editors), *Overcapacity, Overcapitalisation and Subsidies in European Fisheries: Proceedings of the First Concerted Action Workshop on Economics and the Common Fisheries Policy, Portsmouth U.K. 28-30 October 1998*. *CEMARE Misc. Publication* No. 44, University of Portsmouth.

Townsley, P. (1998) Social issues in fisheries. *FAO Fisheries Technical Paper* No. 375. FAO, Rome, Italy. 93p.

Westlund, L. (2003). Draft Guide for Identifying, Assessing and Reporting on Subsidies in the Fisheries Sector. Appendix E in: FAO Report of the Expert Consultation on Identifying, Assessing and Reporting on Subsidies in the Fishing Industry. Rome, 3-6 December 2002. FAO Fisheries Report. No. 698. Food and Agriculture Organization, Rome, Italy.

Wiium, V. (1999). "Subsidies in Irish fisheries: The saviour of rural Ireland?" in: *Overcapacity, Overcapitalisation and Subsidies in European Fisheries: Proceedings of the First Concerted Action Workshop on Economics and the Common Fisheries Policy, Portsmouth U.K. 28-30 October 1998*. *CEMARE Misc. Publication* No. 44, University of Portsmouth.

World Commission on Environment and Development. 1987. *From One Earth to One World: An Overview.* Oxford, Oxford University Press.

Chapter 8

Social Capital and Fisheries Subsidy Reform[1]

Using the concept of social capital the paper examines the interrelationships between fisheries governance and performance and government financial transfers to the fisheries sector. It is argued that social capital plays a crucial role in promoting trust and co-operation among fishers, both of which are needed to reduce the 'race to fish' and 'effort creep' inherent in fisheries. Social connections across communities and links between fishers and the regulator are also important in ensuring successful fisheries management outcomes by making management more flexible and adaptable to change, by increasing knowledge and understanding of the resource by stakeholders and by helping to increase compliance of fishing rules. The relevance of social capital to the reform of government financial transfers is assessed using the categories of direct payments, cost-reducing transfers and general services to fishers. A framework is also provided for explicitly considering the importance of social capital in direct payments to fishers. The paper finds that social capital can be supported to improve management outcomes, and possibly reduce management costs. This would likely require a redirection in priorities and funding away from 'top-down' fisheries management towards 'co-management' where governments provide fishers with both rights and responsibilities to be effective partners in ensuring sustainable fisheries.

This chapter focuses upon the *social* aspect of subsidy reform and has been prepared as part of the OECD's project on the sustainable development effects of financial support to the fisheries sector. In particular, it addresses the interrelationships between social capital and the reform of subsidies. The paper explains the meaning of social capital describes its value in the fisheries sector and assesses its implications for the reform of government financial transfers to fisheries.

The work is organised as follows: the following section provides a definition of social capital and briefly describes the three components (trust, civic engagement and co-operation, social networks) commonly associated with its measurement. The next section provides a detailed examination of key components of social capital in the context of

1. This paper was written by Dr. R. Quentin Grafton, Australia. The views expressed in the chapter are those of the author and do not necessarily reflect the views of the OECD or its Member countries.

fisheries and evaluates their effect on fisheries performance and management. Then, the subsequent section gives an overview of the level of expenditures and the different categories of government financial transfers by OECD countries. Thereafter, the section examines the relevance of social capital in analysing the process of the reform of government financial transfers. Other policy issues regarding social capital and fisheries are addressed in the following section, while the next section outlines a conclusion.

Towards an Understanding of Social Capital

Social capital is an all-encompassing term for the norms and the social networks that facilitate co-operation among individuals and between groups of individuals. The term has been invented and re-invented by various authors (Portes 1998). One of the earliest recorded uses of social capital was by Hanifan (1916) who used the concept to help explain why community involvement helps ensure some schools are more successful than others. Much later, Bourdieu (1980) described social capital as a set of resources linked through social relations that influence social outcomes. Coleman (1988) developed his own meaning of social capital, but one that is surprisingly similar to that of Hanifan's earlier use of the term, by relating educational outcomes to the social background of pupils. According to Coleman (1994), social capital comprises social structures that facilitate or help individuals in their cognitive development.

Robert Putnam has probably done more than anyone else to both extend and popularise the concept of social capital. He first used it to help explain differences in institutional performance of northern and southern Italy (Putnam 1993). His most definitive and far reaching work on social capital, entitled *Bowling Alone* (Putnam 2000), examined the changes over time and importance of social networks in the United States. This work also provides the most commonly accepted definition of social capital, namely, "…connections among individuals–social networks, and the norms of reciprocity and trustworthiness that arise from them" (Putnam, 2000, p. 19).

As a type of 'capital', social capital can be added to (by volunteering) and subtracted from (by criminal behaviour) on an individual level, by collective actions (such as public education) and is affected by a range of socio-economic factors (such as per capita income, age structure, ethnolinguistic divisions, rule of law, etc). Unlike reproducible, human or natural capital, social capital can only exist at a group or community level. Social capital is also unique in that it resembles what may be called a *local and impure public good* (Sandler 2003, p. 133). This is because individuals of a defined social community or network enjoy benefits that are *non-rivalrous* (the returns from social capital enjoyed by one individual in a community do not diminish the benefits enjoyed by others) and *partly non-exclusive* (every member within the community can enjoy the benefits of social capital, provided that they maintain their membership in the community).

The difficulty in operationalising social capital in policy making is measuring it. Frequently, researchers have resorted to assessing the effects of social capital such as the trust individuals (Glaeser *et al.* 2000) have in others within a society, the level of crime, or the degree of volunteerism (Sobel 2002). Others have tried to measure social capital by determining values for factors that likely influence its level, such as income inequality or linguistic divisions (Grafton, Knowles and Owen 2002). Clearly, no single measure (or even a collection of measures) can adequately represent the social capital of a society. Despite their shortcomings, comparative indicators across different societies of the effects and influencing factors of social capital suggest that it does have an important effect on socio-economic performance (Knack and Keefer 1997).

To better understand what is social capital and how it may contribute to societal performance, it is useful to divide it into three distinct, but related, areas: trust and trust worthiness, civic engagement and co-operation, and social networks (Paldam 2000).

Trust and Trust Worthiness

Trust, or more precisely wide-radius trust (Knack 2001), helps determine the *effectiveness* or *quality* of social relations. If trust is lacking, a myriad of welfare-improving exchanges may not arise because potential participants to an exchange may choose not to interact for fear of being exploited. Communities where mutually beneficial social exchange occurs regularly are often characterised by 'general reciprocity', whereby individuals are prepared to help others without an expectation of the favour being returned by the recipient of the aid because they expect others to do the same for them should they require assistance (Putnam 1993). A lack of trust in social relations also has other implications because almost all economic transactions have embedded within them an element of trust between the transacting parties (Arrow 1972) that cannot be substituted for by legal contracts.

Trust is important in fishing communities and it plays a major role in reducing the costs of fisheries management. If fishers trust each other to comply with local and regulatory rules to protect the resource, and this trust is justified, then the costs of monitoring the actions of individual fishers are much reduced. Social norms of behaviour that encourage fishers to comply with fishing rules, such as generalised reciprocity and altruistic behaviour reduce compliance costs. Thus social capital is valuable because it enables fishers to harvest a given catch with lower compliance costs, while also increasing the likelihood the resource will be sustained in the future.

Another form of trust is that between fishers and the management authority. If fishers and the regulator trust each other, and have good working relationships, this promotes the sharing of knowledge and information about the resource (Pomeroy and Berkes 1997). Such knowledge exchange can reduce costs and improve management outcomes. For example, with an effective interchange of ideas fishers become better aware of the consequences of their collective actions on the resource, while managers benefit from timely information about local changes in the stock and environmental conditions.

Civic engagement and Co-operation

Trust between individuals contributes to co-operation and also civic engagement, such as involvement in volunteer and club activities and various forms of political and community participation. Co-operative behaviour for mutual gain is also closely related to the concept of social cohesion, or the idea that people working together for a common interest can generate substantial social and economic benefits via improved institutions (Ritzen, Easterly and Woolcock 2000, Temple and Johnson 1998).

Co-operation between fishers is a necessary (but not sufficient) condition for a well-managed fishery. In many artisanal fisheries, co-operative and community management is the basis for the on-going sustainability of marine resources (Ostrom, Gardner and Walker 1993, chapter 11). Increasingly, regulators and fishers are developing forms of 'co-management' (Jentoft, McCay and Wilson 1998) that requires co-operative behaviour among fishers, and between fishers and regulators and government agencies. These arrangements include, but are not limited to, fishers acting in an advisory role to managers, consultative decision-making between fishers and managers, and assistance by fishers in stock assessment and also monitoring and enforcement. Indeed, a common characteristic of fisheries that are both sustainably managed and generate substantial and on-going benefits is that fishers have (individually and collectively) a decision-making role in fisheries management, especially in terms of the nature of fisheries regulations (Grafton 2000a).

The most striking example of fishery co-management is the Fisheries Co-Operative Associations (FCAs) of Japan that have been delegated rights and responsibilities for local fisheries management under Japan's 1949 Fisheries Law. FCAs provide an important link with the fishery regulator while helping to effectively set fishing rules at a local level (Ruddle 1989, Yamamoto 1995). The example of Japna's FCAs and other common-pool resources suggest that co-operation in fisheries contributes to:

- an enhanced ability to help resolve conflicts when they arise,
- increased pooling and sharing of information, and
- devolution of responsibilities between the regulator and fishers.

All three factors have been shown to materially improve natural resource management (Adams *et al.* 2003, Pretty 2003).

Beyond direct fishery benefits, co-operative behaviour also generates indirect community payoffs via civic engagement and volunteer activities. For example, volunteerism, such as 'big brother' and 'big sister' activities and other youth and education engagement, can have substantial social payoffs by both improving educational outcomes and reinforcing social cohesion. In small and isolated fishing communities, such activities may be especially important because state-provided services are frequently less well provided than in major urban centres.

Social Networks

Unlike trust and co-operation that represent *outcomes* of social capital, social networks represent *causal* factors in its determination. Social networks can be divided into three categories: bonding, bridging and linking social capital (Woolcock 2001; Narayan 1999; Putnam 2000). *Bonding* social capital involves linkages or 'strong ties' *within* groups of like-minded individuals (e.g., families, small fishing communities) that often correspond to denser and more localised networks. Strong ties are particularly useful in the fisheries context because they are associated with trust and co-operation that, in turn, encourage individual fishers to observe fishing rules and sustainable fishing practices.

Bridging social capital is concerned with linkages *across* similar, but different, groups or social networks. Often links or interactions are usually much weaker between heterogeneous groups than within a relatively homogeneous group. These 'weak ties' (Granovetter 1973), however, can be very important as they provide a critical mechanism for the diffusion of knowledge and innovation (Grafton, Knowles and Owen 2002). In the fisheries context, bridging social capital can play a crucial role in technological improvements, generating regional co-operation across fishing communities and in conflict resolution across competing fishing gears and interests.

The other important type of social network is *linking* social capital. It refers to connections or engagement across disparate groups or networks, but at different hierarchies. For instance, connections between a fishery regulator or a government fishing agency and a group of fishers would represent a form of linking social capital, rather than bridging social capital. Such links are required if the management of fisheries is to be effectively shared between fishers and regulators.

Social Capital and Fisheries

An assessment of how social capital influences fishery outcomes is provided from the perspective of the proximate causes of social capital, namely, the quality and number of social connections within and across social networks. To understand why social capital may help deliver desirable fishery outcomes, it is useful to first review the common-pool nature of fisheries and the rules used to regulate fisheries.

The Common-Pool Problem

Fisheries are resources that are part of the natural capital stock that can be added to or depleted by the level of harvesting. Harvesting is *rivalrous* because a fish that is landed by one vessel prevents others from catching it. The less abundant and more valuable is the fish species, the greater is the rivalry and the larger the negative externalities generated by an individual's harvesting. The other important feature common to fisheries is that it is costly and difficult to *exclude* others from harvesting fish. This is because many fish species are mobile, at least at some stage of their life cycle, and the ability to freely observe fishing behaviour at sea, especially in the open ocean, is limited.

The individual rivalry from fishing and the difficulty in excluding others from harvesting fish suggest that mechanisms that facilitate collective action will improve fisheries management. This is because co-operation helps to limit fisher behaviour that impinges on other harvesters and provides social incentives to comply with collectively-agreed-to-fishing rules. For example, fishers who fail to comply with community fishing rules may be shunned socially or may be excluded from important social activities, thus acting as an important deterrent to behaviour that imposes costs on others.

A large body of literature indicates that fishing communities that have developed effective social norms and collective control over harvesting have increased returns from fishing while helping to ensure resource sustainability. For example, Table 8.1 presents a comparison of the harvesting externalities present in 21 different fisheries from 14 different countries derived from 30 case studies. In each fishery, fishers were asked open-ended questions about their community's institutional structures and the state of the resources they harvest. Using the descriptors of low, moderate and high level of externalities, the study contrasts the outcomes where fishers have organised collective rules governing the use of the resource to the case where they have not. In this analysis, fishers were 'organised' if they had collectively established boundary rules to limit access to the fishery, and authority rules governing the nature of harvesting, such as controls over where to fish, size limits and seasonal closures.

Using the above methodology, Table 8.1 shows that co-operation can play an important role in improving fishery outcomes. For instance, only 6% of the organised fisheries have high negative externalities associated with harvesting while the proportion is many times higher for fisheries without any collective organisation. Using this and other evidence, the authors of the study conclude that fishers, "…who organised were generally successful in reducing the severity of technological externalities…" (Ostrom, Gardner and Walker 1994, p. 263)

Table 8.1. Organisation by Fishers and the Prevalence of Negative Technological Externalities from Harvesting

Organisational Ability of Fishers	Negative Technological Externalities :		
	Minimal	Moderate	High
Organised	9 (53%)	7 (41%)	1 (6%)
Not Organised	0 (0%)	1 (25%)	3 (75%)

Notes:
1. Cell numbers represent number of fishery groups within each category (organised or not organised) and the percentage is the proportion of total number in each category in the particular cell.
2. 'Organised' refers to fishers who have established collective rules regarding harvesting in terms of boundary rules and also authority and scope rules.
3. Data obtained from 21 different fisheries.

Source: Ostrom, Gardner and Walker (1994, p. 264).

Fishing Rules

The norms and 'rules of the game' commonly established by fishers include, but are not limited to, *spatial* limits that determine who can fish and in what areas, *temporal* restrictions as to when and for how long people might fish, *gear* constraints as to what harvesting gear may be used and *physical* controls on gender, size and other characteristics of fish that may be harvested. The success of the rules established by fishers themselves, by outside regulators or by both groups is determined by a range of 'governance' factors (Dietz, Ostrom and Stern 2003), but principally depends on:

1. Ability to monitor fisher behaviour,
2. Rates of change in resource use,
3. The level of interaction between fishers and their families,
4. Ability to exclude outsiders, and
5. Collective support for monitoring and enforcement.

Social capital, as represented by social networks in the form of bonds, bridges and links among individuals and groups, plays an important role in all five aspects of governance. For instance, the less able fishers are to monitor the activities of fellow harvesters, the more important is bonding social capital in promoting community interest over personal gain. Also, the more fishers are connected to outside networks, in the form of bridging social capital, the better able they are to cope with change, especially external shocks. Links to outside enforcement agencies can also play a crucial role in reducing illegal fishing by using the force of the state to exclude outsiders from fishing community resources.

Role of Social Capital

The potential role of bonding, bridging and linking social capital in terms of fisheries governance is summarised in Table 8.2. The table assesses the role of the three types of networks in terms of conflict resolution, rule compliance, knowledge creation, diffusion and exchange, management flexibility, rent-seeking behaviour and management options under uncertainty.

Table 8.2. Social Capital and Fisheries Governance

Aspect of Fisheries Governance	Type of Social Capital:		
	Bonding Social Capital	**Bridging Social Capital**	**Linking Social Capital**
Conflict Resolution	X	X	X
Rule Compliance	X	X	X
Knowledge Creation, Diffusion and Exchange		X	X
Enhanced Flexibility to Change		X	X
Rent-Seeking Behaviour	X		X
Management Options with Uncertainty	X	X	X

Note: 'X' indicates the governance factor (row) is likely *increasing* in the number and quality of connections of the given type of social capital (column).

All types of social networks are likely to be important in terms of *conflict resolution* at their respective levels: the fishing community, between groups of fishers and between fishers and the regulator. Links within and across social networks are important because rivalry in harvesting predisposes fisheries to conflicts between individuals, communities, fishing gear, and between the regulator and fishers. Thus effective links within closely knit groups (bonding social capital) and across groups (bridging social capital) provide the means to mitigate conflicts and to help self-correct problems as they arise.

'Strong ties' within groups have also been shown to be very important in ensuring individual fishers conform to community rules (Ostrom 1990), while good links and mutual trust between fishers and regulators contribute to greater acceptance and *compliance* with fishing regulations. Frequently, the willingness to comply with collective rules is determined by membership in a social network, such as with FCAs in Japan. Community membership and residency, in turn, helps in the transmission of traditional knowledge and increases the opportunities for social interaction that promotes altruistic behaviour. Where the costs of non-compliance are very large, resulting in even the collapse of fisheries, both bonding and linking social capital play an especially important role in good fisheries governance.

The literature on 'weak ties' (Coleman, Katz and Menzel 1966, Ryan and Gross 1943, Rogers 1995) provides strong support that links across networks provide an important mechanism for the *transfer of knowledge* and ideas. In turn, 'strong ties' within communities help diffuse the knowledge transmitted by 'weak ties'. Similarly, *knowledge exchange* on the state of a fishery, with fishers providing traditional knowledge and regulators supplying scientific knowledge, is an important aspect of successful co-management. An enhanced ability to *adapt to changes* in the fishery and external influences is also likely to be positively related to 'openness' or inclusiveness of networks. This is because a familiarity with different ways of thought and methods of operations helps individuals to adapt to change. Consequently, the greater are the 'weak ties' and links across network hierarchies, as measured by the strength and quality of the connections across social hierarchies, the more flexible management is likely to be.

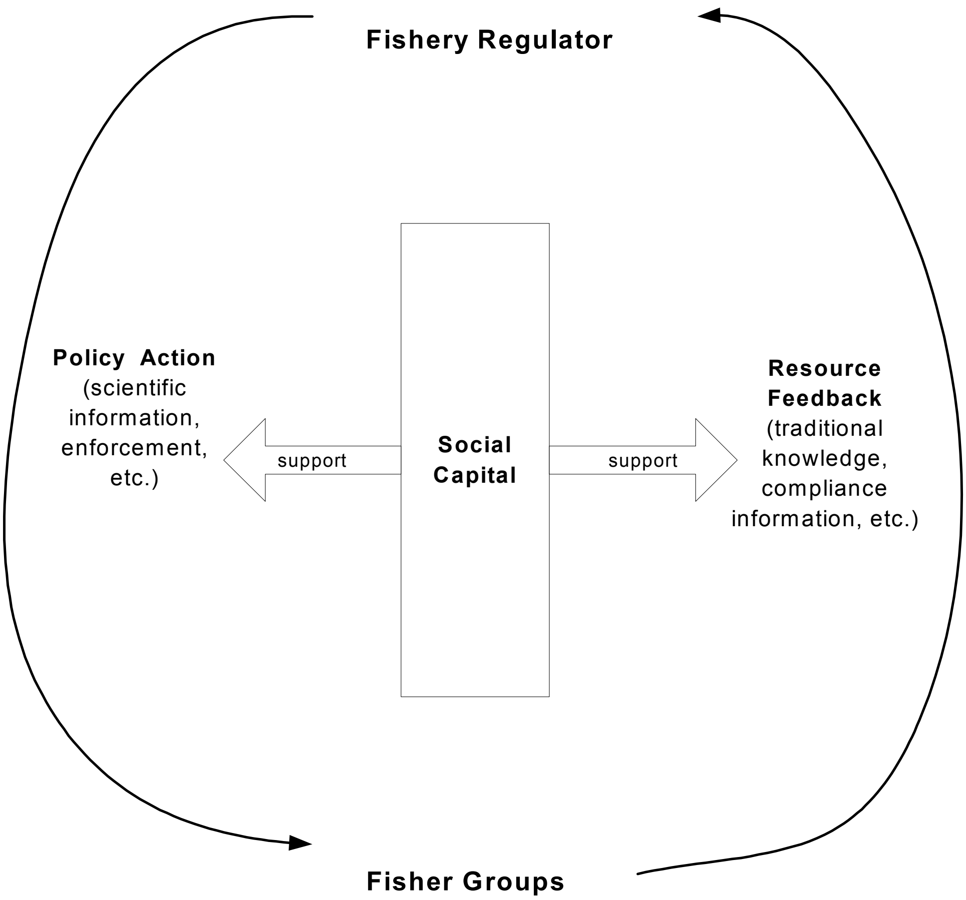
Another important, but deleterious, aspect of fisheries governance that may be associated with bonding social capital is the possibility that some fishers may band together and lobby the regulator at the expense of rival groups. For example, competing fisher groups may lobby for an increased share of a total allowable catch (TAC) to the detriment of fishers external to them. Such activity is called *rent-seeking behaviour* and can be enhanced by strong community ties and identification to particular interests, especially if such communities have strong connections to regulators.

The management of fisheries is governed by profound uncertainties. To help ensure some level of control, whatever the scenario, management needs to be 'nested' (Ostrom 1990) so there exists individual, local or community, regional and national management controls. Social capital helps to support these different layers of management and, thus, contributes to *management options* under a range of outcomes. This is desirable because norms and rules developed at different scales: local, regional and national level will likely vary in their effectiveness over time and across circumstances. For instance, community rules developed from traditional knowledge are likely to be important in ensuring the sustainability of local stocks, while national control of total harvests is important in ensuring the viability of meta-stocks and eco-system integrity. Similarly, disputes between domestic and foreign fishing vessels are probably best addressed at a national level, while the development of rules for seasonal closures would likely benefit from local participation and knowledge in the decision-making process.

Co-Management

To illustrate the importance of social capital, Figure 8.1 shows the *process* by which social capital can play a role in fisheries management. The thin arrows in the figure represent a flow of information and services between the two main actors (fisher groups and the fishery regulator). For example, regulators often supply scientific knowledge in the form of advice and models while fishers can provide valuable local and traditional knowledge (Berkes, Colding and Folke 2000). Social capital 'lubricates' this exchange by increasing the number and quality of communication links between the fishers and fishery managers.

Figure 8.1. How Social Capital Supports Fisheries Management



In Figure 8.1, linking social capital provides the trust and co-operation required by fishers to play an active role in providing traditional knowledge about the state of the resource. Such information is often extremely valuable at small spatial scales (Ruddle, Hviding and Joannes 1992) and provides managers with regular and timely signals about environmental and resource change (Pinkerton 1989). In turn, regulators can supply fishers with valuable scientific information over much larger spatial scales, and with greater modelling sophistication. This two-way exchange of knowledge or communication is impossible without the existence of well-developed social capital. The policy actions by the regulator, in the form of monitoring and enforcement, are also crucial to successful fisheries management given its common-property nature. Similarly, ensuring compliance and promoting co-operative behaviour at a local level is greatly enhanced by the existence of bonding social capital within communities.

Government Financial Transfers to Fisheries

Government financial transfers (GFTs) from national and regional governments to fishers come in three main forms. They include *direct payments*, such as vessel or gear subsidies and price support that represent direct financial support for fishers who remain fishing, *cost-reducing transfers*, such as payments to reduce excess capacity in the form of vessel or licence buy-backs designed to reduce fishing effort, and *general services*, such as management costs like monitoring and enforcement and stock assessment that are paid for out of general public revenues. Globally, these three forms of assistance represent multi-billions of dollars support for the fisheries sector.

Table 8.3. Government Financial Transfers to Marine Capture Fisheries in the OECD, 1996-2000

(USD millions)

	1996	1997	1998	1999	2000
Direct Payments					
- Cost-reducing transfers	789	740	772	714	600
- Other	838	702	758	870	625
General Services	5 171	4 856	3 914	4 255	4 647
Total (USD million)	6 799	6 298	5 481	5 790	5 816
% of landed value of fish	18%	17%	19%	19%	19%

Notes:
1. Amounts are obtained from national budgets and do not include off-budget support and, in general, do not contain subnational level transfers.
2. Missing data exist for some countries for certain years.

Source: Cox and Schmidt (2002, p. 8) and Cox (2004).

A summary of the GFTs over the period 1996-2000, for all OECD countries, is presented in Table 8.3. The figures show that, collectively, OECD governments provide substantial assistance to the fisheries sector. By far the biggest expenditure is from general services that account for at least 70% of total transfers. The table, however, masks considerable variation across countries. For instance, countries such as Iceland and New Zealand have GFTs that represent less than 5% of the total value of their landings. By contrast, the amount of funds spent on GFTs by Finland and Ireland account for over half of the total landed value of their fish harvests. Table 8.3 also indicates that the overall trend is for a decrease in the nominal amount transferred to the fisheries sector, but as a proportion of the landed value of fish harvested, GFT support has increased because of a decline in the overall landed value of capture fisheries.

Direct Payments and Cost-Reducing Transfers

Direct payments represent 'subsidies' in the sense that they *directly* influence individual fisher behaviour by either reducing costs, raising returns or increasing profits (Schrank and Keithly 1999) that would not have occurred in the absence of the intervention. A rich literature shows that direct payments that *increase* nominal fishing effort can be deleterious to the long-term sustainability of fisheries (Milazzo 1998; Munro and Sumaila 2002). This is because of the common-pool nature of fisheries where the harvest of one fisher generally imposes a negative externality upon fellow harvesters. Consequently, subsidies that encourage fishers to impose costs on others will reduce the economic returns from fishing.

Not all subsidies are necessarily a 'lose-lose' proposition. For example, subsidies that encourage more desirable behaviour, such as payments to eliminate the use of harmful fishing practices, such as providing a salvage value to buy out fishing gear like drift nets, may help promote resource sustainability. Similarly, direct transfers to fishers via vessel or licence buybacks that reduce overall fishing effort can generate short-term benefits for remaining fishers, while also helping to reduce stresses on fishery resources. However, without effective controls or appropriate incentives to limit fishing effort, cost-reducing transfers may accomplish little in the long run. This is because the experience in many fisheries is that effort often 'creeps' back following a vessel decommissioning (Hatcher 2000).

General Services

The most important component of GFTs in fisheries, accounting for about 70 per cent of total expenditures, is the general services provide by states. These represent expenditures on a bureaucracy to manage fisheries and include the costs of enforcement, stock assessment, retraining schemes, research on deep-sea fisheries and a multitude of other items (OECD 2000). For the OECD as a whole, direct expenditure on research, direct management, and enforcement costs represent about a third of all government financial transfers to fisheries (Cox and Schmidt 2002, p. 7). The other major item of expenditure under general services is physical infrastructure costs, such as the construction and maintenance of port facilities used by fishers.

A strong case can be made that expenditures to ensure sustainable fisheries represent a 'duty of care' that responsible governments need to spend to maintain national assets or resources on behalf of their citizens. In some countries, governments also obtain a contribution from fishers towards conservation costs in the form of licence fees or other payments. These co-payments are justified on the grounds that fishers who are able to capture substantial rents, for example, through the allocation of individual harvesting rights by the state, have a concomitant responsibility to help pay for the conservation of the resources they use (Grafton 1995).

Reform of Government Financial Transfers and the Relevance of Social Capital

Most of the transfers made to the fisheries sector by national governments are made with little consideration of the effects on social capital, be it positive or negative. This, however, does *not* imply that social considerations are unimportant to national governments. Indeed, many of the direct transfers and indirect payments for fisheries infrastructure are made with a view to achieving socio-economic objectives, such as reducing unemployment in job-scarce fishing communities or retraining fishers for employment in other sectors (Grafton and Lane 1999).

The key point is that if social capital plays a crucial role in helping to ensure effective fisheries management and sustainable fisheries, as is argued in this paper, then *explicit* consideration of the effects on social capital is required in any reform of government financial transfers. If governments have made the decision to spend a given amount on fisheries to achieve a particular set of objectives under a reform process, *how* these funds are spent may be the difference between generating beneficial fishery outcomes or not. Indeed, even if governments choose to maintain the same level of expenditure or support with a reform of financial transfers, they may be able to achieve a better set of socio-bio-economic outcomes by specifically considering the effects on social capital within the fisheries sector. These issues in terms of the reform of government financial transfers are addressed in terms of the expenditures categories of direct payments, cost-reducing transfers and general services to fisheries.

Direct Payments

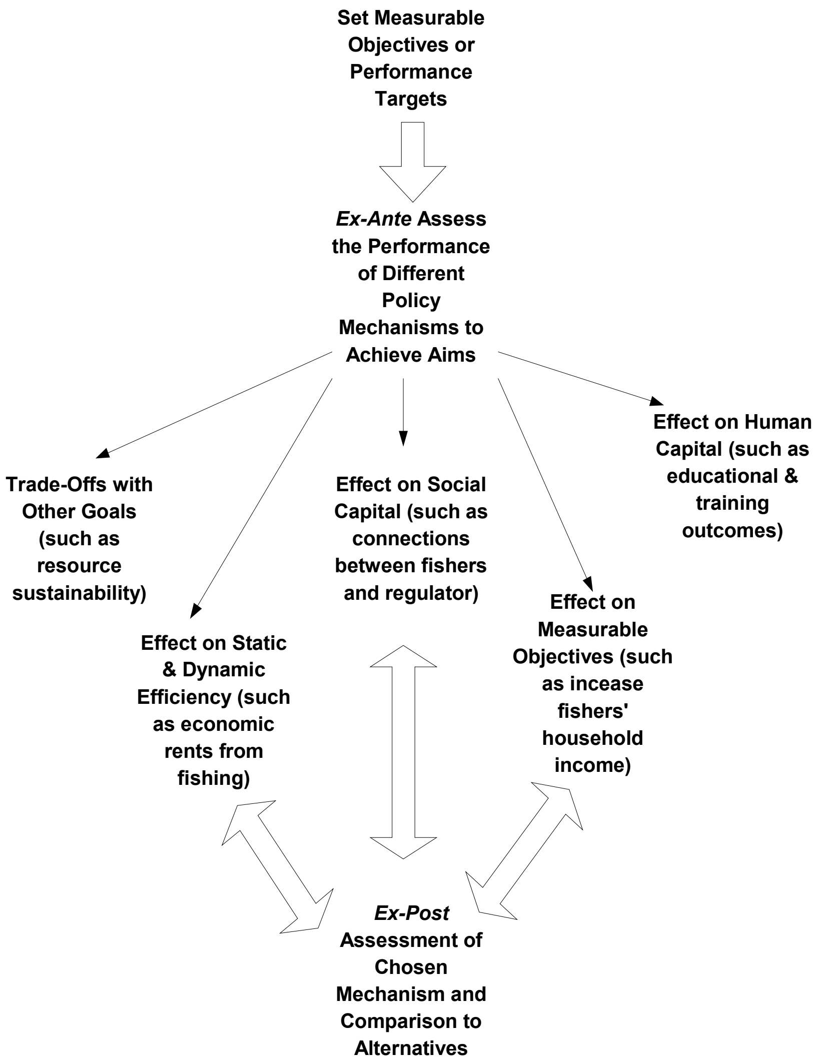
In general, direct subsidies to fishers are counter-productive for common-pool resources from either an economic or sustainability perspective. Nevertheless, their use has been justified, primarily for social reasons. For instance, financial assistance has been used to help maintain fishing communities, to prevent increases in unemployment in economically depressed areas and to provide transitional or short-term support in the face of unexpected declines in fish stocks.

Achieving social objectives, in general, are important for governments and transfer payments for this purpose represent a significant fraction of national budgets. The issue, however, is whether payments designed primarily to meet social objectives should be coupled to participation in fisheries, especially if they contribute to additional biological and economic overfishing.

A possible framework for assessing the effectiveness of direct payments to fishers in a reform of GFTs is provided in Figure 8.2. The framework indicates that any policy action should be clearly defined and be quantifiable and measurable so as to evaluate whether the expenditures have been well spent. Prior to the choice of the policy mechanism to achieve the defined objectives (such as increasing household incomes in small fishing communities), an assessment of a variety of possible alternatives should be undertaken. Thus for *each* possible policy mechanism, a variety of *ex-ante* evaluations should be undertaken that should, at a minimum, include the possible trade-offs with other desirable goals (such as resource sustainability), the effects on static and dynamic efficiency, the impact on human capital and the consequences for social capital. After implementation of the policy action, an *ex post* assessment is also required to judge the effectiveness of the chosen instrument. Such an evaluation should enable fishery regulators to explicitly consider the consequences of policy actions in terms of social capital, as well as other factors. A follow-up evaluation would also allow regulators to consider whether the chosen instrument, be it direct payments to fishers or a suitable alternative, is the preferred policy action to achieve the desired objective.

Whether or not direct payments have a positive, negative or neutral effect on bonding, bridging and linking social capital is highly dependent on the form of the assistance. However, some guide as to the possible effects of such payments can be provided from the literature on social networks. For instance, payments that are *universal* or are available to all, or that are based on perceived *need*, are likely to be less detrimental to social connections than those that are arbitrary, or favour one group over another. By contrast, expenditures that would tend to benefit operators of larger vessels over smaller vessels are unlikely to contribute to social capital. Payments that involve a *reciprocal relationship* or exchange are also likely to promote social capital more than those that are perceived as payments ‘something for nothing’. For instance, if assistance requires fishers to undertake an activity (such as retraining), beneficiaries are perceived to have earned their support that, in turn, reduces possible jealousies from other members of the fishing community. Direct payments should also be *consistent* with community and group objectives. For example, payments that encourage individuals to leave the community will be less supportive of social capital than those that do not.

Figure 8.2. Policy Mechanism Assessment in Fisheries



Cost-reducing Transfers

Cost-reducing transfers include a variety of so-called decommissioning schemes to reduce fishing effort in fisheries. Typically, these transfers take the form of a buy-out of fishing licences and/or vessels. Provided that the buy-outs are voluntary and the payments come from general revenues, rather than fishers themselves, such schemes are often looked on with favour by fishers. Fishers, who following a decommissioning exit from a fishery, benefit from payouts that supplement their wealth, while fishers who remain are advantaged by reduced competition following the removal of fishing effort.

The effects of decommissioning and the reform of cost-reducing transfers on social capital are highly dependent on the circumstances of the fishery and the nature of the payouts. Sometimes the injection of funds into the fishery can be used to help resolve disputes between the regulator and fishers, such as occurred with decommissioning in the South-East Trawl Fishery of Australia (Fox, Grafton, Kompas and Che 2004). Thus, decommissioning can potentially support linking social capital that connects fishers and fisher groups to the regulator. By contrast, decommissioning schemes that are perceived to be arbitrary or unfair, or that exclude certain groups of fishers from participating, may have negative impacts on both bridging and linking social capital. To help overcome such difficulties, regulators may wish to use a reverse auction that is 'neutral' in terms of who receives a pay out, generally open to all fishers and is less deleterious on social capital than approaches that discriminate on the basis of vessel size or gear type.

General Services

In many developed fisheries the traditional approach to management is 'top-down' such that the regulator almost entirely determines the total harvest and the fishing rules (gear type, fishing season, etc.). A hierarchical approach to fisheries management can raise the costs of fisheries management, particularly monitoring and enforcement costs, and also fails to fully draw upon the skills and expertise of fishers (Jentoft 2000). A growing realisation that fishers can make an important, and sometimes critical, input into ensuring desirable management outcomes suggests that 'bottom-up' models of fisheries governance (Lane and Stephenson 2000) may deliver better results, and at a possibly lower public cost. Such a 'win-win' – a better outcome at a lower cost – in terms of managing fisheries, however, crucially depends on the trust, co-operation and the quality of links between fishers, and between fishers and the regulator. By drawing upon social norms that encourage co-operative rather than competitive behaviour and by linking regulators to fishers, fishing communities can play a greater role in improving management outcomes. In other words, achieving the goal of sustainable and economically viable fisheries is greatly enhanced by nurturing ties within and across communities and between fishers and managers.

A critical component in the reform of GFTs to fisheries is to ensure that fishers have the appropriate rights and responsibilities. If harvesters have little or no input into the decision-making process, and also lack long-term tenure over the resource, they have few incentives to co-operate and invest their time in improving fishery outcomes. By *not* drawing upon or promoting social capital, regulators are likely to make more mistakes, be less flexible to change, raise management costs and generate poorer compliance with fishing rules (Grafton 2000b). The implication for the reform of government financial transfers is that, by strengthening the tenure and rights of fishers and their communities, fishers have a greater incentive and competence to assume some of the current responsibilities of regulators and, thus, are able to lower the financial cost to governments of general services.

The key to enjoying the benefits of social capital is to involve fishers in co-management of resources (Pomeroy and Berkes 1997). Consequently, in any reform of GFTs, regulators should consider incorporating traditional fisher knowledge about the state of the resource in a systematic manner, nurture decision-making bodies or advisory boards that include representatives from fisher groups and communities, develop processes for dispute and conflict resolution, provide assurance of long-term rights and tenure to the fishery and ensure legal recognition of local governance rules (and associated penalties) within national fishery regulations. In fisheries with a history of low compliance and poor communication between fishers and the regulator, sequential confidence-building measures are probably required before co-management can be effectively implemented.

Not all co-management approaches are necessarily applicable in all fisheries, but it does require a meaningful dialogue between fishers, and also that fishers have long-term interests in the fishery. In particular, devolving responsibilities to fishers in the reform of

GFTs requires that fishers have commensurate rights. For instance, this might involve the legal recognition of *de facto* community rights, particularly in artisanal fishing communities (Squires, Grafton, Alam and Omar 2003), or possibly the introduction of individual harvesting rights in developed fisheries (Grafton 1996).

By creating or supporting the rights of fishers, regulators provide fishers with strong incentives to be active participants in co-management. For example, in New Zealand the introduction of individual harvesting rights has stimulated the formation of management associations by fishers. In the case of New Zealand's southern scallop fishery, fishers have formed their own corporation to enhance the seeding of scallops and to help to set the total commercial catch for the fishery (Harte, Arbuckle and McClurg 2000). Such 'supply-side' approaches that increase returns and promote sustainability also exist in other fisheries where long-term tenure exists for fishers. For example, in the Maine lobster fishery harvesters have established hatcheries to release small lobsters because they have a high degree of surety that they can benefit from their efforts to enhance future harvests (Acheson 1989).

Some of the steps to use and build upon social capital in fisheries might, at least initially, increase costs but would also likely generate substantial payoffs. The pay-offs from nurturing social capital include better management outcomes and, ultimately, reduced public expenditures. For example, monitoring and enforcement costs of regulators can be reduced if fishers increase their compliance, or if monitoring is devolved to fisher groups themselves, as has occurred in the British Columbia halibut fishery (Grafton, Squires and Fox 2000). The possibility also exists that by moving towards a system of governance in which fishers, along with the regulator, are partners in ensuring the long-term well being of fisheries, general services costs may fall while management outcomes improve. Indeed, the two countries that have gone the furthest towards ensuring fishers have both rights and associated responsibilities at an individual level–Iceland and New Zealand– have some of the lowest GFTs of all OECD countries.

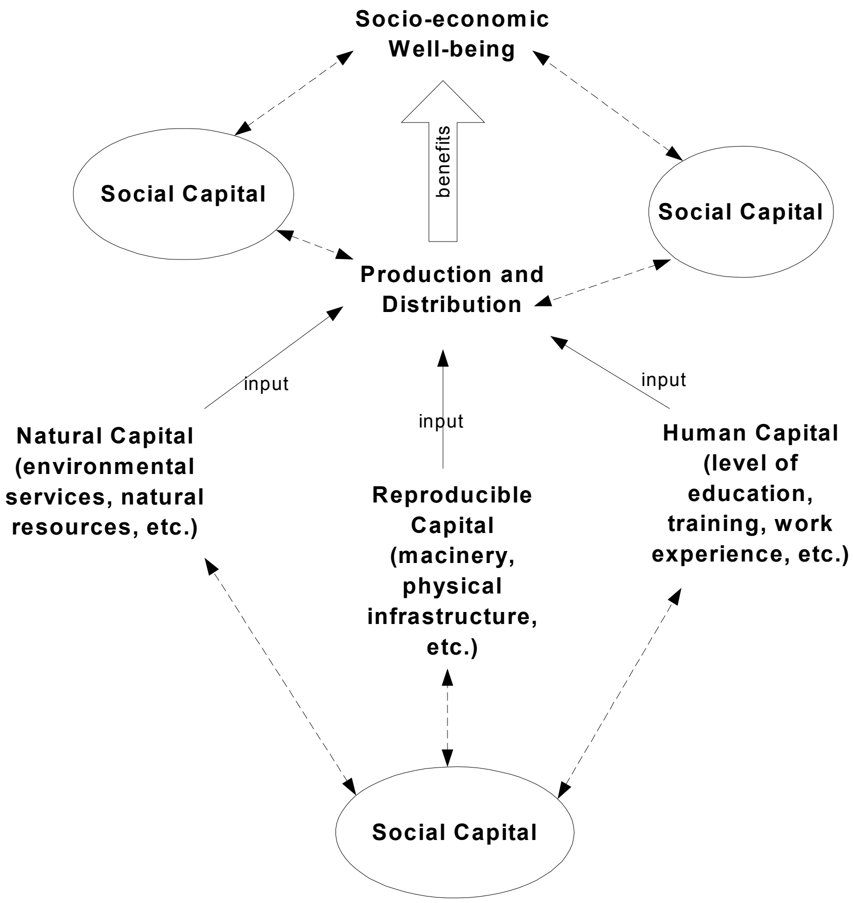
Social Capital and Other Policy Issues

Social capital in fisheries has relevance beyond the government financial reform process. The existence of social capital is a necessary condition for well-managed institutions within the economy as a whole, and for all natural resources in particular (de Ferranti *et al.* 2002). Indeed, effective institutions, which are in large measure determined by social capital, help determine why some countries are rich and others poor (Olson 1996). These issues are explored in terms of both macro linkages of social capital and its possible association with collusion and exclusion in fishing communities.

Macro Linkages

The importance of social capital in generating desirable socio-economic outcomes is illustrated in Figure 8.3. The figure shows that social capital supports, and is supported by, other forms of capital (natural, reproducible and human). Collectively, the capital stocks provide the inputs that determine the level of production and distribution of output. Production and distribution are also co-determined, in part, by social capital because the level of income and its distribution is a major influence on social capital, while the level of social capital helps determine the quality of institutions that affect income levels. Further, social capital also plays an important role in determining social relations and interactions that, in turn, affect overall well being.

Figure 8.3. The Influence of Social Capital on Socio-economic Well-being



The key point is that social capital in fisheries is linked to the rest of the economy and society, and *vice versa*. Thus social and economic policies not specifically directed to the fisheries sector will likely have effects within fisheries. Consequently, expenditures on physical infrastructure (such as internet connections, roads, etc.) will likely influence the links both within and across social groups, including fishers. Awareness of the cross-links and complementarities of different policies, both within and beyond fisheries, would help ensure that policy actions specifically targeted to fisheries are as effective as they can be.

Collusion and Exclusion

At both the macroeconomic scale and at the level of fisheries, social capital plays an important role in determining the distribution of benefits from resources. For instance, familial relationships are a major determinant of who will become fishers, while community and historical ties are frequently used as a basis for access to natural resources. Thus social capital, or rather the social networks within communities, is closely connected to the flow of benefits from fishing.

In one sense, the 'strong ties' across fishers is beneficial because it promotes mentoring of fishers and a system for knowledge diffusion, among other benefits. On the other hand, close familial and community networks in the form of bonding social capital can be exclusionary. Further, networks with 'strong ties' may be used to acquire resources and allocations from less organised fishers, especially in the setting of harvest allocations among vessels with different gear and at different locations (Grafton and Lane 1998). In the case where one gear or vessel type or fishing community is pitted against another, a lack of 'weak ties' across communities may even have negative impacts on the sustainability of the resource. In such a situation, a lack of ties and trust *across* communities inhibits co-operative outcomes that may be globally optimal to all fishers.

The point is *not* that strong community ties are necessarily harmful, but that transparent and open processes are needed in key decisions over access and allocation of fishing harvests among competing groups. Effective management that explicitly considers the importance of social capital also requires that decision makers be cognisant of the divisions across fishing communities and that efforts be undertake to build 'bridges' between them. In other words, involving all fishing communities in management, and by making transparent decision making with allocation rules that are agreed to be all parties helps to avoid rent-seeking behaviour and the possible negative aspects of social capital.

Concluding Remarks

The paper draws upon a rich literature to show that social networks help determine levels of trust and co-operation in society and have a major impact on outcomes in fisheries. In particular, social connections in the form of 'strong ties' within communities, 'weak ties' across communities and links between fishers and the regulator are important in ensuring successful fisheries management outcomes.

The significance of social capital is relevant to the current reform of government financial transfers in fisheries. Reform of subsidies to fisheries can generate even better outcomes if explicit consideration is given as to how the reform process affects social capital. To help in these reforms, the paper proposes a general framework for explicitly considering the importance of social capital in direct payments to fishers. Actual policies will, and should, differ across fisheries, but the basic conclusion is that social capital can be nurtured to support and improve management outcomes and possibly reduce management costs. Such a 'win-win' outcome in the reform of government financial transfers requires explicit consideration of social capital. It also demands a redirection in priorities and funding away from 'top-down' fisheries management towards 'co-management' where fishers have both rights and responsibilities to be effective partners in ensuring sustainable fisheries.

BIBLIOGRAPHY

Acheson, J.M. (1989). "Where Have All the Exploiters Gone? Co-Management of the Maine Lobster Industry," in *Common Property Resources: Ecology and Community-Based Sustainable Development* (F. Berkes Ed.), Belhaven Press: London, pp. 199-217.

Adams, W.M., D. Brockington, J. Dyson, and B. Vira (2003). "Managing Tragedies: Understanding Conflict Over Common-Pool Resources," *Science* 302, 12 December: 1915-1916.

Arrow, K.J. (1972). "Gifts and Exchanges,": *Philosophy and Public Affairs* 1(4): 343-362.

Berkes, F., J. Colding, and C. Folke (2000) "Traditional Ecological Knowledge," *Ecological Applications* 10(5): 1251-1262.

Bourdieu, P. (1980). "Le Capital Social; notes provisoires," *Actes de la Recherche en Sciences Sociales* 31: 2-3.

Coleman, J.S. (1988). "Social Capital in the Creation of Human Capital," *American Journal of Sociology* 94, supplement: S95-S120.

Coleman, J.S. (1994). *Foundations of Social Theory*. Belknap Press: Cambridge, MA.

Coleman, J.S., E. Katz, and H. Menzel (1966). *Medical Innovation: A Diffusion Study*. Indianapolis: The Bobbs-Merrill Company, Inc.

Cox, A. (2004). Personal communications, February 12.

Cox, A. and C.-C. Schmidt, (2002). "Subsidies in the OECD Fisheries Sector: A Review of Recent Analysis and Future Directions," OECD Fisheries Division: Paris, OECD.

de Ferranti, D., E.G. Perry, D. Lederman, and W.F. Maloney (2002). "From Natural Resources to the Knowledge Economy: Trade and Job Quality," Washington D.C.: World Bank, http://lnweb18.worldbank.org/External/lac/lac.nsf/0/55671FFABEE5F88485256AE10079A58A?OpenDocument

Dietz, T., E. Ostrom, and P.C. Stern (2003). 'The Struggle to Govern the Commons,' *Science* 302, 12 December: 1907-1912.

Fox, K.J., R.Q. Grafton, T. Kompas, and N.T. Che "Capacity, Quota-Trading and Productivity: The Case of a Fishery," unpublished manuscript.

Glaeser, E.L., D.I. Laibson, J.A. Scheinkman, and C.L. Soutter (2000). "Measuring Trust," *Quarterly Journal of Economics* 115: 811-846.

Grafton, R.Q. (1995). "Rent Capture in a Rights-Based Fishery," *Journal of Environmental Economics and Management* 28: 48-67.

Grafton, R.Q. (1996). "Individual Transferable Quotas: Theory and Practice," *Reviews in Fish Biology and Fisheries* 6: 5-20.

Grafton, R.Q. (2000a). "Property Rights for Fisheries," in *Environment and Property Rights* (R.R. Scott and K.F.D. Hughey Eds.), Lincoln University: Lincoln, pp. 87-95.

Grafton, R.Q. (2000b). "Governance of the Commons: A Role for the State?" *Land Economics* 76(4): 504-517.

Grafton, R.Q. and D.E. Lane (1998). "Canadian Fisheries Policy: Challenges and Choices," *Canadian Public Policy* 24(2): 133-147.

Grafton, R.Q., Knowles, S. and Owen, P. D. (2002). "Productivity and Social Divergence: Making a Connection," in *The Review of Economic Performance and Social Progress 2002* (A. Sharpe, F. St-Hilaire and K. Banting Eds.), The Institute for Research on Public Policy: Montreal.

Grafton, R.Q., D. Squires, and K.J. Fox (2000). "Private Property and Economic Efficiency: A Study of a Common-Pool Resource," *Journal of Law and Economics* 43(2): 679-713.

Granovetter, M.S. (1973). "The Strength of Weak Ties," *American Journal of Sociology* 78:1360-1380.

Hanifan, L.J. (1916). "The Rural School Community Center," *Annals of the American Academy of Political and Social cience* 67: 130-138.

Harte, M., M. Arbuckle, and T. McClurg (2000). "Property Rights and the Evolution of Fisheries Management in New Zealand," in *Environment and Property Rights* (R.R. Scott and K.F.D. Hughey Eds.), Lincoln: Lincoln University, pp. 97-116.

Hatcher, A. (2000). "Subsidies for European Fishing Fleets: The European Community's Structural Policy for Fisheries 1971-1999," *Marine Policy* 24: 129-140.

Jentoft, S. (2000). "The Community: A Missing Link of Fisheries Management," *Marine Policy* 24: 53-59.

Jentoft, S., B.J. McCay and D.C. Wilson (1998). "Social Theory and Fisheries Co-Management," *Marine Policy* 22(4-5): 423-436.

Knack, S. and P. Keefer, (1997). "Does Social Capital Have an Economic Payoff? A Cross-Country Investigation" *Quarterly Journal of Economics* 112(4): 1252-1288.

Knack, S. (2001). "Trust, Associational Life and Economic Performance," in HRDC-OECD, The Contribution of Human and Social Capital to Sustained Economic Growth and Well Being, International Symposium Report, HRDC: Ottawa, 172-202.

Lane, D.E. and R.L. Stephenson, (2000). "Institutional Arrangements for Fisheries: Alternate Structures and Impediments to Change," *Marine Policy* 24: 385-393.

Milazzo, M. (1998). "Subsidies in World Fisheries: A Re-examination," World Bank Technical Paper No. 406, World Bank: Washington D.C.

Munro, G. and U.R. Sumaila (2002). "The Impact of Subsidies upon Fisheries Management and Sustainability: The Case of the North Atlantic," *Fish and Fisheries 3*: 233-250.

Narayan, D. (1999). "Bonds and Bridges: Social Capital and Poverty," World Bank Policy Research Working Paper No. 2167.

Olson, M. (1996). "Big Bills Left on the Sidewalk: Why Some Countries are Rich and Others Poor," *Journal of Economic Perspectives* 10(2): 3-24.

Organisation for Economic Co-operation and Development (OECD). (2000). *Transition to Responsible Fisheries: Economic and Policy Implications.* Paris: OECD.

Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action.* Cambridge, United Kingdom: Cambridge University press.

Ostrom, E., R. Gardner, and J. Walker (1994). *Rules, Games and Common-Pool Resources.* Ann Arbor, Michigan: The University of Michigan Press.

Paldam, M. (2000). "Social Capital: One or Many? Definition and Measurement," *Journal of Economic Surveys* 14:629-653.

Pinkerton, E.W. (1989). "Introduction: Attaining Better Fisheries Management through Co-Management Prospects, Problems, and Propositions" in *Co-Operative Management of Local Fisheries: New Directions for Improved Management and Community Development* (E. Pinkerton Ed.), University of British Columbia Press: Vancouver, pp. 3-33.

Pomeroy, R.S. and F. Berkes (1997). "Two to Tango: The Role of Government in Fisheries Co-Management," *Marine Policy* 21(5): 465-480.

Portes, A. (1998). "Social Capital: Its Origins and Applications in Modern Sociology," *Annual Review of Sociology* 24: 1-24.

Pretty, J. (2003). "Social Capital and the Collective Management of Resources," *Science* 302: 1912-1914.

Putnam, R.D. (1993). *Making Democracy Work: Civic Traditions in Modern Italy.* Princeton University Press: Princeton.

Putnam, R.D. (2000). *Bowling Alone: The Collapse and Revival of American Community.* Simon and Schuster: New York.

Ritzen, J., W. Easterly, and M. Woolcock, (2000). "On 'Good' Politicians and 'Bad' Policies: Social Cohesion, Institutions, and Growth" World Bank Policy Research Working paper #2448, World Bank: Washington D.C.

Rogers, E. M. (1995). *Diffusion of Innovations.* (fourth edition) The Free Press: New York.

Ruddle, K. (1989). "Solving the Common-Property Dilemma: Village Fisheries Rights in Japanese Coastal Waters, " in *Common Property Resources: Ecology and Community-Based Sustainable Development* (F. Berkes, Ed.), Belhaven Press: London.

Ruddle, K., E. Hviding, and R.E. Johannes (1992). "Marine Resources Management in the Context of Customary Tenure," *Marine Resource Economics* 7: 249-273.

Ryan, B. and N.C. Gross (1943). "The Diffusion of Hybrid Seed Corn in Two Iowa Communities," *Rural Sociology* 8(1): 15-24.

Sandler, T. (2003) "Assessing the Optimal Provision of Public Goods: In Search of the Holy Grail," in *Providing Global Public Goods: Managing Globalization* (I. Kaul, P. Conceição. K. Le Goulven and R.U. Mendoza Eds.), Oxford University Press: Oxford.

Schrank, W.E. and W.R. Keithly Jr. (1999) "The Concept of Subsidies," *Marine Resource Economics* 14: 151-164.

Squires, D., R.Q. Grafton, M.F. Alam, and I.H. Oman (2003). "Technical Efficiency in the Malaysian Gill Net Fishery," *Environment and Development Economics* 8: 481-504.

Sobel, J. (2002). "Can We Trust Social Capital," *Journal of Economic Literature* 40(1): 139-154.

Temple, J. and P.A. Johnson, (1998). "Social Capability and Economic Growth," *Quarterly Journal of Economics* 113: 965-990.

Woolcock, M. (2001). "The Place of Social Capital in Understanding Social and Economic Outcomes," in HRDC-OECD, *The Contribution of Human and Social Capital to Sustained Economic Growth and Well Being, International Symposium Report*, Ottawa: HRDC, 65-88.

Yamamoto, T. (1995). "Development of a Community-Based Fishery Management System in Japan," *Marine Resource Economics* 10: 21-34.

PART III

COUNTRY CASE STUDIES

Chapter 9

Canada's Response to the 2003 Cod Fishery Closure

Background

This case study forms part of Canada's contribution to the OECD Committee for Fisheries project analysing the effects of government financial transfers (GFTs) on the fishing industry. Earlier Committee work had focused on trade and economic impacts; the analysis has been broadened in the current programme of work to include the effect of GFTs within a sustainable development paradigm.

This paper examines License Retirement Programs (LRPs) as a specific type of GFT. LRPs and vessel decommissioning schemes have been employed in many countries over the past thirty years. A cursory search of the literature reveals at least 35 distinct LRPs in 10 countries.[1] A LRP is often introduced in response to a dramatic Total Allowable Catch (TAC) reduction or a fishery closure. Simply put, the license is removed by the management authority in exchange for a financial payment. In other instances, the LRP has purchased a license, and transferred the right to catch or the privilege of access to other fleets or groups in society.

This paper is a case study of why Canada's response to the 2003 closure of 3 Atlantic cod stocks did not include a LRP, whereas the response to closures of the same stocks in 1992/93 resulted in a series of LRPs. This study explores why a similar problem (closure of the same stocks in the same areas, ten years later) resulted in very different policy responses. The OECD paper "Decommissioning Schemes" written in 2004 serves as the introduction to LRPs more generally, and allows this case study to focus more closely on the Canadian experience.

Cod Management

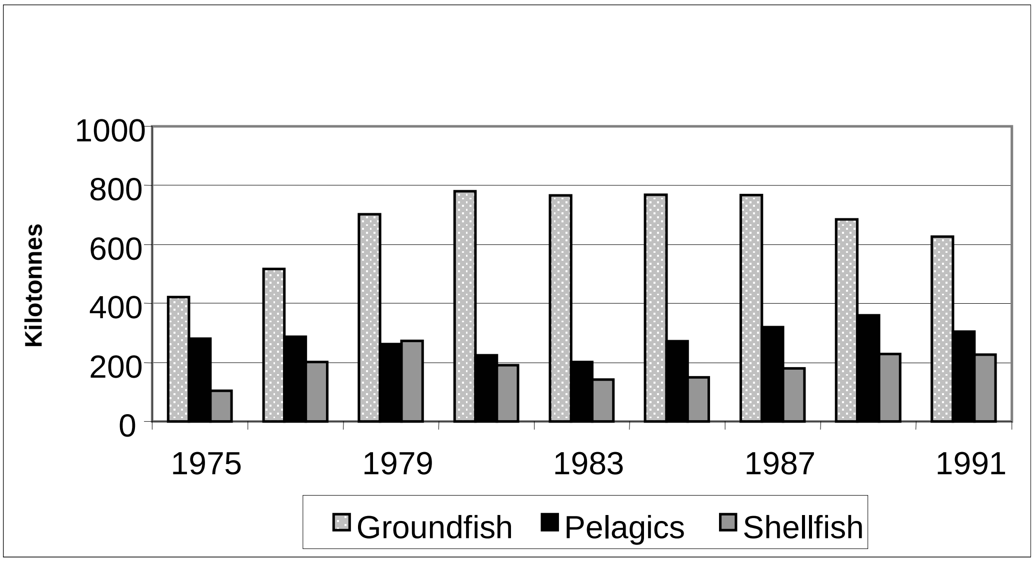
Until 1992, groundfish, especially cod, was the foundation of the Atlantic fishery in Canada. In some areas, it was the foundation of the entire economy. In the province of Newfoundland and Labrador, one person in five was employed in the fishery.

In 1968, over 800 000 tonnes of cod was harvested from the most abundant of stocks, the northern cod stock, in Northwest Atlantic Fisheries Organization (NAFO) area 2J3KL. By 1987, Atlantic Canada landed 886 000 tonnes of groundfish, over half of which was cod (see Figure 9.1). While the importance of groundfish to the fishing

1. This chapter has been prepared by the Canadian Department of Fisheries and Oceans. The views expressed do not necessarily represent the views of other OECD Member countries. Sources : Holland *et.al.* (1999) ; United States General Accounting Office (1999, 2001) ; Congressional Research Service (1997) ; Funk *et.al.* (2003); OECD (2003).

industry varied considerably by area, in the province of Newfoundland and Labrador, groundfish supplied approximately 80% of fishing revenue. In some communities, this reliance was effectively 100%. Due to the enormous volume of groundfish, its particular dominance in the employment-intensive inshore fishery, and despite the greater value (by weight) of shellfish, groundfish employed two thirds of those in the fishing industry. In 1990, more than 800 fish plants employed 60 000 workers; 26 000 families depended on processing to earn a living. Dependence on cod extended through plant workers, license holders and crew members.

Figure 9.1. Canadian Fisheries Landings – Atlantic



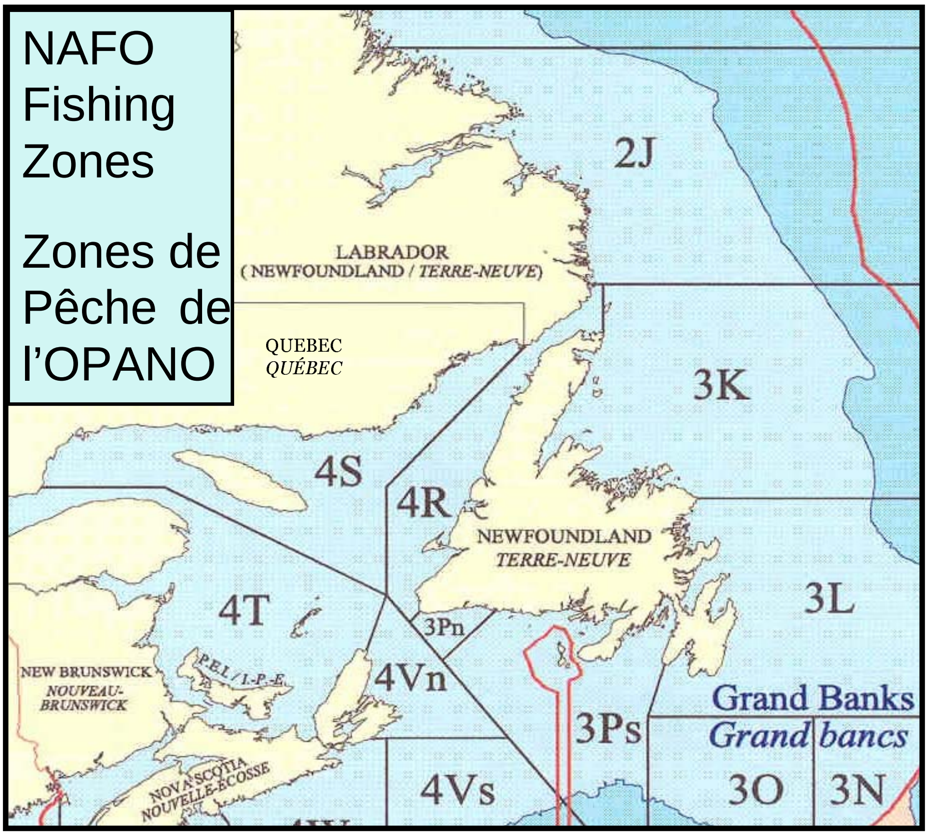
In July 1992, the Canadian government responded to a sharp decline in Northern cod stocks off of Newfoundland (NAFO area 2J3KL) by imposing a two-year fishing moratorium. This stock alone had accounted for one half of all cod landings in Atlantic Canada, and had supported 12 000 fishermen and 15 000 plant workers in the province of Newfoundland.[2]

In November 1993, a federal task force noted that "recovery will take a long time -- most of these stocks, especially northern cod, will require at least five to seven years; and, after recovery, catches generally will be substantially lower".[3] It had become clear that the outlook for northern cod had worsened since the moratorium and in December 1993, and the government announced that the ban on cod fishing would be extended indefinitely. By 1994, the cod moratorium was extended to include cod stocks off the south coast of Newfoundland (3Ps), in the Gulf of St. Lawrence (3Pn4RS and 4TVn) and off part of Nova Scotia (4VsW). See Figure 9.2.

2. Cashin (1993, p.22).

3. Cashin (1993, p.54).

Figure 9.2. NAFO Fishing Zones



The Gulf and Northern cod stocks were re-opened by 1997 and 1998, respectively, at a level of less than 5% of the 1991 pre-moratorium TAC. The stocks were thought at the time to be recovering from the lows of the early 1990s. The stocks were fished at a low harvest level until 2003.

Canadian Response 1992-2002

The closure has been called the biggest lay-off in Canadian history, affecting the entire east coast of Canada. "In ecological and societal terms, those dependent on the fishery, particularly the groundfish fishery, face the equivalent of the prairie dust bowl of the 1930s or the Irish potato famine of the 1840s".[4] In Newfoundland, the "impact on the people, communities and economy… will be devastating".[5]

A comprehensive response was required to address the social devastation, to diversify the regional economy such that it would become less dependent on a single sector, and to

4. Cashin (1993, p. 36).

5. Cashin (1993, p. 22).

make changes within the fishing industry itself to promote self-reliance, self-adjustment and increase economic and employment stability.

The Canadian position was that "governments have a responsibility towards affected individuals to help them adjust to the calamity of losing their livelihood. Governments have a responsibility towards fishery-dependent communities to help them adjust".[6] Accordingly, the response provided:

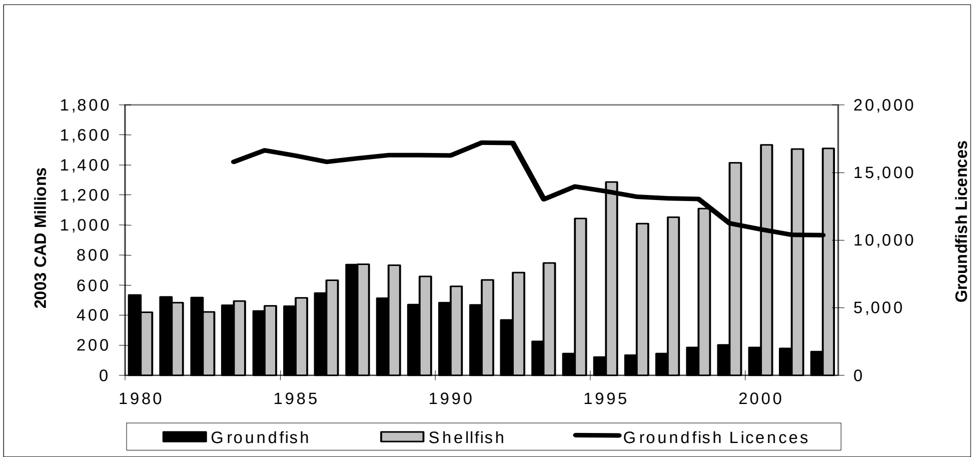
- income assistance for fishers and plant workers to offset the immediate social consequences of a closure ('social adjustment'), and to improve their long-term economic prospects and therefore to realize labour market adjustment ('economic adjustment'); and
- a restructuring of the industry by reducing participants and capacity, and in so doing, promoting an ecological and commercially sustainable future fishery.

As Figure 9.3 illustrates, through LRP and changes in policy, the 1990s were marked by a steady decline in the number of groundfish licenses (a drop of nearly 40% in 10 years). There were three components to the fisheries adjustment measures designed to reduce capacity and restructure the industry:

- Cancellation of inactive groundfish licenses.
- The establishment of 'core' fisher status, to promote the emergence of a core group of professional fishers, able to diversify their operations to take advantage of a greater variety of fisheries, including the more lucrative shellfish stocks. This ensured that the substantial increases in shrimp and crab quota were directed to core license holders with a significant attachment to the industry. Non-core licenses were made non-transferable, and will expire when the license holder no longer participates in the fishery. This, in effect, ensures a future further capacity reduction.
- License retirement programs, targeted to license holders with a significant attachment to the fishery.

Figure 9.3. Landed Value and Number of Groundfish Licenses

Atlantic Groundfish, Pelagics and Shellfish



6. Cashin (1993, p.89).

In response to the crisis, the Government of Canada developed three separate programs that included a LRP component for the Atlantic fishing industry between 1992-2002.[7] In total, CAD 3.5 billion was spent on income support, industry adjustment measures and economic development assistance programs. From the point of view strictly of license retirement, a total of 3 686 licenses were retired at a cost of CAD 330 million. Participants in each program were required to permanently exit the fishery.

- As noted above, the establishment of core fishers and the cancellation of inactive licenses further reduced participation. In Newfoundland and Labrador, the 9 500 groundfish licenses in existence in 1992 had been reduced by 50%, to 4 700, by 2002. This number will be further reduced by 735 as non-core licenses expire.

Table 9.1. Assistance Programmes for the Atlantic Fishery with a License Retirement Component[1]

1992-2001 (CAD million)

Program Components/Year	NCARP 1992-1994	TAGS 1994-1998	CFAR[2] 1998-2001	Total
Income Replacement	484	1 750[2]	315	2 549
Training and Counselling	333		0	333
Vessel Support Program	15	12	0	27
Early Retirement	31	28	85	145
License Retirement	40	60	230	330
Economic Development	0	50	100	150
Total	903	1 900	730	3 533

[1]Adapted from DFO media backgrounder "Current State of the Atlantic Fishery April 2003" available at: http:"www.dfo-mpo.gc.ca/media/backgrou/2003/cod-1e.htm
[2] Includes money for training and counselling. The portion of CFAR funding dedicated to Pacific coast program elements has not been included in this table.
NCARP – Northern Cod Adjustment and Recovery Program
TAGS – The Atlantic Groundfish Strategy
CFAR – Canadian Fisheries Adjustment and Restructuring Plan

Objectives of License Retirement Programmes

The desired outcomes of past Canadian programmes were social adjustment, economic adjustment, and industry restructuring. The means to achieve these outcomes were the program objectives. The objectives of a LRP, as one element of a more comprehensive response program designed to realise the desired outcomes, can be generalised into three categories:[8]

- a transfer payment or 'compensation' for the license holder and their transition into other economic sectors (social and economic adjustment);
- improved conservation of the resource (industry restructuring); and
- improved economic efficiency (industry restructuring).

These objectives are to a certain extent mutually reinforcing: greater economic efficiency (resulting from fewer participants) may lead to improved conservation of the

7. Source: DFO media backgrounder "Current State of the Atlantic Fishery: April 2003". Available at: http://www.dfo-mpo.gc.ca/media/backgrou/2003/cod-1_e.htm

8. Holland *et.al.* (1999).

resource. In other ways, the objectives may contradict: transfer payments may reduce industry restructuring if the income assistance payments maintains marginal participants in a fishery, and in so doing lowers the economic efficiency of the fishery.

The objectives of a LRP applied to a closed fishery are by definition different from a LRP applied to a fishery in which the TAC has been severely reduced for conservation reasons, or to reduce participation to improve economic efficiency (as in the LRP applied to the British Columbia salmon fishery in 1970, 1981, and 1993; and the Atlantic lobster fishery in 1969 and 1977). For a closed fishery, the objectives (aside from a transfer payment objective) are to improve the future prospects for conservation of the resource and the economic efficiency of the future fleet that would operate when the fishery reopens.

For this reason, the nature of the closure is critical: a short-term moratorium with an anticipated re-opening at a certain TAC suggests a LRP with the objectives of reducing licenses within the given timeframe to a target participation at a level appropriate for the TAC when the fishery re-opens. A LRP for a short closure therefore could have strong industry restructuring objectives. By contrast, the objectives of a LRP for a fishery with an expected long-term closure (in which TAC is expected to remain at zero for many years, or indefinitely) are tenuously linked to industry restructuring: neither resource conservation nor economic efficiency is an issue within the planning time frame.

Objectives of Past License Retirement Programmes

In order to evaluate past LRP applied to northern and gulf cod, it is necessary to examine their specific objectives.

The Northern Cod Adjustment and Recovery Program (NCARP) had two basic objectives:[9]

- to replace the income lost by those affected by the moratorium; and
- restructuring the fishery so that it would be better able to sustain itself once the moratorium had ended.

The LRP portion of NCARP had no target number for capacity reduction (e.g., number of licenses). Payment was based on a multiple of landed value, ensuring a link between cost and capacity. However, to qualify for license retirement, a fisher must have been eligible for the income replacement component of NCARP. As criteria for accessing income replacement was based on dependence on the fishery, the LRP was *de facto* targeted to dependence rather than capacity.

9. Source : http://www.oag-bvg.gc.ca/domino/reports.nsf/html/94ac_e.html

The overall objectives of The Atlantic Groundfish Strategy (TAGS) were to:[10]

- restructure the fishery industry in Atlantic Canada to become one that is economically viable and environmentally sustainable through resource rebuilding and the reduction of the harvesting and processing capacity;
- facilitate the labour market adjustment of individuals affected by the Atlantic fishery crisis;
- enhance the profession of fishers who remain active in the fishing industry; and
- facilitate community economic adjustment focused on regional strengths and opportunities of those areas affected by adjustments in the fishery industry.

The LRP component of TAGS aimed to remove 50% of existing groundfish licenses. Eligibility was limited to fishers who had a demonstrated dependence on groundfish and a significant attachment to the fishery. Among those eligible, the objective was to retire the maximum harvesting capacity at the lowest cost per unit of capacity removed.

The Canadian Fisheries Adjustment and Restructuring was announced as "the last opportunity for fishers to leave the fishery with government assistance".[11] A central goal of the CFAR license retirement program was to achieve a better balance between the resources available and the number of people who depend on them for their livelihood. Specific objectives were to:[12]

- permanently remove up to 3 000 groundfish licenses from the Atlantic fishery, with the primary focus on license holders who were eligible under TAGS;
- achieve a more diversified and economically viable fishery by retiring license holders who were less viable and less diversified relative to others within a specific area; and
- retire those licenses for which the bid amounts provided the best value.

The license retirement program of CFAR was available to all groundfish license holders in Atlantic Canada and Quebec with vessels less than 65 feet length overall. A variety of criteria were used to retire licenses, including historical degree of dependence and attachment to the fishery.

Evaluation of Past LRPs

Past LRPs removed over 3,600 licenses; no vessels or gear was purchased.[13] Policy changes removed additional low-value or inactive licenses. The question is whether the

---

10. Source: Evaluation of the Atlantic Groundfish Strategy (DFO components) - December 1998 (DFO Review Directorate) http://www.dfo-mpo.gc.ca/communic/cread/reports/98-99/tags98/index_e.htm; http://www11.hrdc-drhc.gc.ca/pls/edd/TAGS_55005.htm

11. Source: DFO Press Release, available at http://www.dfo-mpo.gc.ca/media/newsrel/1998/hq-ac51_e.htm

12. Source: Evaluation of the Canadian Fisheries Adjustment and Restructuring Program Licence Retirement Programs - Evaluation Report - May 2002 (DFO Review Directorate). http://www.dfo-mpo.gc.ca/communic/cread/reports/02-03/cfar/index_e.htm; http://www.glf.dfo-mpo.gc.ca/pe-pe/es-se/fish-fond/groundfish_poissondefond-e.html

13. This number includes a small number of non-groundfish licenses; in some parts of Atlantic Canada, other types of licenses were also retired as part of the LRPs.

outcomes of social adjustment, economic adjustment and industry restructuring were realised.

On the matter of social and economic adjustment, the LRP component of past programs did transfer CAD 330 million to license holders interested in permanently exiting the fishery. As such, money was provided to individuals who gave up licenses, providing recipients with the means to finance self adjustment. That said, social adjustment was not the primary focus of past LRP; instead these should be seen as an inducement to license-holders to avail themselves of those components of the response better able to provide economic adjustment (*e.g.* retraining, economic diversification, etc.). Furthermore, LRP do not provide any assistance to the majority of those attached to the fishery: crew, processing plant workers, suppliers to the fishing industry, or other economic sectors that indirectly benefit from the fishing industry.

On the matter of industry restructuring, progress would be realized towards the objective if sufficient catching capacity were removed so as to improve resource conservation or the economic efficiency (profitability) of the fleet that remained. However, resource conservation was not a primary objective of past LRPs. Only TAGS mentions it in passing, and hence the impact on LRPs on resource conservation is not assessed in this case study.

- As a general comment, if TAC is set independently of the composition or size of the fleet, and such a TAC is effectively enforced, then the outcome of industry restructuring is irrelevant to resource conservation. In reality, overcapacity may in fact lead to harvesting beyond the established TAC, discarding, or pressure to set the TAC higher than what would be biologically warranted.14 Where such conditions do not exist, the link between LRP and resource conservation is weakened.

The Auditor General of Canada noted in 2000 that "The removal of these groundfish licenses is important to the management of the groundfish fishery. However, the Department is still developing the means to measure and, if needed, manage surplus harvesting capacity. Therefore, the Department does not know the impact of these measures on harvesting capacity."[15] It was not, therefore, possible to know if the level of participation was appropriate, as the tools to understand what capacity the participation represented did not exist.

Moreover, the cod stocks did not recover as anticipated during the first moratorium, and the TAC was consequently set lower on re-opening than earlier hoped. The situation under which the programs had been established had shifted considerably. Therefore, even if license reduction targets had been reached, the fleet would still have been too large for the catch available. It is a near-impossible task to establish the ideal capacity

14. Overcapacity may lead to fishing enterprises competing for stocks insufficient to support all enterprises. This competition may lead to increased effort (leading to increased bycatch or habitat degradation), misreporting of catches, disincentive to invest in conservation measures to maintain the stock, or pressure on the fishery manager to increase the TAC beyond that which would be a biologically precautionary level. The International Plan of Action for the Management of Fishing Capacity does state that "excessive fishing capacity is a problem that, among others, contributes substantially to overfishing, the degradation of marine fisheries resources, the decline of food production potential, and significant economic waste" (Source: http://www.fao.org/docrep/006/x3170e/x3170e04.htm). Thus the link of overcapacity to resource conservation is made.

15. Source: http://www.oag-bvg.gc.ca/domino/reports.nsf/html/0033ce.html

level (even were one able to measure it) for a stock that will re-open at an unknown time, and at an unknown level.

During 2002, the last year of the fishery, nearly 3 900 license holders participated in the harvest of a 15 000 tonne cod fishery of a few weeks duration. From an economic perspective, it is clear that the fishing capacity that remained when the fishery reopened in 1997/98 (and continuing through to the 2002 fishing season) exceeded that required to harvest the available catch.

In the absence of nation-wide cost and earning data,[16] it is difficult to assess the economic viability of the participants involved in this fishery.[17] An assessment of gross earnings reveals that almost 50% of those license-holders catching cod depended on those stocks for less than 10% of their fishing earnings.[18] Therefore, this group was primarily engaged in other fisheries, and cod represented a relatively minor portion of their enterprise. For those license holders for whom cod was an important component of their landed value (more than half of landed value from cod), 80% had landings less than CAD 20 000. Hence, those most dependent were also those who earned the least from fishing.

That said, the economic position of the fleet would have been considerably strengthened had the stocks rebounded to the levels as hoped; as it was, with a low TAC, previous LRP failed to reduce the fleet to a level commensurate with the available resource.

Policy Drawbacks to License Retirement Programs

The policy drawbacks to LRP are well documented elsewhere, and for the purpose of this case study, they require only cursory mention:

- Input stuffing: unless entry and effort controls are in place, removal of capacity through a LRP may be met with capacity increases for the remaining fleet, reducing the program's effectiveness. As a related issue, the removed vessels could transfer capacity to other fisheries, leading to overcapacity or resource pressure.
- Expectations for future assistance: although assistance may have the very best intentions, the response to a fishery decline creates the expectation of assistance in any decline, perpetuating the dependency of certain parts of the fishing industry on government transfers. As noted above, CFAR was announced as the last opportunity for fishers to leave the industry with government assistance. As Figure 9.4 illustrates, a costly government response for a small portion of the groundfish fishery (represented by the lower area in Figure 9.4) would establish a prohibitively expensive precedent in the case of a downturn in a shellfish species (represented by the uppermost area in Figure 9.4).

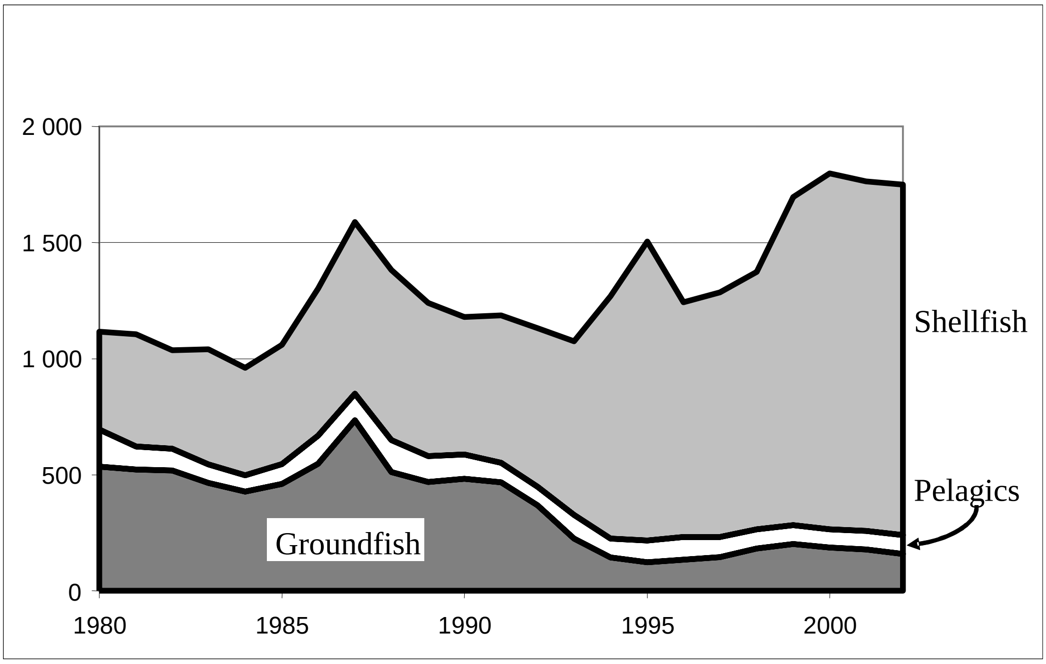
16. There are small-scale cost and earning studies available for isolated fleets that would assist in a partial analysis. No broad conclusions could be drawn from this work.

17. That said, the viability of many harvesting enterprises can be assumed to have improved in recent years as the number of participants has been reduced and the landed value of the fishery has significantly increased.

18. Source: http://www.dfo-mpo.gc.ca/communic/fish_man/cod-morue/cod-morue_e.htm

Figure 9.4. Landed Value of the Atlantic Fishery

(2003 CAD million)



- Perverted incentives: related to the point about expectations, above, government support of LRP can reduce the incentive fishers have to conserve or self-adjust to regular increases and decreases in TAC to maintain economic efficiency and resource sustainability.
- Expensive: LRP are invariably expensive. In the case of a closed fishery, government is purchasing an asset with no earning value. urthermore, if the value of a license includes not only the value of the catch, but access to other government programs (such as employment insurance, or favourable tax treatment), then the payment for the license would include the present value of all future associated benefits. This can drive the price of a license to a figure many times the value of fish caught. Finally, vessels and gear were not purchased; as past LRPs required a permanent exit from the industry, this certainly had a significant impact on the cost of retiring a license.

These issues, along with an evaluation of the LRPs in the 1990s, are relevant in the examination of the policy direction taken following the 2003 cod closure.

2003 Cod Closure

In early 2003, scientists and fisheries managers from Fisheries and Oceans Canada, participants from the Atlantic fishing industry and academics from Canada, the United States, the United Kingdom and Iceland met to assess the state of the northern (2J3KL) and Gulf of St. Lawrence (3Pn4Rs and 4TVn) cod stocks (see Figure 9.2 above). In general, they concluded that the stocks were in very poor shape and imminent recovery was unlikely.[19]

The group concluded that the southern Gulf spawning stock biomass would decline and that rebuilding was unlikely over the next few years, even in the absence of fishing. In the northern Gulf, the stock's abundance and stock spawning biomass remained low, and had declined since 2000. The stock could be expected to increase only marginally, even in the absence of fishing. Lastly, the Northern cod biomass was determined to be extremely low, and that projections indicated that during the next decade the stock spawning biomass in the inshore area will not reach the level achieved in 1998, even in the absence of fishing.

In response to the scientific assessment, the Minister re-introduced a closure. The government concluded "that there will not be a prompt recovery in any of these stocks in the near future".[20]

Of the Total Allowable Catch (TAC) of 18 262 tonnes set in 2002 (the last year prior to the closure) for these three stocks, fishers harvested approximately 15,000 tonnes, including bycatch. These cod stocks were worth about CAD 20.5 million in landed value, or just over 1% of the CAD 1.8 billion Atlantic fishery.

As noted above, despite the removal of 3 686 licenses through the three retirement programs 1992-2002, there remained 6 380 groundfish license holders entitled to fish for cod from these three cod stocks in 2000. Of this number, 3 882 actually fished for cod – mostly in small quantities.[21]

Predictions and planning were for a lengthy closure. However, possible evidence of improvements in the stock in the 2003 survey, and the need to foster shared stewardship with the industry, led the Minister of Fisheries and Oceans to reopen the two Gulf of St. Lawrence stocks in May 2004, at half the harvesting levels of 2002.[22] The Northern Cod (2J3KL) stock remains under moratorium. At such low catch levels, the landed value of the Gulf cod would be insignificant against the value of other species. The 2004 limited reopening notwithstanding, the planning assumption for the 2003 announcement was for a long-term closure.

Response to the 2003 Closure

The areas that were most affected by the closure of the cod fishery tended to have lower average incomes, fewer economic opportunities, an existing high unemployment rate, and lower education level.

At the time of the closure, the Canadian federal government was exercising strong fiscal controls to maintain the country's strong economic position, and sought to reduce discretionary spending in non-priority areas. That said, it has been the consistent government position to ensure that no area of the country is neglected, and that regional economies are provided with economic diversification assistance.

19. Source: DFO media backgrounder "State of Northern Gulf Cod Stocks in 2003, April 2003". Available at: http://www.dfo-mpo.gc.ca/media/backgrou/2003/cod-2_e.htm

20. Source : http://www.dfo-mpo.gc.ca/media/backgrou/2003/cod-3_e.htm

21. Source : DFO media backgrounder "Current State of the Atlantic Fishery April 2003". Available at: http://www.dfo-mpo.gc.ca/media/backgrou/2003/cod-1_e.htm

22. Source : http://www.dfo-mpo.gc.ca/media/newsrel/2004/hq-ac43_e.htm

Accordingly, the Government introduced a two year response program at the April 2003 closure announcement:[23]

- a CAD 44 million community-based economic development assistance program to provide assistance for short-term job creation; and
- a CAD 6 million programme to expand on current activities to evaluate and assess the impact of seals on fish stocks.

Six weeks later, the Canadian government added a CAD 27 million Temporary Fisheries Income program to provide temporary financial assistance to fishers and plant workers whose employment insurance benefits expired before the community-based economic development measures could be implemented.[24] No LRP was made available.

For a variety of reasons, while past LRPs (coupled with various management changes) did remove a considerable number of licenses, they did not result in the removal of a significant amount of harvesting capacity.[25] Past LRPs attempted to reduce capacity to a level appropriate for the TAC level anticipated upon reopening. Cod stock rebuilding occurred at a level lower than expected, and thus overcapacity would have remained even if the LRPs had removed the intended level of capacity Atlantic-wide.

In contrast to the previous announcements, the 2003 announcement was for a long-term closure (although no fixed re-opening date or criteria were set). Since no fishing on these stocks was expected for a long time, the LRP objectives of increasing economic efficiency or improved resource conservation were not applicable. The sole justification for a LRP in the context of a long closure would be a transfer payment to license holders in order to realize social adjustment. As has been illustrated above, LRP are not particularly well suited to this objective.

Instead, transition income assistance was provided to individuals affected by the closure to reduce the social cost, and economic development funding was provided to create non-fishing employment opportunities for displaced fishers and plant workers.

Last, Fisheries and Oceans Canada was in the final stages of revising its Atlantic fisheries policy. Out of this consultative process came a new framework to promote conservation and sustainable use of fisheries resources, self-reliant fisheries, a stable and predictable access and allocation approach and shared stewardship with resource users.[26] A government-funded LRP does not support these objectives.

Summary

A LRP can help to restructure an industry, by removing participants, in the hope of increasing the economic viability of those who remain, and reducing the pressure on the resource. Policy changes, however, are just as important. These changes must promote an industry composed of professional fishers, and (where possible) with access to a variety of species so that they can better weather the ups and downs of the resource.

---

23. Source: http://www.dfo-mpo.gc.ca/media/newsrel/2003/hq-ac0424_e.htm

24. Source: http://www.hrdc-drhc.gc.ca/common/news/insur/030603.shtml

25. A significant constraint for the TAGS program was that the budget for the LRP component was dramatically reduced to fund the income replacement element.

26. Source: http://www.dfo-mpo.gc.ca/media/newsrel/2004/hq-ac27_e.htm

Removing a license does not necessarily remove capacity. If inactive (or barely active) licenses are removed, then the problem itself is not addressed.

A LRP does little to transform economies. Income support can help individuals through their immediate crisis, and while theoretically it can help fund their move to another industry, income support more often inhibits individual adjustment.

Removing licenses does nothing if the underlying reasons for the overcapacity remain. If there are no other options to earn a living aside from the fishery, then the fundamental problem is the lack of widespread economic diversification and/or an inability for individuals to be able to make the transition (through lack of education, income, etc.). Economic diversification assistance for communities and transition assistance for individuals helps ensure that alternative employment opportunities are available for displaced fishery workers.

A LRP was not the appropriate policy response to the 2003 closure of the 3 cod stocks. Economic diversification assistance and a transition income grant were better able to realise economic and social adjustment. Industry restructuring would not likely be enabled by a LRP for a fishery in which the majority of participants depended on other species, and for whom cod would likely not be of significant importance for many years.

BIBLIOGRAPHY

Cashin, R. (1993), *Charting a New Course: Towards the Fishery of the Future*, Report of the Task Force on Incomes and Adjustment in the Atlantic Fishery, Minister of Supply and Services Ottawa.

Congressional Research Service (1997), *Commercial Fishing: Economic Aid and Capacity Reduction*, CRS Report 97-441, 14 April, available at www.ncseonline.org/NLE/CRSreports/Marine/mar-24a.cfm.

Funk, R.D., W.L. Griffin, J.W. Mjelde and J.M. Ward (2003), "A Simulation Model of License Buyback in the Texas Bay Shrimp Fishery", *Marine Resource Economics*, Vol. 18, pp. 33-53.

Holland, D., E. Guðmundsson and J. Gates (1999), "Do Fishing Vessel Buyback Programs Work? A Survey of the Evidence", *Marine Policy*, Vol. 23, No. 1, pp. 47-69.

OECD (2003), *Review of Fisheries in OECD Countries: Policies and Summary Statistics*, OECD, Paris.

United States General Accounting Office (1999), *Commercial Fisheries: Information on Federally Funded Buyback Programs*, GAO Report RCED-00-8R, 20 October, http://archive.gao.gov/pdf/162911.pdf.

United States General Accounting Office (2001), "Commercial Fisheries: Effectives ness of Buyback Programs can be Improved", Testimony by Barry T. Hill before the House of Representatives Sub-Committee on Fisheries, Wildlife and Oceans, 10 May, http://www.gao.gov/new.items/d01699t.pdf.

Chapter 10

Analysis of the Fishery Agreement between the Seychelles and the European Union[1]

The Seychelles Economy

The Seychelles Republic comprises an archipelago of 115 islands in the Western Indian Ocean, northwest of Madagascar far from African coast. The islands like Madagascar, Mauritius or Reunion, are isolated in the Indian Ocean, away from commercial ways. This group of small islands covers an area of 455 km^2. The biggest one is Mahe, (144 km^2) which is granite. The other islands, including the biggest atoll in the world (Aldabra), are coral. The population was 81 200 in 2001. Ninety nine per cent of the population lives on the three main islands (Mahe, Praslin and La Digue). Life expectancy currently stands at 68.6 years for men and 74.7 years for women. The illiteracy level is 58%. Communications are based on 13 small airports and Point Larue International Airport. The main port is in Victoria. Independent since 1976, in 1992 a new constitution was implemented to support the new multiparty system.

The Seychelles has four marine national parks. Nowadays, over the 46% of the archipelago's land an additional 228 km^2 of ocean are legally protected in the form of national parks and reserves. An additional 20-25% is classified as being sensitive and may become protected areas in the near future. Seychelles has more than 1000 endemic species of flora and fauna. Seychelles has limited land resources and therefore rely heavily on its coastal and marine resources for employment opportunities, socio-economics development and foreign exchange earnings.

Since independence in 1976, output per capita in this Indian Ocean archipelago has expanded to roughly seven times the old near-subsistence level. Growth has been led by the tourist sector, which employs about 30% of the labour force and provides more than 70% of hard currency earnings, and by tuna fishing. In recent years the government has encouraged foreign investment in order to upgrade hotels and other services. At the same time, the government has moved to reduce the dependence on tourism by promoting the development of farming, fishing, and small-scale manufacturing. A sharp drop illustrated the vulnerability of the tourist sector in 1991-92 due largely to the Gulf war, and once again following the 11th September 2001 terrorist attacks on the US.

The structure of the economy has moved from an agriculture based one, with cinnamon and copra as the main export products, to a relatively diversified economy with two important generators of income, employment and foreign exchange: tuna exports and tourism (Table 10.1). A significant construction industry has been developed, partly in

1. This chapter has been prepared by the Spanish Ministry of Agriculture, Fish and Food. The views expressed do not necessarily represent the view of other OECD Member countries.

response to the needs of the growing tourism industry, and an emerging financial services sector accounted for 5% of GDP in 1999.

Table 10.1. Contribution to GDP by Sector

GDP at Current Market Prices

	Agriculture, Forestry and Fishing	Industry (1)	Tourism	Govt.	Other Services (2)	TOTAL
1986	6.0%	17.0%	12.1%	14.3%	50.7%	100%
1992	3.8%	17.2%	17.4%	13.3%	48.2%	100%
1999	3.2%	28.8%	12.7%	13.8%	41.5%	100%

(1) Includes both Construction and Manufacturing
(2) Transportation / distribution, communications, financial and business services

The small economy of the country is primarily dependent on tourism and fisheries, which provide most of the country's total foreign exchange earnings. The government has been promoting privatisations with a view to increase domestic investments in the country. The private sector employed 49.5% of the labour force in 1996, which rose to the 52% in 1999. To encourage investment, a 1994 Investment Promotion Act offers a wide range of tax concessions for the private sector activities.

The fishing sector is as important as tourism. The export of canned tuna, fresh and frozen fish constitutes about 95% of the value of Seychelles' exports of goods, about the 10% of total foreign exchange earnings.

The source of local employment in fisheries is on the whole confined to the traditional type of fishing, requiring lower skills and capital investments. The typical household size in the island is around 4, so around 4 000 residences, or only 5% of the total population, depend on fisheries for their living.

The GDP per capita in purchasing power parity is USD 7 800 and their GDP real growth rate is 1.5% (2002 estimation). Inflation rate is low (0.5%). The labour force comprises 30 900 people and their occupation is distributed between industry 19%, services 71% and agriculture 10%. The industrial sectors are: fishing; tourism; processing of tuna, coconuts and vanilla; coir (coconut fiber); rope; boat building; printing; furniture and beverages

The most important exports commodities are: canned tuna, frozen fish, cinnamon bark, copra, petroleum products (re-exports) by a total amount of USD 235 million f.o.b. (2002). The total imports are in same year USD 380 million f.o.b. The total economic aid received is USD 16.4 million (1995).

Economic Contribution of the Fisheries Sector

The fishing activity contributes to socioeconomic development of Seychelles. It is a source of income for the country but also an indispensable activity to assure the internal food security.

The fisheries sector is the major contributor to economic development in terms of production, trade and foreign currency generation, the most important source of foreign exchange inflow to the Seychelles' economy. The Seychelles EEZ has 1.4 million km^2 established in 1977. The platform is rich in demersal species while the open ocean provides good fishing grounds for tuna like species

The Total fish production is 50 560 Mt. Their Estimated Landed Value was over SCR[2] 406 million (USD 74 million) in 2001. The fishing activity comprises three segments:

Artisanal Fisheries: Total catch: 4 915 tons, estimated at SCR 100 million (USD 18 million) in 2001, landed value. This segment is operated solely by Seychelles fishers. Comprises 1 400 fishers in 450 boats of which 57% are from fibreglass with outboard motors and about 7 metres in length**.**

Semi-Industrial Sector: Total catch: 411 tons, SCR 10 million (USD 1.8) in 2001, landed value. 2 private enterprises involved in exports and own longliners. Species targeted is swordfish and tuna. There are currently 10 Seychelles longliners (from 16 to 23 m) are fishing for swordfish and tuna. Their capacity varies from 10 to 50 Mt.

Industrial Fisheries: Total catch: 45 180 Mt, SCR 300 (USD 54 million) in 2001. 4 180 Mt (longliners), 41 000 Mt (Purse Seiner)

– *Industrial LongLine*: The industrial longline fishery is prosecuted by foreign vessel flagged in Seychelles. There are to date 21 of those vessels.

– *Industrial Purse Seining*: Seychelles registered purse seiners (French and Spanish origin) started fishing in 1991. The number increased from 1 in 1991 to 10 in 2003. The overall number of purse seiners licensed to fish in Seychelles waters increase from 30 in 1984 to 55 in 2000. Port Victoria is the major tuna transhipment port in the region and in 2002 332 869 Mt of tuna were transhipped in Port Victoria, representing 88% of the total catch recorded for that year.

The fish production comes from artisanal, semi-industrial and Industrial fleets (Canned Tuna). Tuna and prawns comprise the most important species. The last data[3] indicates a constant increase in the production of fish and fish products for the past two years. For the year 2002, total production increased by 17.6% over the previous year compared to the 6.2% increase for the preceding period.

The fleet of Chinese Taipei longliners which set up base in Port Victoria at the beginning of the year landed a total of 1 120 Mt of fish, mostly tuna and swordfish, out of which 642.7 Mt were sold to the two local fish processing companies.

Besides local production, foreign vessels registered under the Seychelles flag recorded a total catch of 53 550 Mt, comprising 50 680 Mt of tuna caught by purse seiners and 2 870 Mt of toothfish. This can be compared to a total of 44 520 Mt for the previous year, where 40 720 Mt of tuna and 3 900 Mt of toothfish were caught.

The employment generated by the fisheries sector and other related activities is sustainable. No significant short-term changes have been observed in the level of employment. It is estimated that the number of people directly employed by the fisheries sector and ancillary activities accounts for approximately 14% of the total formal employment. The mean age for fishers in 1997 was estimated at 44 years. As can be expected the tuna canning factory is the largest employer in the sector with approximately 2 500 employees, followed by another 1 500 employed as crew on fishing vessels. About a hundred persons were employed by the Seychelles Fishing Authority at the end of 2002

2. Seychelles Rupia (SCR) is the national currency. (USD 1 = SCR 5.5 in 2001)

3. Source from Annual Report 2002, Seychelles Fishing Authority

whilst the Coetivy Prawn farm had a staff of about three hundred people. Other people are also indirectly employed in such areas as boat building, trap making, repair and maintenance, net mending, services, stevedoring etc.

Based on information collected through the population census in August 2002, it was estimated that approximately 2 200 households had been engaged in some form of fishing activities during the preceding 12 months. This represents about 10% of the total households and translates to approximately 8 800 people dependent to some extent on fishing. Six hundred and fifty households owned a fishing boat, of which two hundred and fourteen had engaged in commercial fishing activity.

Industrial and Semi-Industrial Tuna Fishing Activities

The industrial fisheries comprise of all foreign purse seiners and longliners that are licensed to operate in the Seychelles Exclusive Economic Zone or vessels that are registered to operate under the Seychelles flag. The Seychelles Flag vessels are fishing vessels registered in Seychelles and authorised to fish solely in the Indian Ocean.

The Purse Seine Fishery

Purse seining activities in the Seychelles EEZ began in 1983 when French and Spanish fleets moved from the tropical Atlantic to Western Indian Ocean. The main fishing nation involved in purse seining in the WIO are those operation under the European Union Agreement (French and Spanish) taking about 60% of the annual licenses. The Japanese fleet that had been active since 1989 moved out of the region in the later part of 1993. Seychelles registered purse seiners (French and Spanish origin) started fishing in 1991 and in 2001 9 vessels were flying Seychelles flag (7 in 2002). The overall number of purse seiners licensed to fish in Seychelles waters increased from 30 in 1984 to 55 in 2000 (49 in 2002).

In the last years the number of vessels licensed to purse seine fishery in the Seychelles EEZ ranged between 49 and 51. During 2001, those vessels were licensed under the European Union (EU) agreement and managed by either French or Spanish private companies. In 2002 they were all managed by Spanish companies. Table 10.2 shows the number of vessels licensed per month and their country if registration. According to logbooks received at the Seychelles Fisheries Authority (SFA), between 44 and 48 vessels were active per month in 2002, giving an average of 46 vessels active per month. The average recorded for 2001 was 47 vessels.

Table 10.2. Number of Purse Seiners Licensed to Fish in the Seychelles EEZ by Country of Registration

(2001 and 2002)

	2001											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Spain*	18	18	18	18	18	18	18	18	18	18	18	18
France*	17	18	18	18	16	15	14	14	14	14	14	14
Italy*	1	1	1	1	1	1	1	1	1	1	1	1
Panama	1	1	1	1	1	1	1	1	1	1	1	1
Mayotte (private)						1	2	2	2	2	2	2
Belize	5											
Seychelles	6	9	9	9	9	9	8	8	8	7	7	7
Iran	1	1								3	3	3
Netherlands Antilles	4	4	4	4	4	4	4	4	4	4	4	4
TOTAL	**53**	**52**	**51**	**51**	**49**	**49**	**49**	**48**	**48**	**48**	**50**	**50**
	2002											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Spain*	18	18	18	18	18	18	18	18	18	18	18	18
France*	14	13	15	15	15	15	15	16	16	16	16	16
Italy*	1	1	1	1	1	1	1	1	1	1	1	1
Panama	1	1	1	1	1	1	1	1	1	1	1	1
Mayotte (private)	2	2										
Belize												
Seychelles	7	7	7	7	7	7	7	6	6	6	6	6
Iran	3	3	3	3	3	3	3	3	3	3	3	3
Netherlands Antilles	4	4	4	4	4	4	4	4	4	4	4	4
TOTAL	**51**	**49**	**49**	**49**	**49**	**49**	**49**	**49**	**49**	**49**	**49**	**49**

*Vessels fishing under EU agreement

The total catch in the Western Indian Ocean by purse seiners holding Seychelles licenses for 2002 was estimated at 379 253 Mt. The total catch recorded during the year 2002 was then the highest annual ever recorded, surpassing the previous record of 331 424 Mt reached in 1999. The fishing effort reported was 13 131 days, 3% lower than the effort that was reported during 2001. The overall monthly catch rates reported during 2002 ranged from 14.64 to 43.77 Mt/day. The total catch reported inside of the Seychelles EEZ for 2002, was estimated at 58 675 Mt, or 15% of the total catch, compared with 67 641 Mt, 23% of the total catch, reported during the previous year. Overall during 2002, a 13% reduction in the total EEZ catch was reported. Table 10.3 summarises the tuna catch statistics for the nine years and Table 10.4 summarises the tuna catch statistics by country of registration from 1994 to 2002.

Table 10.3. Tuna Catch Statistics for the Last Nine Years

Total catch			Yellowfin		Skipjack		Others	
Year	(Mt)	(Mt/Day)	Catch	%	Catch	%	Catch	%
1994	280 114	22.21	94 610	34	154 002	55	31 502	11
1995	307 135	21.27	108 123	35	159 591	51	39 321	14
1996	265 658	20.52	92 429	35	145 135	55	28 095	10
1997	271 100	17.41	71 370	26	171 404	63	28 326	11
1998	252 595	16.35	69 905	28	151 894	60	38 796	12
1999	331 424	23.66	87 659	26	213 182	64	30 583	10
2000	330 340	24.71	118 738	36	191 912	58	19 690	6
2001	296 141	21.77	112 097	37	161 107	54	22 937	9
2002	379 253	28.88	127 156	33	218 415	57	33 682	10

Table 10.4. Summary of Tuna Catch Reported by Country

(Mt, 1994 to 2002)

Country	1994	1995	1996	1997	1998	1999	2000	2001	2002
Spain	117 878	146 007	139 747	137 185	107 354	141 391	140 475	123 353	156 784
France	99 806	96 000	82 410	70 569	60 176	83 319	84 399	76 725	96 791
Seychelles*				7 805	20 232	27 927	27 296	40 716	50 677
Others	44 700	39 997	39 640	55 536	64 833	78 786	78 170	55 347	75 001
Total	262 384	282 004	261 797	271 095	252 595	331 423	330 340	296 141	379 253

* Prior to 1997 catch of Seychelles registered pure seiners were grouped under others. Others represent other countries and they include Mayotte, Italy, Iran, Netherlands Antilles, Panama, and Belize.

Figure 10.1 shows the trend in the annual catches and Figure 10.2 shows the reported fishing effort and catch rates (CPUE) from all purse seiners licensed to fish in Seychelles waters from 1984 to 2002. The CPUE stability is a clear indicator that overcapacity problems under the present system do not exist.

Figure 10.1. Total Catch Reported by Purse Seiners Licensed to Fish in Seychelles Waters

(1984-2002)

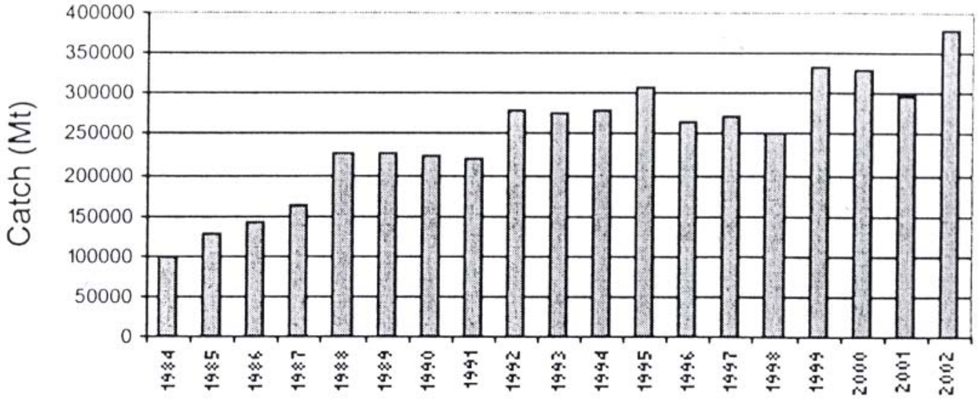
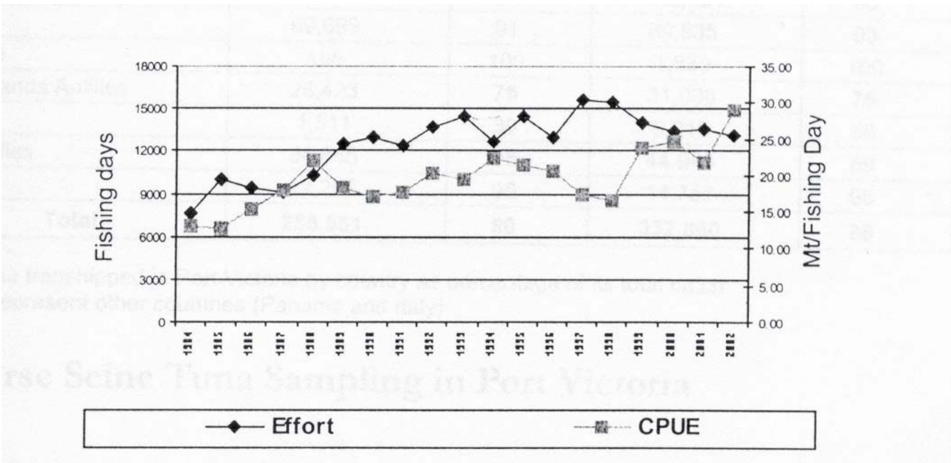


Figure 10.2. Total Effort (Fishing Days) and Catch Rates (Mt/Fishing Days) Reported by Purse Seiners Licensed to Fish in Seychelles Waters

(1984-2002)



Port Victoria remained the principal transhipment port in the Indian Ocean for 2002. A total of 332 860 Mt of tuna were transhipped here, representing 88% of the total catch in the Western Indian Ocean by Purse Seiners. During 2001, 255 551 Mt, representing 86% of the total tuna caught during that year, were transhipped in Port Victoria. Overall, a 30% increase in the total tuna transhipment was recorded during 2002 when compared to 2001. Table 10.5 shows the total transhipment by month (including landings at the canning factory) made by purse seiners in Port Victoria for the last eight years, and Table 10.6 shows transhipment in Port Victoria by nationality for 2001 and 2002.

Table 10.5. Total Transhipment by Purse Seiners in Port Victoria for the Last Eight Years

(Mt)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1995	19 414	13 017	13 801	2 179	2 771	10 039	19 777	20 471	16 848	28 434	19 337	19 401	185 489
1996	20 604	12 349	12 407	6 143	3 375	6 850	13 296	14 442	14 695	21 438	26 990	11 023	163 657
1997	28 785	15 039	20 249	7 685	3 245	7 255	4 027	21 707	24 337	26 177	24 996	16 777	200 279
1998	10 253	5 489	7 907	2 364	4 075	15 376	18 347	16 897	17 040	15 454	31 142	7 248	151 592
1999	23 964	17 075	15 185	3 509	14 080	14 111	13 683	31 488	38 550	34 291	35 721	15 790	257 447
2000	19 472	26 468	19 148	8 030	9 455	14 273	21 493	34 091	25 290	42 273	25 636	24 044	269 673
2001	26 729	21 608	18 160	6 991	7 496	9 965	17 964	28 185	36 988	31 849	26 023	23 593	255 551
2002	18 341	26 613	23 224	13 503	12 883	24 883	33 586	28 665	43 416	48 037	30 400	29 644	332 860

Table 10.6. Transhipment in Port Victoria by Nationality

(Mt)

	2001		2002	
Nation	Transhipment	% of catch*	Transhipment	% of catch*
Belize	2 703	83		
Spain	107 841	87	140 581	90
France	69 699	91	89 835	93
Mayotte	195	100	1 830	100
Netherlands Antilles	26 423	76	31 008	76
Iran	1 511	30	9 915	58
Seychelles	34 885	86	44 940	89
Others[1]	12 297	96	14 751	96
TOTAL	255 551	86	332 860	88

* Total tuna transhipped in Port Victoria by country as percentage of its total catch
[1] Others represent other countries (Panama and Italy)

A Tuna Sampling Programme was developed to collect length frequency data and data on species composition continued during 2002. In April 2001 a French technician from IRD (ex-ORSTOM) arrived to reinforce the SFA sampling team and to monitor the new sampling system. The sampling results obtained in 2001 were satisfactory. The situation improved when about 50% of the total number of samples collected for the year 2002 was achieved. The total number of samples made during 2002 was 938, compared to 759 made during 2001. The number of fish measured was 156 805 (119 473 in 2001) and the number counted was 274 982 (195 463 during 2001). The samples cover the vessels over France, Spain, Panama, Seychelles, Italy, Nederland Antilles and Mayotte. The species covered were Yellowfin, Skipjack, Bigeye and other species

The Longline Fishery

The longline fishery is addressed mainly to catch Yellowfin and Bigeye. The industrial fishing activities began in the Seychelles waters early 1950's with the Distant Water Fishing Nations (DWFN) longlining for tuna in the Western Indian Ocean (WIO). This was initiated by Japanese and soon followed by the fishers of Chinese Taipei (1954) and the Koreans (1960). Longliners from European Union countries (Great Britain, France and Spain) applied for licenses to fish in the Seychelles Exclusive Economic Zone in 1993.

The Seychelles registered vessels (Taiwanese origin) started operating in 1999. Today, Seychelles has 21 large-scale longliners flying it flag.

The number of licenses issued annually has continuously increased during the 90's. A peak of 360 licenses issued was observed in 1997. Over recent years the number has fluctuated between 165 to 241. A total of 190 licenses were issued to 137 longliners in 2002. A drop in the number of licenses taken was recorded for all nationalities: Japanese, Taiwanese and South Korean vessels that take part in this fishery. The Spanish vessels did not renew their licenses in 2002.

The logbooks were collected by SFA yearly. A total of 172 were received during the year 2002, out of which 79 came from small (< 24 m) Taiwanese vessels operating from Port Victoria. Table 10.7 summarises the catch statistics reported to SFA for the nine years.

Table 10.7. Catch Statistics Reported to SFA for the Last Nine Years

Year	Logbooks returned	Total catch (Mt)	Catch rate (Mt/1000)	Yellowfin		Bigeye		Others	
				Catch (Mt)	%	Catch (Mt)	%	Catch (Mt)	%
1994	79	2 828	0.357	1 344	48	1 039	37	445	15
1995	20	1 576	0.630	774	49	596	38	206	13
1996	56	2 246	0.435	1 146	51	805	36	295	13
1997	66	1 574	0.380	797	51	497	32	280	17
1998	122	3 799	0.353	1 667	44	1 583	42	549	14
1999	124	4 968	0.341	2 284	46	2 106	42	578	12
2000	98	3 287	0.310	1 534	47	1 238	38	515	15
2001	93	5 712	0.419	2 513	44	1 877	33	1 322	23
2002	157	4 182	0.515	1 665	40	1 438	34	1 ,079	26

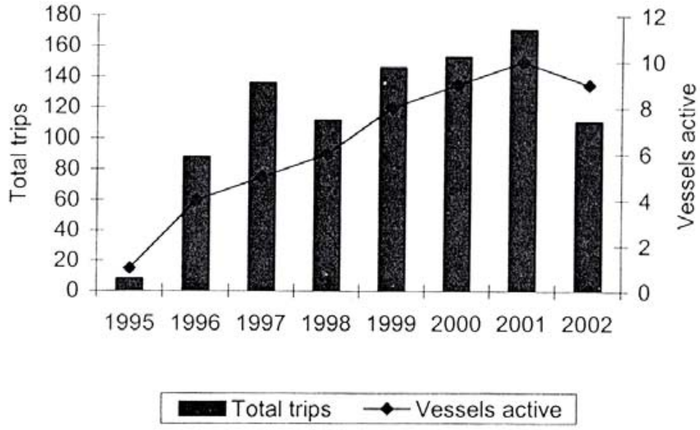
The longline production and the catch rate remain stable for the last nine years. Also the catch rate (CPUE) maintains its stability.

The Semi-Industrial Fishery

The semi-industrial fishery have the swordfish as usual target specie (bycatch consists of yellowfin and bigeye) for the local monofilament longline fishery. However sharks are also targeted.

A total of 111 trips were conducted during 2002 by nine local vessels. In 2001, 171 trips were conducted by ten vessels. Figure 10.3 shows the number of vessels active and total trips conducted since the beginning of the fishery.

Figure 10.3. Total Effort for 1995-2004



Figures 10.4 and 10.5 show the total landed catch and catch rates since the beginning of fishery. The total catch for 2002 was 247 Mt compared to 411 Mt for the previous year (Figure 10.4). The catch estimated for 2002 was 0.52 kg/hook, compared to 0.80 kg/hook reported for the previous year. Figure 10.5 shows that there has been a downward trend in the catch rates since 1999. The catch decrease reported during 2002 is mainly due to the drop in fishing effort; however the drop in catch rate can be attributed to fishing effort diverted to target other species.

Figue 10.4. Total Catch Landed

(1995-2002)

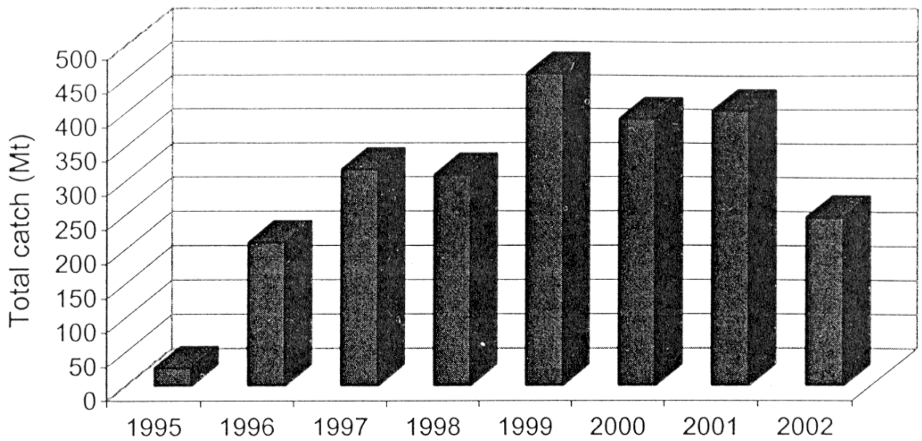
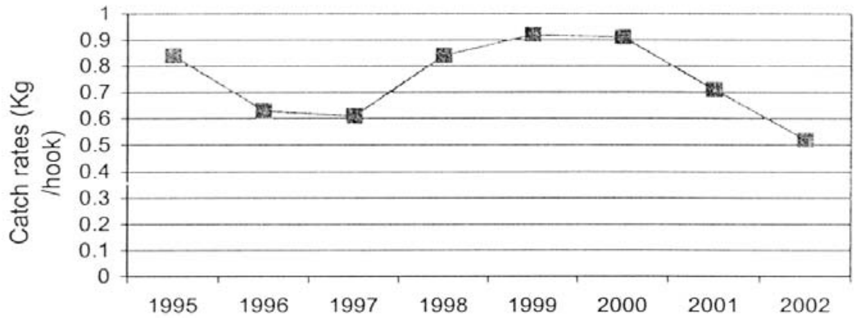


Figure 10.5. Catch Rates (kh/hooks)

(1995-2002)



The loss of catch due to predation reported for 2002 was estimated at 15% of the total catch, compared to 9% for 2001. The most common predators were the false killer whales (*Pseudorca crassidens*) and sharks, identified by the bite marks that they leave on their prey. The remains of a swordfish which had been preyed upon is illustrated below.

The species composition of the total catch reported over the last four years is given in Table 10.8. Swordfish accounts for more than 50% of the species targeted.

Table 10.8. Species Composition of the Reported Catch from 1999 to 2002

Species	1999	2000	2001	2002
Swordfish	50%	52%	51%	59%
Yellowfin	17%	9%	18%	18%
Bigeye	13%	10%	11%	10%
Others	20%	29%	20%	13%

The Artisanal Fleet

The artisanal fleet is composed by small boats: pirogues and outboards. This traditional fishery is practiced near of the coast by the local communities. This fishery is addressed to catch: Trevally, Red Snapper, Jobfish, Emperors, Bonito, Mackerel and Rabbitfish. One of the characteristics of the agreements is also to assure the stability of this activity. The catch Assessment Survey (CAS) of the Research Programme financed by EU agreement addressed to the Artisanal Fisheries generated monthly bulletins of fisheries statistics. The data are summarised in the next table.

Table 10.9. Artisanal Fishery: Catch and Vessel Evolution from 1999 to 2002

	1997	1998	1999	2000	2001	2002
Catch (MT)	4095	3334	4842	4764	4290	4915
Vessels	390	393	420	437	416	395

Around 10% of the vessels are recreational and 30% fish only as part time activity.

The Industrial Tuna Fishing Economic Contribution

Industrial tuna fishing activity is an important source of foreign exchange earning for Seychelles. The earnings consisted mainly of foreign fishing vessels' expenditure on goods and services bought locally, spending by foreign fishing companies based in Seychelles, and access fees for fishing rights in the Seychelles EEZ.

For the year 2002, total revenue generated by industrial tuna fishing activities amounted to 25% of the total gross revenue generated by fishing and related activities. In total a gross amount of SCR 302.21 million was generated by industrial tuna fishing and related activities. Table 10.10 gives an account of the major sources of revenue constituting the gross revenue generated by the tuna fishing activities, whilst Figure 10.6 shows the long-term trends in these major sources of revenue.

Table 10.10. Main Sources of Revenue from Industrial Tuna Fishing Activities 2000-2002

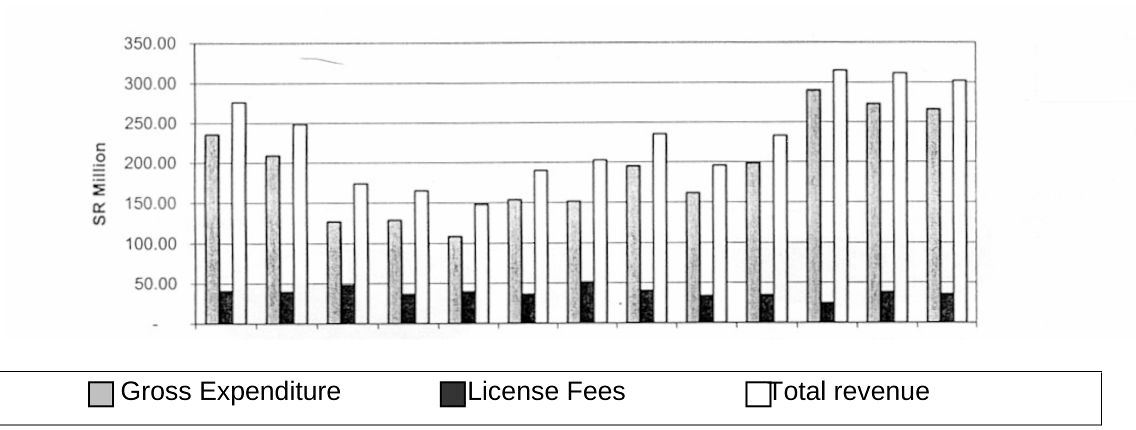
(SCR million)

	2000	2001	2002
Vessels' Expenditure	286.70	269.08	261.44
Companies' Expenditure	3.54	5.52	5.21
License Fees	24.69	38.33	35.55
Total	314.93	312.93	302.21

Source: SFA

Figure 10.6. Revenue from Industrial Tuna Fishing Activities

(1990-2002)



Source: SFA

The long term trends show the growth of expenditures generated by the industrial fleets despite the stability of the amount of licenses fees. Total license fees collected included the EU financial compensation, access rights, and an amount obtained as payment for fines levied for breach of the licensing conditions. Table 10.11 shows the distribution of the payments between EU contribution and the vessels contribution. Table illustrates the main sources of licenses fees and how much each contributes to the total amount collected.

Table 10.11. Major Sources of License Fees 2000-2002

(in SCR million)

	2000	2001	2002
EU Contribution	11.75	18.52	13.78
Purse Seiners	7.03	9.88	13.85
Long Liners	5.86	9.93	7.93
Total	24.64	38.33	35.56

Source: SFA

A sum of SCR 1 449 million was collected in fines for breach of license conditions and SCR 82 270, was collected as payment for licenses for supply vessels.

The Processing Industry

The Seychelles processing industry of tuna is the second in the world in weight and probably the first in value. The last data from 2002 show a production capacity around 90 000 tons. This supposes a production of 360 million of canned boxes. The 14% of tuna conserves of EU are imported from Seychelles.

The processing industry is the first consumer in electricity and water and it is clearly the first source of added value for the Islands. This industry contributes to convert Port Victoria as the first harbour in transhipment of the world.

Some adequate conditions assure this position:

- Good place in the middle of Indic Ocean and Tuna fishing grounds
- Adequate level of wages, that assures the competitiveness of industry
- Status of ACP country in the trade relations with EU
- Adequate origin control of products, that assure the quality of food produced

But also for the viability of this activity it is needed to assure a sustainable production. This production is assured by the fishing agreements, in especial with the EU. By technical and financial reasons, Seychelles do not have the possibility to develop the fishing activities that assure the necessary input for their processing industry.

The Fish External Trade (Exports and Imports)

The European market remained the most important outlet for Seychelles' fish and fish products. In 2002, over 90% of the exports were directed towards the European market, the major product being canned tuna. Table 10.12 summarises the value and quantity for 2001 and 2002 of the main export and import categories of fish and fish products

Table 10.12. Exports (FOB) and Imports (CIF) of Fish and Fish Products 2001-2002

(Mt and SCR '000)

	2001		2002	
Exports	weight	value	weight	value
Fresh and Frozen Fish	455	17 326	477	18 176
Canned Tuna	30 793	771 176	34 791	843 670
Frozen Prawns	251	13 238	218	8 734
Other Processed Fish	3,573	50 393	2 713	47 259
Dried Shark Fins and Sea cucumber	12	1 469	39	2 134
Total	35 084	853 602	38 238	919 973
Total Domestic Exports		892 411		959 609
% of Domestic Exports		*95.7*		*95.9*
Imports	2001		2002	
Live Fish	1.73	99.78	0.53	37.77
Fish, Fresh or Chilled	0.15	1.92	5.14	180.74
Fish, Frozen	78 300.62	369 509.76	90 178.23	380 325.31
Fish, fillets and other fish meat	1.34	43.12	26.61	191.32
Fish, dried, salted or in brine	4.96	300.00	8.95	1 607.62
Molluscs and Crustaceans	181.86	4 266.21	201.24	3 456.29
Others	1.05	29.93	2.78	112.81
Total	78 491	374 250	90 423	385 912

Source: MISD and Customs Division

The import of frozen tuna as raw material for the canning factory remained the most significant imported product accounting to over 98% of total imports of fish and fish products. Whilst the volume of imports grew in 2002 by 10.7%; on the other hand the value registered a drop of about 19%, which may suggest depressed prices for these products during the year 2002 or an appreciation of the local currency *vis-à-vis* other main traded currencies.

Trade in fish and fish products is an important economic activity in the Seychelles, having a major influence on the country's balance of payments as a substantial amount of foreign exchange currencies are earned by the sector.

For the year 2002, a total of 42 946 Mt of fish and fish products were produced locally whilst a further 90 423 Mt were imported. Overall the total gross inflow of foreign currencies from fisheries and related activities would amount to approximately SCR 1 222 billion, 4.8% higher than in 2001. Whilst the visible imports amounted to a total SCR 385 912 million in 2002, the value of imports of other inputs and services required by the industry cannot be adequately ascertained at this point in time to enable the estimation of net contribution of the sector to the balance of payment.

Gross current account achieved SCR 3 161 billion in 2002, which includes trade in goods and services plus income and current transfers; the total inflow generated by fisheries and related activities amounted to approximately 39%, about a percentage point higher than in 2001.

Table 10.13. Inflow of Foreign Currency Generated by Fisheries and Related Activities 2001-2002

(SCR million)

	2001	2002
Visible Exports	853 602	919 973
Revenue from industrial tuna fishing	312.93	302 210
Gross inflow from Fisheries (a)	1 166.532	1 222.183
Current Account Receipts (b)	3 072.800	3 161.100
(a) as % of (b)	37.92	38.60

Source: Central Bank of Seychelles, SFA

According to official figures from the Central Bank, the gross inflow from fisheries and related activities would be about 48% higher than earnings from tourism, which registered an increase of 7.4% in 2002, to reach SCR 827 million, and which accounted for about the 26% of the current account receipts.

Research Activities

The research programme, Thons Tropicaux: Environnment, Stratégies d'Exploitation et Interactions Biotiques dans les Ecosystemes Haturiers (THETIS), set-up by the Institute de Recherche pour le Développement (IRD) for the period 2001-2004, continued during the year 2002. Its aim is to better understand the meso-scale biophysical processes that are controlling the dynamics of pelagic ecosystems, with an emphasis on tuna populations and their relationship with other top predators and their preys. During 2002, a total of three research cruises were undertaken by the SFA's research vessels "L'Amitié" in support of THETIS. During the cruises, 170 otoliths, 250 tissue samples, 517 stomachs of pelagic species, mainly tuna and other top predators (swordfish, marlin etc.), were collected. The areas covered were the North-eastern region of Seychelles and Somali basin.

Isotopic analyses of tissue samples have not yet been initiated. However the stomach content study has been completed and the main prey groups identified down to family level. Further analyses will be done to identify prey down to species level, and a data base will be developed.

Preliminary results show that tuna are opportunistic feeders that shift their feeding regime according to seasonal availability of their prey. During May to October, the Stomatopod, *Natosquilla investigatoris* (mantis shrimp), was found to be the dominant prey species in the tuna diet. The mean size of the individual prey increased from 4 cm in May to 7 cm in October. During November to January the red crab *Charybdis edwardsii* was the main prey species, whilst *Cubiceps pauciradiatus* was the main species of fish in the tuna's diet.

During July 2002, a cruise on board the R/V CURIEUSE, of the Institut Français pour la Recherche et la Technologie Polaire, was conducted in Seychelles' waters. The purpose of this cruise, "Ecologique Trophique dans les Econsystèmes Marins", was to study the space-time variability and the diversity of prey species in the area of Seychelles, where tuna purse seiners and longliners operate throughout the year. The density and abundance of seabirds and marine mammals were also estimated along linear transects by researchers of the Ecologie Marine Laboratory (Univ. of La Réunion), the goal being the integration of "seabirds" and "marine mammals" components into the trophic model. Every 60 miles, hydrological analysis was also conducted. The data collected are being analysed and the results were to be published during 2003.

Foreign Fishing Agreements

The delivery of licenses to foreign fleets beginning in 1979, after the EEZ declaration in 1978. These licenses are only over the Tuna and similar species, and have very strictly conditions. In the recent times it has become compulsory for all vessels to use VMS (Vessel Management System) devices, which allow controlling their position and activity in every moment.

The agreements have a long tradition. Since 1984 exists an agreement with the EU. A total of successive six agreements have been established.

The new protocol to the EU/Seychelles Fishery Agreement[4] which had been initiated in Seychelles on the 28th September 2001, became applicable, starting from 18 January 2002, and will be effective for a period of three years. This Agreement is established for the period 2002 to 2005. The agreement is based on the scientifical analysis on potential resources. This analysis was developed with EU support and local participation. The rules of the agreement are applied in the IOTC framework (Regional Fishing Organisation).

The EU introduced on their vessels a satellite monitoring system. In this agreement the VMS (Vessel Management System) devices become compulsory. This assures that the vessels position and activity are controlled in every moment. The protocol concerning the procedures to be adopted for the transmission of data relating to satellite monitoring of the position of EC vessels was signed in January 2002.

The protocol allows for the possibility of licensing 40 ocean-going tuna annum. The financial contribution of EUR 3 480 000 for the three year period is broken down as follows:

1. EUR 1 230 000 for the development of local fisheries;
2. EUR 1 000 000 for the setting up and development of a monitoring, control and surveillance system, including appropriate technical assistance;

4. EU Council Regulation 923/2002, 30 May 2002

3. EUR 950 000 for scientific and technical programmes aiming at greater knowledge of fish stocks.
4. EUR 300 000 for training courses in the various scientific, technical and economic fields linked to fishing and for attending international meetings.

The agreement supposes also the contribution from the vessels owners, under the next conditions:

- Seine: EUR 10 000 per vessel per year, allows to fish 400 tons.
- Longline: EUR 2 000 per vessel (>150GT) per year, allows to fish 80 tons.
EUR 1 500 per vessel (<150GT) per year, allows to fish 60 tons.

This payment is independent of the catches. If the catches surpassed the limit, then the owners pay EUR 25 per ton.

In October 2004, the European Commission, on behalf of the European Union, and the Seychelles have initialled a new 6-year fisheries protocol to their fisheries agreement, from 18th January 2005 to 17th January 2011. This protocol reflects the EU move from traditional fisheries agreements to fisheries partnership agreements based on cooperation and dialogue to achieve sustainable fisheries in the waters of the partner country concerned. In this context, Seychelles will reduce the fishing effort of tuna long liners by 15% by 2006. The EU financial compensation has gone up from EUR 3.4 million to EUR 4.125 million a year. Almost 40% of this amount has been earmarked for promoting responsible fishing, particularly through control, monitoring and enforcement activities. License fees paid by vessel owners have been increased by 50% to EUR 15 000 for seiners, and to EUR 2 250 and EUR 3 000 for long liners. The number of tuna seiners remains the same at 40 while the number of long liners will be reduced from 27 to 12, reflecting the targeted cut in fishing effort by this category of vessels. Fishing possibilities increase, on the average over the last three years, from 46 000 to 55 000 tonnes.

Other agreements are established with countries and private associations.

The Maurice agreement supposes a delivery of licenses to 5 seines and 1 longline.

A private agreement was established from 1988 with the Federation of Japan Tuna Fisheries Cooperative Associations (Japan Tuna) and the National Federation of Fisheries Cooperative Associations of Japan (Zengyoren). The agreement was renewed in yearly bases after certain minor modifications to the license payment. Each license has validity for 90 operative days.

Other private agreement is established with Export and Tuna Producers Taiwanese Association under monthly bases.

But these other agreements are very far from the importance and stability provided by the EU agreement.

Conclusions on the impact of EU agreement

The Seychelles have 20 years experience in fishing agreements. The Republic has not financial or technical resources to develop the industrial Tuna fisheries: But on the other hand have a large EEZ, which in the framework of UNCLOS can provide resources to develop the country and improve the incomes of their population.

The specific conditions of the agreements have changed in these years. In particular, the cost of the licenses produced long negotiations to determine a satisfactory price for the parts. In any case, the Seychelles prefers sustainable agreements that with the participation of the administrations can be more secure: fixed prices and medium term periods[5].

Control and research improved in this period with the support of EU agreements. An ambitious research plan that covers not only the fisheries but the environment problems (related with the tourism industry) is being developed in the last years. The VMS system control is developed with the support of the EU agreement, including the creation of a new control centre.

The production is stable and does not affect the artisanal fisheries that have reserved areas around the islands. The sustainable objective has been assured for the last 20 years.

The sustainability contributes to sustain the income of the foreign vessels, the national fishermen but also the tourist activities.

Thanks to the Financial Transfers from the external agreement, the transport infrastructures in Port Victoria are being improved, which has a positive impact in the tourism, fisheries and trade activities.

The Financial Transfers from the external agreement allow preserving the natural resources and environment of Seychelles Republic. The most important items in this area are:

- Provide resources to participate in the regional fishery organisation (IOTC)
- Provide control means as the development of control systems (VSM)
- Provide research means and formation
- Provide administrative means to regulate the fishery

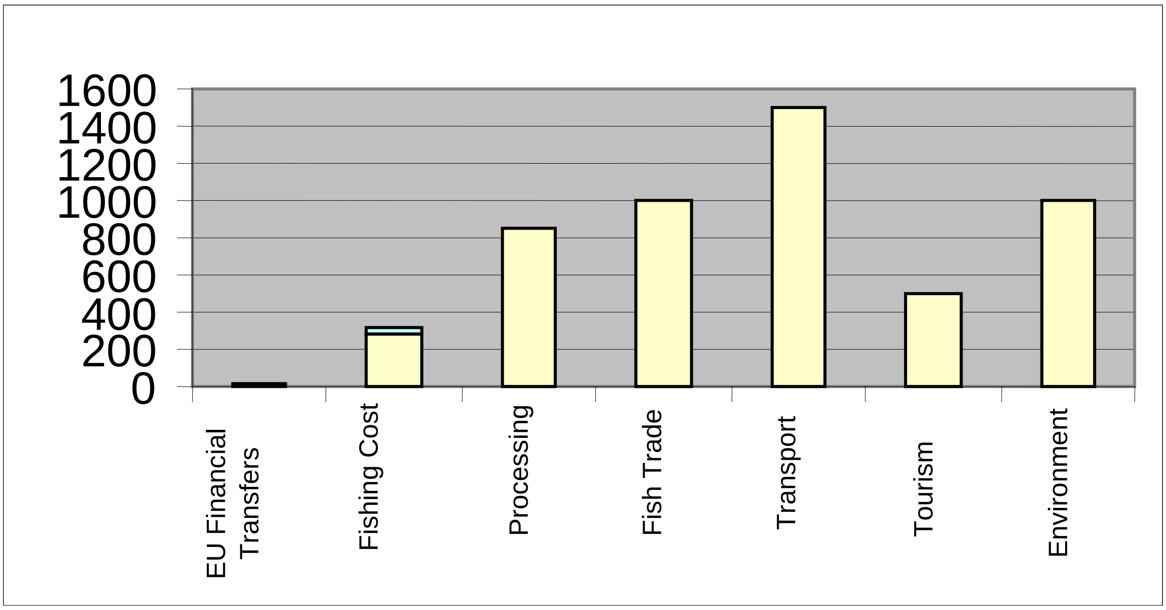
With this mechanism, in the framework where the agreement is developed, it was possible to assure the sustainability of the resource, the catch, the local communities and their incomes.

The financial transfers from the EU agreement allow developing an integral use of the resources of the Seychelles Republic, the development of processing industry, the tourism industry and the transport infrastructures. The financial transfers are then not only addressed to the European fishing industry and so it is not adequate to suppose that these transfers affect and are addressed only to these users.

The Financial Transfers from the external agreement help the development of the Republic and contribute to improve the standard life level of the Seychelles population.

5. Philippe Michaud (SFA Counsellor), *"L'expérience de l'accord de pêche bilatéral portant sur l'accès aux zones de pêche, impact sur l'économie et implications pour les Seychelles des résultats de la médiation de l'OMC sur le dossier du thon qui oppose l'UE à la Thailande et aux Philippines"*, 2003.

Figure 10.7. Add Value Distributed by Sectors in Seychelles Republic



In Figure 10.7 we show the weight of the EU financial transfers in relation to the cost of the fishing activity. This cost includes the fees paid by the EU owners to acquire the licenses.

The figure includes the estimated added value of different sectors that depend of the agreement. Some sectors have a direct relation: fish trade, processing and transport (basically fish). Others have an indirect relation. If there is no airport activity, the tourism activity would probably suffer an important reduction because in this case, to arrive to Seychelles could be much more expensive. The environment preservation, without research and external support for monitoring could be difficult to assure, and then the natural resources could be damaged.

In fact, it is very difficult to evaluate exactly all impacts of the EU agreement, but it is clear that they are not limited to the fishing activity.

Chapter 11

Fisheries Subsidies in Norway[1]

Introduction

Fisheries subsidies in Norway have a long and interesting history. In the first years after the Second World War the fisheries of Norway were quite profitable, and reserve funds were accumulated through levies on exports of fish. After a few years the fishing industry began to lag behind other industries in terms of productivity, and the funds were used to support declining incomes in the industry. Gradually the funds were depleted, and in the latter half of the 1950s the government began to provide financial support to the industry.

Initially government support to the industry was given on a year by year basis, in response to demands from the Federation of Norwegian Fishers (*Norges Fiskarlag*), an interest organisation comprising both boatowners and employees on fishing boats in Norway. In the beginning this support addressed what was regarded as an extraordinary emergency, but as it became clear that the bad times would not go away it was deemed necessary to deal with the issue from a longer time perspective. Two committees appointed by the government considered this issue in the late 1950s and early 1960s. The first, appointed in 1957 and concerned with the groundfish fisheries (*Torskefiskeutvalget*), emphasized the need for a fisheries policy which made it possible for the industry to make ends meet without subsidies from the government. It did, however, endorse a temporary support while the industry was solving its problems, but stressed that this support should be given in forms that promoted greater efficiency.

This notwithstanding, government support of the industry increased from year to year (see Figure 11.1). A new committee was appointed and delivered its report in 1963. One of its recommendations was the establishment of a formal agreement between the government and the Federation of Norwegian Fishers regarding government support of the industry. This support had up to that time been given on an annual basis, in response to difficulties that proved recurrent rather than transient. The committee felt that general procedures and guidelines for subsidies ought to be established, but that the purpose of this support should be to enable the industry to stand on its own feet. The committee saw the industry as being in need of a major restructuring in order to obtain incomes for labour and capital owners on par with other industries and considered economic support by the government as a means to achieve this restructuring. The committee stressed that

1. This chapter was prepared by Dr. Rögnvaldur Hannesson,, Center for Fisheries Economics, the Norwegian School of Economics and Business Administration. The views expressed in the chapter are those of the author and do not necessarily reflect the views of the OECD Committee for Fisheries or its Member countries.

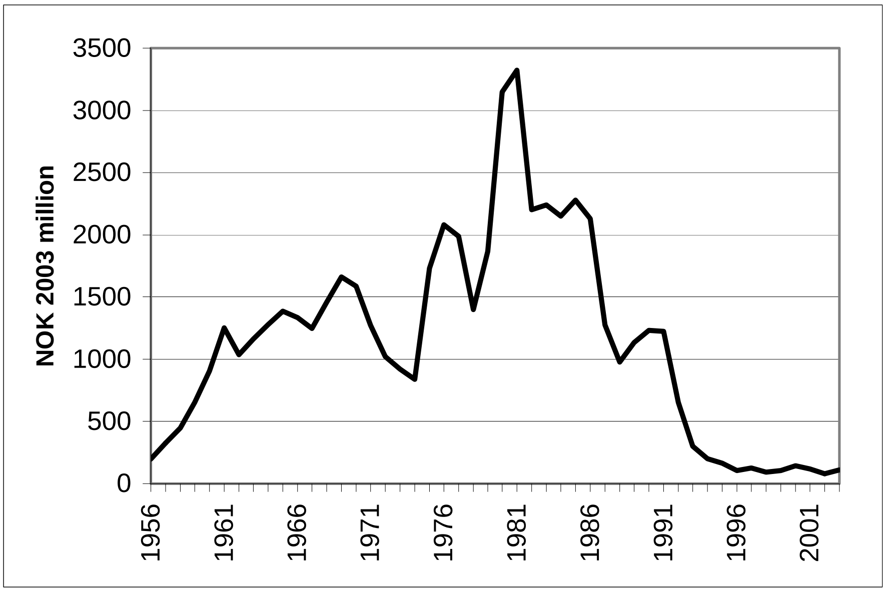
subsidisation of the industry must be temporary and extraordinary, to be provided in ways that over time would make itself redundant.

Such was not to be. The recommendation that there be put in place a formal agreement between the government and the Federation of Norwegian Fishers was heeded. In 1964 the Norwegian Parliament endorsed an agreement, usually referred to as the General Agreement (*Hovedavtalen*), with the Federation. This agreement gave the Federation a right to demand negotiations with the government whenever the revenues in the industry were insufficient to provide incomes for fishers par with comparable occupations. Far from making itself redundant, this agreement turned into a vehicle for a recurrent and for many years increasing flow of subsidies to the industry.

Figure 11.1 shows government subsidies to the Norwegian fisheries, from 1964 according to the General Agreement, in constant value of money. Far from making themselves redundant the subsidies increased, with some ups and downs, to a peak in 1981, at which time they amounted to about 70% of the value added in the industry.[2]

Figure 11.1. Government Subsidies to Norwegian Fisheries according to General Agreement

(from 1964 to 2001)



Source: Ministry of Fisheries, reports to Parliament on fisheries subsides, various years, and national budget documents.

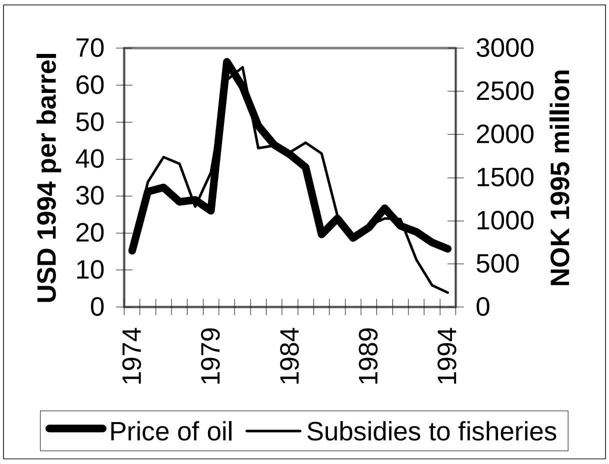
What accounts for this development? Over time the Federation of Norwegian Fishers developed considerable negotiating skills. It managed to sell the idea that the fisheries were about other things than just generating incomes for those who work there, such as keeping small fishing communities viable. Nevertheless, fishers' incomes ought to be comparable with the rest of the economy. The difference was expected to be made up by the government. Several factors promoted this way of thinking. One was the subsidisation, and protection through tariffs and import restrictions, of Norwegian

2. The subsidies were NOK 1 135 and 1 345 million, respectively, in 1980 and 1981 while the remuneration to labour and capital was NOK 1 580 and 1 877 million (*Statistics Norway, Fisheries Statistics*).

farmers. Fishers compare themselves in many ways to farmers; both industries are rural and both produce food, but in Norway the difference between the two is that fishing is based on favourable natural conditions while Norwegian farming is hampered by a cold and unfavourable climate. So, while the Norwegian fisheries are a major export industry, farming in Norway needs protection from foreign competition in order to keep itself alive.

Fishers did also get much help from the fact that Norway discovered an immense resource wealth from the late 1960s onwards in the form of oil and gas deposits in the continental shelf. The basic challenge faced by any country which makes such discoveries is how to turn such non-renewable resource wealth into a renewable wealth that may provide lasting benefits to the nation. For a surprisingly long time, however, the Norwegian debate on the oil and gas issue was dominated by how to absorb the very considerable revenues of the oil and gas extraction into the economy without generating problems such as high inflation and too rapid deindustrialization. There is little doubt that this resource wealth made Norwegian governments of shifting political hue more spendthrift than they would otherwise have been.[3] In fact the correlation between the price of oil and the subsidization of the fishing industry was for many years astonishingly high (see Figure 11.2). It is not likely to have been caused simply by higher crude oil prices feeding into higher fuel prices and a greater "need" for subsidies; it is highly likely to have been associated with how much money the government thought it could afford to spend on various "worthy" causes, including fisheries subsidies.

Figure 11.2. The Price of Crude Oil and Fisheries Subsidies in Norway



But, as we can see from Figure 11.1, the subsidies eventually came down, and the fishing industry is now again self-supporting.[4] What did the subsidisation accomplish? Most likely very little, except delaying the structural adjustments necessary to make the

3. Most of the pure profit (resource rent) from oil and gas ends up with the Norwegian government. The tax rate on incomes from oil and gas is 78%. The government also gets considerable income from equity sharing in oil and gas projects.

4. Even if the subsidies have not been totally eliminated, it is more than likely that industry profits over and above what is needed to maintain the capital in the industry exceed the remaining subsidies.

industry self sustained. In this paper we shall examine whether this is indeed true or not by looking at the investment and employment in the fishing industry and compare them with the subsidies. What we expect to see is subsidies encouraging investment (or discouraging disinvestment) and increasing the employment in the industry or retarding its decline.

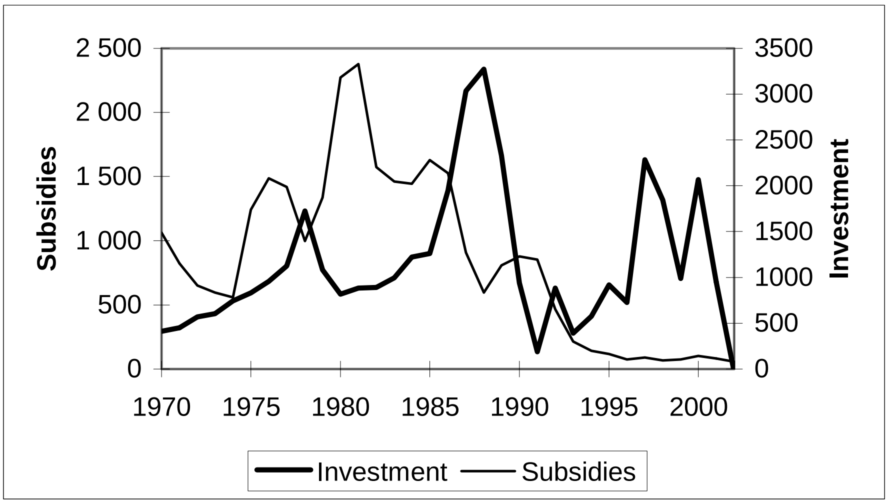
The economic theory of fisheries tells us that subsidies to open access fisheries lead to depletion of fish stocks through encouraging investment and employment in the industry. There are some problems in verifying whether the Norwegian reality conforms to this. The theory presupposes open access to fish stocks and no limit on the catch. After the establishment of the exclusive economic zone in 1977 most stocks exploited by Norwegian fishers came under a total quota regime. For some stocks, Northeast Arctic cod for example, this quota regime did not become fully effective until the early 1980s because the Norwegian coastal fleet could continue fishing even if the Norwegian share of the total quota had been taken. Hence, after 1980 or so, there is little reason to expect the subsidies to have had much effect on the stocks, provided the quota control has been effective. Any excessive investment in boats and employment of labour would under those circumstances have had the effect of shortening the fishing season, as is well known to have happened in other places where there have been restrictions on the total catch but no individual quotas or restrictions on participation in the fishery. Indirectly, however, there may have been an effect, through pressure from an industry with excessive capacity for larger quotas in order to keep the propellers turning.

The other reason why it may be difficult to find a connection between Norway’s subsidies and the status of the fish stocks is that almost all stocks exploited by Norwegian fishers are also exploited by fishers from other countries. Hence, the status of these stocks is as much determined by what the fishers and the governments in these countries do as by what the Norwegian government and the Norwegian fishers do. Therefore, what may appear as an effect of Norwegian subsidies may have been caused by some other country. We do not have the necessary data from other countries to pursue this question but shall nevertheless contrast the development of the Northeast Arctic cod, the most important stock exploited by Norwegian fishers, with the development in subsidies, as the cod fisheries got the major part of the fisheries subsidies.

Finally, all subsidies need not be bad for the development of the industry. The two committees that dealt with the Norwegian subsidies over forty years ago envisaged them as tools to restructure the industry and make it self-supporting. That effect was long in coming, if at all present, for the industry as a whole, but does not preclude that some subsidies did have such an effect for parts of the industry. The decommissioning grants to the purse seine fishery are an example of that and one which we shall look into.

Investment and Subsidies

Figure 11.3. Fisheries Subsidies (NOK 2003 million) and Gross Investment in Fishing Boats (NOK 2002 million)



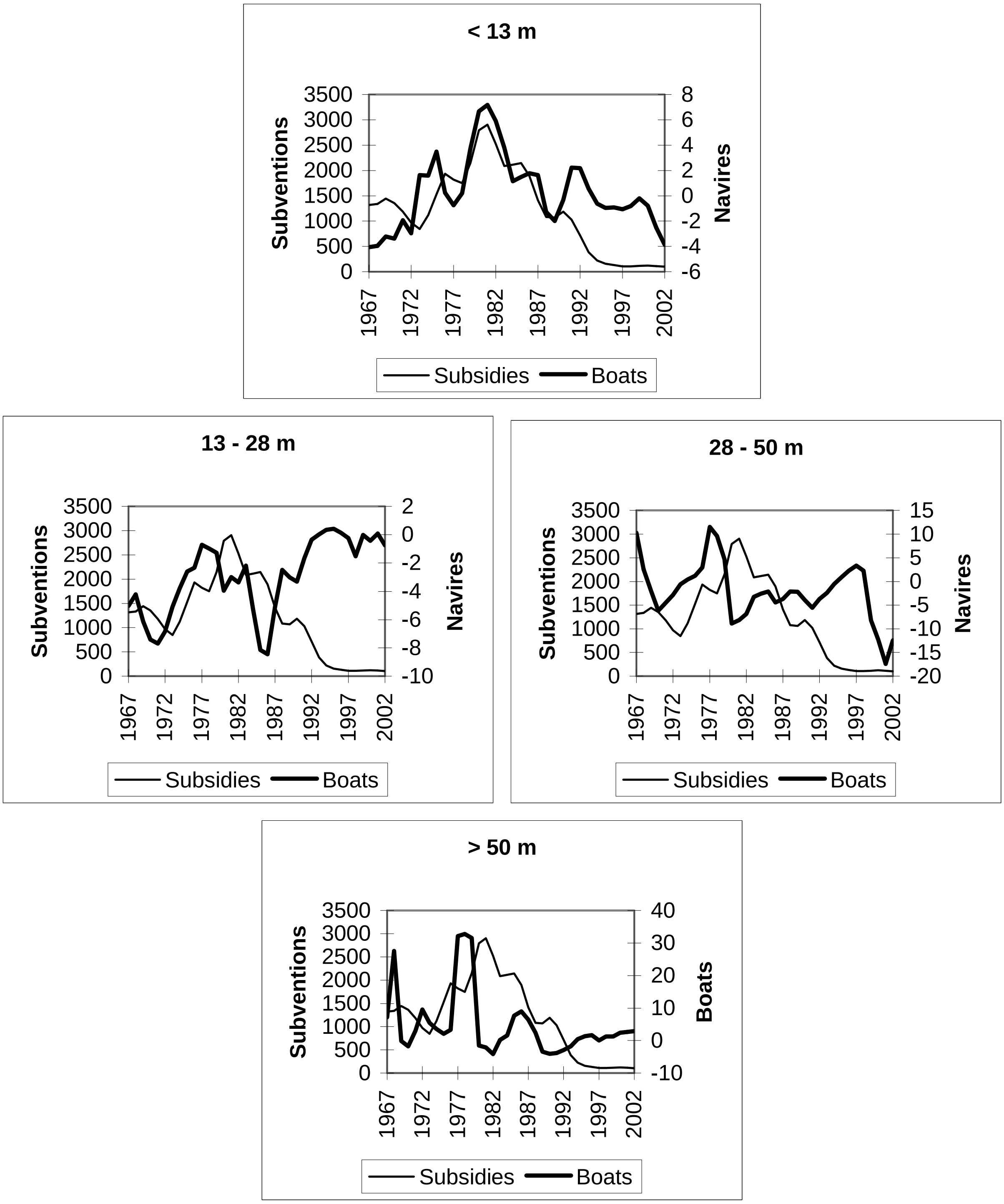
Source: Statistics Norway.

Figure 11.3 shows gross investment in fishing boats and the fisheries subsidies since 1970. There is no positive correlation between the two, and the diagram suggests a negative one, which is however insignificant. From this it would seem that the subsidies had no effect whatsoever on the investment in fishing boats.[5] This is not what we would expect. One possible explanation is that the subsidies affected mainly certain segments of the industry; the industry consists of different fisheries which exploit different stocks and use different technologies. It is often the case that one segment of the industry is doing well while another is in trouble. Since the subsidy regime was designed to mainly affect those who were in trouble it is possible that the effect of subsidies gets lost in the noise from other effects.

5. The data on gross investment was obtained from Statistics Norway. The data on fisheries subsidies is from Fisheries Statistics, published by Statistics Norway. The latter deviate slightly for some years from the data used for the first years in Figure 1, which was compiled from various annual reports on the implementation of the General Agreement issued by the Ministry of Fisheries.

Figure 11.4. Fisheries Subsidies (NOK 2003 million) and Change (%) in the Number of Boats in Different Length Groups

(Three Year Moving Average)



Source: Statistics Norway and Directorate of Fisheries.

There is no time series available on investment in different types of fisheries, but we do have information on the number of fishing boats by size group and by year of construction. The change in the number of boats is likely to be a good proxy for the investment. Figure 11.4 shows the change in the number of registered boats in different size classes and the fisheries subsidies. Both series have been smoothed by taking a three-year moving average. There are two reasons for this. First, one would expect that the effect of subsidies on investment would occur over some time and that persistent subsidies would have a greater effect than transient ones. Second, there have been two changes in definitions of the size groups over the period, which may have shifted some vessels from one size group to another.[6]

Judging from Figure 11.4 there appears to be a quite close correlation between the subsidies and the change in the number of boats less than 13 meters. For the next two groups (13 - 28 and 28 - 50 meters) this correlation is less obvious and, what is more, it appears that the investment in boats leads the level of subsidies and not the other way around. We usually think of subsidies as stimulating investment, so if anything subsidies should lead investment, partly because it takes time to make a decision to invest and to have the boat built. The opposite causal relationship is not inconceivable, however. Investment in boats which were not really required would not have added anything to the total revenue in the industry while the total costs would have increased, reducing overall profits in the industry. Since the subsidies were supposed to be based on the annual cost and earning studies of the fishing fleet, excessive investment could with some time lag have given rise to higher subsidies. After the late 1980s, when the subsidies were on their way to virtually disappear, whatever relationship there may have been between subsidies and investment for these vessel groups disappeared; there has been a substantial growth in this fleet segment since the late 1980s.

For the remaining group (over 50 meters) there is even less of a relationship between subsidies and the number of vessels. We may note, however, the investment peak occurring in the late 1970s. This was followed by a subsidy peak in the early 1980s. This development is consistent with the explanation that investment in new boats led to lower incomes through declining catches per boat and higher costs, leading to an increase in the "need" for subsidies.

The fact that the subsidies seem primarily to have led to investment in small boats is not entirely surprising. Much of the subsidies went to the groundfish sector fishing cod and similar species. The small craft are primarily engaged in this fishery. This is also the fleet segment where entry was easiest; the capital needed is relatively small. The fact that the largest boats are also the most expensive ones and investment in these boats was apparently not very sensitive to the subsidies could explain why we did not find much of a relationship between the gross total investment in fishing boats and subsidies.

The change in the number of boats from year to year is a net investment, being the result of additions to and removals from the registry of fishing boats. It is possible that figures on gross investment would be more appropriate to use, as some boats might not be removed from the registry until well after they have been taken out of use. Figure 11.5

6. The data on vessel numbers have been collected from reports from the Directorate of Fisheries showing the number of registered fishing vessels of different sizes. We have aggregated the information in these reports into the size groups shown here. Before 1978 the vessel length was measured in feet and not in meters. In 2000 the reports began to use 28 meters as a critical limit. For earlier years we have used 25 meters instead of 28.

shows the number of new boats.[7] This ought to come close to representing gross investment in boats. For boats less than 30 meters there appears to be a connection between the number of boats and subsidies, but for boats over 15 meters the number of boats appears to lead subsidies and not the other way around. This is not consistent with subsidies causing the change in the number of boats but rather with overinvestment in boats increasing the "need" for subsidies, as earlier discussed. For boats over 30 meters there appears to be no relation between subsidies and the number of new boats built.

Hence subsidies do not appear to have caused investment in new boats, except for the smallest ones, and there is some indication of the reverse causality, namely that investment in new boats has led to more subsidies a few years down the road.

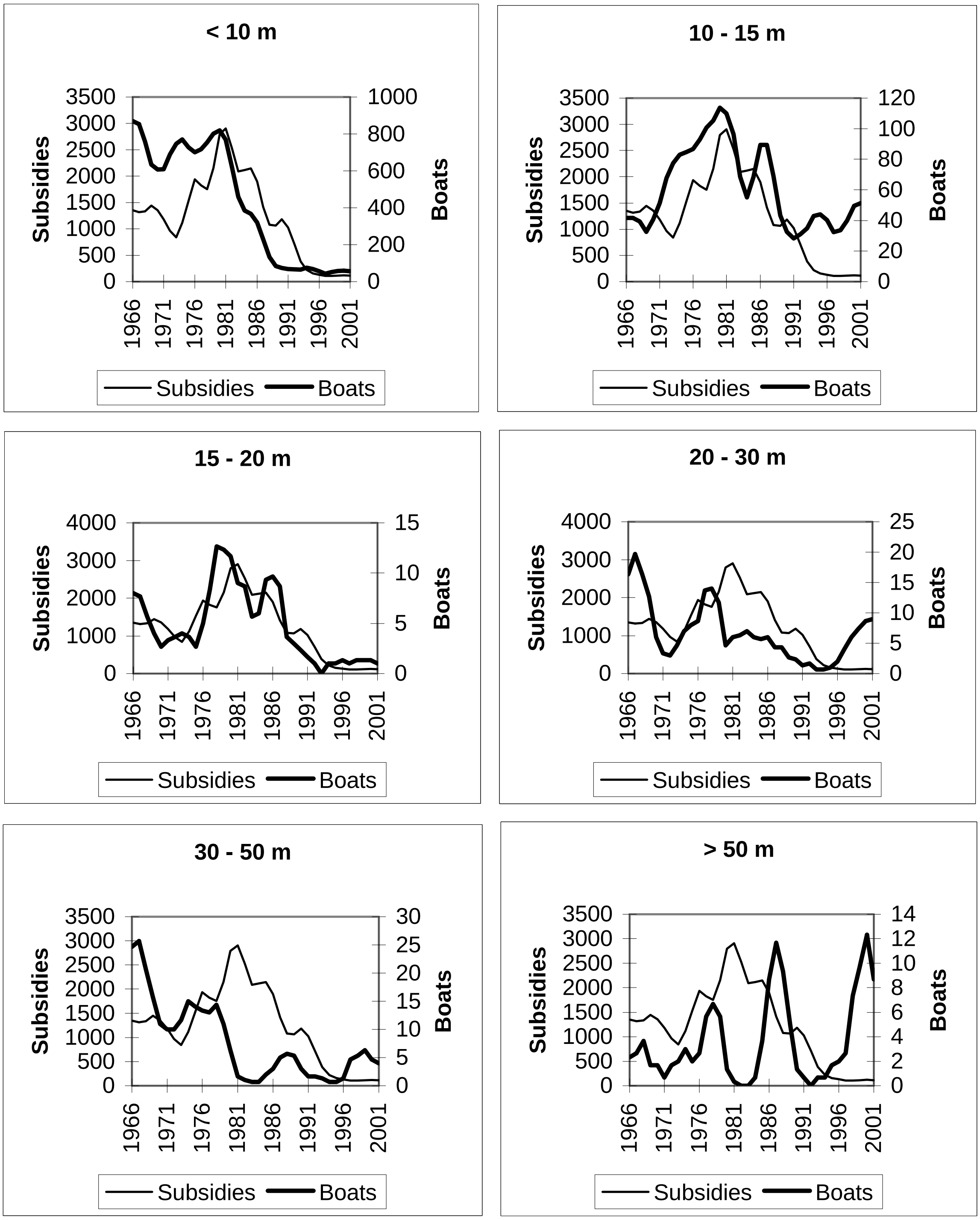
But there are different kinds of subsidies. Some were price subsidies, others encouraged scrapping and selling of fishing boats, and yet others subsidized investment in fishing boats by outright grants and subsidization of interest payments. Over the years there have been investment grants and interest subsidies paid to the fishing industry in addition to the subsidies based on the General Agreement. These investment subsidies have been paid through what used be the Government Bank for Fisheries (*Statens Fiskarbank*), which in 1996 was integrated into the Government Bank for Rural Development (*Statens distrikts- og utviklingsfond*). Figure 11.6 shows the investment subsidies to the fisheries channelled through these two institutions since 1976. These figures may be incomplete for the years up to 1991, and there may have been such subsidies prior to 1976, but this awaits further investigation. The figure also shows the subsidies based on the General Agreement. In relative terms the investment subsides were of minor importance until the 1990s, when the General Agreement subsidies fell to a very low level.[8]

7. These figures have also been compiled from the reports published by the Directorate of Fisheries and based on the boat registry. We have used the number of boats built in year *t* as registered in year *t*+1 (for some years we have had to use figures for earlier years of building, due to incomplete data series). Not all boats are completed in the year the building commenced, and it turns out that the number of boats built in year *t* continues to increase for two or three years afterwards. On the other hand, some boats might be sold out of the country relatively quickly, so we have decided not to go further back than one year, as each boat should not take more than one year to be completed. Import of used boats from other countries would not be covered by this if they are more than one year old. Note that the division into size groups is different for this set of data.

8. These investment subsidies comprise both investment grants and interest subsidies on loans. From 1996 onwards these are reported explicitly in the budget documents of the Ministry of Finance. Such allocations to the Fisheries Bank are also reported for the years 1993-1995. For 1986-1992 there are only aggregate figures for the ministry's allocations to the Fisheries Bank, from which we have subtracted NOK 17 million each year, which is approximately the difference between the total allocation to the Fisheries Bank and the reported investment subsidies for the years 1993-1995, presumably covering administrative costs. For the years 1982-85 there are no reported allocations to the Fisheries Bank, while there are some such subsidies reported for 1976-81. It may be noted that the Norwegian credit market was regulated until the 1980s, with government banks providing loans at low interest rates and with the interest rates in private banks also being controlled. Investment in fishing boats in the years until the interest rate regulations came to an end may have been limited by the budget of the Fisheries Bank, although the option of financing such investment through private banks was in principle open.

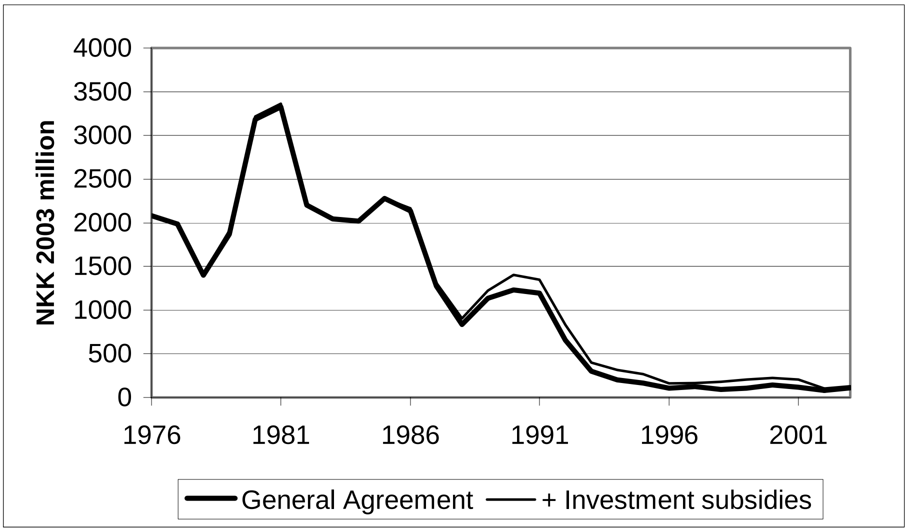
Figure 11.5. Fisheries Subsidies (NOK 2003 million) and the Number of New Boats in Different Length Groups

(Three year moving average)



Source: Statistics Norway and Directorate of Fisheries.

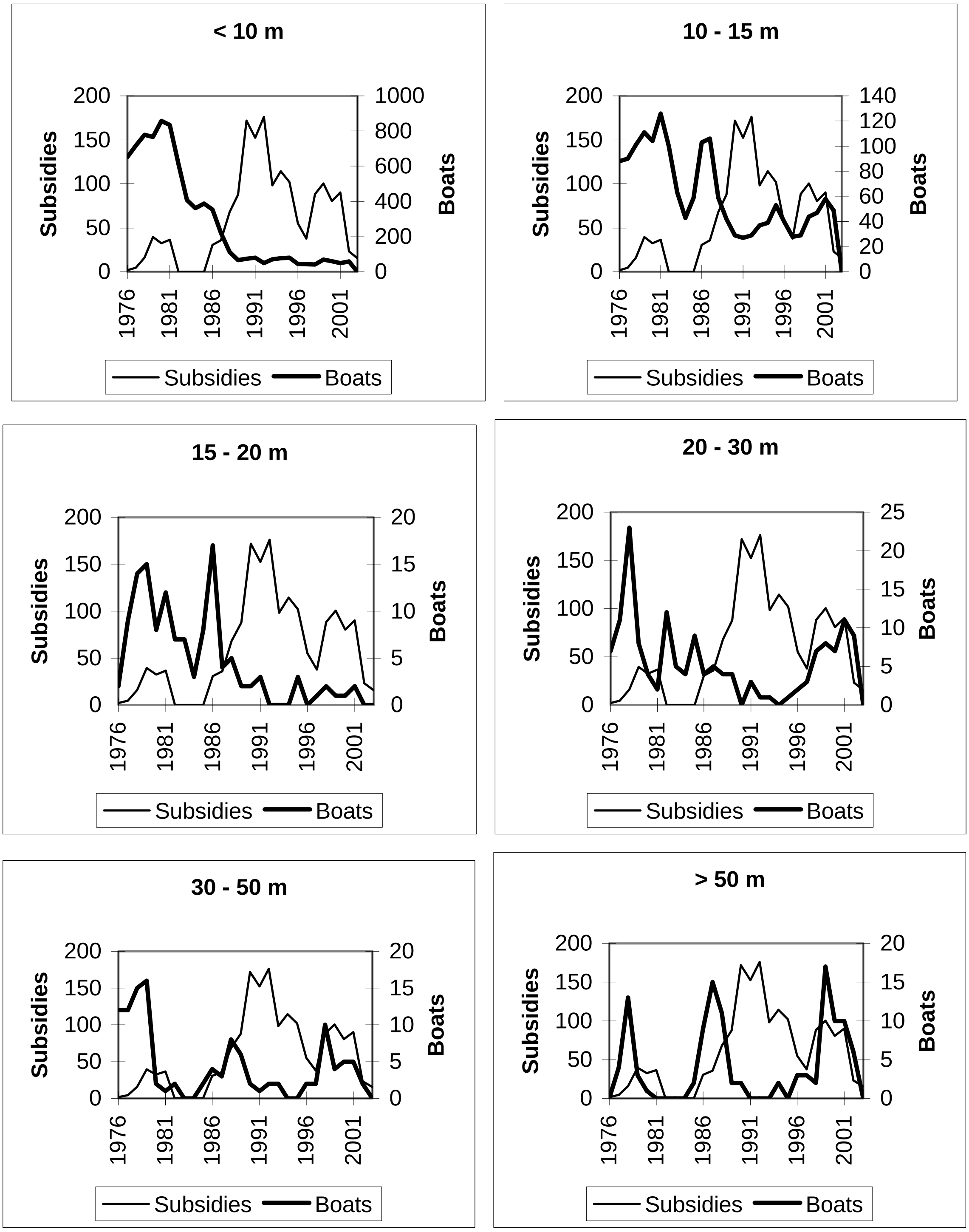
Figure 11.6. Subsidies According to the General Agreement and Investment subsidies through Government Banks



Source: Minstry of Fisheries, annual government budget (St. meld. nr. 1), various years.

Figure 11.7 shows the investment subsidies and the number of new boats (the time series have not been smoothed in this case). These subsidies were highest in the early 1990s, but do not appear to have had any effect on investment at that time. In the late 1990s, after the ordinary subsidies virtually disappeared, a relationship can be detected between the investment subsidies and investment in boats over 20 meters and in the 10-15 meter group. In the late 1970s the investment subsidies apparently mainly stimulated investment in small boats (less than 20 meters).

Figure 11.7. Investment Subsidies (NOK 2003 million) and the Number of New Boats in Various Size Groups



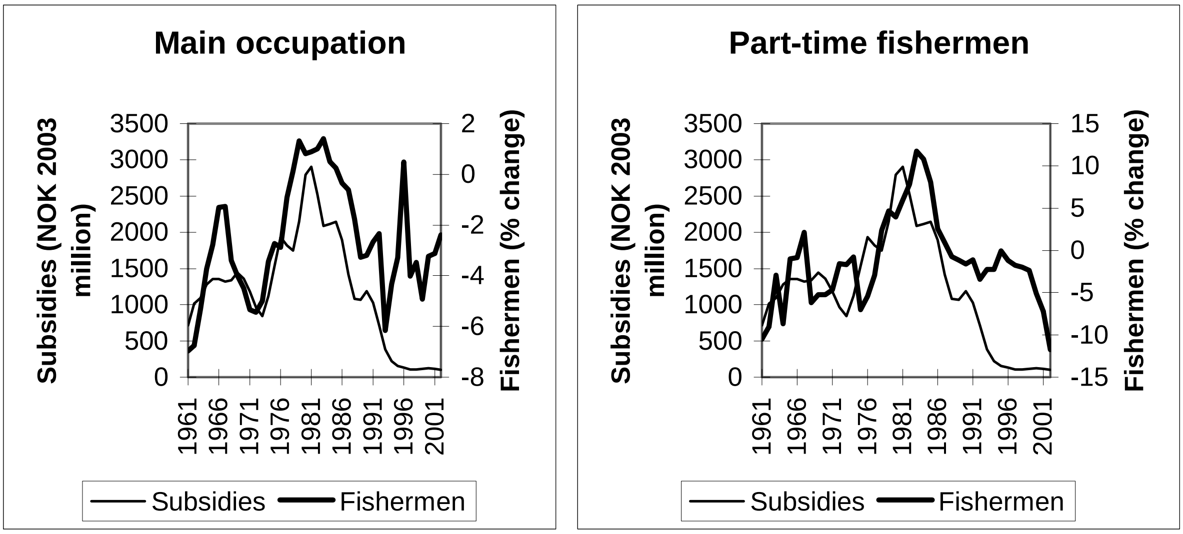
Source: Statistics Norway and Directorate of Fisheries.

Subsidies and employment

In Norway there is a registry of fishers. This registry keeps track of whether fisheries are a partial or a major source of income. In 1982 the registry was revised and the definitions changed, and so the numbers before and after are not comparable, strictly speaking, and numbers for 1982 are missing. We have dealt with this by looking at the change in the number of fishers from year to year, interpolating the change between 1981 and 1983. Partly for this reason, we have looked at a three-year moving average, both for the change in the number of fishers and the level of subsidies. Furthermore, as for investment, the effect of subsidies on the number of fishers should be expected to be spread over some time, and persistent subsidies are likely to have more effect on the growth in the number of fishers, or on slowing their decline, than transient ones.

Figure 11.8. Fisheries Subsidies and the Change in the Number of Fishers with Fisheries as Main Source of Income

(Three year moving averages)



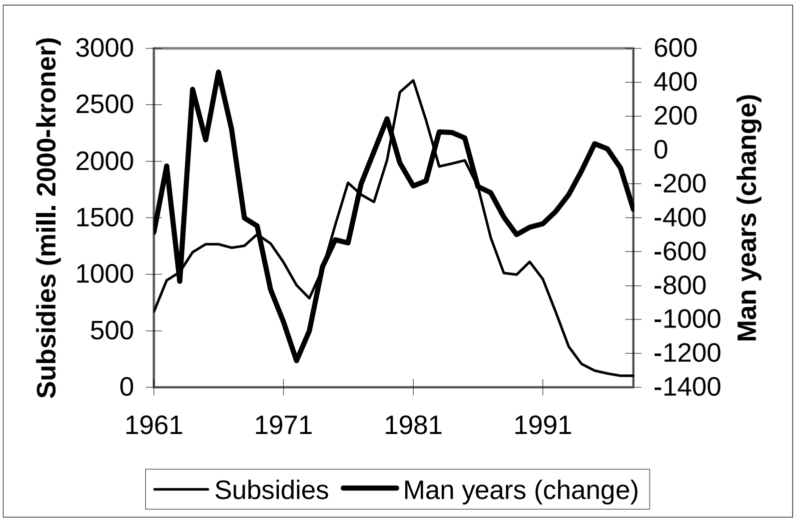
Source: Statistics Norway: Fisheries Statistics and Ministry of Fisheries, annual budget documents and reports on fisheries subsidies, various years.

Figure 11.8 shows the level of subsidies, in constant value of money, and the change in the number of fishers, both part-timers and those with fishing as the main source of income. The subsidies appear to have slowed down the decline in the number of fishers of both categories. After the subsidies virtually disappeared in the 1990s there is little connection, however; the number of part-timers declined steeply around 2000 while the number of fishers with fisheries as the main source of income continued to decline, albeit at a quite variable annual rate.

The number of registered fishers is a crude estimate of the use of labour in the fisheries. Statistics Norway has estimated the input of labour in the fishing industry. Figure 11.9 shows the fisheries subsidies and the change in the use of labour in the fisheries (3-year moving averages). It tells much the same story as Figure 11.8; the subsidies appear to have slowed down the decline in the number of man years up until the late 1980s when the subsidies began to decline.

Figure 11.9. Fisheries Subsidies and the Number of Man years (change) in the Fisheries

(3 year moving averages)



Source: Statistics Norway: Fisheries Statistics and Ministry of Fisheries, annual budget documents and reports on fisheries subsidies, various years.

Hence it appears that the subsidies slowed down the decline in the use of labour in the fisheries and even reversed it in some years. This accords with the previous finding that the subsidies stimulated investment in small boats. These are the most labour-intensive boats in the fishing fleet.

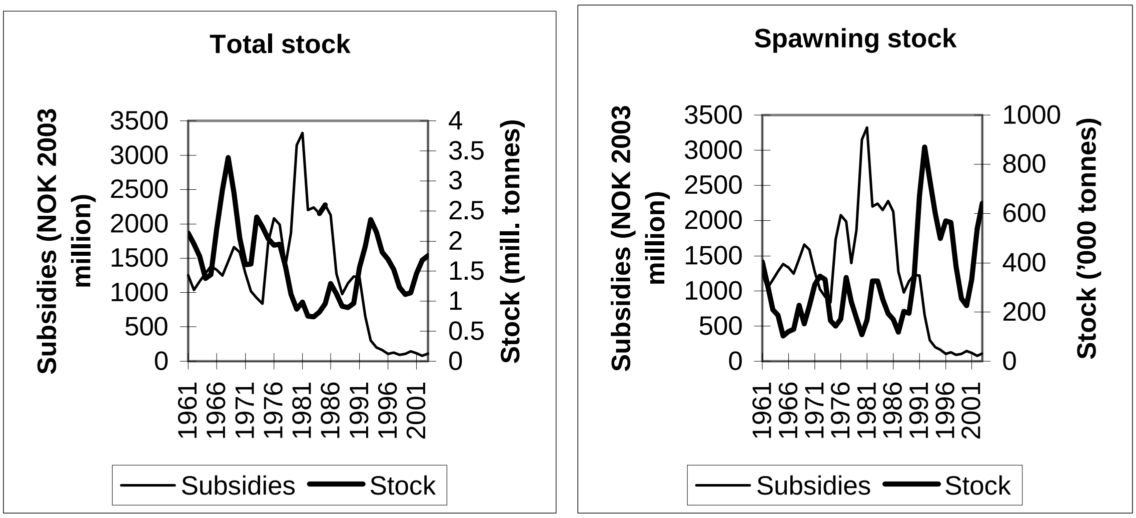
Subsidies and Fish Stocks

Did the fisheries subsidies lead to overexploitation of fish stocks? The collapse of the Atlanto-Scandian herring stock is well known but happened in the late 1960s, before the fisheries subsidies really took off. This collapse has been attributed to technological leaps (the power block, the sonar) which occurred over a relatively short period of time, together with the vulnerability implicit in the schooling behavior of the stock and the fact that access to the stock was open. Change in ocean climate may also have had something to do with this.

There is more reason to expect the Northeast Arctic cod stock to have been affected by the subsidies. This stock is the most important one economically in the Norwegian fisheries, and the cod fisheries probably got the shark’s share of the subsidies. It is worthwhile, therefore, to examine whether there is any connection between the subsidies and the depletion of the stock.

As already mentioned, from about 1980 this stock has been controlled by a total catch quota, so any effect of subsidies would be expected to have occurred first and foremost before that time. The high subsidies in the late 1970s and early 1980s may have caused some decline in the stock. Since the exploitable stock consists of several year classes, any overexploitation caused by subsides would have had repercussions over several years. The stock was in decline from the early 1970s to the late 1980s, with a brief recovery in the mid-1980s. As discussed earlier, the stock is influenced as much by foreign catches as Norwegian, besides being subject to environmental fluctuations, so it is not easy to conclude that the said decline was caused by the Norwegian subsidies, but this development is certainly consistent with that hypothesis. After the subsidies almost vanished in the 1990s the stock has been in a slightly better condition than during the high subsidy period. Note, however, that the absence of subsidies would have had only an indirect effect in this latter period, owing to the total catch control.

Figure 11.10. The Fisheries Subsidies and the Northeast Arctic Cod Stock



Source (for the cod stock): ICES, Report of the Arctic Working Group 2004, Table 3.24.

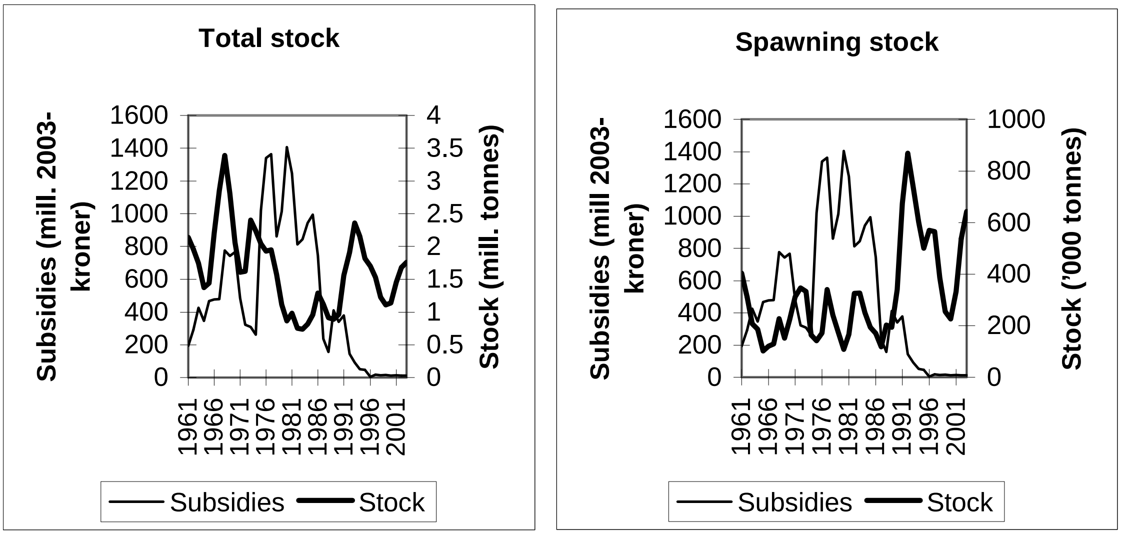
It can be argued that the Norwegian subsidies would have primarily affected the spawning stock, since this part of the stock is primarily exploited by Norway (the spawning takes place in the Norwegian EEZ). Figure 11.10 also shows the Norwegian fisheries subsidies and the spawning part of the Northeast Arctic cod. Up until about 1990 the spawning stock fluctuated without much of a trend, but since that time the spawning stock has been substantially larger than previously. The subsidy spree in the 1970s and early 1980s does not appear to have caused any unprecedented decline of the spawning stock.

The recovery of the spawning stock that took place in the 1990s coincided with the winding down of the subsidies. It is, however, highly doubtful whether there is in fact any causal relationship here. The fishery on the spawning stock was subjected to an unprecedented and harsh regulatory regime in 1989-1991, with very small catch quotas. The background for this was a perception of an all time low of the spawning stock and the disaster of the Northern cod of Newfoundland, an event which the Norwegian government was loath to repeat in its own backyard. With hindsight it now appears that things were not quite as bad as they appeared at the time.

The subsidy figures we have been looking at include all subsidies based on the General Agreement. As stated, most probably went to the cod fisheries. It is possible to identify some subsidies that went specifically to the cod fisheries. These are price subsidies targeted to cod and similar fish as well as subsidies to bait and bait stations.[9] Figure 11.11 shows these subsidies, together with the development of the stock of the Northeast Arctic cod. The pattern of the subsidies specifically targeted at the cod fisheries is not very different from the total subsidies, and there are no different conclusions to be drawn.

So, to sum up on stocks and subsidies, there is some indication that the subsidies in the 1970s and early 1980s did encourage heavier exploitation and a decline in the stock, but this effect is not particularly strong. Needless to say this should not be taken to mean that subsidies are of little consequence for fishing effort and fish stocks; the problem is rather that these influences are difficult to detect for stocks that are subject to very substantial environmentally-driven fluctuations as well as exploitation by other countries which may have followed totally different policies.

Figure 11.11. The Subsidies Targeted at the Cod Fisheries and the Northeast Arctic Cod Stock



Source (for the cod stock): ICES, Report of the Arctic Working Group 2004, Table 3.24.

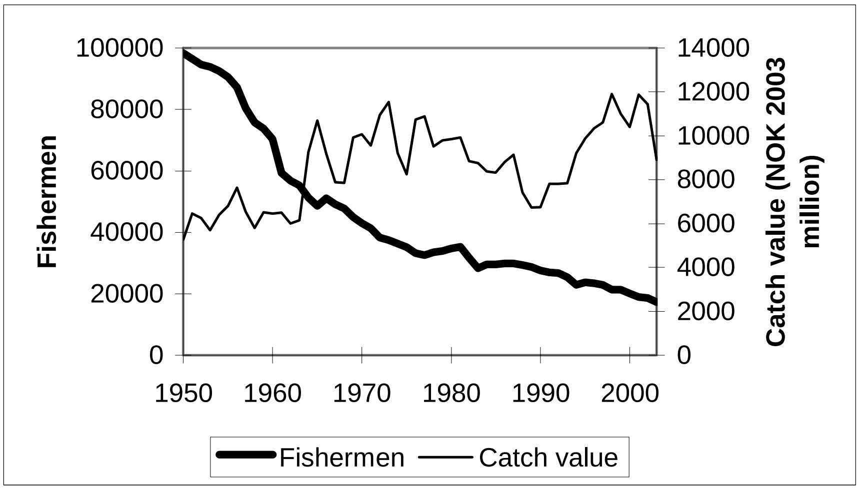
9. Some subsidies additional to these undoubtedly went to the cod fisheres but these cannot be identified directly. The subsidies are itemized in *Statistics Norway: Fisheries Statistics.*

Some Long term Tendencies in Norway's Fisheries

Figure 11.12 shows the development of the catch value, in constant value of money, and the number of fishers in Norway since 1950. While the catch value has roughly doubled, the number of fishers has declined by about 80%. Together these changes imply that the catch value per fisherman is now about ten times what it was in 1950 (Figure 11.13).

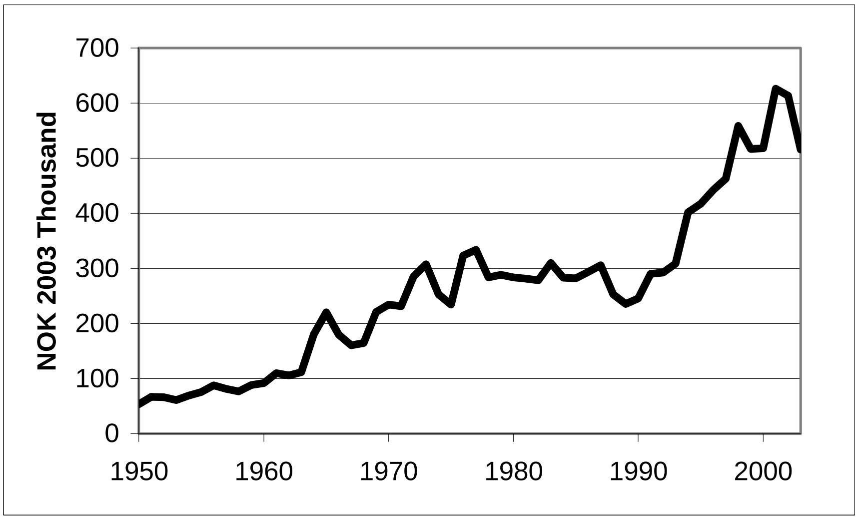
What would have happened if the number of fishers had remained the same? The fish stocks in the Norwegian EEZ and nearby waters have long been fully exploited and perhaps overexploited; there is no way that the value of the catch could have been increased beyond what it now is. The catch value per fisherman would have been a fraction of what it now is, depressing fishers' incomes below any reasonable level compared with other comparable occupations. Needless to say, this would never have happened. Yet this example is useful to illustrate how fishers' incomes can be maintained in an economy where productivity and incomes in other sectors are growing. The productivity in fisheries which have long since reached the limit of what the fish stocks can support can only be increased by a technological improvement which maintains revenues in the industry while the number of fishers declines.

Figure 11.12. Catch Value and the Number of Fishers (part time workers included) in Norway



Source: Statistics Norway.

Figure 11.13. Value of the Catch per Fisher in Norway



Source: Calculated from data in Figure 11.12.

In Figure 11.12 we may note that the number of fishers increased slightly in the late 1970s and early 1980s when the subsidies were at their peak. Here we see again (*c.f.* Figure 11.8) how the subsidies retarded the necessary structural changes in the industry. From Figure 11.13 we see how the catch value per fisherman stagnated in the late 1970s and throughout the 1980s, despite the very substantial subsidies, much of which was given in the form of price support which bolstered the value of the catch. Or perhaps it was because of and not despite the subsidies that the catch value per fisherman stagnated, due to a slowdown in the structural changes in the industry.

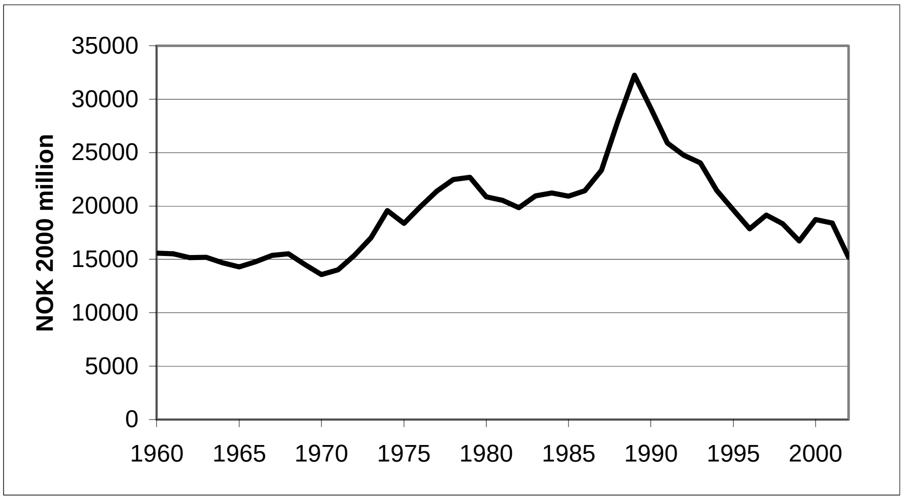
After the subsidies practically vanished in the 1990s the catch value per fisherman grew handsomely, up to about 2000. Possibly we see here an inverse relationship between subsidies and productivity; as already alluded to several times, subsidies are likely to impede the structural changes that are necessary to maintain the productivity increase in the industry, which ultimately is what allows fishers's incomes to increase on par with incomes of people in comparable occupations. While improved catches and prices undoubtedly had much to do with the favourable development in the 1990s, the income per fisherman would not have risen quite so handsomely unless their number had continued to fall.

What, then, accounts for the increased productivity of fishers despite fully or overexploited stocks? It is tempting to think of an increase in real capital. Figure 11.14 shows the development of real capital in Norway's fisheries since 1960.[10] Surprisingly, perhaps, the real capital is no greater in the industry now than what it was in the early 1960s, having reached a peak in the 1980s, but since the number of fishers has fallen, the real capital per fisherman has increased. To those versed in the theory of economic growth the limited rise in real capital is perhaps not so surprising, however. One lesson of growth theory is that the most enduring source of economic growth is technological progress rather than accumulation of capital. One million NOK, corrected for the change

10. The figures since 1970 are from Statistics Norway. The figures 1960-70 were constructed by using figures for real capital published in the Fisheries Statistics 1965-70 and figures on net investment 1960-65.

in the value of money, buys a totally different and more productive equipment today than it did thirty or forty years ago.

Figure 11.14. Real Capital in the Fisheries of Norway

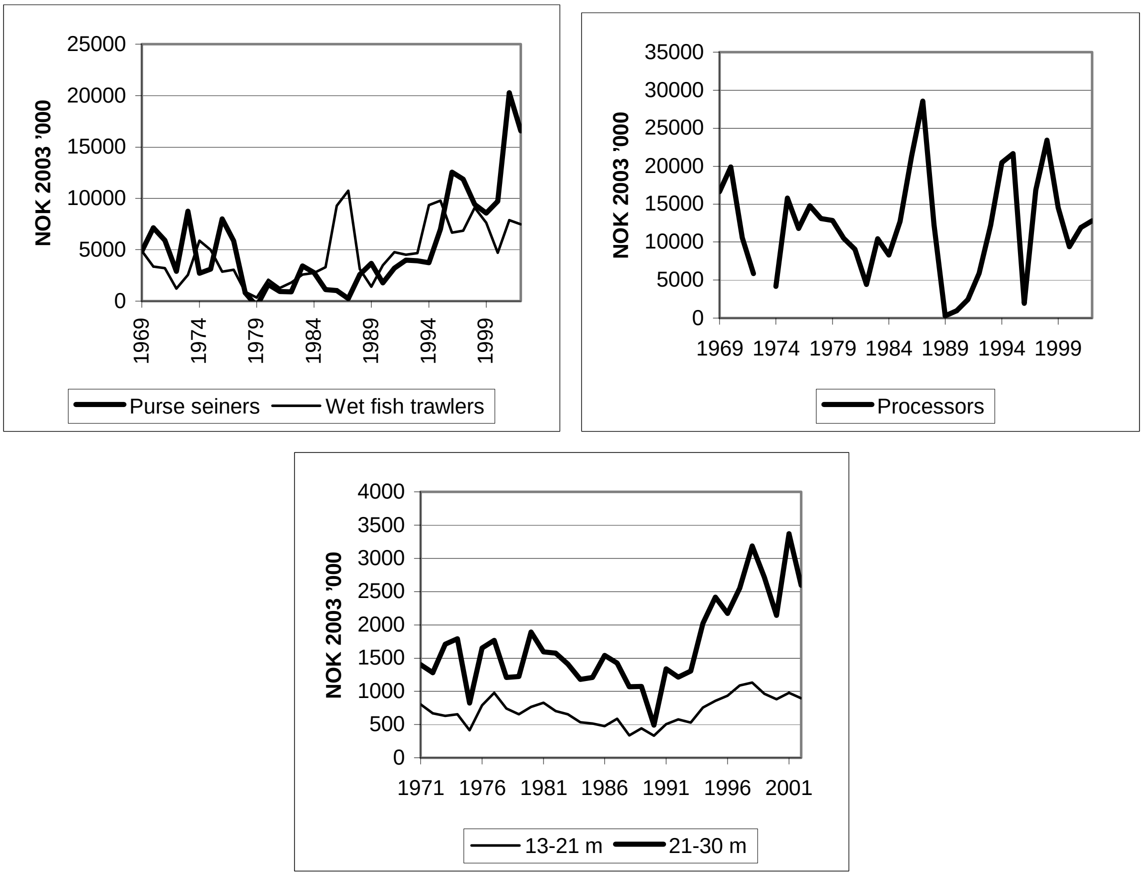


Source: Statistics Norway.

What has happened to the profitability of the fishing fleet? The longest time series available is the one on potential wage (*lønnsevne*). This is the residual one gets after subtracting all costs, including capital costs but excluding the cost for the crew, from the revenues. Preferably this ought to be expressed per man-year or some other unit of labour input, but the publication of this series was discontinued in the 1990s. What we do have is potential wage per boat, and for boat groups that consist of fairly similar boats over the time period considered this is probably an acceptable measure of how the profitability of the fleet has developed. Note that in principle all capital costs have been subtracted, but there have been some changes in the calculation of capital costs over the years, among other things of the calculation of the opportunity cost of equity. The potential wage should thus cover both the crew wage and any excess profit, or the opposite. The boat groups we shall look at are large purse seiners, large wet fish trawlers, trawlers with on-board processing facilities, and boats 13-21 meters and 21-30 meters.[11]

11. There have been some changes in the definitions of these groups over time. Large purse seiners are boats over 8000 hectolitres cargo capacity but excluding those that also use midwater trawls to catch blue whiting. Before 1977 the length of vessels was measured in feet, and for those years this group consists of boats bigger than 140 feet. Large wet fish trawlers are stern trawlers greater than 250 gross register tons (200 before 1976). Trawlers with onboard processing facilities are identified as factory trawlers before 1977.

Figure 11.15. Potential Wage for Various Groups of Norwegian Fishing Vessels



Source: Directorate of Fisheries: Cost and earnings studies.

Figure 11.15 shows the potential wage of these five groups of fishing vessels. Before the mid-1990s the potential wage of large purse seiners and wet fish trawlers were not all that different, but after that the purse seiners have pulled away and their potential wage has increased. We will return to the purse seiners in the next section. For the wet fish trawlers there has been only a moderate increase in the 1990s. The potential wage of trawlers with onboard processing facilities has varied enormously but without much of a trend. These vessels are also the most capital intensive ones and thereby the ones where fluctuations in catch value can be expected to produce the largest variations in the residual we get after subtracting all costs other than labour costs. For the 21-30 meter boats we see a handsome increase in the potential wage in the 1990s, but negligible for the smaller boats. We may recall the finding above that after 1990 there has been a considerable investment in boats above 20 meters, which on this background could be explained by an improved profitability.

The Restructuring Subsidies

Elsewhere it has been emphasized that the detrimental effect of subsidies in fisheries depends critically on how well the fisheries are being managed. With effective management, subsidies would not lead to stock depletion but only to increasing costs of fishing. And with a management regime like ITQs subsidies would only bolster the profits of boatowners or crew, and possibly both, as the former would have a strong incentive to keep costs down in any case.

Under effective fish stock management, on can go a step further and maintain that subsidies could be used to promote the restructuring of the fishing fleet, provided they are temporary and do not leak back into the industry. Over the years the Norwegian government has used such subsidies with at least a partial success. In this section we will discuss these subsides and how they worked. This section draws on a working paper and a presentation to a workshop in San Diego in 2004 on the effect of buy-back programs.[12]

The first buy-back program began in 1979 and went on until 1995. Over this period slightly over NOK 1 billion, in a current value of money, was spent on the program. About one-half was spent on the purse seiners. The program appears to have had greatest success for this fleet segment, and we shall begin by describing the effects of the program for this fleet segment in some detail. Table 11.1 shows how the buy-back money used in 1979-95 was spent.

Table 11.1. Total Expenditure on Buy-backs

(1979-1995)

	NOK millionr	No. boats
Coastal fleet	324.0	706
Sprat	6.3	26
Whaling	3.2	10
Trawling for pelagics	65.0	57
Trawling for cod	146.2	28
Purse seiners	449.7	102
Sealing	12.5	12
Small trawlers	10.7	4
Shrimp trawlers	2.3	1
Other	18.3	
Total	1 038.2	946

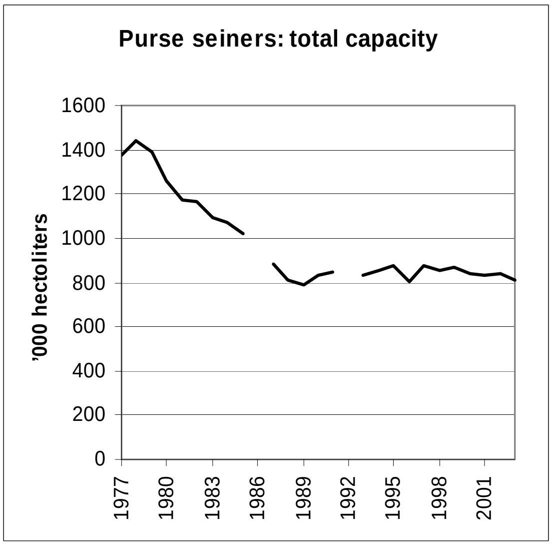
Source: Statens Fiskarbank

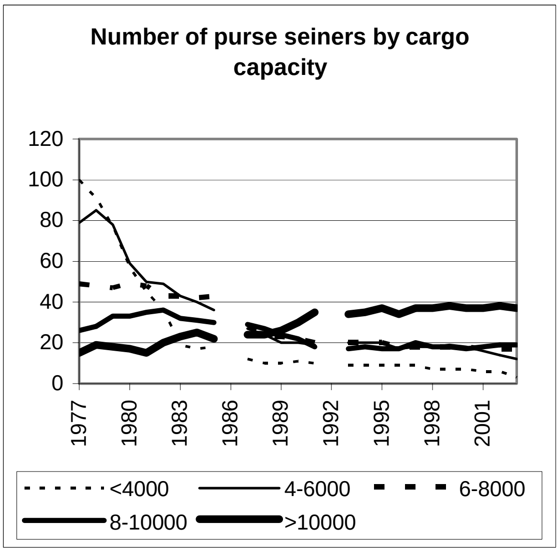
The reason why the buy-back program worked well for the purse seiners lies in the way this fishery is regulated. After the collapse of the herring stocks around 1970 this fleet was put under a licensing regime. All boats above a certain size (90 feet or 1 500 hectolitres cargo capacity) were required to have a specific license, a “concession” which stipulated their cargo capacity. Soon after, the most important stocks fished by these boats were put under a quota regime. The quotas were split into individual units determined by

12. See Hannesson, R., Buy-back programs for fishing vessels in Norway, Working Paper No. 13, 2004, SNF, Bergen.

the concession capacity of the vessels through a certain allocation rule. There were, however, far more vessels than were needed to take the permitted catch. Furthermore, there are economies of scale in this industry, with large vessels being more profitable than small ones, at least up to a certain limit and provided they can be used to their full capacity.

Figure 11.16. Purse Seiners in Norway Subject to Concessions: Total fleet capacity and the number of vessels in different size classes (hectoliters cargo capacity)



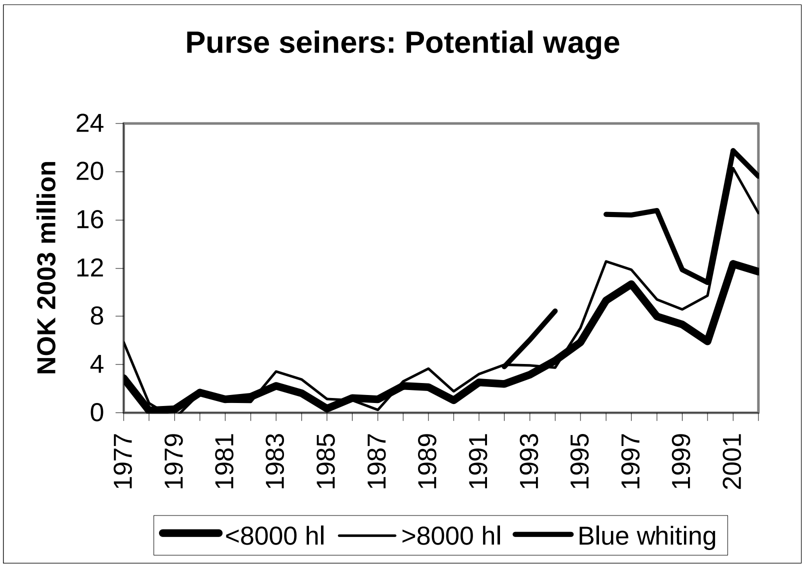


Source: Statistics Norway: Fisheries Statistics and Directorate of Fisheries.

Although the concessions were originally meant to be transferable only to the next of kin, in practice they quickly became transferable without restrictions. The economies of scale meant that it was profitable to buy the concession of a small boat, add it to one's own boat and then buy a new boat with the combined concession capacity of the former two. The buy-back program helped in two ways. Some boats were bought out of the fishery and their concessions annulled, which raised the quotas of the boats that remained in the fishery. Some boatowners were given grants to facilitate the scrapping of their boats, while they could sell their concessions to other boatowners. This brought about a structural change towards fewer and lager, more profitable vessels. This development is traced in Figure 11.16. The total fleet capacity started to fall immediately after the buy-back program was initiated (1979). The number of small purse seiners (less than 6 000 hectoliters cargo capacity) fell while the number of large purse seiners has increased a result of utilizing economies of scale.

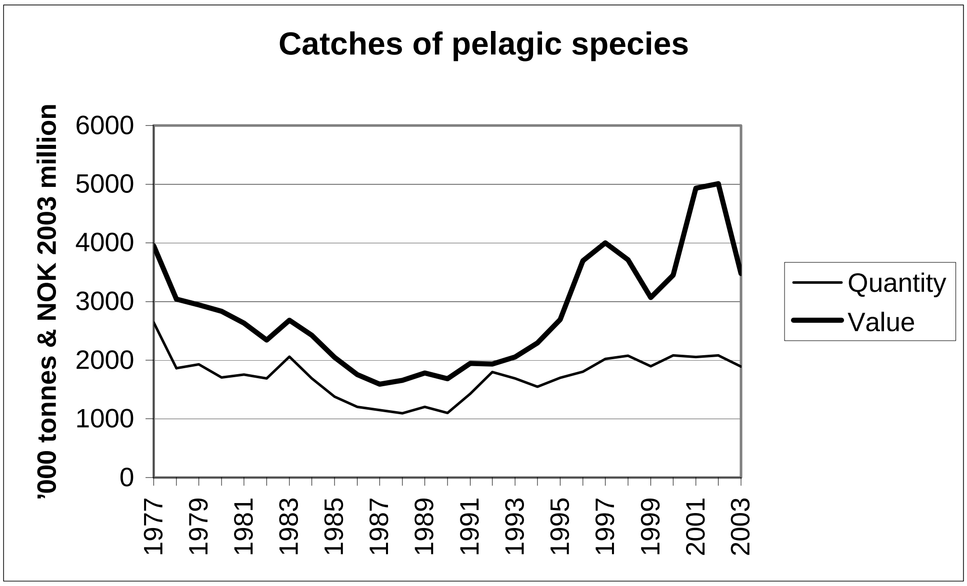
What were the results in terms of profitability Figure 11.17 shows the potential wage of three groups of purse seiners. Since the early 1990s this has greatly improved. Before we jump to ascribe this to the buy-back program let us note that most of the money was spent during the very first years (1979-83), although there was a spike again in 1987-91 (see Table 11.2). However, it is not so far fetched to attribute success to the buy-back programme. The value of the catches of pelagic species, the bulk of which is taken by the purse seiners, continued to fall until the late 1980s (see Figure 11.18). Hence, initially, the buyback program did not do much more than prevent falling catch values from translating into ever lower potential wage for the purse seine fleet; as we see from Figure 11.17 the potential wage remained fairly constant after the buyback program began and until the late 1980s. In the 1990s, and especially after 1995, the potential wage has risen handsomely. This has been due to an increase in catches, and even more so to an increase in fish prices, but these gains have not been eroded by the entry of new boats; the total capacity of the fleet has remained fairly steady despite a high and rising potential wage per boat. This is, of course, due to the closed entry implicit in the concession regime, but that regime has also provided for a positive and lasting effect of the buy-back program.

Figure 11.17. Potential Wage per Vessel of Three Groups of Purse Seiners



Source: Directorate of Fisheries: Cost and earnings studies.

Figure 11.18. Catches (value and weight) of Pelagic Species in Norway



Source: Statistics Norway: Fisheries Statistics and Directorate of Fisheries.

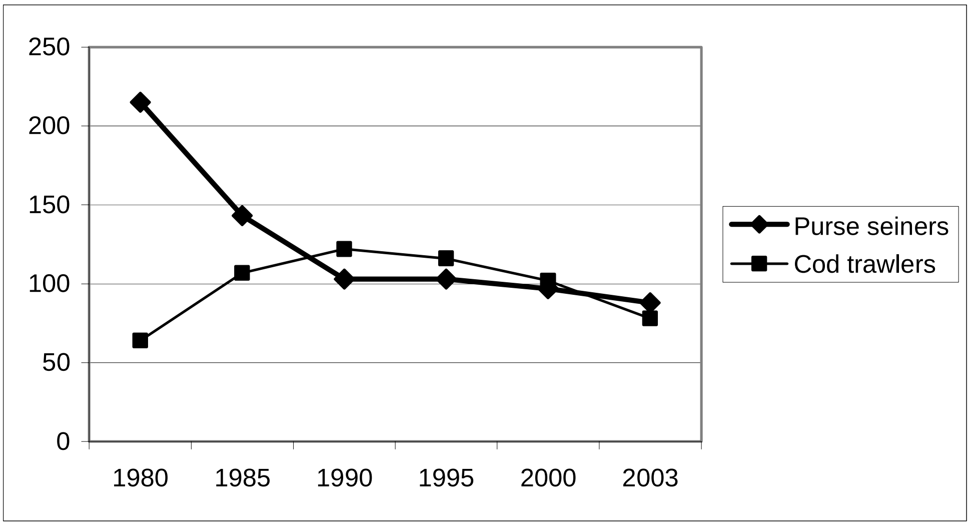
Table 11.2. Grants for Scrapping or Selling Purse Seiners

Period	NOKMillion	Number of boats
1979-83	225.2	67
1984-86	24.5	5
1987-91	193.8	29
1992-93	3.0	1
	446.5	102

Source: Statens fiskarbank

For other segments of the fleet the buyback program was much less successful. One reason is that the money was spread more thinly, another and probably a more important one that entry into these fisheries was less tightly controlled until very recently. Figure 11.19 shows how the number of licenses (concessions) for purse seining *versus* cod trawling has changed since 1980. While the number of purse seine licenses has fallen from 215 to 88 the number of licenses for cod trawling almost doubled from 1980 to 1990. While the number of licenses for cod trawling has declined since then it is still higher than in 1980. Above we found that the potential wage of the large wet fish trawlers has increased only moderately in the 1990s, and not at all if we take the mid-1980s as a point of reference.

Figure 11.19. The Number of Licenses (Concessions) for Purse Seining and Cod Trawling in Norway



Source: Directorate of Fisheries.

Conclusion

Several interesting conclusions emerge from the experience with the Norwegian fisheries subsidies. First, subsidies that are meant to be temporary and to make a structural change less painful to achieve have a tendency to become permanent. The pain refuses to go away, reasons can be found to make the transition more gradual, interest organisations mobilise to make the subsidies permanent and discover new arguments to make them so. In Norway they were greatly helped by the discovery of the oil and gas wealth which gave rise to an assortment of ideas to build a great society. With the fall in oil prices in 1986 sobriety set in, and the fisheries subsidies were virtually abolished alongside a number of other economic reforms aiming at rooting out endemic inflation and put the public finances on a sounder footing.

Secondly, the abolition of subsidies does not necessarily mean gloom and doom for the industry. The Norwegian fisheries subsidies disappeared with remarkably little pain. The timing was not auspicious in all respects. The years around 1990 were difficult in the cod fisheries; the cod quota was cut to an unprecedented low, and some fishers went broke. Yet the fisheries subsidies were much lower than they used to be (see Figure 11.1), and as times got better they were virtually abolished. The profitability of the fisheries is not lower than it used to be during the subsidy regime and in some fisheries certainly better. Conversely, contrary to being a cure for inadequate incomes and revenues in the industry, subsidization can set in motion a process which, over time, increases the "need" for subsidies. Subsidies may encourage excessive investments, which depress incomes in the industry. There was some indication of a vicious circle like that in Norway during the heyday of subsidies in the 1970s and 1980s.

Third, timing is important. There are two aspects to consider. One, in order to implement political changes a perception of crisis is usually necessary. The drastic decline in oil prices in 1986 offered a golden opportunity and a clear need to reign in some excesses in public finances in Norway and in economic policy in general. Additionally, removal of subsidies causes much less pain in the industry if it is done on an upturn in the fishery cycle. The years after 1990 brought considerable increase in catch and fish prices and offered a good opportunity to remove the subsidies without causing too much pain.

Fourth, the removal of subsidies sets in train structural changes that enable the industry to survive on its own. Ineffective firms disappear, improving the balance between the available resources and the fishing fleet. Policy makers find greater resonance in the industry for reforms that increase efficiency, and the industry may take some such initiatives on its own. From the mid-1990s and up to the present, individual transferable quotas have come to be increasingly applied in the Norwegian fisheries, albeit with some hesitation and restrictions on transferability. The industry itself has played an active role in dividing the total catch quotas for individual fish stocks between different segments of the fishing fleet, on which basis the individual vessel quotas have been designed.

Fifth, not all subsidies are necessarily bad. Much depends on the context and the management regime applied. The buy-back program helped putting the purse seine fishery on a sounder footing. It worked because the fishery was closed and there was a measure of transferability of fishing rights in the form of tradable fish concessions. Needless to say, such help to restructuring must be temporary. To the extent it is foreseen it will be expensive, because it inflates the market value of old boats. The industry may very well be able to restructure without any such help, so its harm may be mainly be in the form of expenses for the taxpayer or the crowding out of other and more worthy public expenditure.

Chapter 12

Analysis of Subsidies to Decommissioning Vessels and License Retirement in Australia[1]

Background

Concerns about the overcapacity of global fishing fleets and the unsustainable harvest of fish stocks have resulted in increased attention being directed at subsidies to fishing. There is currently significant debate on the environmental and trade impacts of the various subsidies used worldwide and the manner in which subsidies should be disciplined.

The OECD Committee for Fisheries is undertaking a major project to broaden the analysis of fisheries subsidies beyond the trade and environment focus by examining subsidies within the sustainable development paradigm. This broader analysis of the effect of subsidies is to be supplemented by more detailed analysis of the impact of particular types of subsidies. The OECD has engaged ABARE to conduct further analysis of subsides that are provided to the sector for the decommissioning of capacity and the retirement of licenses.

Governments have a specific role to play in preventing the market failures that occur with open access fisheries and lead to unsustainable harvests and the dissipation of economic returns. The primary role for government in structural adjustment of fisheries is to establish a management regime that removes any incentives that lead to overcapacity, and facilitates autonomous adjustment to occur in response to changing economic and biological conditions. It is important to differentiate overcapacity problems from the problem of excess capacity. Excess capacity relates to the situation where the level of physical capital (**inputs**) in a fishery is in excess of what would be required to capture a given level of stock. Overcapacity, on the other hand, is the difference between the maximum potential **output** that could be produced and a desired optimum level of output (Pascoe *et al.* 2003).

Subsidies aimed at reducing the capacity of a fishery and assisting in the transition towards sustainable fisheries are widely regarded as being positive in nature. The effectiveness of these programs in achieving their objective is, however, often disputed on the basis of theoretical insight and limited empirical analysis. This report analyses the results of these schemes in the Australian context using a number of case studies, namely,

1. This chapter was prepared by the Australian Bureau of Agricultural and Resource Economics, Canberra. The views expressed in the chapter do not necessarily represent the views of other OECD Member countires.

the Commonwealth managed Northern Prawn and South East Trawl Fisheries, and the East Coast Trawl Fishery managed by the state of Queensland.

Subsidies to Vessels Decommissioning and License Retirement

It has been widely recognised that the subsidisation of fishing fleets and open access to marine resources have been the major factors contributing to overcapitalisation of fishing fleets, which has contributed to unsustainable harvests in many fisheries worldwide (FAO 1993; WTO 1997). While overcapacity will occur in open access fisheries without the provision of subsidies, the use of subsidies in some cases has contributed to the speed and degree of overcapacity and overfishing (Porter 2001). Revenue enhancing or cost reducing subsidies result in increased fishing effort if management regimes do not effectively limit catch and effort.

A major problem is how to reduce the current overcapacity in fishing fleets worldwide as rapidly as possible (FAO 1993). While boat exits from the industry can be expected to be delayed because of high sunk costs (FAO 1993), the existence of subsidies may inhibit the adjustment process. Subsidies can obscure price signals from the fishery that would otherwise result in capacity adjustment. Another problem associated with reducing capacity through decommissioning schemes is that these vessels can often transfer effort to other fisheries or countries where management controls are not as rigorous. This 'spillover' effect can create or exacerbate any capacity problems in the region.

There are a number of methods for governments to provide assistance to the fishing industry. For example, assistance measures can include:

- direct transfers
  - compensation for effort reduction
  - subsidies for investment and modernisation
  - direct income support
  - subsidies on inputs to production
- lending support programs
- tax preference and insurance support programs
- sector specific employment and social security provisions
- general services
  - fisheries enhancement expenditure
  - expenditure on exploratory fishing
  - payments for access to other countries' waters
  - payments to producer organisations
- marketing and price support programs.

At present a lack of data and transparency in assistance programs means that the magnitude of the assistance provided to the fishing industry cannot be estimated comprehensively. However, despite these difficulties, a number of estimates have been made. The FAO (1993) has calculated that the total estimated operating and capital costs of worldwide commercial fishing fleets exceeded their gross revenues by around AUD 54 billion in 1988. The portion of this deficit met through government support has been speculated to range from half to all (WWF 1998). In OECD counties government financial transfers (GFT) were estimated to amount to AUD 6.2 billion in 2000 and AUD 5.5 billion in 20001. This represented 15% of fish production in 2000 (OECD 2003).

Subsidies to the fishing industry can be expected to affect world seafood markets and trade. Where effective fishery management arrangements are not in place, fishery subsidies can also have adverse implications for the sustainability of fish stocks. It is important to note that the removal of subsidies alone is unlikely to make fisheries sustainable. Effective fisheries management must also be implemented (Gooday 2002).

Subsidies aimed at reducing the capacity of a fishery, through the decommissioning of vessels and license retirement, are widely regarded as being positive in nature, with the aim of reducing capacity and assisting in the transition towards a sustainable fishery. These subsidies differ from other types in that they are explicitly targeted at reducing fishing effort and fleet capacity. However, their effectiveness will depend on how the remaining effort and capacity is controlled (Gooday 2002).

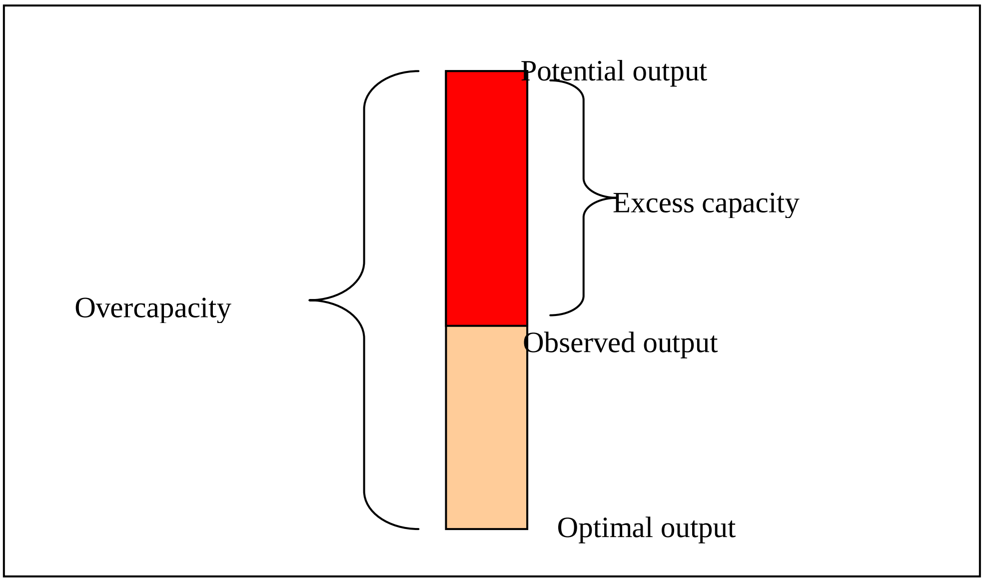
Excess capacity and overcapacity

The OECD Fisheries Committee defines excess harvesting capacity as the “harvesting capacity in excess of the minimum amount required to harvest the desired quantity of fish at least cost” (OECD 1996). This results in economic waste from society’s point of view, however, from the viewpoint of operators the investment in excess capacity is entirely rational. In contrast to other industries, overcapitalisation is not a short run phenomenon, given the open access nature of many fisheries, and can be expected to be of indefinite duration.

The terms excess capacity, overcapacity and overcapitalisation have been used as synonyms in the past. The Food and Agriculture Organization (FAO) and the US National Marine Fisheries Service have agreed on two concepts of capacity in fisheries, which are illustrated in Figure A. One concept is **excess capacity**, which is defined as *“*the difference between the maximum potential output – given technology, current resource conditions and full and efficient utilization of capital stock, other fixed and variable factors – and the observed output*”* (Pascoe *et al.* 2003).

The other concept, and the one that appears to be of greatest concern to resource managers, is **overcapacity**. Following Pascoe *et al.* (2003), overcapacity can be defined as the difference between the maximum potential output that could be produced – given technology, current resource conditions, and full and efficient utilization of capital stock and other fixed and variable input – and a desired optimum level of output. The concept of overcapacity is, therefore, a long-run concept.

Figure 12.1. Excess and Overcapacity



The distinction between the two concepts is quite important for fishery managers concerned about reducing capacity in fisheries. Excess capacity is a problem that can possibly self correct. That is, excess capacity may occur when shifts in supply and demand cause disequilibrium in the market (Pascoe *et al.* 2003). In these situations, firms can autonomously adjust their capital and variable inputs to either increase or decrease production. In contrast, overcapacity usually occurs because the market fails to efficiently allocate inputs and outputs. Firms cannot prevent other individuals from harvesting the resource, and there are no incentives to conserve inputs or outputs. An overcapacity problem will persist until effective fisheries management arrangements are implemented.

From a pure stock conservation perspective, the existence of excess capacity does not pose any significant threat provided that the total output of the fishery is constrained to a sustainable level (for example, through an enforced total allowable catch quota). However, the existence of excess capacity creates an economic problem in that economic returns generated by operators are lower than they would be otherwise. At the aggregate fishery level, the existence of excess capacity indicates a waste of resources, as, by definition, the same catch could have been taken by fewer vessels, using less inputs (in aggregate).

The existence of capacity management problems will not only lead to the dissipation of resource rents, but this will in turn cause the industry to be vulnerable to adverse resource and economic shocks. Hence, it can be anticipated that fisheries with excess capacity will request government assistance from time to time to relieve economic stress (Greboval and Munro 1999). Poor financial conditions will also provide incentives for operators to pressure managers to set liberal controls in the hope of alleviating short term financial pressures. This will exacerbate the problem.

A change to the management regime that governs a fishery modifies the economic incentives to invest and operate in the fishery. Therefore, changes may leave some operators who have already made substantial investments worse off, and with substantial non–malleable capital[2]. In these cases there may be a case for structural adjustment assistance on equity grounds.

The major beneficiaries of a reduction in capacity will be the operators that remain in the fishery. As a result, it is possible to design adjustment schemes that are all or partially funded by industry. In order to ensure that the benefits of restructuring are not dissipated over time, any government financial assistance in the removal of overcapacity should be dependent on the implementation of new management arrangements that effectively constrain effort and catches and encourage autonomous adjustment.

Decommissioning and license retirement

Buyback programs can involve the removal of actual vessels from a fishery and/or the purchase of access licenses or entitlements. The goal of a buyback scheme is to remove capacity, in the form of vessels or other gear, from the fishery for either biological or economic reasons. Buyback programs have also been implemented to reduce conflict between sectors or to reallocate resources from the commercial sector to the recreational sector (Metzner and Rawlinson 1998). While license retirement may remove physical capital from a fishery, human capital such as the skills and knowledge of the crew may remain in the fishery.

Metzner and Rawlinson (1998) specify three fundamental mechanisms for buyback programs:

- fixed or calculated values for entitlements or gear
- negotiated amounts for licenses or gear
- sealed bids3 or competitive tender

Coupled with this there are three ways of addressing the issue of effort displacement.

- Mandatory gear or vessel scraping requirements
- Regulatory restrictions on subsequent use of vessels and entitlements
- No restrictions on subsequent activities in other fisheries

Buyback programs may be voluntary, mandatory, or a combination of the two. These schemes have often been successful in attaining the mandated objective in terms of gear removal, but the rate of removal has depended on whether the buyback is voluntary or mandatory and whether the buyback period is specified. It is difficult to assess the success of these programs in terms of the effective effort removed, increases in economic efficiency, the effect on the stock condition, and the long term impacts and durability of the programs (Metzner and Rawlinson 1998).

An issue of concern to many countries is whether these subsidies should be considered as environmentally beneficial subsidies and given special status. While

2. The concepts of ‘malleable’ and ‘non-malleable’ vessel capital have now been adopted by the FAO (Greboval and Munro 1999). Malleability refers to the ease with which vessels can be removed from a fishery. Perfectly malleable capital is capital that can be disposed of without fear of capital loss. On the other hand, perfectly non-malleable capital is capital that cannot be sold once it is acquired.

3. First-price sealed-bid auctions require bidders to submit single confidential bids to the seller. The bidder with the highest bid wins and pays that bid. Vickrey auctions have a second-price sealed-bid format. The bidder making the highest bid wins and pays the next highest bid. In the case of buyback programs, operators submit bids to the scheme and the lowest bid wins and are paid that bid. Additional information may be required to help discriminate between the bids and achieve the greatest impact for least cost.

subsidies of this type may appear to be beneficial, this will not always be the case. As Arnason (1998) notes, unless there is an effective fisheries management system in place that addresses overcapacity problems, subsidies designed to reduce fishing effort will not have any long term impact on fisheries profitability (or sustainability), as the capacity reduction scheme will not change the underlying incentives that created the excess capacity problem.

In addition, Munro (1998) argues that if buyback schemes are seen as measures that managers will use periodically then capital investment decisions will be distorted. That is, the expectation of future buyback programs is likely to lower the perceived risks associated with investing in fishing capital. The existence of vessel and license buyback programs can create an expectation that government will cover any losses that may arise from excess investments in vessels. According to Munro and Sumaila (2001) there is evidence that capacity does seep back into fisheries after a buyback or decommissioning scheme. If the need for future decommissioning schemes is anticipated by operators, the trickle of capacity back into the fishery can be expected to increase dramatically (Munro and Sumaila 2001). Expectations of future buyback schemes may also be one reason why operators hold inactive or dual permits.

Another potentially major problem associated with subsidies designed at removing capital from a fishery is associated with subsequent uses of that capital. There are a number of possible options for the use of excess capital. Where the vessels concerned have distant water capabilities they could be redirected to high seas fisheries or to the exclusive economic zones (EEZs) of other coastal states. Where the vessels do not have distant water capabilities they may be redirected to more lightly regulated fisheries within the home country's EEZ or sold to fishers operating in other fisheries. Where these alternatives are not viable, vessels may be scrapped or used in other industries (Gooday 2002). The 'spillover' of excess capital to other fisheries can lead to overcapitalisation or exacerbate existing overcapitalisation problems if the fishery into which the excess capital moves is not well managed.

The potential for spillover effects to occur can be reduced through the introduction of effective management plans that assign property rights to operators and prevent excess capital from freely flowing into a fishery. In some cases the threat of the spillover of capital may lead to more rapid reform of management arrangements being introduced in a fishery, such as individual property rights. However, the potential for the spillover of capital may be a significant issue for high seas fisheries where management plans that effectively constrain fishing effort are difficult to implement.

In conclusion, structural adjustment through buyback programs maybe effective at reducing the level of excess capacity in a fishery, but not overcapacity. This is because the overcapacity problem arises from an underlying market failure caused by the management arrangements that buybacks do not address. Given that excess capacity tend to adjust autonomously if access rights are well defined, allocating government revenue to buyback schemes to reduce excess capacity in a fishery should be avoided. Reducing excess capacity in conjunction with a management change that addresses overcapacity may result in some benefits. Therefore, buyback programs, which have a dubious record under strict limited entry schemes, may be a useful ancillary instrument when introducing a new management regime that effectively controls effort and catch.

Management regimes

As previously discussed, the management of a fishery will often determine the effectiveness of subsidies designed to reduce capacity and effort in a fishery. If there are no controls on either the fish caught (output controls) or effort used (input controls) then the removal of licenses or gear from a fishery will have no effect on fish stocks as there is no restriction on new vessels entering the fishery to replace those scrapped.

Table 12.1 summarises the impact that capacity reduction schemes can have under different management regimes. The table is divided into two categories in which operators either have individual rights, such as individual quotas, or operators compete under a global management regime, such as a competitive total allowable catch[4].

Table 12.1. Impact of Decommissioning Schemes under Different Management Regimes

Management regime			
Individual rights		**Global management**	
Output controls	Input controls	Output controls	Input controls
No effect on stock. Improved returns to operators (long and short term).	Effort reduced in short term, some stock recovery and improved returns. Effort creep in long term and dissipation of economic returns.	No effect on stock Some short term increase in returns. Economic returns dissipated in long term.	Effort reduced in short term, some stock recovery and improved returns. Effort creep in long term and dissipation of economic returns.

If a fishery is managed using output controls then decommissioning schemes will have no effect on stocks unless the total allowable catch is also reduced. A decommissioning program will initially increase stocks if there are input or effort controls in place, provided that the controls are effective barriers to new vessels entering the fishery and remaining vessels increasing effort and catch. However, there will be an incentive for vessels remaining in the fishery to substitute unrestricted inputs for restricted inputs. That is, over time, effort creep will cause the net rents in the fishery to decline as vessels use less efficient input combinations and total effort increases, placing additional pressure on stocks. This is illustrated further in the Northern Prawn Fishery case study.

In an output controlled fishery, buyout schemes may improve the rents generated by those operators that remain in the fishery. This may have occurred without the scheme, as obsolete vessels are retired. However, buyout schemes may speed up this adjustment process. Alternatively, Munro and Sumaila (2001) argue that even in output controlled fisheries, decommissioning payments will adversely affect stocks due to the expectations

4. 'Global management' set restrictions on either inputs or catch for the fishery as a whole, rather than assigning property rights to individual operators.

of buyout schemes being built into investment decisions of fishers, and then exerting pressure on managers to either increase the TACs or shifting vessels to other fisheries that may be less well managed.

It may be beneficial to address excess capacity prior to or in conjunction with the implementation of a new management regime. For example, the implementation of an ITQ management regime is likely to see excess capacity removed from a fishery through quota consolidation. However, this may be a slow process, as many of the vessels in a fishery may have very limited uses outside the fishery and as a result have a low market value. In such a circumstance, it may be rational for an operator to delay exiting the fishery until the vessel is at or near the end of its economic life.

A decommissioning program can help facilitate structural change under a new management scheme. First, it will reduce the disincentive for operators to leave the industry as vessel disposal becomes less of an issue, and second, the quota trading price is likely to be lower, as it will not need to include a capital element to compensate operators who exit the fishery for their lost capital investment (Pascoe *et al.* 2002). This should lead to quota consolidation and an associated reduction in excess capacity. However, this type of adjustment scheme is unlikely to result in a net economic benefit – the benefit to fishers remaining in the fishery will tend to be lower than the cost of the scheme. While the final level of annual economic returns should be the same as that under autonomous adjustment, the scheme will have removed capital and labor (that has a low opportunity cost) prematurely from the fishery.

The argument promoted above assumes that managers can set TACs or TAEs that control effort and catches at effective levels. However, if the presence of substantial overcapacity means that managers are unable to set catch or effort levels consistent with the long term efficient management of the fishery, then an adjustment scheme may be warranted. In addition, if the fishery requires urgent adjustment to avoid serious or irreversible damage, it may be desirable for government to become more actively involved in the process, to ensure sustainability objectives are not postponed.

Effort creep

Effort creep is the term applied to the continuous increase in catching power that occurs in fisheries as a result of technical innovation or the uptake of unregulated fishing inputs. In the absence of ongoing restrictions to fishing inputs, effort creep is a particular problem in input controlled fisheries because it leads to increasing catching capacity through time. This places additional pressure on the stocks unless the restrictions on inputs are continuously updated such that total catching capacity of the fleet does not increase. If this does not occur, then effort creep can lead to overexploitation of fishery resources and dissipation of economic rent.

As previously discussed, the fishery management regime, the status of fish stocks, and the level of fishing capacity can all affect the success of vessel decommissioning and license retirement schemes. If the economic incentives for overcapitalisation have not been removed (allocation of rights to a portion of the catch) the temporary removal of capacity may stimulate further increases in effort and capacity from those remaining in the fishery.

In addition, if the level of capacity and effort in a fishery is already excessive, the relevant issue is whether a subsidy inhibits capacity adjustment in a fishery, not whether a subsidy results in greater fishing effort (Gooday 2002).

The degree of effort creep in a fishery will often determine the result of subsidies designed to reduce the capacity and effort in a fishery. The effectiveness of such a scheme depends how the capacity and effort that remains in the fishery is managed. If there are no controls in place in a fishery, then decommissioning subsidies will have no effect on fish stocks as initially remaining vessels may increase effort in the fishery, and in the long term new vessels will enter the fishery to replace the scrapped vessels.

In some instances once operators sell their vessels to a buyout scheme they are often free to sell either the quota or gear units to other operators. As previously stated, it is likely that there will be a movement of resources to more efficient operators, further increasing effort creep. While effort creep occurs in output controlled fisheries, this is realised through productivity increases with no adverse impact on stocks. As vessels in the fishery become more efficient they will buy quota from less efficient operators, improving the economic performance of the fishery as a whole. However, as resources move to more efficient producers in an input controlled fishery it is likely that there will be increased pressure placed on fish stocks. There are measures that can be put in place to limit this impact. Some of these are discussed in the East Coast Trawl Fishery case study.

Case Studies

Management authorities in several countries have implemented vessel and license retirement programs. The general goals of most programs are similar, while the specific stated objectives may vary. Most programs attempt to increase the profitability and sustainability of fisheries and simultaneously provide funds for 'social adjustment' to the biological or political event that reduced the available catch. Conservation objectives may also drive buyback programs in some cases (Holland *et. al.* 1999).

Despite the similar motivations and goals the actual implementation of buyback schemes may vary in many aspects. In the following section, three case studies of buyback schemes implemented in both Commonwealth and state managed fisheries are analysed.

The Northern Prawn Fishery and South East Trawl Fishery are both managed by the Australian Government (formerly the Commonwealth Government). These two fisheries have been analysed to highlight the differences between buyback schemes that have been undertaken in an input and an output controlled fishery. The East Coast Trawl Fishery has been included in the analysis to illustrate a more recent scheme, in which many of the problems of the earlier buybacks have been addressed to some extent.

The specifics of each case study, including the stated objective, initiating body, changes to management arrangements, source of funding, and the success of the program in reducing capacity in the fisheries are examined. These specifics also provide a general overview of the success of vessel decommissioning and license retirement in reducing the capacity of a fishery.

Economic performance of the fisheries

The financial performance of major Commonwealth fisheries is derived from ABARE survey data. These surveys are designed and samples selected on the basis of information supplied by the Australian Fisheries Management Authority (AFMA). This information includes data on the size of the catch, fishing effort and boat characteristics.

Maximising economic efficiency in a fishery involves maximising economic rent. The term 'economic rent' is used to describe the part of the return from the use of a natural resource that stems from the scarcity of that resource. The concept of economic rent arose in the early nineteenth century from the realisation that rent for land was not set by the owners of the land but rather by the potential profitability that users could reap from using the land (Barlowe 1958). In a fishery, economic rent is the long run surplus income after all other costs had been met, such as fuel, bait, labor, repairs and the necessary return on capital to justify any investment. Any economic rent in fisheries is commonly accrued by fishing operators.

As an indicator of economic rent, ABARE calculates net returns for the fisheries using survey data. However, net returns in a given year may differ from the long run economic rent for a number of reasons. Of particular importance are the condition of the fish stock, capital structure and market conditions. For example, if the fish stock is being fished down, then net returns in that year will include revenue from selling off part of the fish stock that will not be available over the long term. Consequently, the calculated net returns will overestimate the long term economic rent available from the fishery (Galeano *et al.* 2003).

Funding sources

Funding for buyback schemes can either be sourced from governments or the industry. There are four basic forms of possible fiscal support for adjustment programs (Metzner and Rawlinson 1998);

- Industry or sector financed
- Government facilitated (for example, through loan guarantees
- Government financed
- Government financed with industry repayments

The Australian Government established the national fisheries adjustment program (NFAP) in 1985 with initial funding of AUD 3 million to fund an adjustment program on the northern prawn fishery. The fund was extended to other fisheries in 1986 with an allocation of a further AUD 6 million. The purpose of the fund is to provide loans or grants to specific fisheries to assist with restructuring. The Australian Fisheries Management Authority, AFMA, administers the fund but all surplus expenditure proposals require approval of the minister.

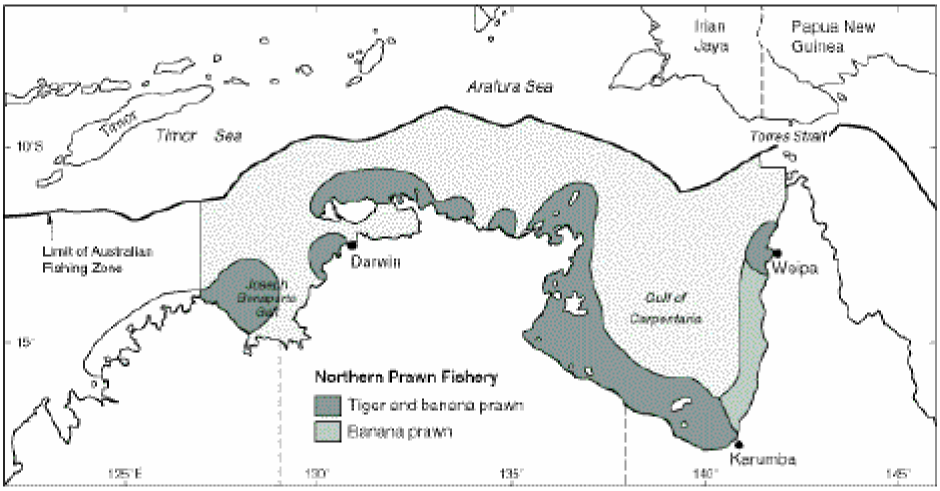
Northern Prawn Fishery

The fishery

The Northern Prawn Fishery is located off Australia's north coast and covers an area of approximately 800 000 square kilometres. It extends from the low water mark to the outer edge of the Australian Fishing Zone (AFZ) and is bordered by Cape York in Queensland and Cape Londonderry in Western Australia. Although it is one of the largest fisheries in Australia, only 27% of the fishery is subject to fishing. This is because of the large area closure enforced in the fishery, and the inshore nature of prawn fishing (AFMA 2001b).

The fishery targets nine commercial species of prawns, including white banana (*Penaeus merguiensis*), redlegged banana (*P. indicus*), brown tiger (*P. esculentus*), grooved tiger (*P. semisulcatus*), blue endeavour (*Metapenaeus endeavouri*) and red endeavour (*M. ensis*). Squid is also taken as an opportunistic target species along with scallops and bugs (Brown *et al.* 2002).

Figure 12.2. Northern Prawn Fishery



Fishing in the northern prawn fishery is divided into two main seasons: a daytime fishery targeting schooling banana prawns, and a night time fishery targeting tiger prawns. The fleet starts fishing for banana prawns at the beginning of the fishing season on 1 April. However, the banana prawn fishery presently lasts only about three to four weeks. As the banana prawn catch rates decline, the fleet progressively changes to tiger prawn fishing. This lasts until November, and includes a midseason closure from mid-May until August (Brown *et al.* 2002).

Management arrangements

The NPF has historically been managed through the use of input controls, which place limits on the type and amount of prawn fishing conducted by individual vessels. Input controls include gear (net) restrictions, annual closures, and Class A and B Statutory Fishing Rights (SFRs). It is often argued that managing the NPF using output controls would be difficult due to variations in stock size from season to season. In addition, operators could 'high grade' their catch by dumping overboard prawns of lesser size or quality to maximise the value of the quota held (Senate Rural and Regional Affairs and Transport Legislation Committee, 2000). However, catch per unit effort is also highly variable.

In January 1977 the Australian Fisheries Council (AFC) implemented an interim three-year management plan for the NPF. The plan included a moratorium on the entry of new operators into the NPF, and the formation of the Gulf of Carpentaria Prawn Advisory Committee, later the Northern Prawn Management Advisory Committee (NORPAC), to allow for more direct consultation with industry.

However, the success of the moratorium was limited, as the number of fishing licenses granted at the commencement of the plan in 1977 was 292, up from 145 in 1976. A second three-year management plan was implemented in January 1980, which again limited entry under revised criteria. However, the replacement of old with new vessels reduced the effectiveness of the plan (Senate Rural and Regional Affairs and Transport Legislation Committee 2000).

In 1984, NORPAC and the NFC were amalgamated to form NORMAC, responsible to the Australian Fisheries Service for the management of the NPF. In an attempt to limit the increase in fishing effort which had been occurring simply by the substitution of new trawlers for old, NORMAC introduced a new management plan creating Class A and B units (Pownall 1994). Under the new management plan, a vessel required one Class A unit for each cubic metre of hull volume and each kilowatt of engine power. Class B units were introduced to regulate the number of vessels licensed to operate in the NPF. In total, 133,269 Class A and 302 Class B units were issued by NORMAC in 1984 (AFMA 1999).

Economic performance of fishery

The gross value of production (GVP) in the northern prawn fishery is the highest of any of the Commonwealth fisheries in Australia. In 2002-03, despite significant falls in GVP in both 2001-02 and 2002-03, the Northern Prawn Fishery accounted for around 20% of the total value of production from Commonwealth fisheries. In 2002-03 the real GVP was around AUD 82.5 million, compared to a high of around AUD 175 million in 2000-01 (Figure 12.4). The variation in value displayed in figure 3 is mainly driven by considerable fluctuations in catches of banana prawns (Figure 12.3). Over the past decade, catches of banana prawns have ranged from 2 222 tonnes in 1999-2000 to 6 286 tonnes in 2000-01.

Figure 12.3. Catch in the Northern Prawn Fishery

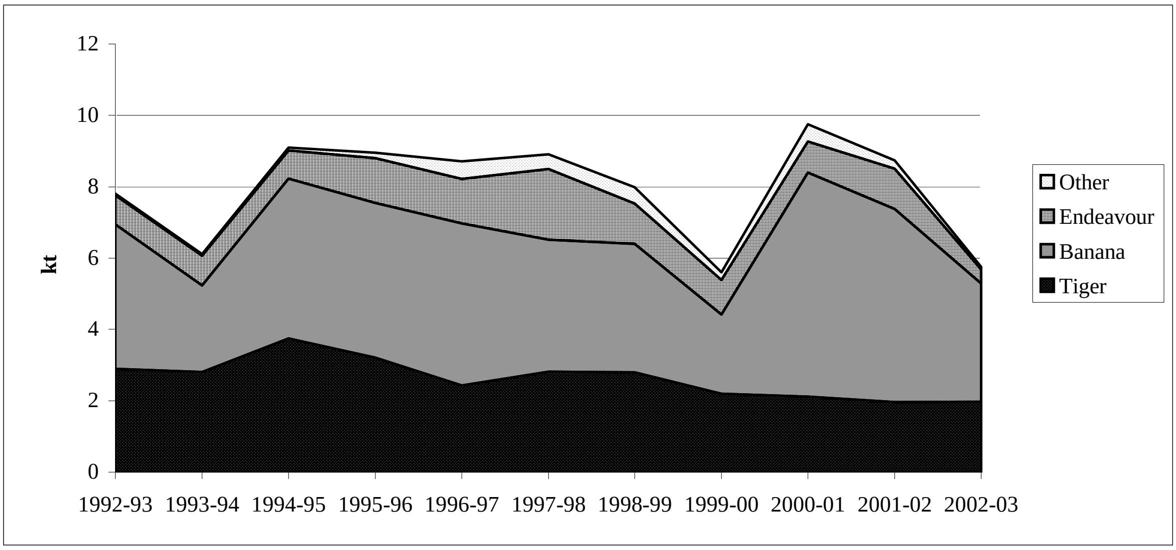
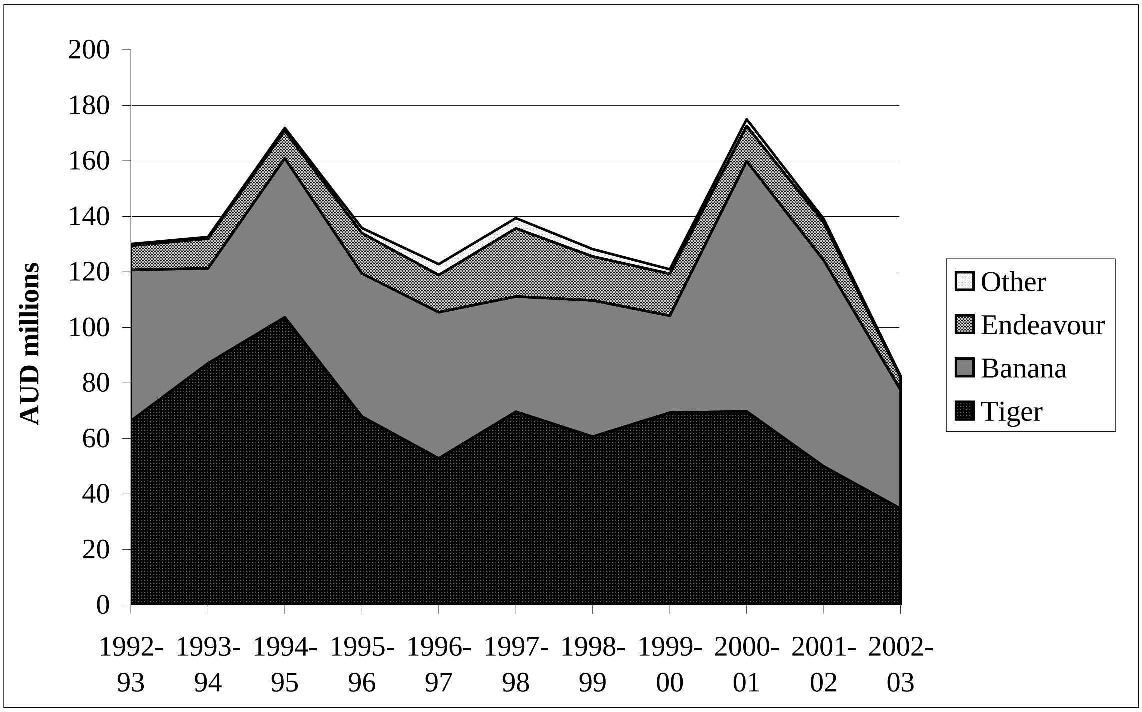


Figure 12.4. Real GVP of the Northern Prawn

(in AUD 2002-03)



The key economic question about the management of any fishery is whether it results in the maximisation of resource rent. Resource rent is the long run excess of income from a fishery over fishing and management costs. A proxy measure for resource rent – net return to the fishery – is calculated with ABARE survey data.

The real net returns to the northern prawn fishery for the period 1990-91 to 2001-02 are shown in Table 12.2. Net returns to the fishery (including management costs) have averaged around AUD 30 million per year over this period. In 2000-01 and 2001-02 real net returns were estimated at AUD 61.4 million and AUD 33 million respectively. The estimate for 2000-01 coincides with record harvests of banana prawns in that year as well as high prices (Galeano *et al.* 2003).

Any measure of the net return to the fishery needs to be considered in the context of market conditions and the condition of the fishery. Of particular importance are the condition of the fish stock, capital capacity, prices of the fishery’s products and inputs and the management structure of the fishery.

Table 12.2. Net Returns in the Northern Prawn Fishery

(in AUD 2002-03)

	Revenue a		Operating costs a,b		Capital a, c		Net returns (excl. management costs) d		Management costs e	Net returns (incl. management costs)	Vessel No.
1990-91	149.4	(3)	110.7	(3)	98.1	(1)	22.3	(12)	n.a.	22.3	169
1991-92	115.8	(4)	94.5	(3)	80.3	(2)	10.0	(22)	n.a.	10.0	160
1992-93	128.6	(10)	99.1	(10)	68.5	(11)	21.3	(15)	n.a.	21.3	129
1993-94	140.8	(9)	108.0	(12)	59.7	(11)	21.9	(8)	n.a.	21.9	132
1994-95	173.8	(8)	116.6	(6)	77.8	(6)	44.0	(16)	n.a.	44.0	133
1995-96	147.7	(3)	111.1	(3)	92.3	(7)	21.1	(17)	1.6	19.5	134
1996-97	139.1	(3)	101.3	(3)	80.6	(7)	24.1	(14)	1.9	22.2	128
1997-98	167.4	(2)	109.5	(2)	77.1	(6)	43.8	(5)	1.7	42.1	130
1998-99	153.0	(3)	105.0	(3)	73.2	(8)	35.6	(7)	1.4	34.2	133
1999-00	121.9	(4)	89.2	(4)	58.3	(8)	22.1	(16)	1.1	21.0	130
2000-01	185.7	(3)	114.3	(2)	52.7	(9)	62.4	(6)	1.0	61.4	118
2001-02	139.3	(3)	97.1	(3)	45.4	(9)	34.0	(7)	1.1	33.0	118

a Amount attributable to fishery.
b cash costs include imputed operator and family labor costs but exclude license and levy payments and interest payments.
c Replacement capital (depreciated capital).
d excludes management costs. Calculated as per the definition in this report.
e AFMA management costs A. Kettle, AFMA, personal communication, 4 September 2002).

The buy back scheme

Despite the introduction of Class A and B units, data compiled by the CSIRO in 1986 showed a serious decline in brown tiger prawn stocks in the western Gulf of Carpentaria. At a series of meetings in Darwin in late 1986, the CSIRO proposed an immediate 25% reduction in fishing effort to protect pre-spawning tiger prawns (Pownall 1994). The objective of the scheme was to increase the sustainable yield in the fishery rather than to maximise net rents generated by operators (Pascoe 1988).

To address this issue, NORMAC introduced a buy-back of Class A units with an agreed target of 70 000 by the start of the 1990 season. Any shortfall would be met by a compulsory acquisition at the start of the 1990 season. However, this compulsory acquisition was opposed by the industry, and later disallowed by the Senate. The voluntary buy-back continued to operate, but without a specific target (Taylor and Die, 1999).

Initially, only class A units were purchased by the scheme, while class B units were forfeited once the operator had less than 100 class A units. In 1997 provisions were made in the voluntary adjustment scheme to purchase class B units as well. A second aim of the policy was to reduce the number of class B units to around 160. The scheme, however, did not buy the boat from the operators, so redundant vessels could transfer to new fisheries rather than being scrapped (Pascoe 1988).

Given the unspecified outcome of the voluntary buy-back, NORMAC introduced other strategies to reduce fishing effort. A six-week closure during the winter months (15

June to 1 August) was introduced to reduce capture of pre-spawning tiger prawns (Taylor and Die 1999). Operators were also restricted to towing twin gear (two nets) rather than the more widely used triple or quad gear. Finally, NORMAC implemented a more restrictive voluntary vessel replacement policy requiring the surrender of two Class B units for a new vessel of any size (AFMA 1999)

However, it remained clear that the rate of reduction in effort was insufficient to sustain the profitability of the industry. In 1990 the Commonwealth Government appointed a task force to examine ways of restructuring the NPF. After protracted negotiations, a further reduction in Class A units to 50 000 by the beginning of the 1993 season was agreed, to be achieved by a voluntary buy-back scheme and a compulsory, across the board, proportional surrender of Class A units. The 50 000 limit was subsequently raised to 53 844 following agreement with industry that concessions be given to vessels under 375 Class A units (AFMA 1999).

At the end of 1992, the target of 53 844 Class A units had not been met, and on 1 April 1993 the remaining Class A units were compulsorily acquired to reach the target. After the compulsory buy-back, only 132 Class B units remained, less than half the number available in the mid-1980s (AFMA 1999).

Class A and B units were subsequently rolled over as Class A and B Statutory Fishing Rights (SFRs) under the Northern Prawn Fisheries Management Plan of 1995. As part of the plan, the existing restrictions on the total number of Class A SFRs (54 844) and Class B SFRs (132) were maintained (AFMA 1999).

Provision of funding

The "voluntary adjustment scheme" (VAS) was a primarily industry funded buyback scheme introduced in 1986, funded by a AUD 3 million government grant and AUD 5 million borrowed from the National Fisheries Adjustment Scheme.

As a direct result of the scheme was that the VAS price became the floor price for all other unit sales. This meant that all sales other than to the VAS were all at or above the VAS price. Therefore the VAS price was constantly lagging the market price. From the fishing operators perspective they had, for a small outlay in levy payments, achieved a substantial increase in the value of their units (Meany 1993).

In 1987, increased levies were imposed to revitalise the buyback scheme and increased prices paid for forfeited licenses. An accelerated buyback was initiated with still higher prices paid for license units (Holland *et al.* 1999).

The buyback was financed by a AUD 5 million government grant (to be used as an interest subsidy) and a commercial loan of AUD 40.9 million of which AUD 20 million was drawn down. The loan was serviced by levies on the remaining operators. However, if the target of 50 000 units was not achieved by April 1993 there would be a pro rata surrender of units to achieve the target (Meany 1993). In total the cost of the buyback program was AUD 43 million, of which AUD 18 million came from levies and AUD 25 million from loans to be repaid by unit holders. The Commonwealth contributed AUD 8 million in grants (Holland *et al.* 1999).

The compulsory surrender was challenged in court, but was allowed to proceed providing that compensation would be paid if the court found that the fishing effort units were property of the fishers. The government eventually won an appeal allowing the uncompensated surrender (Holland *et al.* 1999).

Extent of effort reduction

The process of fleet restructuring and capacity reduction has been a continuous one in the NPF. The series of industry-funded buybacks (with limited government assistance) reduced the fleet from a maximum of 302 boats in the early 1980s to a maximum of 137 in 1995. This is believed to be the most significant restructuring of a viable fishery achieved anywhere in the world. Boat numbers were 118 in 2002-03 (Galeano *et al.* 2003) and have declined further in the 2003-04 period.

Effort creep in the NPF

Effort creep has occurred in the NPF as operators have had a financial incentive to harvest stocks as early as possible to maximise their share of the overall catch within the limitations of their vessel size and engine capacity (Commonwealth of Australia 2000). This has included both the adoption of new technology as well as the substitution of unregulated fishing inputs for regulated ones.

The adoption of new fishing technology has been continuous in the NPF since the fishery was first developed in the late 1960s (Timcke, Harrison, Bell and Chapman 1999). Innovations such as global positioning systems (GPS) and plotter systems have dramatically changed the way that operators fish. Other new technologies and practices adopted include more efficient vessel and gear designs (for example, bulbous bows and new otter board materials). Calculations by CSIRO based on actual catch data indicate that the introduction of GPS technology into the fishery in the late 1980s and early 1990s increased fishing power by around 12% in just three years (CSIRO 2000). The fitting of Kort nozzles to propellers is estimated to have increased effort by a further 6.7%.

The continual uptake of unregulated fishing inputs has also increased effective effort in the NPF. For example, following the compulsory surrender of more than 30% of all Class A SFRs in 1993 a number of other input restrictions that were introduced as interim measures in 1987 were lifted (AFMA 2000). This included the removal of restrictions on net sizes and resulted in a significant increase in the size of nets that have been used since then. It is estimated that on average operators with less than 375 Class A SFRs have increased their net sizes by more than 15% since 1992 (AFMA 2000).

The technological improvement of fishing inputs on individual vessels together with the substitution of unconstrained inputs for regulated inputs has significantly increased the fishing power of the fleet in recent years. CSIRO estimates that they have led to a measured average increase in fishing power of 2.5% a year since 1988 (Commonwealth of Australia 2000). However, not all improvements or changes in fishing inputs have been quantified and, in adopting a precautionary approach, the NPFAG (Northern Prawn Fishery Assessment Group) therefore uses the assumption that the combined increase in fishing effort is about 5% a year (CSIRO 2000).

As a result of effort creep in the NPF, the input controls used to manage the fishery have been repeatedly reviewed. The management of the NPF has involved a number of input controls and season and area closures that have been introduced into the fishery over time in order to reduce effective fishing effort and address overcapitalisation of the fleet (Timcke *et al.* 1999). Specific measures have included:

- permanent and seasonal closures (first introduced in the early 1970s);
- limited entry (1977);
- boat replacement policies (first introduced in 1977);
- introduction of Class A and Class B units (1984)
- daylight trawling ban for the tiger prawn fishery (1987);
- midseason closure (introduced 1987);
- gear restrictions (for example, use of twin gear only introduced in 1987);
- buyback schemes (1987 and 1990); and
- translation from Class A SFRs to gear SFRs resulting in a 15% reduction in headrope length (1999)

The NPFAG advised in the latter half of the 1990s that effective effort directed at tiger prawns was well above that required to take the maximum sustainable yield (MSY) and should be reduced by 25–30%. In 1997, NORMAC supported the idea of a change to the use of gear-based units, but this was not implemented for several more years. The length of the closed seasons was also altered to reduce fishing effort in 1999 and 2000, making them the shortest NPF fishing seasons in 20 years. In July 2000, the change from managing fishing effort through units based on engine size and vessel-hull volume to gear-units based on the headrope length of fishing nets came into effect. AFMA considered that headrope length would represent a vessel's fishing power more closely than engine and vessel size, so would provide a better control of effort. The new system would not prevent future effort creep, but altering headrope length is expected to be a more direct and simplified method for reducing effort (Caton 2003).

The 1999 assessment of the fishery indicated that during 1999 the effective fishing effort on brown tiger prawns decreased by 40%. The decreases were largely the result of the extended seasonal closure in that year. The effective catch per unit of effort for both species of tiger prawn declined between 1998 and 1999 to well below the average for the previous seven years (Caton 2003).

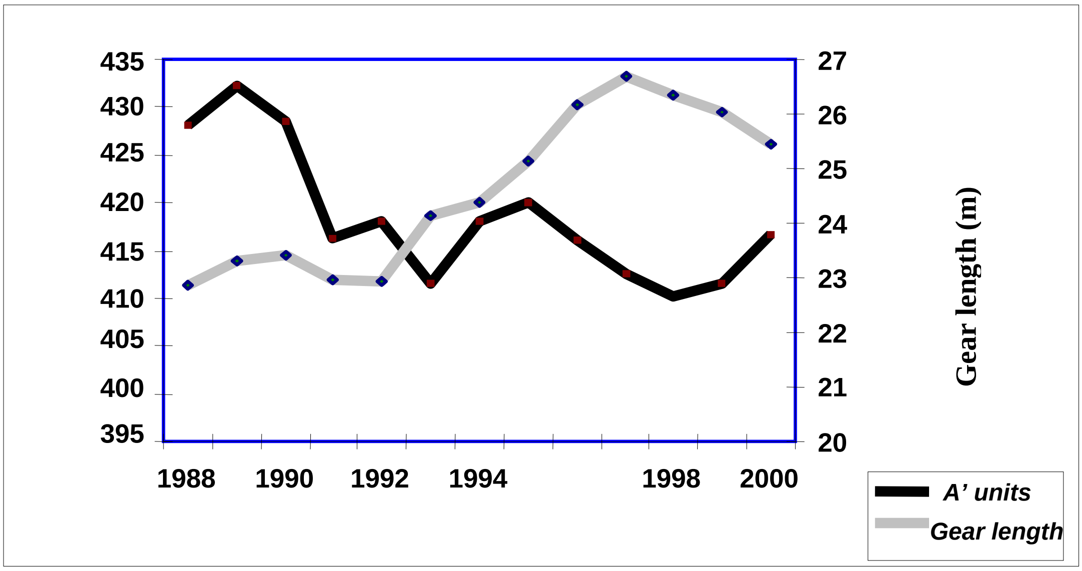
In 2001, AFMA contracted Dr Rick Deriso, an independent expert, to review the 1999 tiger prawn assessment. Dr Deriso supported the assessment's conclusion that brown tiger prawn stocks were at 42–54% of target levels and grooved tiger prawn stocks were at 66–86% of target levels in 2001 and that tiger prawn stocks were overfished. He also suggested that the levels of effort were too high to promote recovery (Caton 2003).

The model used to assess the status of tiger prawns has been updated in recent years (Dichmont *et al.* (2001) and Dichmont *et al.* (2003) as in Caton (2003)). The assessments still show brown tiger prawns as being overfished. However, effort levels in 2002 are thought to have been below the level needed to achieve the stock associated with maximum sustainable yield and projections suggest that rebuilding of the target spawning stock size will occur within a couple of years if 2002 effort levels are maintained (Caton 2003).

The assessment indicated that increased recruitment in recent years has meant that the grooved tiger prawn stock is not considered to be overexploited, and has recovered to a biomass level that corresponds with that associated with the 'maximum sustainable yield'. The stock is fully exploited and is projected to remain at this level based on the assumption that current effort levels (2002) are maintained and are not increased.

Figure 12..5. Effort Creep in the Northern Prawn Fishery

(average per boat)



Regular review of the effectiveness of management tools and subsequent adjustments are necessary but will not eliminate further effort creep. This is because changes in the regulation of input controls will create incentives for operators to change their input combinations by substituting unregulated inputs for regulated ones, thus increasing their effective effort. An example of this in the NPF can be seen throughout the 1990s when average net sizes – which were unregulated – increased as the regulated Class A SFRs were increasingly restricted. In the case of the northern prawn fishery, this is illustrated in figure E, where fishers substituted gear length for 'A' units in the 1990s when the fishery was managed with a limit on 'A' units (Galeano *et al.* 2003).

As a result, individual fishers tend to use a combination of inputs that do not necessarily minimise costs for the level of catch. Consequently net returns to the entire fishery are not maximised. Evidence of this effect in the northern prawn fishery is illustrated in Kompas and Che (2002) where it was found that changes to the input control system introduced in the fishery in the early 1990s resulted in a drop in technical efficiency and considerable effort creep. It was also found that the new set of controls introduced in 2000 are likely to increase technical efficiency, but not to constrain effort as fishers are likely to substitute unrestricted inputs for the restricted input (gear length).

Effectiveness of the scheme

- The effectiveness of the buyback scheme in the Northern Prawn Fishery needs to be viewed over both the short and long run. In the short run, the scheme was effective at removing capacity from the fishery with the maximum number of boats reduced from 302 in 1985 to 137 in 1995. This possibly resulted in some stock recovery and increased net returns over what they would otherwise have been. In the long term, however, an increase in effective effort from effort creep followed the first buyback scheme and further restructuring was required in 1999.

- Despite a reduction in the size of the fleet in the NPF, effective effort has increased steadily in response to continually improving harvest technology and a rise in the use of unregulated fishing inputs. Recent stock assessments continue to indicate that tiger prawn stocks are overfished (Dichmont *et al.* 2001; Taylor and Die 1999; Die and Bishop 1999). Tiger prawn catches in the last few years (2 694 tonnes in 1997, 3250 tonnes in 1998 and 2 986 tonnes in 1999) are well below the estimated maximum sustainable yield (MSY) of around 4000 tonnes a year.
- Concerns about the ecological sustainability of the fishery led to a 15% reduction in the total available headrope across the NPF fleet in conjunction with the translation from Class A SFRs to gear SFRs.

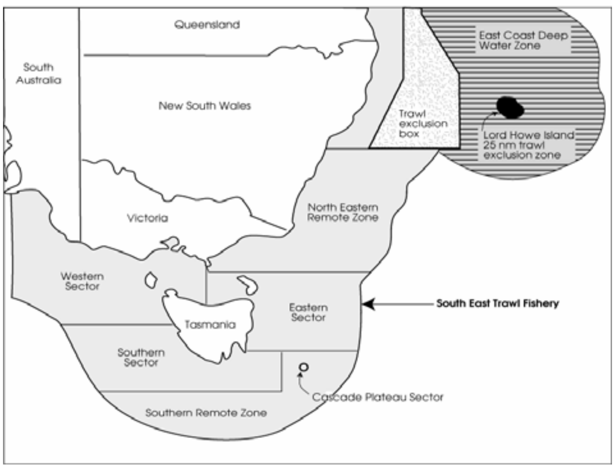
South East Trawl Fishery

The fishery

The South East Trawl Fishery is one of Australia’s oldest commercial fisheries. Although some processing facilities and export markets have been developed, the fishery continues to supply the bulk of market requirements for fresh fish in New South Wales, Victoria, Tasmania and South Australia.

The bulk of the catch consists of twenty species or species groups managed by quota. However, over a hundred species of finfish and deepwater crustaceans are commercially caught. The major species landed (by gross value) are orange roughy, blue grenadier, ling and tiger flathead and silver warehou. Many of the fish species caught in the South East Trawl Fishery are also caught in other Commonwealth and state fisheries and by recreational fishers. The three types of trawl method used are otter board, Danish seine and midwater trawl.

Figure 12.6. South East Trawl Fishery



Following the inclusion of the East Coast Deepwater Zone Fishery from the 2000 fishing year, management boundaries for the south east trawl fishery now extend from a line east from Sandy Cape in Queensland to a line from Cape Jervis in South Australia. The fishery also includes waters around Tasmania from a distance of three nautical miles offshore (the limit of the state managed waters) to the 200 nautical mile limit of the Australian fishing zone (Figure 12.5).

Management arrangements and fishery status

Until the late 1970s the SETF was primarily based on inner continental shelf species and its management was undertaken by the states. The expansion at this time into deeper grounds off the continental shelf margin and mid slope resulted in part of the fishery coming under Commonwealth jurisdiction. In 1985 the SETF was formally brought under Commonwealth legislation with the release of the South East Trawl Management plan.

Vessel unitisation was introduced in 1986 through the establishment of a boat unit register for hull and engine units. The unitisation allowed the development of a boat replacement and upgrading policy in which these units could be transferred and operators could purchase units to cover the units of the proposed replacement vessels plus a proportion to be forfeited to counter the increased fishing power of the replacement vessel.

Unitisation and the boat replacement policy failed to slow the rapid growth in fishing power as smaller vessels were purchased by other operators and used to introduce larger vessels with endorsements to fish anywhere in the fishery. The rapid expansion in Orange roughy catches and the decline in gemfish catch provided the rationale for the introduction of TACs (AMC 2000).

The South East Trawl Fishery is currently managed using a combination of individual transferable quotas (ITQs) and input controls (limited entry, mesh size and area restrictions).

ITQs were initially introduced for the trawl capture of eastern gemfish in 1989. In 1992, the use of ITQs was extended to cover a further fifteen species. At this time, operators were only allowed to lease quota on a seasonal basis to other operators within the fishery, and the sale of quota was prohibited. Full and permanent transferability of quota has been permitted since January 1994.

Under the ITQ system, each quota species is subject to a total allowable catch (TAC) apportioned between the operators who are entitled to fish. The total allowable catch is set each year by AFMA to satisfy management objectives.

Economic performance of the fishery

The volume of catches in the South East Trawl Fishery have fluctuated in recent years, primarily reflecting fluctuating orange roughy catches (Figure 12.7). The catch of blue grenadier has also increased substantially since the mid-1990s.

Figure 12.7. Catch in the South East Trawl Fishery

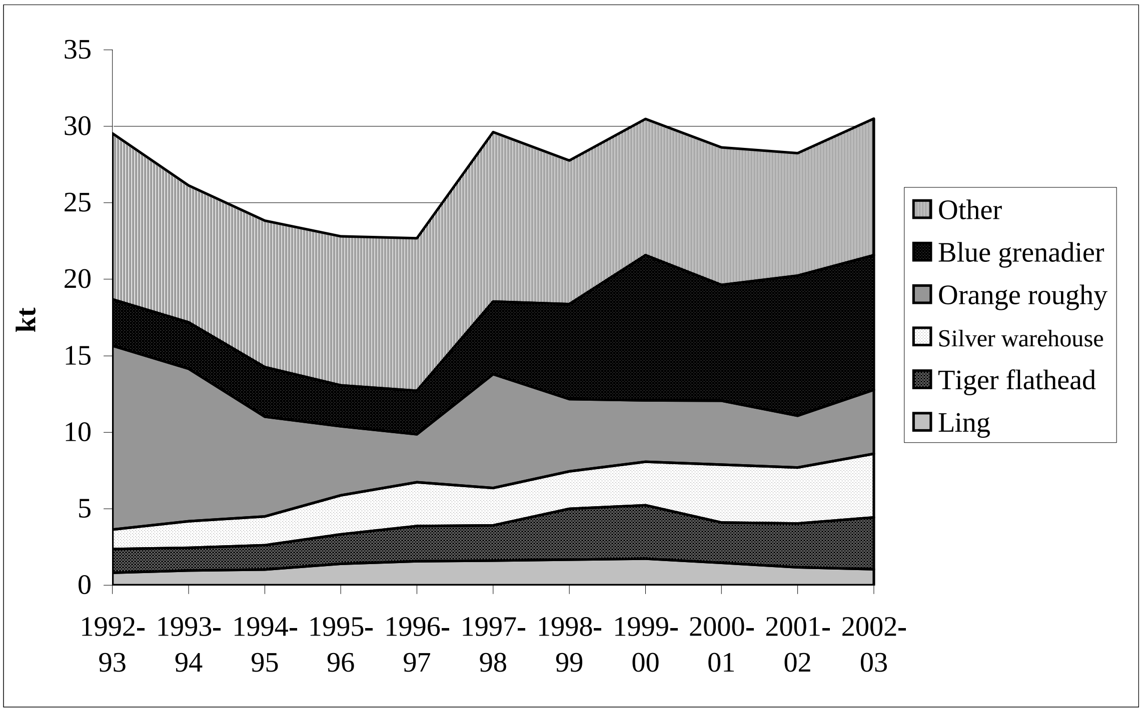
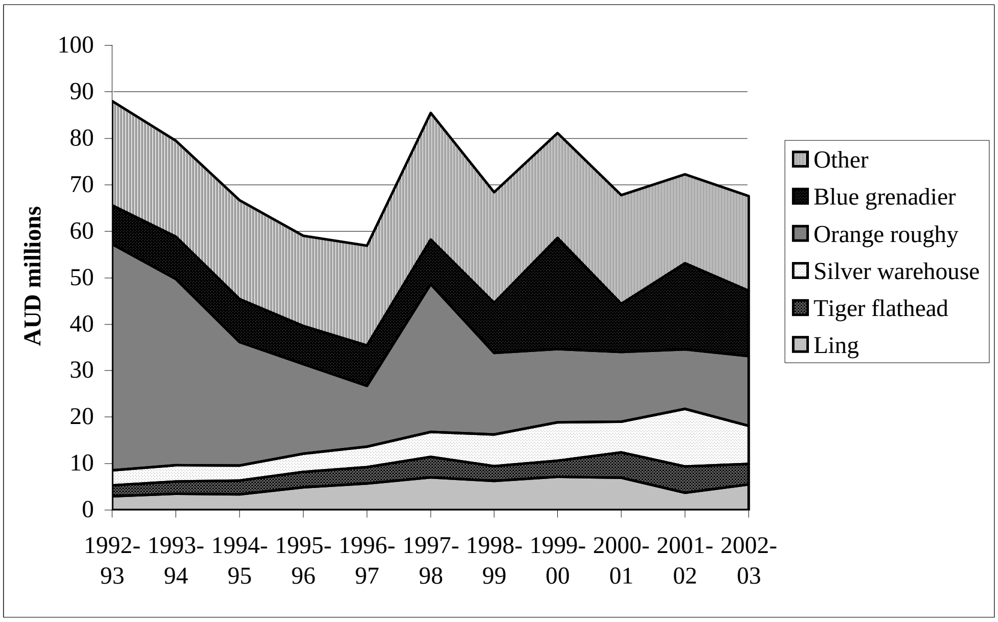


Figure 12.8. Real Gross Value of Production in the South East Trawl Fishery

(in AUD 2002-03)



Until the mid-1980s total south east fishery landings were dominated by catches taken off New South Wales and eastern Bass Strait. However, during the late 1980s and early 1990s, increased targeting of orange roughy and blue grenadier in waters around

Tasmania brought about a marked increase in Tasmanian and Victorian landings. More recently, the downturn in orange roughy catches has resulted in increased effort in the shallower waters of the south east trawl fishery. Major ports for landing quota species are Port Melbourne, Ulladulla, Devonport, Eden, Lakes Entrance, Portland and Hobart (Smith and Wayte 2001).

The real net returns to the South East Trawl Fishery for the period 1996-97 to 2001-02 are presented in Table 12.3, which shows that net returns to the fishery (including management costs) have averaged around AUD 2.0 million per year. In 2000-01 and 2001-02 real net returns were estimated at AUD 2.5 million and AUD 0.5 million respectively (Galeano *et al.* 2003).

Table 12.3. Net Returns to the South East Trawl Fishery

(in AUD 2002-03)

	Revenue a		**Operating costs a, b**		**Capital a, b, c**		**Net returns (excl. management costs**		**Management costs e**		**Net returns (incl. management costs**	**Vessel No.**
1996-97	68.0	(17)	56.6	(11)	37.9	(11)	5.0	(108)	2.0	n.a.	3.0	109
1997-98	74.2	(16)	60.0	(11)	32.4	(12)	8.3	(63)	2.8	n.a.	5.5	109
1998-99	60.5	(14)	53.2	(13)	24.5	(13)	3.1	(90)	2.5	n.a.	0.6	103
1999-00	66.5	(15)	59.5	(14)	23.0	(15)	2.9	(142)	2.8	n.a.	0.1	101
2000-01	72.1	(12)	63.0	(11)	23.4	(11)	5.2	(56)	2.7	n.a.	2.5	106
2001-02	70.1	(14)	63.8	(13)	19.8	(11)	2.9	(95)	2.4	n.a.	0.5	97

a Amount attributable to fishery.
b cash costs include imputed operator and family labour costs but exclude license and levy payments and interest payments.
c Replacement capital (depreciated capital).
d excludes management costs. Calculated as per the definition in this report.
e AFMA management costs A. Kettle, AFMA, personal communication, 4 September 2002). *Note*: Figures in parenthesis are relative standard errors. A guide to interpreting these is included in 'Survey methods and definitions'

Objective of the subsidy

The structural adjustment program in the South East Trawl Fishery was implemented in the wake of the allocation of individual transferable quotas. One of the primary reasons for implementing ITQs was to address the overcapacity of the fleet. In this sense the adjustment was partly structural and partly to compensate fishers who had their fishing operations affected by the move from input based units to output based ITQs (AMC 2000).

Many operators were surprised and aggrieved by their quota allocations and numerous appeals and court challenges followed. Opposition to the quota regime was not relieved after an internal and external review and reallocation of ITQs. Litigation on aspects of the initial quota continued with industry uncertain about the stability and security of the ITQ management arrangements. A review of Commonwealth Fisheries by the Senate Standing Committee in 1993 found that there were inequities in the original allocation in the SEF, and unless addressed urgently would continue to hinder the development of a satisfactory management regime. It was recommended that AFMA consider adjustment options including buyouts and buybacks.

The buyback therefore had two purposes: first to reduce the perceived over capacity of the fishery, and second, to remedy the opposition over the initial allocation of quota and facilitate the change in the management of the fishery.

Provision of funding

The South East Fishery Working group recommended targeted financial assistance and fishing permit buyout of AUD 6.9 million, to be funded from the National Fisheries Adjustment Program (NFAP) (AUD 5.4 million) and from direct government budget appropriations (AUD 1.5 million).

Extent of effort reduction

When ITQs were introduced there were 137 vessels licensed to operate in the fishery. By 1997, 109 vessels were fishing in the fishery. This was thought to be excessive by an Adjustment Working Group established by the Minister, who considered that "there is significant overcapacity in the SEF and agrees with the general industry view that around 30% of effort should be removed" (Report of the South East Fishery Adjustment Working Group. November 1996). Following acceptance of the report by the Minister, a buy-out scheme was initiated.

The scheme was to purchase up to 50 permits, covering both active and latent effort. Latent effort or capacity refers to licenses that were not utilised in the fishery, but have the potential to become active without any restrictions. A fixed price system was used such that AUD 25 000 was received per permit surrendered plus an additional 10% of the value of the associated quota up to a maximum of AUD 75 000 per permit.

Twenty-seven operators elected to sell their fishing permits to the buyout, and payments under the buyout totalled AUD 1.7 million. Of the twenty-seven permits retired several vessels remained in the fishery attached to different permits, either with a new owner or fishing a different permit issued to the same owner. Operators often had multiple several licenses to fish in a number of the southern fisheries. When these smaller fisheries were amalgamated into the South East Trawl the permits were not retired resulting in operators having multiple licenses.

The buy back also retired six latent permits that were not attached to any vessel, with no associated reduction in effort. Therefore, only fourteen active permits were retired under the scheme

Effectiveness of the scheme

- At first glance it appears that the buyout scheme is the South East Trawl Fishery was relatively ineffective. The design of the scheme meant that little active effort or capacity was removed from the fishery.
- Recent work suggests a productivity increase occurred as a result of capacity reduction and that the introduction of the ITQ management regime has allowed the productivity improvement to be maintained. The net effect was to increase the expected profitability in the fishery, as reflected in the value of boat licenses to participate in the fishery which rose from AUD 60 000 to AUD 85 000 immediately following the license retirement (Fox et al. 2004). That is, despite the amount of latent effort surrendered to the scheme, there is evidence to suggest that the combination of the buyback program coupled with the move to ITQs has reduced effort in the fishery and increased returns to the remaining operators.

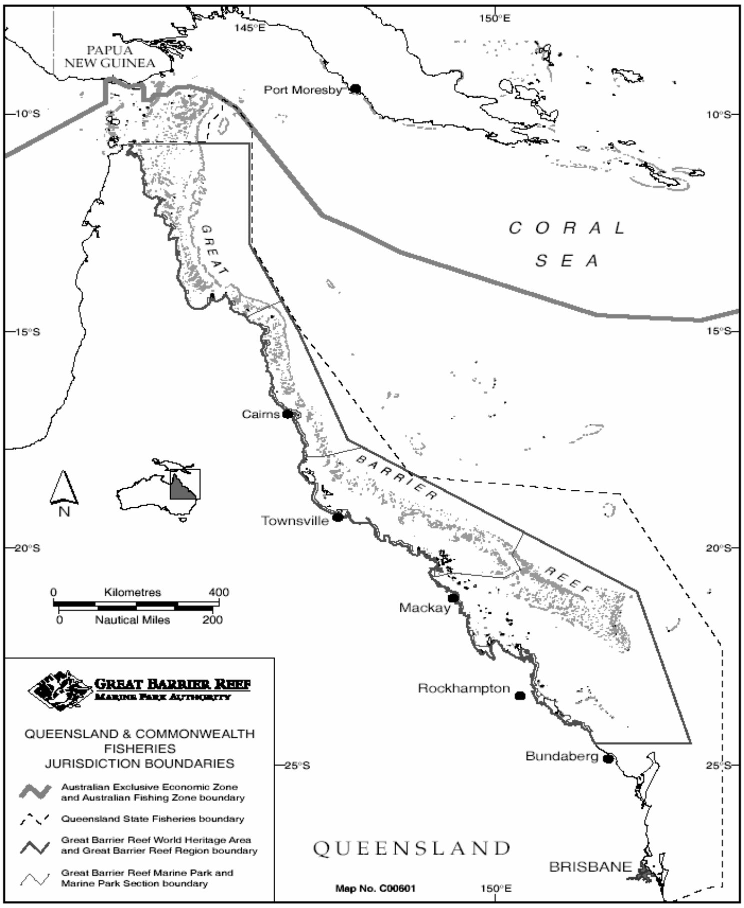
- As indicated in Table 12.1, buyback programs will have no impact on fish stocks or the sustainability of the fishery in an output controlled fishery with individually assigned rights. The program will encourage resources to move to more efficient operators improving the financial returns to those who remain in the fishery, however, stock improvements will only result from changes to the TAC.

East Coast Trawl Fishery

The fishery

The East Coast Trawl Fishery (ECTF) is Queensland's largest commercial fishery in terms of value, production and geographical distribution. It extends from the tip of Cape York (about 10.5^{0}S) along the eastern seaboard to the New South Wales / Queensland border (about 28.5^{0}S).

Figure 12.9. East Coast Trawl Fishery



The ECTF is predominantly a commercial fishery and, in general, there is limited overlap with other fisheries. The exception is blue swimmer crab; a commercial pot fishery takes 183 tonnes per annum and a further 200 tonnes are estimated to be taken annually by the recreational sector (Zeller 2002). Bay Prawns are also taken recreationally in the inshore and near shore areas. Quantities caught by Indigenous fishers are unknown but are believed to be restricted to inshore prawn species only.

By the 1950s, a prawn fishery using otter trawl had developed in Moreton Bay. The fishery continued to expand northwards along the coast with sequential discoveries of fishing grounds off Bundaberg, Gladstone, Yeppoon, Mackay, Bowen and Townsville. Since the fleet was targeting mainly banana prawns, it was possibly the schooling behaviour of the species that led to the discovery of these more northern grounds. Records of the earliest signs of temporary localised stock depletion date back to the late 1950s, when fishing declined significantly off Bundaberg after a few good seasons. However, it is likely that the high inter-annual variations in banana prawn numbers and major impediments to river flows may also have contributed to this phenomenon. Diversification commenced in the fishery in the mid-1950s, with the discovery of scallop grounds off Bundaberg. This was followed by a further offshore expansion because of the discovery of Eastern King Prawn grounds in deeper water (Huber 2003).

Management arrangements and fishery status before the scheme

From the mid-1950s to 1979, the ECTF fleet continued to expand until it reached some 1 400 vessels. This expansion was driven by the emergence of lucrative export markets for prawns and scallops into Asia and greater offshore capabilities through technological advances.

In September 1979, the Queensland Government announced a moratorium on any further entry into the fishery and moved to reduce the total number of vessels in the fleet. The Commonwealth continued to license new vessels for operations in Commonwealth waters (*i.e*. outside 3 nautical miles from the Territorial Sea Baseline) until December 1984. From the late 1970s to 1999, Queensland managed the ECTF through a range of input controls. In June 1987, Queensland took over responsibility for the management of the waters outside three nautical miles (apart from tuna species) under the Offshore Constitutional Settlement (OCS) arrangements.

Under the input control based system, controls on fishing effort in the ECTF were used as a proxy to control exploitation that indirectly controlled catch. As in the Northern Prawn case, input controls often have an impact on nominal effort. Operators are likely to accommodate the additional constraints by improving the efficiency of their operation or by input shifting to circumvent the restrictions.

Objective of the subsidy

Despite a cap on vessel numbers in 1979 and other input measures, fishing effort in the ECTF continued to increase. In particular, there was a dramatic increase during 1986 - 1988 when the “2:1” boat replacement policy that required two vessels to be retired for a new vessel to enter the fishery, resulted in smaller vessels being replaced with larger, more efficient vessels. The catching power of the fleet also increased through technological improvements in engine design. By 1996, effort in the ECTF had peaked at around 108 000 fishing days. The fishery showed signs of being “fully exploited” (if not over-exploited) with declining catch rates for some species (such as scallops) and the serial depletion of fishing grounds (Huber 2003).

There was also a significant over-capitalisation of the fleet and declining profitability of operators in the fishery (Huber 2003). Despite these signs, and calls from some groups (such as the Great Barrier Reef Marine Park Authority - GBRMPA) for major reductions in fleet size and fishing capacity, a Management Plan (East Coast Trawl Plan) was introduced for the ECTF in November 1999, which consolidated the then management arrangements without any effort cuts. At the time, there was reluctance to implement measures that were needed to reduce effort.

Changes to management arrangements

Following major criticism of the East Coast Trawl Plan by the GBRMPA and intercession by the then Commonwealth Minister for Environment and Heritage, Queensland re-examined options for effort reductions. During early to mid 2000, future management arrangements (including the feasibility of a structural adjustment scheme for the fishery) were assessed and a stakeholder working group was established by the Queensland Premier. The group's task was to consider ways to give effect to the agreements reached at the 28th Great Barrier Reef Ministerial Council in 1999. Subsequently, agreement was reached between the Commonwealth and Queensland about essential changes to the ECTF management arrangements.

The revised Trawl Plan set a maximum number of fishing days to be allocated in the ECTF, which was equivalent to the 1996 level of fishing. The implementation of the voluntary structural adjustment scheme resulted in the removal of nearly 100 licenses from the ECTF. This amounted to an effort reduction of nearly 11% of the allocated fishing days. In addition, industry had agreed to a mandatory 5%^fishing day reduction across-the-board in lieu of its contribution to the structural adjustment scheme. Thus, there was an up-front reduction of nearly 16% of fishing days at the start of the revised Trawl Plan.

The revised Trawl Plan for the fishery allocated effort units based on the product of historical participation in the fishery (allocated fishing days) and the standardised hull units of the vessel. About 3.5 million effort units were allocated at the beginning of 2001.

In addition to the overall effort cap in the fishery, a second effort limitation related to the Great Barrier Reef World Heritage Area. The Commonwealth contributed AUD 10 million to the structural adjustment package in return for assurance from the Queensland government that effort would not increase in the World Heritage Area. Subsequently, effort in the region was capped at about 2.4 million effort units.

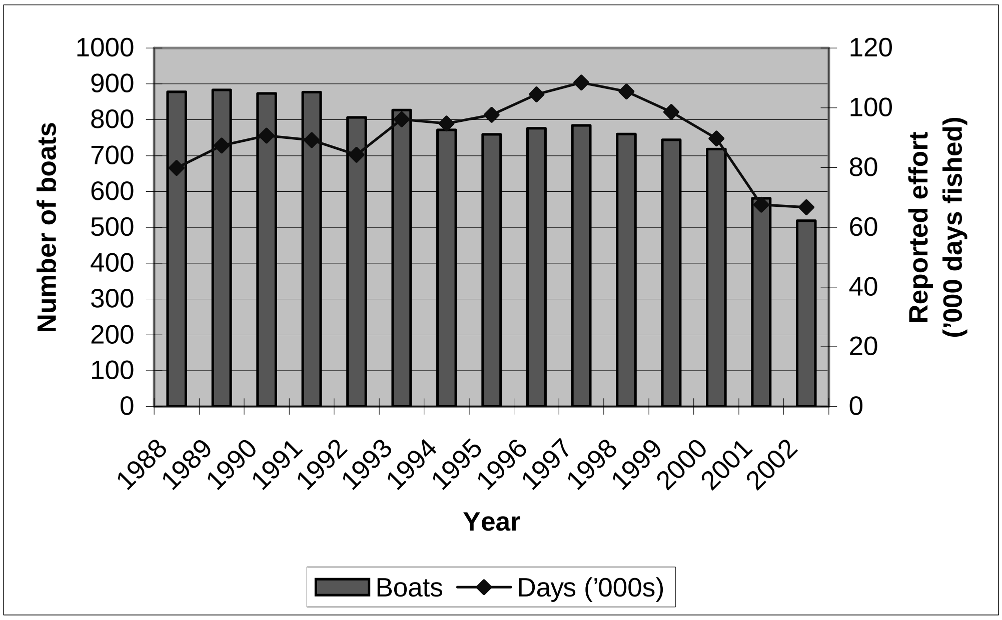
Extent of effort reduction

The combination of the structural adjustment scheme and the penalties designed to control effort creep, resulted in a 14% reduction in effort after the first year. This was in addition to the 5% surrendered by industry in lieu of its contribution to the adjustment scheme and above the estimated 11%. According to the Queensland Fishing Service 493 241 effort units were removed from the fishery in 2001. This reduction in effort also brought about the removal of 237 trawlers from the ECTF fleet. Ninety-nine licenses were bought out by the scheme and a further 138 operators surrendered their trawl endorsements as a result of selling their effort units. Unlike the SEF and NPF, a competitive tender system was used to ensure vessels were retired at least cost.

The historical fishing effort in the ECTF expressed as days fished, and changes in the total number of vessels since 1988 are shown in Figure 12.10. Reported effort increased from 1988 to 1997 where it peaked at 108 530 days before a rapid decline. This decline can be attributed to a combination of the vessel replacement program, vessel buy-back scheme, effort unit trading system, and the cap in total effort (QFS 2003).

Until the restructure in early 2001, the fishery had an average annual production of around 11 000 tonnes and an average annual estimated value of nearly AUD 130 million (Williams 2002). Some 850 boats fished about 100 000 days per year. Following the license buyback the fleet size decreased to about 530 boats. This resulted in a lowering of annual production and GVP for the fishery in 2001 to 7 500 tonnes and AUD 95.5 million respectively (Huber 2003).

Figure 12.10. Annual Number of Reported Days Fished and Number of Reported Vessels



Source: CFISH database

With a reduction in the number of ECTF operators and greater profitability for those that remained in the fishery, it was anticipated that the fleet would be upgraded over time. Mechanisms were built into the Trawl Plan to address effort creep, which was estimated to average 3% per annum. Operators are required to surrender 10% of their transferred effort units upon trading. Similarly, a 5% penalty on effort units applies to the transfer of a license (except for a transfer from a deceased estate).

Under a third mechanism, operators need to surrender effort units upon boat replacement. The amount of effort units that are forfeited depends on the size of the replacement vessel, as specified in Schedule 5 of the Trawl Plan. The QFS has indicated that 3% of effort was removed in 2001 by these three mechanisms. Huber (2003) notes that while effort creep occurs across the fleet through enhanced technology, only those operators wishing to trade or upgrade vessels pay the associated penalties. As a result, this arrangement may act as a disincentive to an autonomous fleet restructure.

Provision of funding

The funding for the structural adjustment package was shared between industry and the State and Federal Government, who contributed AUD 10 million each. Subsequently the industry agreed to surrender an extra 5% of days to secure an extra AUD 10 million of government funding in lieu of its contribution to the package.

Unlike the NPF and SETF buyback scheme where a fixed price was given to operators surrendering their licenses, the ECTF buyback used a competitive tender. A competitive tender requires operators submit and offer to the scheme. These bids are then compared against a reserve price. However operators are paid their bid and not the reserve. This method can result in a lower cost paid to reduce effort. Other information can be elicited from operators to enable further discrimination between the bids, rather than being based on price alone.

Effectiveness of the scheme

- Ninety-nine licenses were bought out by the scheme and a further 138 operators surrendered their trawl endorsements as a result of selling their effort units.
- According to the Queensland Fisheries Service (2003), the total catch of principal fish has significantly decreased following the introduction of the Trawl Plan and the structural adjustment of the fleet in 2001.
- Mechanisms were built into the Trawl Plan to address effort creep and effort was capped at 1996 levels. This should sustain some of the benefits generated by the buyback program.

Lessons from Australia

A number of important lessons can be learned from Australia's experience with subsidies aimed at reducing capacity in a fishery by decommissioning vessels and retiring licenses. The fundamental lesson from all the case studies is that the excess capacity originally existed in the fisheries due to the historical management regimes and the associated economic incentives they created. Unless these underlying incentives to create excess capacity are addressed any benefits of buyback schemes on both fish stocks and economic rents will be short lived.

Important factors that need to be considered when designing a buyback scheme include:

- The existing management regime – whether the fishery is managed using input or output measures will greatly impact the success of the program.
- Voluntary or compulsory – the speed of reaching the targeted capacity reduction is contingent on whether the scheme is voluntary or compulsory.
- Competitive tender or fixed price – the cost of buyback schemes can be minimised if a competitive tender system is used. For this system to work it is important that the scheme operates at arms length from the industry such that the reserve price is not known by operators.
- Latent effort reductions – targeting active effort ensures that the benefits in terms of increased fish stocks and improved economic rents are maximised. However, the removal of latent effort can prevent an effort 'explosion' if new fishing grounds are discovered.
- The removal of gear units from smaller operators will move resources to more efficient operators, resulting in effort creep and added pressure on fish stocks. Effort penalties can be put in place to minimise this problem.

- In output managed fisheries there will be no additional pressure placed on stocks from the movement of quota from smaller to larger operators, and economic efficiency will improve.
- Decommissioning schemes can be successful in reducing effort (excess capacity) as part of a one-off structural adjustment program where the management regime is also changed to one that provides more security and stability and addresses the market failures leading to the overcapacity problem. The scheme can aid in the transition to a more responsible fishery in which the sustainability and profitability are improved.

The experience with buyback schemes in the NPF has highlighted the need to ensure the remaining capacity is controlled. Effort creep has been a continuous problem in the fishery and has reduced the benefits of the vessel buyback schemes. While there was an initial decline in the effort in the NPF brought about by the buyback program, the decline only lasted a few seasons due to effort creep. That is, the program removed excess capacity from the fishery without addressing the market failure leading to overcapacity accumulating in the fishery.

Although the license buyback in the South East Trawl Fishery removed a large amount of inactive effort, evidence suggests that the scheme has had some success. The buyback in 1997 in the SEF resulted in productivity growth in 1998 – and coupled with the more extensive trading of ITQs solidified the gains. The introduction of an ITQ management regime addressed the overcapacity problem, while the decommissioning scheme removed some of the excess capacity. Evidence thus suggests that buyout schemes combined with a substantive output controlled management device can be effective at both reducing effort and increasing economic returns (Fox et al. 2004). However, if the scheme targeted active effort the impact may have been greater.

The more recent package implemented in the East Coast Trawl Fishery in Queensland had several benefits over some of the early schemes. First, the use of competitive tendering ensured that vessels were removed at least cost. Secondly, an attempt to control effort creep has been made through a series of penalties associated with trading of effort units, and vessel upgrading. The long-term success of this program is not known at this stage. However, if the new management regime does not address the market failures leading to the accumulation of capacity, any benefits can be expected to be short lived.

BIBLIOGRAPHY

Arnason, R. (1998), "Fisheries subsidies, overcapitalisation and economic losses", in Hatcher, A. and K. Robinson (eds), *Overcapacity, Overcapitalisation and Subsidies in European Fisheries*, University of Portsmouth, England.

(AFMA) Australian Fisheries Management Authority (2001a), Strategic Assessment Report Northern Prawn Fishery, Canberra.

––– (2001b), Annual Report 2000-01, Canberra

––– (April 1999), *Factual Brief* for the Independent Allocation Advisory Panel on Translation to Gear Statutory Fishing Rights, p 3

(AMC) Australian Maritime College (2000), *An economic assessment of the South East Fisheries Ajustment Package* (SEFAP), AMC, Launceston.

Barlowe, R. (1958), *Land Resource Economics: The Political Economy of Rural and Urban Land Resource Use*, Prentice-Hall, Englewood Cliffs, New Jersey.

Bergin, A. and M. Haward (2000), *Australia and International Fisheries Management Issues – Future Directions*, Report to the Fisheries Resources Research Fund, AFFA, Canberra.

Brown, J. and S. Weinberg, (2001), "Fisheries subsidies: international initiatives to establish disciplines", in *Outlook 2001*, Proceedings of the National Outlook Conference, 27 February – March 1, Canberra, vol. 1, *Natural Resources*, ABARE, pp. 193–201.

Cartwright, I. (2003), "SIFAR/World Bank Study of good management practices in sustainable fisheries: The Australian Northern Prawn Fishery", Thalassa Consulting.

Caton, A. (ed.) (2003), Fishery Status Reports 2001-02: Resource Assessments of Australian Commonwealth Fisheries, Bureau of Rural Sciences, Canberra.

Clark, C.W. (1976), *Mathematical Bioeconomics: The Optimal Management of Renewable Resources*, Wiley-Interscience, New York.

Commonwealth of Australia (2000), *Northern Prawn Fishery Amendment Management Plan 1999*, Report of the Senate Rural and Regional Affairs and Transport Legislation Committee, Canberra, March.

Commonwealth of Australia (1989), *New Directions for Commonwealth Fisheries Management in the 1990s*, AGPS, Canberra.

Department of Environment and Heritage (2004), "Marine Protected Areas and Displaced Fishing: A Policy Statement", http://www.deh.gov.au/coasts/mpa/displaced-fishing.html.

Dichmont, C.M., D. Die, A.E. Punt, W. Venables, J. Bishop, A. Deng and Q. Dell, (2001), *Risk Analysis and Sustainability Indicators for Prawn Stocks in the Northern*

Prawn Fishery, CSIRO project for the Fisheries Research and Development Corporation, project number 98/109.

Die, D. and J. Bishop, (1999), *Status of Tiger Prawn Stocks at the End of 1998*, NPFAG Working Paper 99/1, CSIRO, Cleveland, Queensland.

FAO (Food and Agriculture Organization of the United Nations). (1997). *FAO Technical Guidelines for Responsible Fisheries No. 4: Fisheries Management*, Rome

FAO (Food and Agriculture Organisation of the United Nations) (1993), "Marine fisheries and the law of the sea: a decade of change", in *The State of Food and Agriculture 1992*, Rome.

Fox, K.J., R.Q. Grafton, T. Kompas and N. Che, (2004), Capacity Reduction, Quota Trading and Productivity: The Case of a Fishery – Draft Report, ABARE, Canberra.

Galeano, D., D. Langenkamp, W. Shafron, and C. Levantis, (2004), Australian Fisheries Surveys Report 2003: Economic Performance of Selected Fisheries in 2000-01 and 2001-02, ABARE, Canberra, January.

Greboval. D, and G. Munro (1999) "Overcapitalization and excess capacity in world fisheries: Underlying economics and methods of control", in *Selected papers on underlying concepts and issues' FAO Fisheries technical paper 386, FAO*, Rome

Gooday, P. (2002), "Fisheries subsidies", ABARE Report to the Fisheries Resources Research Fund, Canberra, January.

Gooday, P. and D. Galeano, (2003), "Fisheries Management: A Framework for Assessing Economic Performance", ABARE eReport 03.7, Prepared for the Fisheries Resources Research Fund, Canberra, April.

Gordon, H. (1954), "The economic theory of a common property resource: the fishery", *Journal of Political Economy*, vol. 62, no. 2, pp. 124–42.

Holland, D., E. Gudmundsson, and J. Gates, (1999), "Do fishing vessel buyback programs work: A survey of the evidence". *Marine Policy*, Vol.23, pp47-69.

Huber, D. 2003, Audit of the Management of the Queensland East Coast Trawl Fishery in the Great Barrier Reef Marine Park, GBRMPA. Available online: http://www.gbrmpa.gov.au/corp_site/key_issues/fisheries/commercial/trawl_fish_report.html.

Kompas, T. and N. Che, (2002), "A stochastic production frontier analysis of the Australian northern prawn fishery", ABARE report to the Fisheries Resources Research Fund, Canberra.

Meany, F. (1993). "NPF Restructuring – Lessons for the Future". Australian Fisheries, November.

Metzner, R. and P. Rawlinson, (1998), "Fisheries structural adjustment: towards a national framework", prepared for Management Committee, Standing Committee for Fisheries and Aquaculture, Australia Canberra. Department of Primary Industries and Energy, Canberra.

Munro, G. 1998, "The economics of overcapitalisation and fishery resource management: a review", in Hatcher, A. and K. Robinson, (eds), *Overcapacity, Overcapitalisation and Subsidies in European Fisheries,* University of Portsmouth, England.

Munro, G.R. and U.R. Sumaila (2001), "Subsidies and their potential impact on the management of the ecosystems of the North Atlantic", in Pitcher, T., U.R. Sumaila, and D. Pauly, (eds), *Fisheries Impacts on North Atlantic Ecosystems: Evaluations and Policy Exploration*s, University of British Columbia Fisheries Research Report 9(5), Vancouver, pp 10-27.

OECD (2003), *Review of fisheries in OECD countries: Policies and summary statistics.* Organization for Economic Cooperation and Development, Paris.

OECD (1996), *Synthesis Report for the Study on the Economic Aspects of the Management of Marine Living Resources*, AGR/FI (96) 12, Paris.

Pascoe, S. (1988), "The effectiveness of the Northern Prawn Fishery Voluntary Adjustment Scheme", Paper presented at the Australian Economic Congress, 28 August – 2 September, Canberra.

Pascoe, S.; J.E. Kirkley, D. Gréboval, and C.J. Morrison-Paul, (2003) "Measuring and assessing capacity in fisheries". 2. Issues and methods. *FAO Fisheries Technical Paper*. No. 433/2. Rome, FAO.

Pascoe, S., D. Tingley, and S. Mardle, (2002), "Appraisal of Alternative Policy Instruments to Regulate Fishing Capacity. Centre for the Economics and Management of Aquatic Resources", (CEMARE) University of Portsmouth.

Porter, G. (2001), "Fisheries Subsidies and Overfishing: Toward a Structured Discussion", Paper presented at the UNEP Fisheries Workshop, Geneva, Switzerland, 12 February.

Pownall, P (ed.) (1994). "Australia's Northern Prawn Fishery: the first 25 years", NPF25, Cleveland, Australia.

Queensland Fisheries Service (QFS) (2003), *Status of the Queensland East Coast Otter Trawl Fishery*. Department of Primary Industries, Queensland.

Rose, R. (2002), "Efficiency of individual transferable quotas in fisheries management", ABARE report to the Fisheries Resources Research Fund, Canberra.

Scott, A. (1955), "The fishery: the objectives of sole ownership", *Journal of Political Economy*, vol. 63, pp. 116–24.

Senate Rural and Regional Affairs and Transport Legislation Committee (2000), The Northern Prawn Fishery Amendment Management Plan 1999, Canberra, March.

Smith, A.D.M. and S.E. Wayte (eds) (2001), "The South East Fishery 2000, Fishery Assessment Report compiled by the South East Fishery Assessment Group", Australian Fisheries Management Authority, Canberra.

Taylor, B and D. Die, (Eds) (1999), "Northern Prawn Fishery Assessment Report, 1997 and 1998", AFMA, Canberra.

Timcke, D., S. Harrison, R. Bell, and L. Chapman, (1999), *Applying ESD Principles in the Northern Prawn Fishery: An Economic Assessment*, ABARE report to the Fisheries Resources Research Fund, Canberra.

Williams, L.E. (2002), *Queensland's fisheries resources : current condition and recent trends 1988-2000,* Department of Primary Industries, Brisbane, Qld. 180p.

WTO (World Trade Organisation) (1994), *Subsidies and Countervailing Measures Agreement*, WTO, Geneva.

— (1997), *Environmental Benefits of Removing Trade Distortions: Note by the Secretariat*, WT/CTE/W/67, Brussels.

WWF (World Wildlife Fund) (1998), *Towards Rational Disciplines on Subsidies to the Fishery Sector – A Call for New International Rules and Mechanisms,* WWF International, Surrey, England.

Zeller, B. (2002), *Ecological assessement of the Queensland East Coast Otter Trawl Fishery : a report to Environment Australia on sustainable management of a multi-species macro-scale fishery ecosystem*, Department of Primary Industries, Brisbane, Australia. Available from http://eron.gov.au/coasts/fisheries/assessment/qld/eco-trawl/pubs/draft-eco-trawl.pdf

OECD PUBLICATIONS, 2, rue André-Pascal, 75775 PARIS CEDEX 16
PRINTED IN FRANCE
(53 2006 02 1 P) ISBN 92-64-03663-6 – No. 55215 2006

Financial Support to Fisheries

IMPLICATIONS FOR SUSTAINABLE DEVELOPMENT

OECD governments pay out around USD 6 billion a year to support the fisheries sector. Some of this expenditure is provided to help ensure the effective management of fisheries through the provision of research, administrative and enforcement services. However, its effects on economic profitability and resource sustainability are open to debate. Such support has often been linked to over-fishing and over-capitalisation, and its reform may lead to improved economic, environmental and social outcomes. The focus of the World Trade Organization and the World Summit on Sustainable Development, among others, on fisheries support measures highlights the importance that governments place on moving towards a more coherent and sustainable approach to financial support for the sector.

In order to address these concerns, the OECD undertook a major study on the impacts of government financial transfers. This report analyses the impacts of such transfers from a sustainable development perspective by addressing the economic, environmental and social dimensions of financial transfers. Through this innovative focus, this study will deepen policy makers' understanding of the complex issues at play in the fisheries sector – a sector that is characterised by ongoing concerns regarding economic profitability, community resilience, and resource sustainability.

www.oecd.org

OECD

OECDPUBLISHING

ISBN 92-64-03663-6
53 2006 02 1 P

9 789264 036635