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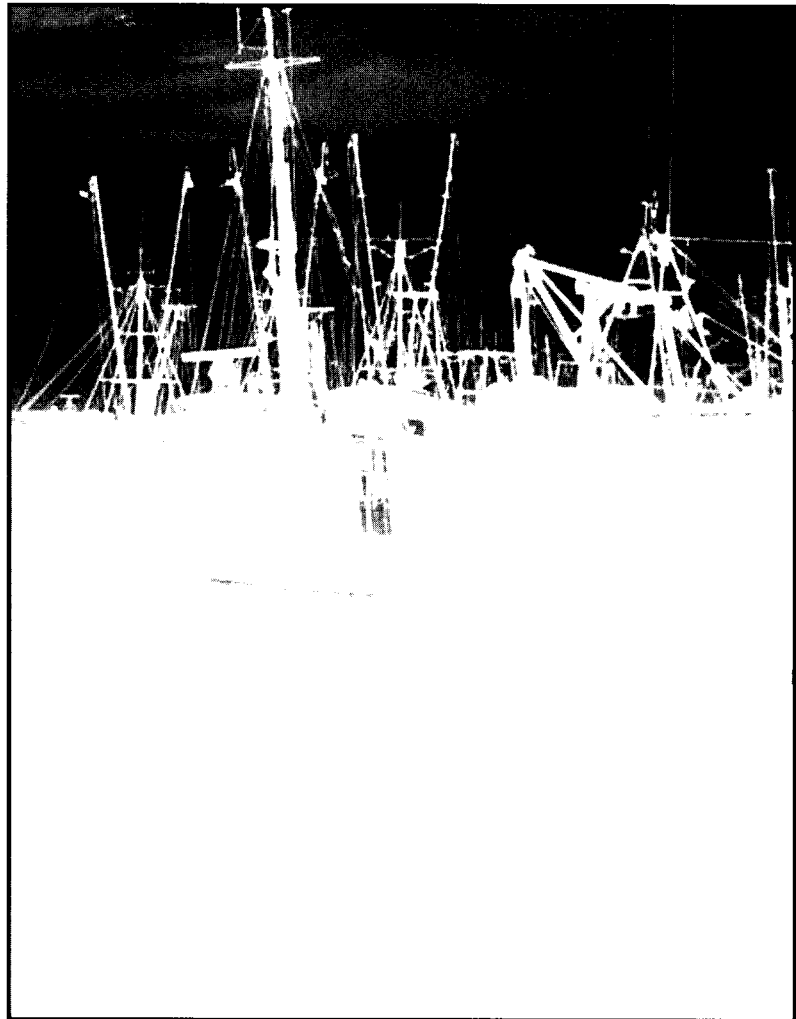
WORLD BANK TECHNICAL PAPER NO. 406

Fisheries Series

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Subsidies in World Fisheries

A Reexamination



Matteo Milazzo

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A Reexamination

Matteo Milazzo

*The World Bank
Washington, D.C.*

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FOREWORD

Fisheries and the World Bank Group

With mounting evidence of non-sustainable levels of fishing effort being targeted at well over half of the world's main fishing populations, the traditional development paradigm of supporting development in areas with abundant fish resources is becoming increasingly irrelevant. Limiting fishing efforts to sustainable levels has become the most urgent sector objective for many Governments and Development Finance Institutions. Because the creation and operation of an effective fisheries management systems is complex and frequently requires careful institutional engineering and political leadership - notably when over-fishing has already wreaked havoc with the fish resources - the principles of fisheries management and their application have become the number one issue in fisheries.

New Zealand, Iceland, Namibia, Norway, Canada, Japan and the countries of the European Union have demonstrated the limitations and substantial potential of past and ongoing efforts to create more effective fisheries management systems. The Food and Agriculture Organization of the United Nations (FAO) has drafted a *Code of Conduct for Responsible Fishing*, which defines the principles of sustainable fisheries management; many countries have already adopted the code. All experiences agree on one point: effectively managing fisheries is impossible without removal of the key causes behind the excessive investment levels in fleets and infrastructure of the past. Of these, overt and hidden subsidies have played a major, and in some cases decisive, role.

This issue has received limited scholarly or analytical attention in the past, possibly because reliable data are often hard to come by, and some are sensitive. A clear framework for analysis was lacking. Mr. Milazzo has made the first, courageous effort, to estimate the order of magnitude of major subsidies to the fishing sector on a world wide basis. His findings support earlier assumptions that massive levels of subsidies have indeed been a major driving force behind much of the expansion of fishing effort in many parts of the world.

World Bank Group lending to the fishing sector has demonstrated considerable variation. While during 1969-1983 annual lending levels to the sector averaged some US\$ 25 million, sector lending declined during the remaining 1980s and early 1990s. Early projects mostly supported fishing ports, fisheries credit programs and rural marketing infrastructure, while in later years the share of lending for fish culture and fisheries research substantially increased, reflecting increasing concern about the state of exploitation of marine fish resources. The World Bank Group now gives the highest priority to assisting its clients in creating the institutional, policy and technical environment to exploit their marine sources and develop their aquaculture potential in a more sustainable way.

ABSTRACT

Fisheries in the world is reaching a turning point. Many of the traditional most highly valued stocks are fully or overexploited in a biological sense; in economic terms most fisheries employ excessive fishing effort to reach current levels of production. Ineffective management is the fundamental cause for this over-fishing and excessive use of inputs. Weak and ineffective management systems still govern exploitation of most major fish stocks. Paradoxically, fisheries management effectiveness is being undermined by the very subsidies that are provided to maintain fisheries sector income. This study examines the role of subsidies in explaining the obvious and injurious mismatch between fishing effort and biological production capacity. It uses the definitions and methodology of the World Trade Organization on Subsidies and Countervailing Measures of 1994 in defining the nature and size of subsidies to the sector and their impact, based on case studies for Japan, the European Union, Norway, the United States, Russia and China. It covers the subsidies explicitly covered in the WTO agreement, including those that are part of public budgets covering operations in local and foreign waters, and unbudgetted subsidies, including subsidized sectoral lending, tax preferences, cross-sectoral subsidies and infrastructure. In addition subsidies that are implied by the WTO agreement, like resource rent subsidies and conservation subsidies are being assessed in some detail. The aggregate level of subsidies to fisheries in the World is estimated at \$14-20 billion annually, depending on the extrapolation method from the cases studied. Unbudgetted, cross-sectoral and resource rent subsidies account for close to 80% of all subsidies. Compared to other food products, total support levels for fish production (including global trade protection) are high, of the order of 30-35%; this compares with global support levels for beef (35%), pork (22%), poultry (14%) and lamb (45%). Subsidies are a significant factor in undermining the sustainable use of the wild fish resources in many parts of the world.

ACKNOWLEDGMENTS

In the last half-dozen years, the view has emerged and won wide acceptance that something is fundamentally wrong with the ways in which governments manage and promote their fishery sectors. Numerous analysts and commentators have given ever closer scrutiny to the causes and cures of the emerging general crisis in world fisheries. Indeed, the widely accepted overall view of the fisheries sector's status is generally pessimistic.

Presently, just two decades after the worldwide move to 200-mile fisheries zones in the late 1970s, the major elements of this picture include widespread overfishing and overcapitalization, ineffective management, deteriorating resource health, decline or flat global harvests of most traditional species from capture fisheries, and economic and trade policies in the fisheries sector whose impact on conservation can most politely be described as perverse. Much of the credit for calling attention to this crisis belongs to the Food and Agriculture Organization's (FAO) Fisheries Department staff, who prepared a number of reports on the worsening state of the world's fisheries resources.

I began to pay more attention to these concerns in late 1995, shortly after the completion of the United Nations' fisheries agreements, when officials from FAO and some governments identified "overcapacity" as the most fundamental problem. Simultaneously, it became clear that most specialists considered "overcapacity" and the related (and broader) phenomenon "overfishing" to be somehow derived from

both faulty management, and excessive and poorly designed subsidies.

In the spring of 1996, I started to examine more systematically the aspect of subsidies and decided to prepare a paper on its role in the general resource crisis. In particular, I noted the resistance to efforts to discipline subsidies in recent multilateral trade and shipbuilding negotiations. Accordingly, I began to suspect that subsidies in the fisheries sector must play some important role that transcends the sphere of trade.

As I probed more, I soon realized that the topic is highly complicated, rapidly changing, and seriously encumbered by a woeful lack of up-to-date and reliable information. To give some measure of order and structure to this enterprise, I then began to look for definitions and, more generally, an analytical framework. The result of this search was a decision to use, as much as possible, the definitions, concepts, and thresholds of the World Trade Organization's (WTO) 1994 agreement on subsidies.

However, the 1994 WTO agreement is a trade agreement and, as such, was negotiated to respond to trade-related economic injury, and not to environmental harm. To use a trade agreement to elucidate conservation issues, I created my own categories of "effort- and capacity-enhancing" and "effort- and capacity-reducing" subsidies, and applied them to a wide range of government measures in fisheries. The rest is given in the pages that follow.

During the research and drafting of this study, I was able to take advantage of my position in the International Fisheries

Division, Office of Sustainable Fisheries, of the National Marine Fisheries Service (NMFS) and I received considerable help and encouragement from a number of my National Oceanic and Atmospheric Administration (NOAA) colleagues. Among others, special thanks go to Will Martin and Pamela Mace for encouraging this project, to Dean Swanson for giving me the time to work on it, and to Mark Wildman for help in sorting out and interpreting materials on Japanese and Chinese fisheries.

I also benefited from excellent advice and information from a number of fisheries and trade specialists in other U.S. government agencies, including subsidies experts in the Office of the U.S. Trade Representative and the Department of Commerce's Import Administration, and fisheries investigators with the International Trade Commission. Fisheries experts in international organizations other than FAO, such as the World Bank, were also helpful and supportive. Special thanks go to Gert Van Santen and Marea Hatzios at the Bank for reading the manuscript, suggesting changes, and encouraging me to press forward.

In addition, I have to thank the many foreign service officers and others employed in a number of U.S. missions abroad whose reporting cables provided valuable information that I could not obtain from any other source.

I am also deeply obligated to certain individuals outside of government: Professor Christopher D. Stone of the University of Southern California's School of Law, who tried to steer me through the

minefields of trade law and conducted an electronic correspondence course in the basics of subsidies law; Gareth Porter, whose work has shed valuable light on the mechanics and impacts of distant-water fisheries subsidies, especially resource access payments; and Scott Nance, a Washington-based trade attorney, who urged that I look at user fees in fisheries in the context of subsidies and pointed out the relevance of the U.S.-Canadian softwood lumber case.

All of the above individuals deserve my gratitude for helping in various ways with this project; none of them is responsible for the shortcomings and errors that doubtlessly will appear on the pages that follow. For those mistakes, I am solely to blame.

Finally, I also have to take exclusive responsibility for the views and interpretations expressed here, especially with respect to certain poorly defined and contentious issues, such as environmental, infrastructure, and resource rent (user fee) subsidies in fisheries. I have sought to deal with these and other issues as well as I could with limited information and, to a degree, with a tentative analytical framework. These issues all need to be studied more carefully than I was able to in this sectoral study. Moreover, the General Agreement on Tariffs and Trade (GATT) consistency of practices with respect to these issues is, to put it mildly, ill defined. In short, much remains to be done both analytically and in the policy sphere. Hence, the conclusions that I suggest regarding these matters are my own, and do not necessarily reflect the positions and views of the U.S. government.

INTRODUCTION

In the last half-dozen years, the realization has emerged that the world fisheries sector has reached a turning point. Around 1990, it became apparent that global fish production had plateaued at about 100 million tons annually. To be precise, while aquaculture output continued to grow, yields from capture fisheries - the traditional and largest sector - were uneven and showed increasing signs of stagnation. Fisheries analysts at FAO identified and publicized these apparent trends in preparation for the 1992 international conference on responsible fishing at Cancun, Mexico,¹ and, in the next few years, 1993 and 1994, their assessments of trends in world fisheries continued to highlight this problem.

The marine fisheries sector, by far the most important, attained an apparent peak in 1989, with an estimated 85 million tons of harvests.² Of this total, many of the traditional, most highly valued stocks are fully harvested or overexploited, and most experts would agree that effort in these

¹ The most concise statement of FAO's emerging pessimistic view of overall trends in world fisheries may be found in: FAO, Fisheries Department, *World Fisheries Situation, 1992*, prepared for the International Conference on Responsible Fishing, Cancun, Mexico, May 6-8, 1992.

² Global marine capture harvests in 1994 and 1995 have exceeded the 1989 peak, according to preliminary FAO estimates, but practically the entire recent uptick in production reflects a jump in harvests of relatively low-value pelagic species, especially by a few Latin American nations in their Pacific fisheries. In fact, the latest increase in harvests may even be discouraging because it may suggest that the traditional pattern of developing and overusing one resource after another remains unbroken.

fisheries should be somehow reduced or, at a minimum, not increased.

In fact, specialists had predicted before the general move to 200-mile zones in the mid- and late 1970s that the global maximum sustainable yield was probably not much more than about 100 million tons and that, given the unpredictable variations and unknown status of many resources, prudence should limit actual harvests to about 80 million tons annually.³

More recently, FAO has completed its latest global review of status and trends in world fisheries resources, and the major conclusions are, if anything, even more pessimistic.⁴ This last global assessment covers trends over a period of more than four decades (1950-94) and, most interestingly, proposes a developmental fisheries model. With this approach, FAO has identified four sequential phases: (1) undeveloped, (2) developing, (3) mature, and (4) senescent.

Applying this model to 200 of the most important fish resources, FAO determined that 35 percent are senescent (declining landings); 25 percent mature (high exploitation levels); 40 percent still developing; and, strikingly, none in the undeveloped phase. In other words, 60

³ J. Gulland had made these estimates for FAO in the early 1970s. FAO, Fisheries Department (S.M. Garcia and C. Newton), *Current Situation, Trends, and Prospects in World Capture Fisheries* (Rome: FAO, 1995).

⁴ FAO, Fisheries Department (R.J.R. Grainger and S.M. Garcia), *Chronicles of Marine Fishery Landings (1950-1994): Trend Analysis and Fisheries Potential* (Rome: FAO Fisheries Technical Paper No. 359, 1996).

percent of the world's major fisheries resources are overexploited or already exploited at maximum rates, and the potential for future increases in output is modest at best.

Practically all fisheries experts point to ineffective management as a fundamental cause of the overfishing and overcapacity that are so common throughout the world. In this view, ineffective management or, more specifically, the absence of adequate and meaningful controls on access, inevitably induces participation at excessive levels. Further, until and unless such controls are implemented, economically viable fisheries will continue to attract new entrants, eroding both the fisheries' profitability and the sustainability of the resource. And as long as fishing effort and harvesting capacity are at excessive levels, profitability will tend to decline and fishermen will press for subsidies. Unfortunately, subsidies, once provided, tend to make the effort and capacity problems worse, and the final result is an even more intractable management dilemma.

The basic question posed in this study may be stated as follows: How do subsidies help to explain the increasingly obvious and injurious mismatch between effort/capacity and available resources? To answer that question or, more modestly, to initiate a dialogue on this issue, this study will review a wide range of direct and implicit assistance programs that encourage and promote the building, repair, modernization, and operations of the world's fishing fleets. In so doing, this study will hazard some admittedly rough estimates of their overall impact, both nationally and globally.

The importance of subsidies in this sector is increasingly attracting attention. In a dramatic piece of analysis, a 1993 publication prepared primarily by Francis T. Christy Jr. and FAO Fisheries Department staff argued pointedly that subsidies are a major causal factor in the creation and perpetuation of excess fishing capacity, and even offered a gross, inferred estimate of global assistance in fisheries.⁵

In recent years, this issue has also made its way to the negotiating table, although without much success. Attempts were made in the Organization for Economic Cooperation and Development (OECD) and WTO to fashion rules that would have applied to fisheries subsidies. In OECD, the context was the shipbuilding negotiations; in the WTO, it was the Uruguay Round Agreement on Agriculture. In both instances, the fisheries sector (boats in OECD; fish products in WTO) were explicitly excluded. Inevitably, one has to ask why governments are so reluctant to apply disciplines to subsidies in the fisheries sector.

Nor is the issue of subsidies in fisheries restricted to their trade implications. Increasingly, the impacts of subsidies in fisheries are seen more in terms of conservation than in the context of trade injury. And fisheries subsidies seem to fit

⁵ The starting point for this entire discussion is a special chapter to FAO, *The State of Food and Agriculture, 1992*. FAO's fisheries staff and Christy are to be credited for launching and shaping the terms of the debate on the extent and impacts of subsidies in the fisheries sector. FAO, Fisheries Department, *Marine Fisheries and the Law of the Sea: A Decade of Change* (hereinafter cited as FAO, *Special Chapter/Marine Fisheries*) (Rome: FAO, 1993).

logically in a broader context of environmentally harmful subsidies in all natural resource sectors. In various ways, the issue has been raised recently in a number of international forums and meetings, and a fundamental question is always: How can we determine and measure the environmental effects of subsidies in fisheries?

This study will seek to assess, however roughly, the implications and impacts of subsidies in the fisheries sector. From a methodological perspective, the categories and general analytical approach are taken from the recently concluded trade agreement on subsidies. However, in so doing, we will also apply our own subsidiary "categories" organized around the impacts of subsidies on the resource, as opposed to their effects on trade. Hence, the chapters that follow will categorize separately (1) subsidies that tend to promote additional or more intense fishing effort and added capacity, and (2) those other subsidies that are intended to reduce effort and capacity.

The first group is undesirable from a conservation standpoint; the second group may be environmentally desirable, and, according to some, can provide a means of dealing effectively with the general resource crisis in world fisheries. In other words, this study will examine fisheries sector subsidies within a trade-related conceptual framework but for conservation more than for trade ends.

Most fundamentally, it is our hope that this approach will help clarify the degree to which environmentally harmful subsidies are contributing to the obvious ongoing erosion of the world's wild fish stocks. One

outcome of this study should be a better understanding of whether and how the "bad" subsidies are effectively an important cause of the problem, as opposed to merely a symptom of ineffective management. More ambitiously, this method may provide a useful and enlightening analytical tool. Most optimistically, it is hoped that this assessment, in concert with the work of so many others, will prompt governments and international organizations to integrate subsidies reform into the broader efforts to support the sustainability of fish resources.

MANAGEMENT AND SUBSIDIES IN FISHERIES

It is widely accepted by fisheries experts that inadequacies in most management regimes have almost inevitably resulted in overuse of the resource.⁶ Accordingly, the most fundamental problem in fisheries is the fact that it is still by and large a common property resource that is managed on an open access basis.⁷ As a result, management

⁶ This is a classic theme in fishery economics, going back to the "tragedy of the commons" of G. Hardin. As early as the mid-1960s, fishery specialists, like Francis Christy, were making this basic point about open access fisheries. See, Francis Christy Jr., *Efficiency in the Use of Marine Resources* (Washington, D.C.: Resources for the Future, 1964), pp. 1 - 2. For a good example of a current statement along the same lines, note the first sentence in Thoroflur Matthiasson, "Why Fishing Fleets Tend to Be Too Big," *Marine Resource Economics*, Vol. 11, No. 3, Fall 1996, pp. 173 - 9. "Economists have known for a long time that the implication of having the most economically viable fish stocks held in common is a tendency towards over-investment in fishing capacity."

⁷ Christy even states that "open access" management regimes have not only caused overinvestment in the harvesting sector, but also

regimes are unable to control participation in the fishery, including both fishing effort and investments in harvesting capacity. Under these circumstances, effort and investments tend to exceed optimum levels, with unfortunate consequences both for the resources and the long-term economic benefits to the industry and to the larger public.⁸

In recent years, a number of commentators, including FAO staff, academics, and environmentalists, have focused increasingly on global trends in the harvesting sector of the fishing industry. Their chief concern is with the industry's use of the resource, specifically with respect to harvesting capacity and effort.

For this study's purposes, capacity refers essentially to vessels and gear, and effort to vessels, gear, and the labor and the use to which all the above are put. Therefore, capacity and effort are distinct but, to some degree, overlapping and related terms.

Work done by FAO in the early 1990s in preparation for the May 1992 Cancun, Mexico, conference on responsible fishing was largely responsible for prompting this debate. This work made two key points on

"massive overinvestments in fisheries administration and research." Francis T. Christy Jr., "The Death Rattle of Open Access and the Advent of Property Rights Regimes in Fisheries," *Marine Resource Economics*, Vol. 11, pp. 287 - 304.

⁸ An excellent recent summary of this overall analytical framework may be found in a U.S. government publication that addresses the situation in U.S. fisheries: National Marine Fisheries Service, NOAA, Commerce, *Our Living Oceans -- The Economic Status of U.S. Fisheries* (Washington: NOAA Technical Memorandum NMFS-F/SPO 22, December 1996).

fleet trends in the 1980s: that global fleets grew faster than harvests and that their gross operating margins showed substantial deficits.

A 1992 FAO paper on the world fisheries situation points out that "decked" fishing vessels grew from 816,700 in 1980 to 1,172,800 in 1989, an increase of 43 percent, significantly higher than the growth in harvests. Analyses of time series indicate that, between 1970 and 1989, total gross registered tons (GRT) of world fishing fleets increased from 13.6 million to 25.3 million GRT, or by an average 4.6 per year, while landings increased only at an average rate of 2.4 percent annually.

The important point is that during the two decades of the 1970s and 1980s world fisheries harvests grew at only about half the rate as the fleets. FAO staff further assessed these data to take into account the impact of the rapidly changing harvesting technology and, as a result, estimated that the real decline in harvests per unit of capacity was actually even greater.

Obviously, FAO's work on these issues was rough and approximate. Calculations of harvesting capacity and, therefore, harvests per unit of capacity are difficult to do precisely, even under the best circumstances. The definition of capacity has not been resolved, and adequate data on harvests and effort are often lacking. Harvesting capacity, for example, may be assumed to include a number of elements, such as the number of vessels, their size and technical power or efficiency, and the time spent

fishing.⁹ Using this definition, even if information on the numbers and size of the vessels is available, assessments may falter for lack of sufficient data on technical efficiency and effort (trips). To help correct these analytical problems, the United States offered recently to host an FAO-organized technical experts, consultation on managing capacity in fisheries in early 1998, and among the tasks of this consultation are presentations on defining and measuring harvesting capacity.

Keeping in mind the above qualifications, FAO has estimated the global overcapacity level in the major food-fish fisheries at about 30 percent.¹⁰ If one adds fisheries for all species (including the lower-value pelagic species), FAO concludes that all world fisheries are being fished at about the maximum sustainable yield (MSY) level. Simply put, there is considerable evidence in support of the view that no aggregate additions to fishing capacity are required in the foreseeable future.

One reason why world fishing fleets increased in the 1980s is that more nations became significant participants in marine fisheries. In fact, the title of FAO's pathbreaking publication of 1993 (*Marine Fisheries and the Law of the Sea: A Decade*

⁹ Courtland L. Smith and Susan H. Hanna, "Measuring Fleet Capacity and Capacity Utilization," *Canadian Journal of Fisheries and Aquacultural Science*, Vol. 47, 1990, pp. 2085 - 91.

¹⁰ Interestingly, a recent report issued by the U.K. House of Lords Select Committee on Science and Technology on the situation in European fisheries also called for immediate cuts of 30 percent in fishing "effort," as reported by Ehsan Masood, "Briefing Fisheries Science," *Nature*, March 13, 1997, p. 110.

of Change) correctly drew attention to the impact of extended jurisdiction.

In some instances, the resource-rich coastal states rapidly expanded their harvesting capacity. In the United States, for example, a north Pacific factory trawler fleet was developed from practically nothing to more than 60 vessels in less than a decade to take advantage of the groundfish fisheries in waters off Alaska. By the end of the 1980s, this "Americanized" trawl fleet had the capacity to harvest and process onboard more than 1 million tons of groundfish annually, as much as all the allocations given to foreign-flag vessels a decade before. As a result, as early as the mid-1980s, there were growing concerns in government and industry about over-investment and overcapacity in this sector, and, in 1987, the U.S. Congress passed a measure to restrict foreign investments in the harvesting sector of the North Pacific groundfish fisheries.

During the same period, while the resource-rich coastal states generally overexpanded their fleets, the distant-water-fishing countries continued to support their excessively large fleets in a number of ways. This latter group sought to find alternative grounds for their displaced fleets, redirecting them to other exclusive economic zones, such as in the eastern central Atlantic, the southeast and southwest Atlantic, and the southeast and north Pacific. More recently, there was an increase of activity in fisheries in international high-seas waters, such as the so-called doughnut hole between the U.S. and Russian zones in the Bering Sea, and in the "peanut hole" in Russia's Far Eastern Sea of Okhotsk.

Roughly speaking, the former distant-water states tended to seek new grounds in unmanaged international waters or off the coasts of developing countries. It is worth noting that FAO estimates that the total harvests of distant-water fleets actually increased modestly from 7 to 9 million tons from 1979 to 1989.

A recent U.S. government study on world fishing fleets examined trends in the large distant-water fishing fleets.¹¹ This study focused on the very large high-seas fishing vessels, which they defined as vessels of 500 GRT or more that operate entirely or mainly in waters beyond 200-mile zones.

The world high-seas fishing fleet grew from 18,217 vessels and 7.8 million GRT in 1975 to 23,718 vessels and 11.1 million tons in 1992, representing an increase of just over 30 percent in numbers of vessels and 45 percent in tonnage. Thus, the high-seas fishing fleet grew significantly in total numbers and, what is even more interesting, in average size per vessel.

In summary, whatever the obstacles to precise definitions and measurements, there is now a consensus among scientists and fishery managers that fishery resources have been and continue to be overused in many parts of the world. In some cases, excessive participation and rates of exploitation have undermined the economic viability of

fisheries, but their biological sustainability has remained intact. Examples of this

condition are pollock in U.S. Alaskan waters and most major tuna species in the Western Pacific. In other instances, resource overuse has eroded the very viability of the stocks. There are many examples of this more dire situation, and among the best are the distressed state of many demersal, cod-like stocks in both the northeastern and northwestern parts of the Atlantic, in waters under U.S., Canadian, and European Union (EU) jurisdiction.

There is little doubt, then, that effort and capacity in fisheries are excessive. Nor is there much question that inadequate management systems are primarily to blame for these results. It is also worth noting that most fishery experts believe that an effective cure has to include limits on entry, preferably organized around regimes based on property, or harvest, rights. The best known of these measures, individual transferable quotas (ITQs), offers the prospect of introducing market-based incentives (and disciplines) in a sector that until recently has been managed practically everywhere on an open access model.

Management systems incorporating ITQs have made significant progress in the past two decades, in particular in countries like New Zealand, Australia, Iceland, and Canada, and even in three U.S. fisheries. At the same time, however, the impetus for expanding the role of ITQs appears to have slowed, at least temporarily, because of industry resistance in countries as different as the United States and Norway. More troubling is the failure of the fishing giants of the world -- China, Japan, and the

¹¹ U.S. Department of Commerce, NOAA, NMFS, Office of International Fisheries, *World Fishing Fleets: An Analysis of Distant-Water Operations* (Washington: November 1993).

European Union -- to make any appreciable progress with property-rights-based management.¹²

Therefore, ineffective management is a fundamental obstacle, and this problem has not yet been dealt with successfully or at all in the vast majority of countries, including most of the largest fish harvesters. It is compounded by the increasingly obvious fact that governments not only undermanage this sector but also play a countervailing role as providers of perverse economic incentives. At a minimum, then, subsidies are an unfortunate by-product, or even symptom, of ineffective management. Thus, a critical analytical task is to examine the relationship between, on the one hand, ineffective management, and, on the other, government-funded and -directed economic incentives in the fisheries sector.

In summary, it would appear that subsidies generally have the effect of aggravating an existing natural resource management problem. Simply stated, with subsidies, participation is encouraged and exit is discouraged. Even more disconcerting is the possibility that environmentally harmful subsidies in fisheries act independently as self-standing causal factors. This study will seek to shed some light on how environmentally harmful subsidies may legitimately be considered as causes, and not

¹² A good review of the performance of various countries with respect to this issue can be found in Eduardo A. Loayza, (ed.), *Managing Fishery Resources*; Proceedings of a Symposium Co-Sponsored by the World Bank and the Peruvian Ministry of Fisheries in Lima, Peru, June 1992 (Washington, D.C.: World Bank, 1994), especially the summary, pp. xiii-xvi.

simply symptoms, of a larger management problem.

FAO's staff of fishery experts is largely responsible for creating the terms and scope of the debate on the subsidies issue. Interestingly, FAO's "window" to the subsidies issue was work its staff completed at the time of the United Nations' 1992 Rio Green Summit on projected costs and revenues in fisheries.¹³

Fishery economics teaches that, without sufficient access controls, effort and capacity will increase until all the resource rents are dissipated. The striking feature of the FAO analysis is that it sought to show that on a global basis the fisheries sector has long since passed that point and presently operates at deep losses. In fact, FAO estimated global operating and capital costs at \$124 billion and revenues at \$70 billion, yielding a deficit of \$54 billion, based on data from the late 1980s. Disparities of this magnitude between costs and revenues prompted the conjecture that subsidies covered most of the difference. However, FAO did not define, categorize, or analyze the subsidies per se, but simply inferred them from their study of global costs and revenues.

FAO's work on projected (based on 1989 data) global costs and revenues was critically significant. This work had the effect of triggering a debate that is still going on. More important, the emphasis it placed on costs and revenues suggests a way in which the subsidies issue can be

¹³ FAO, *Special Chapter/Marine Fisheries*, pp. 17 - 19, and, in particular, Appendix 1, "Fishing Cost Methodology", pp. 50-53.

integrated into classical fishery economics. More precisely, theory holds that in an open access fisheries regime effort will continue to increase even though revenues per unit of effort are declining and that, ultimately, total revenues will decline until they equal costs. At this point, the fishery is economically unviable and both industry profits and resource rents have been completely dissipated.

A study of subsidies in an open access natural resource sector like fisheries looks at the same dilemma but focuses on the cost curve. That is, since subsidies reduce costs, their aggregate impact is to further stimulate effort and compound the fundamental problem. In other words, this study will examine the "push" from subsidies, as opposed to the "pull" of ineffective management.¹⁴

FAO's work in 1992 and 1993 had a powerful impact. Its broad conclusions were widely accepted; the figures for costs, revenues, and losses were frequently cited, and many commentators, including environmentalists, academics, and journalists, assumed that the huge losses must be covered by subsidies.

As just one example among many others, a March 1997 issue of an influential and respected publication reported that

¹⁴ Obviously, the approach used in this paper, what a U.S. trade official called the "building-block method," has advantages and disadvantages. The advantages are precision, detail, and a more empirical approach. The disadvantages are the complexity, confusion, and unevenness that will necessarily be encountered in trying to deal globally with subsidies across an entire sector.

The global fleet loses about \$54 billion a year through operating losses and insufficient returns on investment in boats. Government subsidies, equivalent to the actual losses, fill the gap.¹⁵

The upshot of FAO's work on costs and revenues in fisheries was to move the subsidies issue out of the strict confines of trade rules and into the broader domain of conservation. As a result, the debate on fisheries subsidies no longer deals exclusively or even largely with trade injury, but, to an increasing degree, with harm to the resource and a more fundamental concern with economic waste.

Simultaneously, the issue of fisheries subsidies has broken out of its narrow sectoral context. That is, subsidies in the fisheries sector are now frequently considered in tandem with subsidies provided to other natural resource sectors. This trend was evident in the 1992 Green Summit at Rio and has been picked up in subsequent meetings in New York of the Commission for Sustainable Development (CSD)¹⁶ and in much of the World Bank's recent studies and advisory work.

¹⁵ Trish Saywell, "Fishing for Trouble," *Far Eastern Economic Review*, March 13, 1997.

¹⁶ At the CSD meeting in New York of April 1997, a large number of delegations noted the environmentally perverse effects of fisheries subsidies and indicated a willingness to further explore remedial actions. However, the final report of the Oceans Section was muted on this issue, referring vaguely to the need to "identify specific steps at the national or regional levels to prevent or eliminate excess fishing capacity." In addition, at the EU's request, it was also agreed that governments should "consider the positive and negative impact of subsidies on the conservation and management of

By the June 1997 U.N. General Assembly Special Session, convened to take stock of progress made in the five years after the 1992 Green Summit, many analysts and government experts tended to treat subsidies in fisheries in this larger natural resource context.¹⁷ It was reported, for example, that subsidies to the energy, mining, forestry, agriculture, fisheries, and other sectors had a collective negative impact of \$500 billion to \$900 billion in "environmental damage." Interestingly, the critics of environmentally perverse subsidies include a growing and somewhat unusual alliance of elements on the political left and right, and are gaining sympathy in developing countries, where subsidies to agriculture and fisheries have long been defended for rural and coastal employment and food security reasons.

This study examines the impact of fisheries subsidies on conservation. To do so, the following chapters will assess their aggregate level, organize them in conservation-sensitive categories, and offer some preliminary assessment of their environmental impacts.

To do the above, however, requires a working definition of subsidies and an analytical framework that addresses their effects on conservation.

AN ANALYTICAL FRAMEWORK

To better understand the aggregate level, variety, and impact of subsidies in fisheries, an analytical framework is required. This section suggests, perhaps somewhat surprisingly, that the recently concluded global trade agreement on subsidies offers a useful model, in spite of the fact that our primary concern is conservation, and not trade-related economic injury. To address the conservation issues that we are primarily concerned with, special fisheries-specific categories have to be developed. This section discusses an analytical framework and various issues related to quantitative assessments.

The 1994 WTO Subsidies Agreement

In the latter half of the 1980s, negotiations in Geneva and Paris on agriculture and shipbuilding respectively presented opportunities to craft much stricter and more comprehensive rules for subsidies in the fisheries sector. In both instances, however, the fisheries sector was excluded.

First, the 1994 Uruguay Round Agreement on Agriculture excluded fisheries products from its scope; second, the OECD Shipbuilding Agreement exempted fishing vessels and was not even ratified by all the signatories, and therefore did not go into effect. As a result, the rules governing the use of subsidies in the fisheries sector are, almost by default, the provisions in the WTO's basic subsidies agreement -- the Agreement on Subsidies and Countervailing

fisheries." UN Non-Paper on Oceans, CSD-5, New York, April 23, 1997.

¹⁷ Barbara Crossette, "Subsidies Hurt Environment, Critics Say Before Talks," *New York Times*, June 23, 1997, p. A-3.

Measures (hereinafter the 1994 WTO Subsidies Agreement).¹⁸

The 1994 WTO Subsidies Agreement represents a significant improvement in the rules and disciplines governing both the use of subsidies and countervailing measures to offset their effects. First, it should be noted that the international rules that govern their use are fairly recent. The original General Agreement on Tariffs and Trade (GATT) referred to subsidies briefly and addressed only export subsidies. In addition, these rules were applied only to subsidies provided for exports of industrial (non-primary) products. On the other hand, subsidies provided to promote exports of primary commodities (e.g., agricultural and fish products) were exempted from binding disciplines.

GATT rules on subsidies were further developed and refined in the 1979 Tokyo Round multilateral trade negotiations, and the principal achievement was an agreement on rules governing actions that may legitimately offset the effects of subsidized imports. Still, the distinction between non-primary and primary products remained; disciplines on domestic subsidies were weak; and the rules were not accepted by developing countries.

Seen against this general background, the 1994 WTO Subsidies Agreement is the logical starting point in our efforts to better understand the specific roles, impact, and

¹⁸ Uruguay Round Multilateral Trade Negotiations, Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations, *Agreement on Subsidies and Countervailing Measures*; Marrakesh, Morocco; April 15, 1994 (Washington: USTR, 1994).

WTO legal status of fisheries sector subsidies. This agreement constitutes the existing international legal regime governing subsidies in the fisheries sector; it was negotiated and implemented recently; it applies to more than 100 WTO members; its rules are binding; it addresses, however tentatively, the issue of environmental subsidies; and it includes what many consider a major breakthrough on the issue of transparency.

Most significantly, the Subsidies Agreement made major progress in defining and classifying subsidies and establishing tests of their actionability.

The 1994 WTO Subsidies Agreement is therefore worth reviewing.

First, there is a clear definition of subsidies. The WTO Subsidies Agreement defines them in Article 1.1 as:

"financial contributions" provided by governments in the form of:

- transfer of funds (e.g.; grants, loans, equity infusions);
- potential transfers of funds (e.g.; loan guarantees);
- forgone government revenue (e.g.; tax preferences);
- goods or services (e.g.; other than general infrastructure);
- payments to a funding mechanism or to a private body to perform any of the above; or
- price or income support programs (other than tariffs).

Second, there is a requirement in Article 1.1 (b) that the subsidy confer an economic

benefit. This is a significant point because "subsidies" and the "benefits" they confer are different concepts and are assessed differently.

Third, there is a "specificity" test in Article 2. The 1994 WTO Subsidies Agreement divides all subsidies into two broad categories: specific and nonspecific. Simply stated, specific subsidies are clearly targeted at certain industries, enterprises, or groups of industries and enterprises in a given geographic region; nonspecific subsidies are made generally available and therefore are broadly distributed in a country.

Fourth, subsidies are organized in three categories: prohibited, nonactionable, and actionable (see Articles 3 and 8).

Prohibited subsidies are, essentially, trade-contingent, and include those that directly promote exports (export subsidies) or restrain imports through, for example, the required use of domestically produced goods.

Non-actionable subsidies include two categories: first, all nonspecific subsidies, and second, three subcategories of specific subsidies, of which two apply to fisheries sector assistance programs. Specific subsidies are nonactionable if they assist disadvantaged regions or "promote adaptation of existing facilities to new environmental requirements." This last point is significant because it represents the first opening for environmental subsidies in a trade agreement on subsidies.

Actionable subsidies must be "specific" and cause one of three "adverse effects":

- (1) injury to the importing country's domestic industry;
- (2) nullification or impairment of a trade benefit; or
- (3) "serious prejudice."

Fifth, and finally, in Article 6, the "serious prejudice" test of "adverse effects" is developed and defined. Interestingly, while the first two examples of adverse effects are explicitly trade-related, the last test -- "serious prejudice" -- is elaborated in ways that, while primarily trade-related, have a somewhat broader scope.

A showing of serious prejudice is a two-step process:

First, serious prejudice exists when the ad valorem subsidization exceeds 5 percent; the subsidies cover an industry's operating losses; the subsidies cover individual enterprises' operating losses on a regular basis; debt is forgiven; or grants are provided to pay debts.

Second, a serious prejudice showing also requires proof of one of the following: trade displacement; price undercutting, or changes in market shares.

To summarize, the WTO Agreement applies a series of tests to subsidies. An offending measure must:

- (1) meet the definition of subsidies;
- (2) be determined to confer an economic benefit;
- (3) be "specific";
- (4) be "prohibited" or "actionable";
- (5) cause an "adverse effect"; and

(6) in the case of the "serious prejudice" test of "adverse effects," pass the two series of tests outlined above.

Environmental Categories of Subsidies in Fisheries

One of this study's major underlying concerns is to examine the relationship between trade rules on subsidies and the sustainability of wild fisheries resources. To do this, two things must be done:

First, the boundaries of this exercise must be further refined. Toward that end, this study will be confined to a consideration of fisheries subsidies provided to the harvesting sector, and not to the entire fishing industry. Conversely, it will exclude fisheries subsidies that are provided solely or primarily for the benefit of other sectors, mainly fish farmers and processors. It is recognized that this distinction in some cases may be difficult to maintain. Some fisheries sector subsidies benefit both the fishermen and the processors and marketers. A good example is a price support program. These programs indirectly benefit the harvesters of the raw fish as well the processors.

Second, in considering subsidies to fish harvesters, a critical, environmentally driven distinction will be made. In one category, we will place subsidies that tend to promote and enhance harvesting operations and capacity. This category of subsidies will be called "effort- and capacity-enhancing" or some other descriptive phrase will be used. Essentially, these environmentally harmful subsidies have the effect, directly or indirectly, of exacerbating excess effort and

capacity and undermining the sustainability of resources in the fisheries sector.

Some may object that treating all effort- and capacity-enhancing subsidies as harmful to the resource is too sweeping and unfair. Proponents of this view may argue that, since some fishery resources are not overfished and may have potential to support increased harvests, we should distinguish between justifiable and unjustifiable effort- and capacity-enhancing subsidies.

However, the approach advocated in this study strongly rejects this view. The basic problem is that, given the negative trends in the status of the resources, the mobility of capital, and the relative ease with which boats can be refitted to operate in fisheries other than those for which they were originally planned, the prudent policy is to treat all such subsidies as potentially harmful to the resource.

Thailand's experience in promoting development of its capture fisheries sector provides a good example. More than 20 years ago, Thailand sought from the Asian Development Bank a loan to develop its trawl fishery for groundfish and was rejected because the ADB felt these resources were already fully exploited. The ADB did, however, grant a loan to develop Thailand's less-exploited pelagic fisheries in 1974, and provided financing for the purchase of 135 gill-netting and purse seine vessels. Within a few years, though, according to a World Bank report, "approximately 70 percent of the project vessels had been converted into trawlers (which were profitable to operate on

a private basis) and were being used to catch already overfished demersal stocks."¹⁹

An even more difficult question is how to deal with subsidies whose intent is the opposite of the undesirable programs. Subsidies that are designed primarily to restore the health of fisheries resources are a good example. These fisheries subsidies are intended to support the viability of the resources through reductions in effort. Therefore, they are called "conservation subsidies," and will be treated separately in Chapter IX.²⁰

In the Uruguay Round trade agreements, the notion of environmental subsidies found its way into both the Agriculture and Subsidies Agreements. Even the WTO Subsidies Agreement recognizes their legitimacy by placing in the nonactionable category:

assistance to promote adaptation of existing facilities to new environmental requirements imposed by law and/or regulations which result in greater constraints and

¹⁹ *Economic Analysis of the Environmental Impacts of Development Projects* (Washington, D.C.: World Bank, 1992), pp. 109-111, citing, Asian Development Bank, *Thailand Fisheries Sector Study* (Manila: ADB, 1985), Table 25.

²⁰ Subsidies with benign effects on natural resources have been increasingly recognized as a separate category and are often referred to as "environmental subsidies." Both the Uruguay Round Agriculture and Subsidies Agreements include provisions for "green-lighting" these subsidies. However, for purposes of this study, subsidies that are intended to reduce fishing effort and capacity -- usually through some sort of decommissioning program -- are actually a subset of environmental subsidies and, for that reason, will be called "conservation subsidies".

financial burdens on firms -- Article 8.2(c).

It is clear from the above language that the negotiators were motivated chiefly by a desire to legitimize subsidies intended to assist industry with pollution abatement costs. Therefore, the WTO Subsidies Agreement's narrowly defined allowance for environmental subsidies does not fit the needs of the fisheries sector. For this exercise, we must support a broader understanding of measures that should be treated as environmentally benign. Some or all of these subsidies could perhaps be formally "green-lighted" by the WTO as permissible measures in fisheries.

Accordingly, we would propose treating separately (and perhaps green-lighting) subsidies that:

- reduce exploitation effort;
- divert producers from activities that promote overexploitation of resources to more benign economic endeavors;
- are intended to enhance the resource base; and
- hasten the development of more environmentally sensitive harvesting technology.

As a practical matter, the most common environmental subsidies in the fisheries sector provide financial incentives to reduce harvesting capacity. Such programs are currently in place in most major fishing nations. These conservation subsidies may involve little more than a vessel buy-back

and fishing permit repurchase scheme, or they may be more elaborately contrived, such as restructuring programs, or programs that finance the diversion of boats from overharvested to underutilized fisheries, or the reequipping of boats for deployment in new fisheries.

Our objective in treating conservation subsidies separately is simple and practical. Our purpose is to exclude measures that, while they may meet the WTO's definition of subsidies, are not intended to enhance effort and capacity but are designed to do the opposite. In other words, our motivation is to sharpen our measure of the impacts of subsidies on conservation.

Conversely, it is not the intent of this sectoral study to speculate generally on the desirability of environmental subsidies or their consistency with trade rules.²¹

The distinction between undesirable and desirable fisheries sector subsidies is gaining momentum. At a recent OECD Fisheries committee meeting, Canada presented a paper dealing generally with the committee's medium-term work plan that proposed a study of the economic benefits in the fisheries sector; this study would address, among other things, the role of "subsidies that lead to overcapacity and overfishing,

²¹ These questions will be briefly reviewed but certainly not resolved in Chapter IX. Certainly, environmental subsidies are hard to define and have only fairly recently been accommodated, to a limited degree, in trade agreements. On an analytical level, they are increasingly discussed and disputed. A good example of a recent discussion of these issues is: OECD, *Trade and Environment: Environmental Subsidies* (Paris: September 1994).

and subsidies that facilitate capacity adjustment to strengthen conservation."

Compounding these difficulties is the fact that governments may combine subsidies that both promote and reduce harvesting capacity. Therefore, even if we could fairly accurately quantify subsidies to the fisheries sector, we would still have a hard time assessing the level and impact of the "good" and "bad" elements. A striking example of this dilemma is the EU's package of financial assistance programs for the European fishing industry.

Assessing the Impacts of Subsidies

One of the most difficult tasks in assessing the impact of subsidies in fisheries is the choice of a suitable measure. However, after establishing the categories and mapping out a typology of subsidies, it became evident that no single yardstick was practical. This study does not utilize any single assessment methodology, relying instead on a varied and eclectic approach.

Most treatments of fisheries sector subsidies -- until the 1993 FAO Special Chapter -- did not assess them quantitatively but simply listed or categorized them²². The trade-based framework proposed here requires that we consider calculation methodologies, as well as the terms and tests reviewed above.

The first and most fundamental point involves the calculation of subsidies in trade investigations. Since the WTO Subsidies

²² A good recent example is OECD, Fisheries Committee, *Inventory of Assistance Instruments in the Fishing Industry and Management Systems* (Paris: OECD, 1993).

Agreement defines them as financial contributions, subsidies will be calculated, to the degree that the evidence permits, "in terms of the costs to the granting government" (Annex IV.1). This calculation is critically significant, because one of the tests of "adverse effects" is "serious prejudice," which in turn is presumed to exist if the "total ad valorem subsidization of a product" exceeds 5 percent -- Article 6.1 (a). Therefore, to the degree possible, the case studies and global projections will assess subsidies in terms of their known or estimated costs to the subsidizing governments.

This budget-based approach works reasonably well with domestic and foreign budgeted subsidies (Chapters IV and V) and with conservation subsidies (Chapter IX), but less well with subsidies to most capital costs and tax subsidies. Subsidies to fisheries infrastructure are normally budgeted but are controlled by agencies responsible for public works and not by fisheries agencies.²³

Measuring unbudgeted subsidies in fisheries presents some serious methodological problems. The major unbudgeted (or underbudgeted) subsidies in fisheries are lending and tax policies and programs (Chapter VI). The economic effect of subsidized lending is normally measured by the difference between the terms of the subsidized loan and the prevailing terms available in capital markets. Tax preferences are usually assessed by reference to the level of lost revenue.

²³ An exception is Japan, where the Fisheries Agency spends over \$2 billion annually on fisheries infrastructure projects.

Another problem with these unbudgeted or underbudgeted subsidies is that information on their global incidence is lacking and must be inferred. In the case of subsidized lending and tax preferences, we had to use assumptions based largely on FAO's 1993 work on global costs in the fisheries sector.

Shipbuilding (Chapter VII) subsidies include both budgeted and unbudgeted elements. To assess the impact of subsidies provided to shipbuilders on the fishing industry, many sources were used, including FAO's 1993 work on global costs, data in Lloyd's annual shipping register, and information derived from the OECD shipbuilding negotiations between the late 1980s and 1994.

The most difficult category of subsidies to assess was resource pricing (Chapter VIII). This subsidy results from the failure of governments to levy an adequate charge to commercial users of this publicly managed resource. In other words, this category of subsidies results from government inaction, and not any direct or indirect governmental intervention in the economy. Ideally, measuring this subsidy would require benchmark prices, that is, prices charged by private producers of the same or similar products or, failing that, information on the total costs to government of managing the resource. In fisheries, however, comparable private prices are not available, and information on the public costs of managing fish resources is scanty at best.

For all these reasons, the user fee issue had to be addressed inferentially, drawing on:²⁴

²⁴ It would appear, too, that in many of the world's major fishing nations, user charges are not levied at all on domestic fishermen or, if they are, are levied at

1. a U.S. "case study," based largely on recent changes in fisheries legislation;
2. data on fees paid by distant-water-fishing nations to foreign governments;
3. trends in user fees levied by governments on their own fishermen; and
4. information on trade cases and analogous user fees in other natural resource sectors, especially forest products.

Another important related point is the scope of this study. That is, since this is a study of sectoral subsidies on a global basis and not a brief supporting a formal trade complaint, the subsidies treated here are obviously much broader and more numerous. In countervailing duty investigations, on the other hand, subsidies are determined as a percentage of the price of the product in question (level of subsidization). However, this study will examine aggregate subsidies in an entire sector, and not simply subsidies per product. To do so, our global "base" will be gross ex-vessel revenues in world fisheries.

FAO's 1993 study calculated gross first-sale revenues at about \$70 billion, but this study

minimal levels. Generally, this state of affairs contrasts with the way most governments manage other natural resources, like forests, water, and mines. Therefore, any discussion of user fees or landing taxes in fisheries must resort to cross-sectoral comparisons and analogies, and has to stress where we are going as opposed to where we are. An interesting World Bank report including a number of case studies of how user fees and environmental taxes have been effectively utilized recently in other sectors in developing countries is World Bank, *Five Years After Rio: Innovations in Environmental Policy* (Washington, D.C.: World Bank, 1997), especially Part Two (Selected Case Studies from the Policy Matrix), pp. 19-50.

will use \$80 billion, based on more recent FAO work.²⁵

Finally, it must be acknowledged that this analytical framework represents just one approach, and that other methodologies exist. As an example, one other approach would be to develop a quantified measure of economic assistance to the fisheries sector. Such a measure, called a producer subsidy equivalent (PSE), was developed for agriculture by OECD and used in modified form in the Uruguay Round negotiations, and was proposed in OECD for fisheries in the early 1990s.²⁶ However, for reasons that have no bearing on this study, the PSE exercise in fisheries was not successfully concluded. More important, PSEs include border measures (tariff and nontariff measures) and may not be a good measure of net impacts on the resource.²⁷

²⁵ As a matter of fact, FAO has published fishery statistics in 1996, with data through 1994, that give the following precise estimates of global first-sale revenues from capture fisheries: 1989 - \$72.5 billion, and 1994 - \$78.8 billion. We feel we are reasonably updating the latter figure by assuming current global ex-vessel revenues from capture fisheries at approximately \$80 billion. FAO Yearbook, *Fishery Statistics: Commodities*, Vol. 79 (1994) (Rome: FAO, 1996). It may also be interesting to point out that, in the last half dozen or so years, the average unit ex-vessel value has shown no discernible trend and even declined somewhat in the last few years. See the average values per metric tons: (1989) \$824, (1990) \$888, (1991) \$917, (1992) \$953, (1993) \$867, and (1994) \$874.

²⁶ OECD, Committee for Fisheries, Ad Hoc Expert Group on Fisheries, *Producer Subsidy Equivalent: Quantification of Fisheries Support/A Pragmatic Approach* (Paris: OECD, 1991).

²⁷ Tariffs and nontariff measures restrict imports (and supply) and therefore tend to raise prices for domestically produced goods. The result is a constriction in demand. Arguably, then, the effect of

Still another approach would be to measure subsidies by the difference between domestic and world prices. This latter method has been used by economists for other sectors, as in recent World Bank analyses of other natural resources.²⁸ However, calculating "price wedges" in fisheries is a daunting and perhaps nearly impossible task.²⁹

The approach used in this study has obvious advantages and disadvantages. A varied and eclectic method may better capture some of the unique features of each category of subsidies and minimize the impact of errors. On the other hand, this scattered approach runs some risk of inviting a profusion of inferences and is not easily comparable with other methods, such as the use of "price wedges," that are commonly used by analysts. Undoubtedly, measuring subsidies in fisheries requires much additional work.

border measures on conservation is not quite as bad as that of subsidies.

²⁸ An example is the discussion of subsidies for fossil fuels and agricultural inputs (pesticides and fertilizers) in World Bank, *Expanding the Measure of Wealth: Indicators of Environmentally Sustainable Development* (Washington, D.C.: World Bank, 1977), pp. 39-62.

²⁹ When OECD attempted in the late 1980s to calculate PSEs for fish, in part using a "price wedge" approach, they ran into numerous difficulties. Essentially, reference, or world, prices for fish were hard to determine because of the large number of species and product forms, and the extreme variability of harvests and prices. In this regard, fish products may have more in common with fruits and vegetables, for which PSEs did not work as well as with the grains.

BUDGETED SUBSIDIES: DOMESTIC ASSISTANCE

This section examines fisheries sector subsidies that are identifiable in government budgets, normally in the budgets of the fisheries agency. The methodology is to examine a half a dozen case studies and, using some reasonable assumptions, to suggest global projections. The case studies treat as fisheries sector subsidies those assistance programs that, first, have the effect of promoting and enhancing capacity in the fisheries harvesting sector, and, second, as far as we can reasonably conclude based on the information available, (1) meet the WTO Agreement's definition of subsidies, (2) confer a benefit, (3) pass the specificity test, and (4) can reasonably be placed in the actionable category. Note that we do not deal with the issue of economic injury, or "adverse effects," and therefore are not expressing any opinion regarding the WTO legality of any of these programs.

The six economies reviewed here are Japan, the European Union, Norway, the United States, Russia, and China. These economies have been chosen because they are all major fishing nations but are also highly diverse in their management of fisheries. All six are large producers, but with significant distinctions. Four of the six are affluent, while Russia and China are less so. Japan, Russia, and the EU were "losers" when coastal states introduced 200-mile fisheries zones, while the United States and Norway were "winners." The United States, Norway, and China are major fish exporters, while the EU and Japan are not. Russia and China developed their fishing industries through massive state investments, while the others did not. We feel, then, that while

these countries are all major fishing powers, they differ in many significant ways and offer an interesting variety of case studies. These six economies account for nearly half of total world fisheries harvests. Obviously, the other half is produced in a large number of developing and less affluent countries. We excluded them simply because we lacked sufficient evidence on their fisheries budgets and subsidies. Clearly, much more work needs to be done on the role of fisheries sector subsidies in these countries.

National Case Studies

Japan

Japan's fishing industry is large, highly diverse, and, generally speaking, its harvesting sector has not fared well economically in recent years. This fishing industry has also traditionally had considerable influence with the government, especially with the Diet committees that determine Fisheries Agency of Japan (FAJ) budgets. For those chief reasons, then, the government of Japan funds the fisheries sector generously both absolutely and relatively.

The current budget of the FAJ, a subsidiary of the Ministry of Agriculture, Forestry, and Fish (MAFF), is almost \$4.0 billion, which is equal to about one-fourth of total revenues in Japan's marine capture fisheries in recent years.³⁰ The FAJ's budget consists of two parts: the first, or "general elements" is \$3.5 billion (almost 390 billion yen)³¹ and the

second, a "special account," is \$490 million. The FAJ's off-budget special account is utilized entirely for fishing vessel insurance, reinsurance and compensation programs.

If the FAJ is the principal distributor of fisheries sector subsidies in Japan, the industry cooperatives play a major role in channeling these resources from government to industry. There are about 1,500 fishery cooperatives, federations, and associations of fishermen and processors who mediate between the FAJ and national or regional industry constituencies, and dispense much of the government's assistance to their members.

Estimating what share of these resources may legitimately be defined as subsidies is a difficult problem and requires that we look more carefully at the budget breakouts.

First, we have to examine the much larger general accounts share. It consists of two parts: (1) a public sector component that provides funding for various programs that we would categorize under the heading "infrastructure," and (2) a "nonpublic expenditures" component, some considerable share of which we maintain are subsidies. As a rule, the public sector share has accounted for about two-thirds, and the private sector share about one-third, of the total.

In fiscal year 1996, the public sector component totaled almost \$2.5 billion, and the nonpublic element just over \$1 billion. The FAJ's nonpublic expenditures consist of programs that are jointly administered by the

³⁰ U.S. Embassy, Tokyo, September 30, 1996.

³¹ We will henceforth give the FAJ's fiscal year 1996 budget figures in approximate U.S. dollars, using an exchange rate of 1 U.S. dollar for 110

Japanese yen, roughly the exchange rate that prevailed during that year.

FAJ, on the one hand, and local governmental entities and trade groups, on the other.

Obviously, the programs funded under the private sector component of the FAJ's budget are virtually all intended, in various ways, to promote industry interests. The summary that follows of these FAJ nonpublic budget lines focuses on programs that directly and indirectly assist harvesters, and it excludes budget lines that support the aquaculture and the processing sectors.

If we organize the nonpublic budget component into major programmatic areas, we would get the following breakout:

Table 1.

FAJ "NonPublic" Budget Lines U.S. Dollars Japan's FY 1996 (April 1, 1996 - March 30, 1997) -- U.S. \$ Million --	
Domestic Fisheries	\$200
Gear Research	18
Domestic Marketing	50
TOTAL	\$268

Source: U.S. Embassy, Tokyo, September 30, 1996

Therefore, we will net at almost \$270 million all the domestic programs budgeted in this portion of the FAJ's FY 1996 account that enhance the operations and capacity levels of the harvesting sector. These programs include the following initiatives: recruiting young fishermen, aid to fish cooperatives and to boat owners, marketing, consumer education, price stabilization, and a variety of measures to improve harvesting techniques.

Next, there is an FAJ special account of

almost \$500 million that funds fishing vessel reinsurance and insurance programs. These programs benefit the harvesting sector, and they certainly appear to fall in the category of a provision by government of "goods or services other than general infrastructure" and therefore meet the WTO Agreement's definition.

These programs are designed to help defray the industry's costs for marine insurance and damage to and loss of their boats, gear, and other equipment. The largest of the programs -- Vessel Reinsurance and Mutual Insurance -- makes available government-funded general insurance and more specialized insurance that guarantees the income of fishermen to cover expenses if production and revenue fail to meet expected levels.

In summary, we conclude that the FAJ currently provides about \$750 million in "budgeted" domestic fisheries sector subsidies.

Inevitably, one has to wonder what effect these subsidies have had. Since this section considers domestic subsidies, we will look at fisheries inside their 200-mile zone. In those coastal waters, where most of their harvests are now taken, there is evidence that many small and medium-scale fishing enterprises are no longer economically viable.

The FAJ's latest white paper reports the following deteriorating trend in economic performance by this latter group:

Table 2

Small and Medium-Size Fishing Enterprises (figures are per firm)					
	1990	1991	1992	1993	1994
-- Millions of yen --					
Profits	2.9	1.3	-0.9	-3.1	-3.2
Revenues	136.7	135.0	130.0	120.7	114.0
Costs					
-Labor	49.7	48.8	48.1	45.3	43.2
-Fuel	14.8	15.6	14.5	13.3	12.1
-Other	10.7	11.0	11.3	11.0	10.9
-Gear	13.8	14.4	12.4	11.9	9.9
-Other	21.0	21.4	22.0	21.8	20.8

Source: FAJ, Annual Report on Fisheries Trends (1996)

These "small and medium" fishing operations include more than traditional coastal fishermen with one or two small boats. This is evident from the fact that the average revenues of this group are over 100 million yen, or about \$1 million, annually. Small and medium fishing enterprises have suffered declining profitability, and "average" fishing enterprises in this category showed an increasingly negative return. Interestingly, the data also suggest that the basic problem is not costs, which seem to be under control, but declining revenues.³² Therefore, recent trends indicate that the relatively generous subsidies to Japan's coastal fishermen have not made this an economically viable sector. Rather, a more reasonable interpretation is that the subsidies have probably slowed down the decline.

Japan's fisheries sector is suffering a steady and long-term downward trend, a sobering fact that is evident from the annual white papers issued by the FAJ. In its latest white

³² The steady decline in revenues is also entirely consistent with the predictions of classical fishery economics, especially the bioeconomic model on the operation of open access regimes.

paper, we learn that overall output has dropped to 7.5 million tons, the seventh consecutive annual decline; gross revenues dropped, imports increased, and exports decreased; average profits for small and medium enterprises declined for the fourth consecutive year; and, most significantly, fish stocks in Japan's Economic Enterprise Zone are leveling off or declining.³³

In summary, it appears that FAJ fisheries sector subsidies may have helped prevent an even sharper economic decline in the traditional small and medium-scale coastal fisheries. However, the recent declines in landings in many coastal fisheries suggest, too, that a number of these fisheries are fully (or even over-) harvested. As far as we can tell, most of the FAJ's subsidies to the fish harvesting sector tend to encourage more building, rebuilding, and technical improvements in the fleet. Therefore, these subsidies have to be considered one factor among others that have helped to create an increasingly serious problem of declining economic viability and resource sustainability in Japan's commercial fisheries.

European Union

The European Union provides through the Common Fisheries Policy, itself a subset of the Common Agricultural Policy, an elaborate scheme of fisheries subsidies. Since about 1970, before the introduction of 200-mile fishery conservation zones, the main elements the EU's fisheries sector assistance plans have been two: market support and structural policy. However, after the implementation of 200-mile limits

³³ U.S. Embassy, Tokyo, May 23, 1997.

and, in particular, the accession of Spain and Portugal in 1983, the EU's Common Fisheries Policy evolved and gradually assumed its present form. With the addition of the Iberian countries, the EU's fishing fleet increased by 75 percent and the number of fishermen more than doubled, aggravating the dilemma of how to deal with an already sizable surplus capacity in the harvesting sector.

During the 1980s, the EU provided increasingly generous subsidies, and between 1983 and 1990, a period when many European fleets were adjusting to extended jurisdiction, the EU's annual fisheries sector financial assistance program increased from \$80 million to \$580 million. Of these totals, an estimated 20 percent was devoted to construction of new vessels.

Restructuring received increasing emphasis in the 1980s, but little progress was made in restoring a better balance between harvesting capacity and available resources. In 1983, the EU decided on a three-year structural policy program, and in 1986, it adopted a 10-year program that would be in force until 1996.

At present, the EU's fisheries budget is \$1.1 billion, and fisheries sector subsidies have evolved considerably in the last decade. Currently, more than half of their total fisheries budget supports an ambitious sectoral restructuring plan. Two categories may be classified as domestic fisheries subsidies: structural programs and market (price) supports.

Structural Programs

The current EU fisheries sector restructuring program, which applies for the six-year period from 1994 to 1999, has been considerably upgraded. During this period, total EU budget outlays are almost \$3.2 billion, or \$530 million per year. This funding is allocated to six major objectives: adjustment of fishing effort, fleet renewal and modernization, processing and marketing, aquaculture, port facilities, and generic product promotion. Since this restructuring plan plays such an important role in the EU's larger fisheries sector assistance policies, it is given in greater detail in the table below:

Table 3

EU Funding for Fisheries Sector Restructuring, 1994-1999 By Major Activities -- US\$ Millions --	
Adjustment of fishing effort	837.1
Fleet renewal and modernization	747.7
Aquaculture	329.2
Protected marine areas	36.9
Port facilities	223.9
Processing and marketing	705.4
Product promotion	101.7
Other	149.9
TOTAL	3,181.5

Source: U.S. Mission to the European Union,
February 29, 1996

A fundamental feature of the EU's fisheries restructuring program is that much of it appears to be spent on traditional forms of industry assistance. Using our categories for classifying subsidies into those that tend to enhance and those others that tend to reduce effort and harvesting capacity, it would appear that items 2, 5, 6, and 7 fall in the undesirable effort- and capacity-promoting category. Item 5 (port facilities) accounts

for more than 10 percent of environmentally harmful subsidies. This category will be treated separately under infrastructure in Chapter VII.

Therefore, approximately 60 percent, or almost \$2 billion, of EU fisheries restructuring assistance in the 1994-99 period belongs to the "traditional" effort- and capacity-enhancing category.

If we annualize these numbers, total EU restructuring assistance for 1996 is about \$530 million, and, based on our breakouts, we would allocate a range of \$300 to 320 million to the effort- and capacity enhancing category. (Another group that adds up to \$200 to 220 million annually tends to reduce harvesting capacity and redirects industry to alternative sources of supply, for example, aquaculture. This group will be treated later in Section IX on environmental subsidies.)

Market (Price) Supports

The EU implements a number of measures to support domestic fishery prices, including a minimum import price program (reference price), and various other measures designed to support price floors, such as programs to remove excess supplies from the market (withdrawal) and to defray storage costs. During the 1980s, these market, or price support, programs were funded at fairly modest levels, usually about \$25 million annually.

Currently, the EU also co-funds, with the member states and industry, the Pesca Community Initiative, which we place in the broad "marketing" category. This program is used for generic seafood product promotion, labeling, and quality

enhancement, and is funded at just over \$300 million for the 1994-99 period, or about \$50 million annually.³⁴ The above price support and Pesca programs may fairly be considered as government-funded initiatives that benefit the entire EU fisheries sector, including fishermen.

In summary, EU-budgeted domestic subsidies that enhance fishing effort and capacity include: 1 about 60 percent of the EU's structural program; and 2 all the EU price support programs.

However, it should also be noted that these funding levels reflect only the EU's contribution, and that most of these programs are co-financed by member state governments and, in some cases, by industry or other private bodies. EU member state co-financing may amount to as much as 70 percent of the EU Commission's contribution, but a cursory examination of a number of recently approved restructuring projects suggests that member state co-financing probably averages about 50 percent. Using that assumption, all EU (EU Commission and member state)

³⁴ The EU Pesca initiative is a good example of a broad governmental program that almost certainly includes significant elements of subsidization, but is hard to assess because we do not know enough about the program. One European analyst of EU fisheries policies described the Pesca program in terms that almost make it appear proconservation. Accordingly, the Pesca initiative is designed "to assist areas dependent upon the fisheries sector in coping and adjusting to structural changes, for instance, by supporting the diversification of employment opportunities in highly dependent areas." Clare Coffey, "Introduction to the Common Fisheries Policy: An Environment Perspective," *International Environmental Affairs*, Vol.8, No.4 (Fall 1996), p.302.

contributions to budgeted domestic fisheries subsidies that we consider on balance undesirable from a conservation standpoint probably amount to at least \$500 million annually.

Norway

Norway has provided financial assistance to its fishing industry for more than 30 years. Since 1964, the government has negotiated annually an assistance package with the Norwegian Fishermen's Association, with the overall objective of raising average fishermen's incomes to the level of industrial workers. Not surprisingly, though, these agreements on financial assistance soon lost sight of their original, short-term objectives and effectively became ongoing subsidies that industry came to expect each year as a matter of course.³⁵

Thus, increases in subsidies have been based on the rationale that the government has an overriding social and economic policy interest in maintaining employment in fishing communities. At their high point (around 1990), these subsidies represented a substantial share of the industry's gross revenues. More recently, even though these subsidies have been reduced significantly, the evidence suggests that the traditional capture fisheries sector is still barely

profitable and may even depend on subsidies to avoid deficits.³⁶

In recent years, these assistance measures have been reduced substantially. There are many reasons that explain Norway's success in reducing subsidies in fisheries: overall affluence, the absence of a distant-water fishing sector, the enormous economic gains associated with salmon aquaculture, and the progress realized in resource recovery through traditional measures, especially in the Barents Sea groundfish fisheries.

Accordingly, Norway presents an interesting example of an affluent and major producer and exporter of fishery products that has apparently succeeded in reducing sharply its fisheries sector subsidies. While Norway's fisheries sector subsidies peaked at more than 1.1 billion Norwegian krona in 1990, this assistance level dropped to under 200 million krona in 1993. Using recent exchange rates, this represents a drop from about \$150 million in 1990 to under \$30 million in 1993.

Norway's major financial assistance package to the fisheries sector in the period 1989-1993 is illustrated below:³⁷

³⁵ This observation is based on Rognvaldur Hannesson, "Fishery Management in Norway," pp. 11-21; in *Managing Fishery Resources*, Proceedings of a Symposium Co-Sponsored by the World Bank and the Peruvian Ministry of Fisheries in Lima, Peru, June 1992.

³⁶ Hannesson ("Fishery Management in Norway," p. 21) concludes that "in terms of economic efficiency, the ambition (of fishery management in

³⁷ OECD, Committee for Fisheries, *Review of Fisheries* (1995), p. 159.

Table 4.

Total value in millions of Norwegian Krona Outlays Per Program in Percentages					
	1989	1990	1991	1992	1993
Price supports	30	27	31	21	-
Support to reduce operational costs	19	14	9	10	37
Social schemes	26	31	22	50	36
Structure programs	19	26	32	15	13
Other	6	3	5	4	14
TOTAL	900	1,125	715	425	195

Source: OECD Review of Fisheries (1995)

In addition, there are smaller subsidies provided to the fisheries sector. For example, Norway provided about \$600,000 in grants to the northern regions fishing industry, most of which is used by the fleet. In 1993, \$2 million was granted for improving industry efficiency, including experimental fishing and some R and D; and another \$1.5 million for improved efficiency in distribution, sales, and marketing; and still another \$1.5 million to individual plants to improve their operating efficiency.

In summary, we may roughly estimate Norway's fisheries sector subsidies in the \$30 million to \$50 million range, of which the large share appear to belong the undesirable, or effort- and capacity-enhancing category.

The most encouraging aspect of Norway's recent handling of fisheries sector subsidies is the simple fact that the government has appreciably reduced them, apparently with no or little negative impact on the industry's harvesting sector. Of the six case studies reviewed in this survey, Norway has

demonstrated more than the others an ability to sharply cut back sectoral subsidies that are environmentally undesirable.

United States

The United States has traditionally allocated relatively modest levels of financial resources to assistance programs in the fisheries sector, and does not have an overall fisheries sector assistance policy along the lines of the EU, Japanese, and Norwegian sectoral programs. In fact, the agency responsible for fisheries, the National Marine Fisheries Service (NMFS), a Department of Commerce subsidiary, has a total budget of just \$315 million, less than one-tenth of Japan's FAJ budget, in spite of the fact that, in terms of landings and gross revenues, the U.S. industry is about half as large as the Japanese.

U.S. fisheries sector assistance programs are spread out over several agencies, including the Departments of Commerce, Agriculture, State, and other agencies, and do not appear to be well coordinated among them. Largely for that reason, there is no such thing in the United States as an overall fishing industry assistance "plan" or "strategy." Fisheries sector subsidies may be organized according to the responsible U.S. government agency as follows:

In the Department of Commerce/National Oceanic and Atmospheric Administration/National Marine Fisheries Service:

- research and development (Saltonstall-Kennedy Grants Program) -- The S-K program funds a program of cooperative

government-industry development grants that was originally used primarily to assist industry. It has been redirected considerably to promote other fisheries policy goals, chiefly in the area of fisheries management. Currently, an estimated \$1 million at most is used for purposes that fall within the scope of our definition of effort- and capacity-enhancing fisheries sector subsidies.³⁸

In the Department of Agriculture:

- export market promotion (Market Promotion Program) -- The MMP program is administered by USDA, and is used generally to fund generic export market promotion of U.S.-produced agricultural and fishery products. The enabling legislation was amended about a decade ago to include fishery products, and in recent years, a total of about \$7 million of MMP funding as been provided to four separate U.S. fishing industry groups.

³⁸ This last estimate is admittedly rough. It is based on an examination of the latest available S-K annual report, which shows about 10 development projects that could be considered as grants that promote increased harvests. It should be noted, though, that practically all of these S-K grants support development of underutilized species, such as Atlantic mackerel and hagfish, certain squids, Alaska grenadier, and Arrowtooth flounder. U.S. Department of Commerce, NOAA, NMFS, *The Saltonstall-Kennedy Grant Program: Fisheries Research and Development, 1996 Report*.

- Government procurement (Surplus Commodity Program) -- The Department of Agriculture administers a domestic surplus food removal program (Section 32) that has included fisheries products for more than a decade. In the current fiscal year, USDA has allocated \$14.4 million under this program for fisheries products, all of which will be used for Pacific salmon products;

In the Department of State:

- payments to compensate for gear damage (Fishing Vessel and Gear Damage and Compensation Fund)
- payments to compensate for damage caused by interaction with offshore energy activities (Fishermen's Contingency Fund)

U.S. fisheries sector domestic-budgeted subsidies that are effort- and capacity-enhancing are listed in the table below:

Table 5.

Program	Approximate Current Funding Level \$U.S. Millions --
S-K development grants	1.0
Export promotion	7.0
Government procurement	14.4
Gear damage compensation	1.0
Contingency fund	0.5
TOTAL	23.9

Source: Various U.S. Government sources.

Therefore, U.S. harvesting effort- and capacity-enhancing subsidies net to roughly \$25 million in domestic budgeted programs, an extremely low level for a nation whose gross first-sale revenues in this sector approach \$4 billion.

Russia

Russia presents an interesting and unique case study of fisheries subsidies. The bulk of these subsidies were implemented prior to 1991 under the former Soviet regime, but their effects are still with us, mainly in the form of a large but declining fleet of distant-water trawlers, trawler-processors, and pure processors, or factory "mother ship". It is widely recognized that the huge Soviet fishing industry was generously supported through direct government payments, state-ownership, and artificially low prices for operating inputs.

It is practically impossible to translate what little we know of Soviet era fisheries subsidies into terms that are meaningful today. Nevertheless, available evidence suggests that as long as a substantial number of Soviet-era fishing vessels continue to operate, these past subsidies should be counted as an important factor. Current Russian fisheries development policies are in state of transition, and it is still hard to forecast their ultimate effect.

Soviet capital investments in their fishing industry were made as early as the 1920s, but the modern high-seas and distant-water fleet operating in all the world's waters is a product of the post-World War II period. A U.S. government study of Soviet fisheries estimated that the Soviets had invested a total of \$16 billion in the fishing industry, most of it in the 1960s and 1970s.

As of the mid-1970s, annual capital investments in Soviet fisheries averaged

more than \$1 billion.³⁹ As recently as 1989, shortly before the eclipse of the Soviet era, the annual total fisheries budget was more than 2 billion rubles, over \$3 billion based on the then-official exchange rate of 1 ruble equaling US \$1.60.⁴⁰ Of course, we have no information on what share of the above fisheries budget was allocated to "capital investment" or commercial fisheries assistance.

Nevertheless, if we assume that capital investments in the commercial fisheries sector continued at the levels prevalent in the 1970s until the end of the Soviet era, we would have to add another roughly \$15 billion to \$20 billion, for a total of more than \$30 billion during the entire Soviet era. Up to the mid-1970s, about two-thirds of all fisheries sector subsidies went directly to the harvesting sector, mainly for fishing and fishing support vessels. However, government investments in the fishing industry during the last decade and a half of the Soviet era were less concentrated in the harvesting sector, once it became evident that prospects were less encouraging in distant-water fisheries.

Massive state support for fisheries produced the expected results. Total catches grew six-fold from 1.7 million tons in the early 1950s to over 10 million tons in the mid-1970s, putting the Soviet Union in second place behind Japan. During the same period, Soviet fisheries catches grew by an annual average of 18 percent, while world harvests grew by an average of just 7 percent. In

³⁹ Department of Commerce, NOAA, NMFS, *Fisheries of the USSR*, Milan Kravanja et al. (Washington: 1977).

⁴⁰ *Rybatskie Novosti*, No. 48, December 1993.

other words, the Soviets were investing in the fish-harvesting sector at a far higher rate than the rest of the world.

By the mid-1970s, then, the Soviet Union was the dominant and most aggressive player in world high-seas fisheries. However, it was also increasingly heavily dependent on continued growth in the high-seas sector, which by then accounted for an amazing 90 percent of the total harvest. When coastal states began to implement 200-mile fishing zones in the latter half of the 1970s, Moscow's basic fisheries policy was bound to fail.

The forced development of the Soviet fleet paid little attention to economic viability. At their peak in the mid-1970s, the Soviets were the least efficient of the major fishing powers. At that time, the Soviet fleet of larger vessels accounted for an incredible 50 percent of the total world high-seas and distant-water fishing vessel tonnage, but accounted for only 15 percent of total world landings.

The Soviet fleet was grossly overcapitalized and required massive institutionalized state support. As a striking example, a U.S. government assessment from the mid-1970s determined that the average Soviet "catch per tonnage in the high-seas fleet" was about one-fifth as great as Japan's; one-sixth as great as the U.S. average; and less than one-third as great as the world average.

The collapse of Russia's fisheries sector after 1991 was swift and dramatic. Shortly after the eclipse of the Soviet state system, the old cabinet-level Ministry of Fisheries (Minfish) ceased to exist; much of the fleet of large trawlers, trawler-processors, and mother

ships was lost to the newly independent Ukrainian and Baltic states; and, most important, government financial support for what remained dropped precipitately. Only after many months of transition did a successor agency, the Russian Committee on Fisheries, effectively take shape.

The industry contracted dramatically, and harvests in both distant-waters and in Russia's zone dropped sharply. The fishing fleet was generally aging and poorly maintained even before the dissolution of the Soviet Union in 1991. Therefore, the demise of Communism had the effect of accelerating an existing trend.

During this period, the Russian fisheries sector saw its production cut to less than half of its peak level. Total Russian output from capture fisheries dropped from 11.1 million tons in 1989 (when the Soviet Union placed first in the world in terms of total harvests) to 8 million tons in 1993 and, incredibly, to 4.3 million tons in 1995. In the Russian Far East, which accounts for two-thirds of total Russian harvests, production declined precipitately from 4.5 million tons in 1990 to 2.4 million tons in 1994 before rebounding in 1995. The rapid drop in Russia's total fish harvests after 1991 shows dramatically how dependent the fisheries sector was on state financial support.

As the government's role unraveled and harvests declined, the industry's fundamental economic viability suffered. The lack of government funding pushed many enterprises to bankruptcy. The then head of the Russian Committee on Fisheries stated in late 1993 that, during the 1992-1993 period, fishing enterprises were owed at one point 300 billion rubles, or more than \$300

million, by the government.⁴¹ At about the same time, it was reported that in 1993 the state accounted for "only" 28.7 percent of total investments (public and private) in the fisheries sector.⁴²

During this transitional period, many fishing enterprises went out of business; the condition of the vessels deteriorated; fuel costs escalated; and overall profitability continued to erode.

A few years ago, a Russian government investigation reported that the majority of firms were barely surviving. Of the 340 fishing enterprises assessed by the State Statistics Committee, an astounding 80 to 85 percent were involved in or nearing involvement in formal bankruptcy proceedings. Clearly, the Russian fishing fleet was unable to function without continued government subsidies.

At the mid-1994 Day of the Fishermen ceremony, a Russian Committee on Fisheries official admitted as much when he stated to the press that

In former economic conditions, Russian fishermen were able to harvest the bioresources of the

⁴¹ This estimate of the U.S. dollar equivalent of 300 billion rubles in 1993 is, to say the least, highly approximate. The ruble has rapidly depreciated throughout the period after the collapse of the Soviet Union. Thus, in 1992, the equivalent would have been \$1.3 billion. Conversions from rubles to dollars are based on the average interbank exchange rates issued by the IMF. Yearly average exchange rates from rubles to dollars are as follows: (1991) 169, (1992) 222, (1993) 933, (1994) 2,205, (1995) 4,562, and (1996) 5,100.

⁴² *Rybatskie Novosti*, No. 18, April 1994.

Southeastern Pacific, the Indian Ocean, Antarctica, and other distant regions, only through significant government subsidies. It follows that either we shall develop a government marine resource program for the high seas or the fisheries in this area will be discontinued in the very near future.⁴³

As Russian distant-water fisheries declined sharply, fisheries in the Russian zone also entered a crisis phase. Lacking adequate, or at times any, state funding, the fishing enterprises sought to break away from Moscow's central authority, and some formed joint arrangements with foreign partners. Interestingly, as early as 1992, Russian Far Eastern fisheries enterprises with foreign capital accounted for more than half of all seafood exports from this region. These joint ventures totaled almost 450, and the major foreign investors were U.S., Japanese, and Chinese.⁴⁴

In the meantime, the Russian Committee on Fisheries scrambled to identify means of sustaining a declining fishing industry and, toward that end, resorted to several "incentive" measures:

- One means was to use the resource itself as a means of generating certain benefits for the domestic industry. For example, the federal authorities announced in late 1994 that they would auction off 350,000

⁴³ *Rybatskie Novosti*, No. 30, August 1994.

⁴⁴ It is interesting to note that the average foreign capital contribution to these joint companies was quite small: just 2 million rubles.

tons of Alaska pollock and other species to both private Russian and foreign enterprises, and use the proceeds for construction and maintenance of vessels used to repair fishing boats on the high seas;

- Fisheries allocations were also provided to Japan and Korea in exchange for fuel that was used by domestic fishermen;
- Certain domestic enterprises were given the exclusive right to export fish products; and
- Foreign investors were given generous allocations and, in some cases, received exemptions from local taxes.

Currently, it is impossible to determine the size of the remaining state-owned sector. Late in 1996, the then head of the Russian Fisheries Committee reported that 92 percent of fishing enterprises had been privatized, leaving 8 percent in the state-owned group.⁴⁵

The key question in projecting subsidies in Russian fisheries revolves around the role of the state. On the one hand, it is clear that the state's participation has vastly diminished and given way to a strong trend toward privatization. On the other hand, there are still reasons to believe that the government will be a major factor in stabilizing and rebuilding this sector. Even in these dire times, the government continues to play a

⁴⁵ Vladimir Korelsky, "Keeping Its Head Above Waters: The Fishing Industry," *The Russian*, December 1996, pp. 20-27.

major role in the construction, repair, improvement, and maintenance of fishing vessels.⁴⁶ And subsidies were paid to fishing enterprises to ensure their delivery of stated amounts of fish products to the Russian Federal Food Fund.⁴⁷

Most fundamentally, to recover from the post-1991 industry-wide crisis, Russia must dramatically upgrade the maintenance and repair of the existing, largely Soviet-era vessels, and rebuild the fleet through domestic and foreign shipyards. The Russian Committee for Fisheries projected these costs at \$2.8 billion (for repair and maintenance) and \$1 billion (for fleet renewal), netting \$3.8 billion in total fleet recovery costs.

However, the Russian government currently lacks the financial wherewithal to provide investments in the fisheries sector that approach the levels of the Soviet era. In 1994, the committee determined that the industry needed a certain level of funding, but the Ministry of Finance agreed to only half that amount, and the Russian Federal budget further reduced it to 128 billion rubles for "the development of the fishing industry." Thereafter, only 47 billion rubles were actually allocated in the first half of 1994, and the "hope of receiving the remaining sum of 81 billion rubles" was dismissed as "optimistic at best."⁴⁸

⁴⁶ It is worthy of note that the Russian agency charged with carrying out fisheries scientific research, VNIRO, has recently converted some research vessels to operate commercially, and is involved in the building and repair of fishing vessels and the supply of gear.

⁴⁷ *Rybatskie Novosti*, No. 38, December 1994.

⁴⁸ *Rybatskie Novosti*, No. 29, August 1994.

In the following year, 1995, the Russian Committee on Fisheries total capital investments budget totaled only about 20 percent of the amount requested in 1994.⁴⁹ In fact, Russia's fiscal year 1996 fisheries budget was modest, with total spending of about \$100 million, of which a little more than half looks like subsidies.

Russia's FY 1996 Committee on Fisheries budget included the following main programs:⁵⁰

Table 6.

Million of US dollars	
Enforcement and aquaculture	16.0 million
Education	27.0 million
Capital investments	9.0 million
"Ryba" ("Fish")	44.0 million
TOTAL	96.0 million

Source: U.S. Embassy, Moscow, October 10, 1996

The basic question remains: How will Russia provide the capital necessary to fund the recovery of its fishing industry?⁵¹ At this point, we can only observe that the resources will come from either the state, the nascent Russian private sector, or foreign investors, or from some combination of all three. Recent Western reports based on information from Russia's fisheries planners suggest that the Russian committee on

⁴⁹ "Russian Government Cuts Fisheries Committee Funding", *Eurofish Report*, March 30, 1995. Some Russians have even claimed that without significant increases in State aid (subsidies), total Russian landings may decline to about 3 million tons by the year 2000.

⁵⁰ U.S. Embassy, Moscow, October 10, 1996.

⁵¹ This is clearly the most fundamental problem. The fishing industry's capital needs far exceed the state and the private sector's ability or willingness to pay.

Fisheries believes that these resources will be raised through loan guarantees, some other vaguely defined subsidies, and the proceeds from fishery exports. Simultaneously, the committee has endorsed the need for tax incentives. All these categories of assistance would likely meet the WTO's definitions of subsidies.

Obviously, precise assessments of fishing industry subsidies in both the Soviet and Russian eras are practically impossible. Essentially, "budgeted" subsidies are currently at modest levels, but "unbudgeted" and "indirect" subsidies may be much more significant. More worrisome is the threat that these subsidies could reappear if and when the Russian government decides it is able to respond to industry's pleas.

A statement made by the head of the Russian Fisheries Committee in late 1996 reveals the lingering expectations for increased government economic assistance:

Direct financial support from the government will play a role, but more important factors include the creation of favorable economic conditions in the areas of credit, taxation, and tariffs, plus full and timely payment of all of the government's budgetary obligations, and the extension of special advantages for companies that supply products to the government agencies and institutions.⁵²

We will therefore assess the state's role in this sector as highly significant but

⁵² Korelsky, "Keeping Its Head above Water: The Fishing Industry," p. 22.

declining.⁵³ There is reason to believe that Russia's fisheries subsidies will continue to move away from state ownership and direct support and toward various unbudgeted and indirect forms. Since this situation is changing so rapidly, it is impossible to quantitatively assess these subsidies.

China

Contrary to recent world trends in fisheries, China has enjoyed a remarkable spurt of growth in all sectors, including aquaculture and capture fisheries. The state has aggressively promoted this expansion, and, as a result, China became a major fishing power in the last decade and a half and is now the world's leading producer. Capture and farmed fish output has boomed from under 5 million tons in 1970 to 13.5 million tons in 1991, more than 20 million tons in 1994, 22 million tons in 1995, and an estimated 25 million tons in 1996, making it by a wide margin the largest producer of wild harvest and cultured fish and shellfish in the world.

Both the growth rates and expectations in fisheries have been astounding. As an example, during China's seventh five-year plan (1986-1990), the state set a target of an almost 30 percent increase in total fish output compared with the previous plan years (1981-1985). Incidentally, this projected increase exceeded the targets for grain (12 percent) and meat (20 percent).⁵⁴

⁵³ Korelsky, "Keeping Its Head above Water: The Fishing Industry," p. 22., points out that, under "Fish-2000," the "federal budget will cover only 20 percent of the industry's overall financial needs."

⁵⁴ u.s. Department of Commerce, International Trade Administration, "Doing Business in China," December 1988, p.7.

There is little doubt that, during the last two decades, the Chinese government has aggressively promoted increased capture fisheries production with a program of fishing vessel construction, repair, modernization, and purchase from abroad. As a result, during the period from 1978 to 1994 -- roughly from the onset of economic reforms to the present -- the number of "powered" fishing vessels grew from fewer than 40,000 to almost 260,000; total gross tonnage increased from 1.2 million to over 4.0 million, and engine power from 2 million to 8.4 million kilowatts.

Simply stated, the aggregate size and power of China's modern fishing fleet roughly quadrupled in just a decade and a half after the beginnings of economic reform. In other words, China's basic policy on marine capture fisheries was to encourage increases in fishing vessels, their engine power, and the associated harvesting technology.

The growth trends in the marine capture fisheries sector are most interesting. Marine harvests grew from less than 4 million tons in 1978 to 8 million tons in 1993, 9 million tons in 1994, and perhaps 10 million tons currently. Using the most recent official figures (for 1994), marine capture fisheries and inland aquaculture each yielded about 9 million tons of annual production, with their combined total of 18 million tons accounting for almost 90 percent of total Chinese fisheries output. Thus, China currently accounts for more than 10 percent of global marine capture fisheries harvests.⁵⁵ China's 9 million tons of marine capture fisheries may

⁵⁵ People's Republic of China, Ministry of Agriculture, Bureau of Fisheries, *China Fishery 1995*, p. 2.

be broken out roughly in two categories: first, more than 8 million tons in China's zone, and second, the distant-water sector at roughly 500,000 tons and increasing. (This second, distant-water sector is discussed at greater length in the following section.)

Such rapid growth in marine capture fisheries output inevitably encountered obstacles. Initially, as one would expect, the authorities responded to problems in China's zone. Although China had enacted a framework fisheries law in 1986 that lay the groundwork for subsequent management actions, it soon became clear that sterner measures were needed.⁵⁶

The telltale signs were numerous:

- By around 1990, average yields (per unit of effort) in capture fisheries dropped by more than 50 percent with the 1950s;
- evidence emerged of overexploitation of traditional species, especially croakers, hairtail, and squid;
- signs of overuse even appeared with respect to less traditional, recently initiated fisheries, like filefish;
- capture fisheries harvests tended to shift toward juvenile fish and lower-value species; and

⁵⁶ This discussion of recent developments in the efforts of China's fisheries leadership to more effectively manage the capture fisheries relies heavily on: U.S. Department of Commerce, NOAA, NMFS, "Chinese Fisheries Management", IFR-92/11L, by Mark Wildman, based

- relations between fishermen and China's booming mariculture sector became strained, in part because the spawning fish used in aquaculture are taken from wild stock.

By the late 1980s and early 1990s, there were signs that the industry's explosive growth had run into serious and undeniable resource constraints.

In 1992, China's Ministry of Agriculture issued regulations that sharply restricted certain fishing practices.⁵⁷ Complaining that "fishing in Chinese waters will be restricted in a bid to restrain the rampant destruction of resources," the ministry sought to regulate more effectively the use of set nets and trawl gear, and implemented closed seasons and areas, and a more restrictive vessel licensing system.

Significantly, China's fisheries authorities decreed a first-time national plan to limit capacity in the harvesting sector. Accordingly, net horsepower in the fleet operating in China's 200-mile zone during that five-year plan period (1991-1995) was limited to 10.23 million, an increase of just 1.3 million over the level of the previous plan period.

Currently, the organization of China's fisheries sector may be described as "mixed." Official publications state that about 90 percent of harvests, or about 8 million tons, are taken by enterprises "run by fishermen," but a large share of these are in fact organized as "collectives, cooperatives, and joint groups."

⁵⁷ *Beijing China Daily* (In English), "Ministry Announces Fishing Restrictions," July 22, 1992.

The remaining share -- about 10 percent -- is operated by the state. In 1995, this latter, fully state-owned group still numbered more than 60 enterprises, with over 3,000 vessels that accounted for 850,000 tons of harvests. There is little doubt that the major form of fisheries subsidy in China is public investment in the state-owned sector.

Therefore, a fundamental and thus far unanswered question is the size and funding levels of the state-owned and -"financed" sector in Chinese fisheries. Until we have more and better information on the state's evolving role in this sector, any attempt to assess the level of subsidies is at best an educated guess.

It appears that the bulk of these subsidies are provided by the Ministry of Agriculture and its fisheries subsidiaries. This writer was unable to obtain data on the fisheries portion of the Ministry of Agriculture's budget, but we can reasonably infer that it must be significant. In the Chinese government's just-announced overall 1997 budget, agriculture is allocated \$7 billion, but we do not have a fisheries breakout.⁵⁸ We may infer, though, that the majority of that fisheries budget is used for development, and the biggest item is government contributions to the state-owned and cooperative sectors. Planned spending in 1997 on all state enterprises is over \$300 billion, one-third more than in 1995. It also

⁵⁸ China's 1997 budget was unusually sparse, even on Beijing's prudent standards. The English document totaled only 19 pages and provided no data on "losses at money-hemorrhaging state-owned enterprises." See, Matt Forney, "Between the Lines: China's Sparse Budget Masks Some Troubling Trends," *Far Eastern Economic Review*, March 20, 1997, p. 53.

seems likely that many state-owned fishing enterprises are losing money. In fact, approximately three-quarters of all Chinese state-owned enterprises (in all sectors) lost money in 1996, according to an embarrassed Premier Li Peng at the spring 1997 session of the National People's Congress.⁵⁹

To make the matter even more complicated, the GATT treatment of subsidies in socialist economies is still undeveloped and largely theoretical. Essentially, centrally planned economies subsidize mainly through state ownership and investments, but these same economies are not yet members of the WTO, and, therefore, these practices have not been challenged under WTO rules. As a result, there is relatively little GATT case law on state ownership and investment subsidies.

Nevertheless, total investments by all governments in all sectors continue to be substantial, in spite of the recent wave of economic reform and privatization. Worldwide, the World Bank estimates annual private investments at \$4 trillion, six times greater than the \$700 billion in government investments.⁶⁰ Naturally, China, by virtue of its size and the organization of its economy, is a major placer of government investments.

One could infer that all payments to all firms qualify as subsidies under Article 1 of the 1994 WTO Subsidies Agreement.

⁵⁹ "Major Speech Puts Li Peng in Spotlight," *Washington Post*, March 2, 1997.

⁶⁰ World Bank, *Advancing Sustainable Development: The World Bank and Agenda 21*, Environmentally Sustainable Development Studies and Monographs No. 19 (Washington, D.C.: World Bank, 1997), p. 13.

Therefore, when China joins the WTO, these massive investments in state-owned and -controlled fishing enterprises will qualify as subsidies, since they are direct financial transfers (grants, loans, equity infusions) or the provision by government of "goods or services other than general infrastructure." [Article I.1 (a)(1) (i) and (iv)].

On the other hand, others may note that to establish equivalent treatment for socialist and market economy firms, the true subsidies should be understood to cover not all transfers of funds to operating enterprises, but only transfers that promote fishing effort in excess of levels required to achieve economic viability or (alternatively) maximum economic yield.

To translate the above, if we had the Chinese government's total budget for capture fisheries programs, we would ideally allocate it partly to a "return on investment stream" and partly to a subsidizing stream, the first defensible and the second potentially actionable.

The evidence that there is a subsidizing stream in China can be inferred from the declining yields and other signs of strain in Chinese fishing operations, and from Li Peng's public concession that three-quarters of all state enterprises were unprofitable in 1996. It is hard to believe that the level of subsidy is less per unit of economic activity in this sector than in Japan or the EU, which, although considerably more affluent, have far lower catches. Therefore, while we regret the sparse data from Beijing, we have no choice but to make an informed and prudent conjecture. Accordingly, we rate the Chinese government's current subsidies

to the domestic capture fisheries sector at approximately \$500 to \$750 million.

Even more alarming is the evidence that we have regarding China's long-range planning for the fisheries sector. A recently published semi-official report stated that China plans to boost total fish production (including farmed and capture fisheries) from the present 25 million tons to 35 million tons.⁶¹ While the aquaculture share will increase from 55 to 60 percent of the total, the remaining 40 percent for capture fisheries still works out to 14 million tons, considerably more than any other country's current total output. Therefore, if these goals are realized, China will by 2000 account for about one-third of total world fisheries output and almost one-fifth of capture fisheries harvests.

Given the resource constraints in their own zone, it is certain that these projected increases in capture fisheries must come from distant-water fisheries. The above-cited report assigns a "high priority" and "major support" to "actively develop deep-sea fishing" through the building of "overseas fishery bases that complement production with transportation and marketing processes" and "the possibility of combining foreign aid projects with economic cooperation in fisheries." With respect to the state-owned sector, Beijing plans to "enthusiastically and boldly push forward the reform of state-owned aquatic products enterprises and "gradually transform them into "limited liability companies."

⁶¹ "China: Fast Development of Fishery Seen," Beijing Xinhua Domestic Service, March 12, 1997.

China is the only major fishing power with such ambitious development plans, and clearly the only one that continues to count on significant increases in production from deep-sea and distant-water fisheries. Therefore, while Japan and the EU may be said to be subsidizing defensively, Beijing's plans call for probable increases in subsidized expansionist efforts outside its zone.

Global Projections

Using the above estimates of the domestic budgeted subsidies that are effort- and capacity-enhancing, we are, let us hope, in a position to hazard a global projection. Obviously, this projection is fraught with difficulties, since we must not assume that the ability and will to subsidize fisheries in the case study countries are matched in the rest of the world.

Nevertheless, we need to make our best effort. Based on the information available on budgets and assistance programs, we believe it is possible to at least initiate a well-reasoned discussion of the magnitude of the problem on a global basis.

Among the budgeted subsidies, state investments present a major problem. Of our six case studies, state ownership and investments play a major role in Russia and China. For the time being, Russia's subsidies to this sector are collapsing, while China's are impossible to assess accurately because we lack the necessary budget information. The matter is further complicated by the fact that, in both countries, public funding in the fisheries sector (indeed in all economic sectors) is in a state of flux. Nevertheless, it is clear that

state ownership and investments play an important, although probably declining, role. It may be noted that, a decade ago, a U.S. government analysis projected that almost 40 percent of 1986 global fish harvests were taken by "state-owned" and "mixed" enterprises.⁶²

In Russia, the Soviet-era massive capital investments in fisheries have been interrupted but clearly have not ceased. In China, the economic reforms have certainly reached and significantly affected the fisheries sector, but, based on the admittedly sparse information available to this writer, the state-owned and -run sector continues to play a very major role. In summary, fisheries subsidies in the form of state ownership and operation are declining in Russia and remain at high levels -- and may even be increasing -- in China.

To project a world total, we start by netting the fisheries sector domestic subsidies of the six case-studies countries at about \$2.0 billion. This estimate, as shown above, is based on budgeted amounts and does not reflect the total economic impact of unbudgeted or underbudgeted subsidies.

Next, we need to add some reasonable estimate for the rest of the world. All other countries, as explained above, account for slightly more than one-half of total world fisheries production in 1994, the latest year for which we have FAO figures. On the other hand, most of these countries are smaller and, less affluent than our six case

⁶² U.S. Department of Commerce, NOAA, NMFS, "World Fishery Trends, 1980-1986," IFR 87/63.

studies and are unable to subsidize as generously as, say, Japan and Europe.

Conversely, many of these countries have statist economies, particularly in the agricultural and fisheries sectors, and probably subsidize this sector to the maximum of their ability to pay. In addition, this category includes a number of developing and industrial economies with fairly large and, in some instances, rapidly growing fishing industries, such as Canada, Chile, Iceland, Indonesia, the Republic of Korea, Mexico, Taiwan (China), Thailand and others.

We will assume that the vast majority of nations other than our six case studies are developing countries that tend to provide only modest budgets for fisheries subsidies. Hence, if net domestic subsidies in the six case studies amount to about \$2.0 billion, we will give the following, highly tentative projections for the rest of the world: low; \$1.0 billion, and high; \$1.5 billion.

In summary, our global estimates of budgeted domestic subsidies that are effort- and capacity-enhancing become: low; \$3.0 billion, and high; \$3.5 billion.

BUDGETED SUBSIDIES: FOREIGN ACCESS

A second category of budgeted subsidies is assistance provided to fishing operations in the waters of other coastal states. This type of subsidy can assume many forms, but the most important type is a government-to-government payment. Subsidies in the form of foreign access fees meet the definitions of the 1994 WTO Subsidies Agreement under

Article 1.1(a)(1) (i) and (iii), since they constitute "a direct transfer of funds" and are "goods or services other than general infrastructure." Essentially, foreign access payments are subsidies because governments, and not the fishing companies, pay them.

This type of subsidy is provided primarily by industrial countries whose distant-water fleets were excluded from foreign fishing grounds after the worldwide adoption of extended jurisdiction in the late 1970s.⁶³ The EU has traditionally negotiated many types of fishery agreements with non-EU nations, including reciprocal access and access-for-trade arrangements, as well as agreements to pay access fees to third country governments. For purposes of this study, we are in principle interested in all three, since they all involve EU measures that offer economic incentives of one sort or another in exchange for improved access for European boats in third country waters. However, the third category -- direct EU monetary payments to other governments -- is the most obvious and glaring example of a subsidy that promotes increased fishing.

A good, recent example of how these agreements work is the fisheries access arrangement that the EU has negotiated with Mauritania. In June 1996, the EU signed a

⁶³ This section deals extensively with distant-water fishing subsidies provided by the EU for the simple reasons that this writer had much more information on EU practices than anyone else's. Scattered evidence indicates, however, that a number of other, chiefly East Asian, countries also provide this type of subsidy. It is not the intention here to place any unfair or disproportionate share of responsibility for this practice on the EU's shoulders.

five-year fisheries access-for-trade agreement with Mauritania that lifted an EU embargo on fishery imports from that African nation in return for EU payments of almost \$350 million, or \$70 million per year. Interestingly, the agreement permits an increase in EU access to Mauritanian waters, authorizes higher EU total harvests, and, for the first time, specifically allows EU directed fisheries for highly valued squid and octopus.

Not surprisingly, the Mauritanian industry expressed alarm at the terms of the agreement, in large part because it sanctions increased foreign effort in already fully and overharvested fisheries. The specific terms of the agreement, described as a "windfall" for the cash-strapped Mauritanian government, substantially increased the overall EU payment from \$34 million (under the old agreement) to almost \$350 million, the number of eligible EU boats from 165 to 240, and allowable EU harvests from 76,050 to 183,392 tons. In response to Mauritanian industry complaints that these arrangements will harm domestic fishermen, Mauritanian authorities are considering remedial measures, including tax exemptions and fuel subsidies.

Even more alarming is the possible negative impact of increased fishing on Mauritania's already fully harvested resources. The combination of increased legal foreign fishing, still-rampant illegal foreign operations, and ineffective enforcement could lead to further and long-lasting harm to an already precarious resource base.⁶⁴

⁶⁴ U.S. Embassy, Nouakchott, July 24, 1996.

At the same time, the EU and Senegal have held long negotiations governing the terms of access of European boats to the waters of that West African country and, according to press reports, finally came to agreement in March 1997. The agreement will be valid for four years (1997-2001), and provides for an annual EU payment of \$15.6 million, an increase of one-third over the previous accord but far less than the \$42 million demanded by Senegalese negotiators. In addition, the EU will pay almost \$8 million annually to Senegal from the European Development Fund. Therefore, total EU assistance to Senegal related to this fisheries agreement is \$23.6 million. Interestingly, the EU received for the first time allocations in coastal waters to fish pelagic species like sardinella and horse mackerel, traditionally low-value species consumed by the Senegalese. As in Mauritania, Senegalese fishing industry groups have objected to the EU's demands, arguing that the local population depends on the coastal pelagic fisheries for food, and that the larger and more powerful EU vessels may overfish these resources.⁶⁵

The EU subsidizes similar fisheries access arrangements with the following West African countries: Cape Verde, Côte d'Ivoire, Gabon Republic, The Gambia, Equatorial Guinea, Guinea, Guinea-Bissau, Morocco, São Tomé and Príncipe, and Sierra Leone. In East Africa, EU agreements have been concluded with Madagascar, Mozambique, and Tanzania, and in the Indian Ocean, with the Comoros Republic, Mauritius, and Seychelles.

⁶⁵ U.S. Embassy, Dakar, October 3, 1996.

There is not much doubt that these arrangements are implemented overwhelmingly for the benefit of the EU distant-water fleet, and that they provide only modest benefits to the developing countries and local industries. This conclusion is shared by European experts themselves. A French academic commentator characterized these EU fisheries agreements as follows:

The impact of this policy on the technical, economic and social development of the African/Caribbean/Pacific countries is negligible. Training, technology transfer, and control over the resources are all neglected. Only a small share of the harvests (of the EU boats) are landed and sold locally to meet (the coastal state's) needs; research programs tend to target high-value species, like tuna, that are exported, rather than species that could be harvested by the local coastal fishermen to supply domestic markets. These agreements pretend to reconcile trade and aid, but they have barely contributed to the development of the local fishing industries of the coastal states. Isn't it wishful thinking ("utopique") to support access by the technically advanced European fleets to the waters of these developing countries and, at the same time, to claim that we are trying to develop the local fisheries?⁶⁶

⁶⁶ J. Le Bail, "Tiers-Monde et Zones Economiques Exclusives: La Difficile Conquetes d'une Nouvelle Frontier," (1992), Unpublished article.

In response to a question posed in 1996 by a member of the European Parliament, the commission defended the economic benefits data showing that "the agreements, by maintaining or expanding the fishing possibilities for the Community fleet in third country waters, seek to protect the level of direct employment on fishing vessels and indirect employment in onshore processing facilities and related industries."⁶⁷ Total "direct and indirect" employment benefits were estimated at 45,000 jobs.

The current annual level of EU payments for these foreign fishing arrangements is about \$350 million, according to a recent U.K. report. These foreign agreements are funded mainly for the benefit of the Spanish, Portuguese, and French fleets.⁶⁸

The European Parliament has spoken critically of these agreements, especially their "considerable financial budget implications."⁶⁹ Budget outlays at these levels and their distribution among EU members have clearly reached a point where they are becoming a divisive issue within the European Community.

Japan has traditionally allocated the bulk of its fisheries subsidies to the small-scale

⁶⁷ Answer provided on May 8, 1996 by Mrs. Emma Bonino, the head of DG XIV (Fisheries), *Official Journal of the European Communities*, No. C297/21, August 10, 1996.

⁶⁸ "House of Lords Says Spain Should Pay More For Third Country Deals," *Worldfish Report*, January 30, 1997, summarizing; House of Lords Select Committee on the European Communities, *Third Country Fisheries Agreements*, (London: Her Majesty's Stationery Office Publications Centre, 1997).

⁶⁹ ³² "MEPs Angry as Commission and Council By-Pass EP," *Worldfish Report*, No. 30, December 5, 1996.

coastal sector and not to the larger companies that conduct offshore and distant-water fisheries.⁷⁰ However, the oil crisis and implementation of extended jurisdiction of the 1970s ravaged the distant-water sector and forced a rethinking of these priorities. Subsequently, Japan has attempted in various ways to both force adjustments in and subsidize its distant-water fishing sector.

Currently, the FAJ spends almost \$100 million on distant-water access arrangements, mainly for the benefit of vessels operating in waters of developing countries in the western Pacific and elsewhere. In addition, another \$100 million or more is spent on foreign fisheries assistance, one objective of which is to secure continued fishing rights in waters of the recipient developing nations.

It should be noted that Japan has evidently chosen not to rescue its entire distant-water sector. In fact, the fleet that previously concentrated on groundfish and salmon in northern, largely U.S. and Soviet waters, has contracted markedly.

Japan's entire distant-water fleet has been reduced from 700 to 288 vessels from 1975 to 1990, and probably has even fewer today.

The very large distant-water sector, i.e., vessels over 1,000 GRT, numbered 127 in 1990 but only 36 in 1994, and have been mostly sold, transferred to foreign joint ventures, or reflagged. These figures suggest that the downsizing of the Japanese fishing fleet hit especially hard in the sector that operated in waters that fell under the

jurisdiction of other countries in the late 1970s. The same conclusion is suggested by data that show that, during the last decade, harvests from "offshore" and "distant-water" fisheries have dropped substantially, while coastal fisheries and aquaculture production has been more or less stable.

As a practical matter, then, Japan's current subsidies to its distant-water fishing industry mainly benefit the tuna and cephalopod (squid and octopus) boats that operate in more southerly waters and off the coasts of developing countries.

China is in a unique position among major fishing powers, since it is the only one that continues to promote a blatantly expansionist distant-water and high-seas fisheries policy.

Within the large marine capture fisheries sector, of great interest to us is the strong growth in China's distant-water fleet. This sector was launched in 1985, and from 1986 to 1991 grew from practically nothing to about 275 vessels, and the distant-water catch (outside China's 200-mile zone) jumped from 0.02 million tons to 0.323 million tons, and, at present, a projected 500,000 tons. China's offshore and distant-water fleets were launched in part to take some pressure off the increasingly heavily exploited near-shore resources. From the beginning, the distant-water fleet was dominated by a few state-run enterprises. For example, in the mid-1980s, distant-water fishing in the North Pacific and off

⁷⁰ OECD, Committee for Fisheries, *Reexamination of Financial Support to the Fishing Industry (Japan)*, November 13, 1978.

Alaska was conducted exclusively by the China Aquatic Products Corporation.⁷¹

Today, China's distant-water fleet operates all over the world, but mainly in the Pacific and Indian Oceans, and off Western Africa. Nor is there any sign that China's top fishery managers see the end of this growth in the foreseeable future. In a 1995 official publication, their long-term fishery development policy included the following goals: "to accelerate aquaculture development; stabilize offshore [still within China's 200-mile zone] fishing; and expand distant water fishing."

An informative case study of how China has rapidly developed its distant-water capture fisheries sector is its high-seas tuna fishery. China's distant-water tuna fishery is concentrated in the South Pacific and, to a lesser degree, the Indian Ocean.⁷² The industry mainly uses longline and pole-and-line gear, and used tuna vessels and refitted trawlers purchased from Japan and Taiwan, China. Its growth has been rapid and recent, and as recently as 1991 its total harvests were only about 2,000 tons, but a few years later, in 1994, China's total tuna production had jumped to about 15,000 tons, mainly in Palau, Micronesia, and the Marshall Islands.

The state has employed a number of incentives to promote the Pacific tuna fishing industry. Principally, it has provided capital in kind in the form of vessels and

⁷¹ *China Agriculture Yearbook*, 1987 and 1988, "Fisheries in 1987", and "Fisheries in 1988" (Beijing: Agricultural Publishing House, 1990 and 1991).

⁷² Japan External Trade Organization, *China's Tuna Fishery*, December 1995.

equipment; the use of government employees, who account for about 10 percent of the staff in this sector; duty-free treatment of imported gear and equipment; direct financial payments to various Pacific island state governments to pay for access to the tuna-fishing grounds; and a policy of "favorable consideration" of industry requests for loans and the use of foreign currency.

Therefore, China's recent expansion into distant-water tuna fisheries has been promoted primarily by the state-owned sector. Anecdotal evidence indicates that China, like the other distant-water fishing nations, pays some share of foreign access fees for its high-seas fleet, but no information on the levels of these payments was available. It appears, until more information is available, that state ownership is probably the principal form of subsidy to its distant-water sector. These enterprises are all state-run or cooperatives, and 70 percent of the fleets' tonnage is accounted for by 11 state-run fishing enterprises, with the remainder belonging to the cooperatives.

The U.S. fishing industry conducts relatively limited distant-water fishing operations. In fact, the only major U.S. distant-water fishery is the tuna purse seine fleet's operations in the southwest Pacific. In 1987, the United States concluded a multi-year fisheries agreement with a number of Pacific island states that guaranteed access to these tuna fisheries in return for license fees and economic assistance payments.⁷³

⁷³ Samuel Herrick Jr., Byron Rader, and Dale Squires, "Access Payments and Economic Benefits in the Western Pacific United States Purse Seine Tuna

Under the initial terms of the agreement, the United States gained access for up to 55 U.S.-flag purse seiners for five years in exchange for fees paid by industry and \$10 million in economic development assistance provided by the U.S. government.

When the agreement was extended in 1991, access was again provided for up to 55 boats, but the industry consented to pay \$4 million annually for licenses, technical assistance, and an observer program, and the U.S. government committed to increase its annual payment to \$14 million. U.S.-flag tuna purse seiners participating in these fisheries numbered from 40 to 45 in the years immediately following the agreement's extension in 1991, but have recently dropped to fewer than 40. Therefore, the U.S. access payment through the South Pacific Tuna Treaty effectively provides an annual subsidy of about \$400,000 per boat.

Subsidies paid in support of access by distant-water fleets to foreign fisheries are troubling in a number of ways. Not only are they clearly subsidies under the terms of the 1994 WTO Subsidies Agreement, but they also effectively transfer excess fishing capacity from northern to southern waters and probably tend to undermine the economic and perhaps even the conservation interests of the coastal developing states. It is evident that, increasingly, both government officials and industry representatives in these developing countries are dissatisfied with these arrangements. The recent negotiations between the EU and Morocco and Mauritania were protracted

and bitter, and Japan refused to increase its payment to Kiribati from 5 to 6 percent, leading to abrogation of the agreement in early 1997.⁷⁴

Increasingly, it appears that the developing countries are questioning the fundamental equity of these arrangements. Just one striking example is the recent decision of Papua New Guinea to terminate its 40-year policy of giving tuna fishing licenses to foreign longline vessels after it decided that the revenues generated by foreign license and access fees were far below an optimum level.⁷⁵

In other words, the issue of foreign access subsidies must be situated in the larger context of the efforts by the coastal states to develop and manage their own fisheries resources. It is fairly clear that one unique feature of fisheries sector subsidies is the simple fact that their effects are not confined

⁷⁴ See, for example, the complaints voiced by Argentine government and industry over the terms of the fisheries agreement with the EU. Department of Commerce, NOAA, National Marine Fisheries Service, "Argentine-European Union Fisheries Agreement," IFR 94/108. This agreement went into effect in 1995, providing for deployment of up to 70, mostly Spanish, vessels in Argentine waters with rights to take as much as 250,000 tons annually of fish and squid. The report mentions that these allocations to EU vessels include species already heavily fished by Argentine fishermen and observes that, even with the financial support of Brussels, the Spanish vessels may not be able to operate profitably Argentina.

⁷⁵ It has even been reported that a study commissioned by Papua New Guinea concluded that the export earnings of a single domestic vessel exceeded the net revenues from licenses and access fees for 130 foreign boats. "P.N.G. Ends Licensing Program", *Tuna Newsletter*, August 1996, p.7.

to waters under the jurisdiction of the country that provides the subsidy. Instead, subsidies in this sector have manifest "spillover" effects, and foreign access payments are probably the best example.

Based on information available on EU, Japanese, Chinese, and U.S. foreign access payments, it is obvious that this category of fisheries subsidies must total at least \$0.5 billion annually, and, if we had better data on other economies, especially Taiwan, China, and the Republic of Korea, the total could easily be as high as or higher than \$0.750 billion.

If these aggregate levels of foreign access payments seem modest, it must be recalled that foreign fishing (by vessels of nation A in the zone of nation B) has declined significantly in the years after the worldwide move to extended jurisdiction. Currently, global distant-water catches total only about 5 million tons, roughly 6 percent of all marine fishery harvests.⁷⁶ In other words, if all fishermen, domestic and foreign, paid fees at these rates, the world total would be about \$8 billion.⁷⁷

In addition, there are other forms of assistance to distant-water fleets that are hard in some cases to quantify. These include the use of "tied foreign fisheries assistance"; agreements to provide aid in kind (such as commitments to land specific

shares of harvests in local ports, to provide training, etc.); programs that provide financial incentives to sell or lease fishing vessels to developing countries; and others. The EU, for example, also administers several "trade-for-access" arrangements in which countries that provide fishing allocations in their waters to EU vessels obtain in return preferential access to the EU market for various fish products.⁷⁸

Therefore, we will give the following rough estimates of budgeted foreign, or distant-water, subsidies: low; \$0.5 billion, and high; \$1.0 billion.

UNBUDGETED SUBSIDIES

A more difficult part of this exercise is estimating subsidies that are not identified in fisheries agency budgets but are the responsibility of other agencies or are, by their nature, unbudgeted or underbudgeted. Two types of subsidy that fall into this category are subsidized lending and tax preferences.

In discussing these categories of subsidies, we are compelled to use anecdotal information and certain reasonable assumptions. The absence of adequate information on the extent, scope, and economic impacts of capital cost and fiscal subsidies in fisheries is a serious problem. It

⁷⁶ FAO Yearbook. *Fishery Statistics: Catches and Landings*, vol. 78 (1994) (Rome: FAO, 1996), p. xviii.

⁷⁷ See Chapter VIII [on resource rent subsidies] for a discussion of user fees charged to domestic fishermen.

⁷⁸ A fascinating question is whether the EU's trade-for-access agreements should be treated as subsidies. The argument could be made that these trade concessions qualify as "forgone government revenue." However, the issue has not been resolved, and, therefore, we do not explicitly treat these arrangements as subsidies in this study and did not include them in our calculations.

is entirely possible, in fact, that subsidized loans and tax preferences are collectively the major form of financial assistance in this sector. In some countries, these unbudgeted subsidies are almost certainly more important than the budgeted programs reviewed in the previous two chapters.

These general comments are borne out by trade investigations and reports prepared by international organizations. In a 1991 countervailing duty and antidumping case brought by U.S. East Coast salmon farmers against the Norwegian Atlantic salmon aquaculture industry, the U.S. International Trade Commission and Department of Commerce concluded that most of the Norwegian government subsidies were in this category, including regional development loans, national fisheries bank loans, capital tax incentives, payroll tax preferences, and accelerated depreciation allowances.⁷⁹ In developing countries, where government agencies responsible for fisheries generally have modest budgets, it appears that the lion's share of subsidies is provided in the forms of subsidized loans and tax breaks.⁸⁰

Lacking sufficient country-specific information, we will turn to the global estimates developed in 1993 by FAO. These

⁷⁹ U.S. International Trade Commission, *Fresh and Chilled Atlantic Salmon from Norway* (hereinafter cited as ITC, *Salmon from Norway*), Investigation No. 701-TA-302, USITC Publication 2371 (April 1991), at B-28.

⁸⁰ This general observation is suggested by a recent FAO study of this issue: David Insull and J. Orzeszko, *A Survey of External Assistance to the Fishery Sectors of Developing Countries* (Rome: FAO Fisheries Circular No. 755, 1991).

estimates of industry's operating and capital costs, and revenues may serve as an introduction to this issue. In its projections of gross costs and revenues in world fisheries, FAO suggested the following breakout of costs:

Table 7.

Estimated Costs in World Fisheries -- US\$ Billions --	
Maintenance and repairs	\$30.207
Supplies and gear	18.506
Insurance	7.193
Fuel	13.685
Labor	22.587
Capital	31.900
TOTAL COSTS	124.078
TOTAL REVENUES	70.000

Source: FAO, *Marine Fisheries and the Law of the Sea: A Decade of Change* (1993)

Subsidized Lending

The first broad category of unbudgeted fisheries sector subsidies is what we generally call subsidized lending. These programs are frequently not adequately budgeted in the accounts of the administering agency. In addition, even if budget lines for loan and loan guarantee programs are included in the accounts of a fisheries agency, the full cost to the government may not be given, or it may be expressed at the relatively low level of the program's basic administrative costs. Hence, subsidized lending is, for our purposes, an unbudgeted or underbudgeted subsidy.

The most common forms of subsidized lending are government-funded reduced interest rates, and loan guarantees. However, based on available information, subsidized lending may also involve more

than these two programs. Some governments may, for example, be willing to commit significant resources to collaboration with industry when they want to refinance their loans. More telling, they may be willing to help industry reschedule or restructure their loans in times of economic stress, and they may even let it be known that, as a last resort, they may forgive government loans.

What are the full costs to government of subsidized lending in fisheries? Clearly, we do not know unless we understand how the government raises money, whether the government is financing a lower-than-market interest rate and what those costs are, how frequently a Government has to make good on bad loans that it has guaranteed, what the lost opportunity costs are, what is the "time value" of lendable funds, and so forth. However one estimates all these costs, they must be considerable.

Capital costs in this industry are of critical significance, since the participants consist for the most part of borrowers with modest financial resources. In developing countries, capital costs in fisheries are probably even more significant.

Information suggests that a large share of the loans for the construction, modernization, and repair of fishing vessels may have been made on terms that have little relationship with normal commercial banking arrangements. This is certainly true of China, the former Soviet Union, and other East European countries with state-owned and -managed fishing industries, but it may also be true -- to some hard-to-determine degree -- of Japan, which has the largest

fishing industry among the market-based industrial countries.

Japan is an interesting example of the use and impacts of subsidized lending in the fisheries sector. In fact, various financing programs constitute an important element in the FAJ's budget. Under this category, we include a number of reduced interest rate and loan guarantee programs, as follows:

Table 8.

FAJ Subsidized Loan Programs -- U.S. \$ billions --	
Program	Loan ceiling
Fisheries modernization	\$1.145
Fisheries management	.920
Improvement promotion	
MAFF finance corporation	.600
Production/marketing	.370
Fisheries management	.275
Reconstruction	
Fisheries maintenance stability	.200
International regulatory	.120
Strengthening fisheries	.090
Management	
TOTAL	\$3.720

Source: U.S. Embassy, Tokyo, September 30, 1996

In summary, the FAJ maintains portfolios of reduced rate and government-guaranteed loans, categorized by the FAJ as "measures for the fisheries industry," that have an aggregate face value of \$3.7 billion. The rates charged by the FAJ are clearly below market, and, in late 1996, were further reduced to 3 percent.

Subsidized financing for the fishing industry is provided by a variety of banking institutions and usually through the numerous fishery cooperatives all over Japan. The large number and variety of wholly and partially government-funded financial entities in Japan that are involved

in providing capital to the fishing industry make it extremely difficult to generalize

about these operations. A 1991 U.S. Government-funded study listed about a dozen finance corporations, industrial and fishing sector banks, foundations, development corporations, and credit banks.

To make matters even more confusing, some of the above entities are strictly governmental, others are quasi-public, while still others were public bodies but evolved as commercial operations.

In the five other countries reviewed in the case studies, subsidized lending is common:

In the United States, a loan guarantee program, the Fisheries Obligation Guarantee [FOG] Program (recently renamed the Fisheries Finance Program), provides a federal guarantee for private long-term debt that finances or refinances the construction, reconstruction, and reconditioning of fishing vessels and shoreside facilities. New guarantees in 1995 totaled \$25 million, and the outstanding loan portfolio reached \$200 million. It is critical to note that in response to growing concerns about levels of capitalization in U.S. fisheries, this program was redirected in the late 1980s, and, currently, the new financings are mainly for shoreside operations, including aquaculture and processing. Fishing vessel financings and refinancings under the FOG went mostly to already existing boats.

In the EU, some of the member states provide loan guarantees to their fishing

industries, although we have no detailed information about these programs.⁸¹

In China, during one five-year plan (1986-1990), the state invested heavily in the fisheries products sector. The government's Agricultural Bank of China made loans to the fishing industry that totaled \$4 billion, or an average of \$800 million per year, a sixfold increase from the previous plan (1981-1985).⁸² It is worth noting that this bank publicized plans in 1991 to provide the bulk of its loans to state and "collective" fishing enterprises in the next plan period (1991-1995).

In Russia, it has been reported that massive loan guarantees will almost certainly be one means that the government will use to rebuild the devastated Russian fishing fleet.

In Norway, the government subsidizes the construction and rebuilding of fishing vessels through a National Fishery Bank program that was capped at 350 million Norwegian krona (approximately \$50 million) in 1993.

In developing countries, where fishing enterprises tend to be small and short of capital, subsidized lending plays an even greater role. At a symposium convened by FAO in Manila on institutional credit arrangements in the fisheries sector in the Asian area, case reports presented by banking officials from India, Bangladesh,

⁸¹ Eric Fleury, "The European Common Fisheries Policy and its Consequences on Fishing Dependent Regions" (Brussels: June 1993) p. 4.

⁸² People's Republic of China; Xinhua News Agency; "Bank Provides Huge Loans to Fishery Industry," July 7, 1991.

illustrated vividly the importance to the fishing industries of subsidized credit. While these arrangements vary from country to country, it nonetheless generally appears that:

- the private banking industries exhibit a continued reluctance to provide credit to the fisheries sector;
- a large share of credit is given by government banks, frequently institutions whose primary function is to finance agricultural and rural economic development; and
- collection problems are common, but foreclosures less so, given the difficulty of disposing of repossessed fishing industry assets (boats).⁸³

There are other examples of the significant role of subsidized lending in the fishing industries of other countries.

Mexico, for example, intends to renew and expand its aging shrimp fleets, and plans to refurbish 700 vessels and purchase 600 new ones at an estimated total cost of \$280 million. The mortgages will be financed by support from the Export-Import Bank of Mexico and a Bank of Mexico trust fund. Other financial intermediaries and sources are expected to step in and help industry with these capital costs. It has even been suggested that, through complex trade arrangements, the Mexican government may

⁸³ FAO, Fisheries Report No. 540, *Regional Consultation on Institutional Credit for Sustainable Fish Marketing, Capture, and Management in Asia and the Pacific* (hereinafter cited as FAO, *Regional Consultation on Institutional Credit*), July 3-7, 1995.

be willing to authorize "in-kind" transactions in which Mexico exports steel and imports shrimp boats.⁸⁴

The government of Vietnam is building a modern fishing fleet with large doses of Vietnamese government, foreign, and other international capital. Currently, Vietnam is building over 100 reasonably large vessels, many of them financed by Spanish and Danish loans. Vietnamese government loans are being offered at about 8 percent.⁸⁵

Prospectively, their plans are even more ambitious. Vietnam will expand its shrimp and high-seas tuna fisheries in a major 300-vessel fleet acquisition program that will require, according to an Asian Development Bank study, \$600 million of investments annually for the next five years, for a total of \$3 billion.

The above are just a few examples of subsidized lending in both the six countries reviewed in the case studies and selected developing countries. Global estimates are practically impossible, but if Japan alone services a portfolio of almost \$4 billion of reduced interest rate loans and loan guarantees, certainly the world total must be considerable.

Another way to get a better idea of the global scope of these programs would be to look at the FAO's 1993 figures on costs. Three items in those estimates stand out: first, capital costs (\$31.9 billion), second, supplies and gear (\$18.5 billion), and, third, maintenance and repairs (\$30.2 billion).

⁸⁴ U.S. Embassy, Mexico City, August 14, 1996.

⁸⁵ *INFOFISH Trade News*, September 16, 1996.

These three items total almost \$80 billion, and a good deal of this total is probably financed. To be conservative, we shall assume that the FAO figures are on the high side and that some share is paid for out of current revenues rather than from borrowed capital, and we will revise the \$80 billion figure sharply downward to, say, \$50 billion.

What is the subsidization level? Of reduced interest rates? Of the longer maturities associated with government-guaranteed loans? Of the financial benefits that result from government-assisted refinancings? Of the forgiven loans? Of the loans that could not be obtained on any terms from private sources?

If the total economic benefits to the recipients of all forms of subsidized lending amount to just 10 percent of all the loans (whose annual payments we place at \$50 billion), the aggregate impact would be \$5 billion.

Most important is the fact that subsidized lending contributes directly to lower operating and capital costs, and therefore substantially aggravates the overfishing and overcapacity problems that are so common in the fisheries of both industrial and developing countries.⁸⁶

⁸⁶ Just one of many examples: At the 1995 FAO-organized conference on credit arrangements for the fisheries sector in southeast Asia, it was reported with respect to Sri Lanka that "in the past some credit programs for in-shore fishing craft which were linked to capital subsidies have contributed to the full and sometimes overexploitation of coastal aquatic resources in western and southern Sri Lanka" U. Tietze, "Adaptation of National Credit Programs to Fishery Management Requirements -- A Case Study

Tax Preferences

The second category of unbudgeted subsidies is tax preferences. Many countries have tax preference programs that benefit the fishing industry, but in most cases these programs are the responsibility of the government agency in charge of fiscal matters, frequently a finance ministry. Moreover, there are so many different types of taxes and tax rates that, even under ideal circumstances, accurate assessments and comparisons are inherently difficult.⁸⁷ Finally, even if these types of programs are listed in fisheries agency budgets, the information therein usually does not fully clarify the programs' costs.

In the fisheries sector, we have ample evidence that three broad types of tax preferences are widely used: exemptions from fuel taxes; accelerated depreciation of capital assets, [i.e., the boats]; and deferral of income taxes.

The most common type of tax benefit in fisheries appears to be fuel tax exemptions. These preferences are available to fishermen in the United States; Taiwan, China; Japan; Russia; and, at least until the early 1990s,

from Sri Lanka," in FAO, *Regional Consultation on Institutional Credit*, p.108.

⁸⁷ In the recent U.S. trade case involving the Norwegian salmon aquaculture industry, the U.S. investigators made the following revealing admission: "It was not possible, given the number of producers in Norway, to obtain the total amount of tax benefits provided to all Norwegian salmon producers." To correct this problem, the U.S. investigators had to ask the government of Norway to conduct a survey. Cited in: ITC, *Salmon from Norway*, at B-29.

Australia and Canada.⁸⁸ In the United States and Taiwan, China, alone, the lost revenues have been estimated at roughly \$250 million and \$130 million respectively.⁸⁹

For other countries, this writer found little useful information. However, in Japan the evidence is revealing. In Japanese longline fisheries for tuna and billfish in Australian waters alone, 250 participating longline vessels benefited from a \$0.25/liter diesel fuel rebate that totaled \$91 million in 1996.⁹⁰ If these three examples of fuel tax exemptions amount to almost \$600 million, the world total is almost certainly considerably higher.

Obviously, fuel tax exemptions in fisheries are environmentally harmful in at least two ways, since they contribute to overuse of the resource and are inconsistent with energy conservation

Even more complicated are the programs that provide fishermen with relief from income taxes.

As one example, in the United States, there is an income tax deferral program (Capital Construction Fund). The CCF program allows fishing vessel owners to defer federal

income taxes on fishing vessel income if that income is set aside in a CCF account, to be used on future construction, reconstruction, and acquisition costs. Deferred taxes are recaptured through reduced future depreciation allowances. In 1994, participants deposited \$80 million in taxable income in CCF accounts and withdrew almost \$94 million. There are currently about 4,300 active CCF accounts, and total deposits in CCF accounts are about \$240 million. The CCF program currently allows withdrawals only for investments in fishing vessels.

There is no doubt that tax benefits provided under the CCF program have contributed, however modestly, to expansion of capacity in some of the most distressed U.S. fisheries. An example is the Northeast region, where these tax preferences have been made available to vessels in the groundfish and scallop fisheries during a period when these resources were already overfished.⁹¹

Unfortunately, virtually no hard information was obtained on income tax preference programs in the fisheries sector in other countries. On the other hand, anecdotal evidence suggests that both legal tax preferences and illegal tax avoidance are widespread in this sector.

⁸⁸ OECD, Committee for Fisheries, *Study on Economic Assistance to the Fishing Industry: General Survey and Country Chapters* (Paris: OECD, 1991), p. 4.

⁸⁹ Peter Weber, *Net Loss: Fish, Jobs and the Marine Environment* (Washington, D.C.: Worldwatch Paper 120, 1994), pp. 29-30.

⁹⁰ "Japanese Fishermen Net Fuel Subsidies," *Forum Fisheries Agency News Digest*, January-February 1997, p.8.

⁹¹ In addition, CCF tax benefits in the groundfish and scallop fisheries generally went to operators of the newer, larger, better-equipped, and harder-fishing boats, the so-called highliners. Amy B. Gautam and Andrew W. Kitts, *Data Description and Statistical Summary of the 1983-92 Cost-Earnings Data Base for Northeast U.S. Commercial Fishing Vessels*, NOAA Technical Memorandum NMFS-NE-112 (December 1996), pp. 2 and 5.

It may be noted that FAO's suggestion that apparent costs exceed revenues by such a wide margin (\$54 billion) would lead us to believe that relatively few fishermen make profits and owe taxes. However, for reasons that we need not enumerate here, we suspect that the fishing industry is and always has been characterized by underreporting of revenues and overreporting of costs. In the United States and Japan, the available evidence seems to indicate that a good number of fishermen continue to operate profitably or did until quite recently.

In conclusion, it has to be assumed that fuel tax exemptions clearly reduce costs, and income tax subsidies serve some purpose for the recipients, and that, generally, they have the effect of mitigating tax liability. We will net these fisheries tax preferences, we believe conservatively, at \$1.0 billion,

Even more fundamentally, what are the costs to government and benefits to industry of these tax preferences? To respond, we would have to know how much current revenue is lost, what are the opportunity costs, the "time" value of the lost revenue, and so forth. We cannot answer these questions. At the same time, we strongly suspect that the practical effect of these programs is to make available more private financial resources for investments in fishing vessels.

In summary, our estimates of unbudgeted subsidies are \$5 billion of subsidized lending and \$1 billion of tax subsidies, for an aggregate level of \$6 billion. However, these estimates may underreport somewhat the scope of these subsidies in developing countries. Therefore, we will express our estimates of unbudgeted subsidies in

fisheries in the following range: low; \$6 billion, and high; \$7 billion.

CROSS-SECTORAL SUBSIDIES

One conclusion of this study of subsidies in fisheries is that, to grasp their full scope, we need to look at cross-sectoral linkages. Therefore, this section examines subsidies that are not provided directly to fishermen, but indirectly benefit them and tend to stimulate fishing effort and capacity. Two types of subsidy that fit this category are aids to shipbuilding and aids to fisheries infrastructure, in particular, fishing ports.

The first of these cross-sectoral, or "indirect," subsidies is aid to shipbuilding, whose relevance to levels of fishing effort and capacity is obvious. This type of subsidy is implemented in two distinct ways and is therefore treated twice in this paper. Subsidies to shipbuilding that are provided directly to the buyers, i.e., fishermen, of fishing vessels, usually in the form of loans, loan guarantees, and tax preferences, are treated in the previous section under capital costs and taxes. However, shipbuilding subsidies are also provided directly to the shipyards, and some share of these benefits pass through to the buyers. It is this second category that we are dealing with in this section.

The second cross-sectoral indirect subsidy is infrastructure. This category is harder to assess with precision and confidence. Obviously, we are concerned with infrastructure spending that is intended largely or exclusively to benefit fishermen, that clearly "targets" the fisheries sector and is therefore "specific" under the terms of the

WTO Agreement and, conversely, should not be treated as "general infrastructure." Infrastructure is probably the most complicated and poorly defined category of fisheries sector subsidies.

Aid to Shipbuilding

Shipbuilding is among the most heavily subsidized industrial sectors in the world. A recent OECD survey listed the following economic sectors in which "ongoing support ... remains prominent ... textiles and clothing, wood and furniture, shipbuilding, steel, motor vehicles, and information technologies."⁹² Not surprisingly, many of the world's leading shipbuilding countries are also (or were until recently) leading fishing powers: Japan, the Republic of Korea, Spain, Germany, and Poland. Nor is it an accident that a disproportionately large share of the world's existing distant-water trawlers were built in these countries.

Circumstantial evidence supports the inference that subsidies provided to shipbuilders are substantial. A casual glance at shipbuilding subsidies in some of the countries reviewed in our case studies is revealing:⁹³

France

- Investment subsidies for operating companies;

⁹² OECD, *Industrial Policy in OECD Countries: Annual Review 1994* (Paris: OECD, 1994) p. 8.

⁹³ This material is taken from a U.S. Government compilation of shipbuilding subsidies: U.S. Department of Transportation, Maritime Administration, *Maritime Subsidies* (Washington: GPO, 1993).

- construction subsidies;
- vessel export credits;
- tax benefits and depreciation for shipyards; and
- grants for research and development.

Italy

- State-owned shipbuilding companies;
- construction subsidies;
- vessel export credits; and
- exemption of all vessels from value-added tax.

Japan

- Operating and construction subsidies;
- export credits;
- export credit insurance;
- maritime credit; and
- research and development.

Norway

- Vessel construction loans;
- loan guarantees to shipyards; and
- research and development.

Spain

- Construction subsidies;
- reduced interest rate loans to shipyards;
- vessel export credits;
- vessel insurance;
- tax exemptions for exported vessels; and
- government ownership.

Unfortunately, we are unable to determine the degree to which these subsidies to shipbuilders effectively subsidize the construction and repair of fishing vessels, as opposed to the other maritime sectors.

Therefore, the fundamental and thus far unanswered question is how subsidies to shipyards influence investment decisions in the fishing industry. At this point, we can only offer rough approximations.

One way to approach this issue is to look at a recent profile of world fishing fleets.⁹⁴

Fishing vessels over 100 gross registered tons totaled 23,515 vessels and 11.2 million gross tons in 1994. As one would expect, fishing vessels are among the smallest vessel types monitored by Lloyd's, but there are many of them. Thus, almost half (11,159) of all fishing vessels were between 100 and 199 tons, the smallest size category in the Lloyd's data. In fact, fishing vessels constitute only about 3 percent of world tonnage of all types of vessels monitored by Lloyd's but almost 30 percent of the total number of bottoms.

Table 9.

World Fishing Fleet Gross Tonnage Categories			
Gross tonnage	No.	Total tonnage	Average age
100-199	11,159	1,560,229	18
200-499	7,827	2,523,313	18
500-999	2,223	1,538,517	18
1,000-1,599	659	835,055	17
1,600-1,999	295	549,442	11
2,000-2,999	816	1,976,136	19
3,000-3,999	344	1,157,289	16
4,000-4,999	117	516,790	11
5,000-5,999	12	65,159	16
6,000-6,999	11	69,652	12
7,000-7,999	50	387,306	3
8,000-8,999	1	8,289	0
9,000-9,999	1	9,814	7
TOTAL	23,515	11,196,991	18

Source: Lloyd's of London

Even more interesting is the fishing fleet's age profile:

Table 10.

World Fishing Fleets Age Profile		
Age category (years)	No.	Gross tonnage
0-4	2,313	1,398,872
5-9	3,196	1,717,893
10-14	3,662	1,703,600
15-19	4,240	2,089,768
20-24	4,443	2,017,524
25+	5,671	2,269,334

Source: Lloyd's of London

Lloyd's gives the average age of world fishing fleets at 18 years, roughly the reasonable useful life of a fishing vessel.⁹⁵ Since the data used by Lloyd's are three years old and new construction in recent years has fallen off, the average age of the

⁹⁴ The information in this discussion of fishing fleets is taken from: Lloyd's Register of Shipping, *World Fleet Statistics* (as of December 31, 1993), (London: 1994).

⁹⁵ In fact, the U.S. trade investigating agencies, USITC and Commerce/ITA, have used 18 years as the average useful life of a fishing vessel.

world fishing fleets is now probably closer to 20 years. Although the smaller vessels tend to be the oldest, vessels in most size categories are fairly old. In fact, more than 18,000 of the total are more than 10 years old. Of special note is the substantial number -- more than 10,000 -- that are 20 years and older.⁹⁶

Two broad conclusions seem to follow from this profile of an aging world fishing fleet. First, in the years to come, world fishing fleets will require considerable repair and maintenance; second, this aging fishing fleet will fairly soon have to be replaced with new construction, upgrades, or conversions of other vessels.

In a fundamental sense, we may be at a critical turning point with respect to capital cost subsidies in the fisheries sector. If these subsidies remain out of control, the aging fleet will be replaced by newer, more powerful vessels and the conservation problem will get worse. If, on the other hand, subsidized lending and tax preferences and subsidies provided to shipbuilders are restrained, excess capacity may be significantly reduced in the near future.

⁹⁶ The Lloyd's information on the age structure of fishing fleets is intriguing in another way. Does it suggest that the excess capacity problem in world fisheries actually peaked about a decade ago? Recall that world fisheries harvests hit a high in 1989 and subsequently declined modestly. (The 1994 "spike" to 109 million tons appears to be an anomaly, because of sharp increases in catches of pelagics in a few countries.) Only in the early 1990s did FAO formally take note of the urgency of the situation. Thereafter, the "excess capacity" issue was featured front and center in the Code of Conduct for Responsible Fisheries, which was negotiated in 1994 and 1995.

With this background in mind, we may then turn back to FAO's 1993 analysis, where it is estimated that the world fishing fleet has a replacement value at \$320 billion. This estimate has been criticized as too high, and to accommodate these criticisms, we will use a significantly lower value, say, \$200 billion.⁹⁷ Based on a 20-year useful life for the average fishing vessel, this works out to \$10 billion in annual new construction. Next, we will assume that the average level of subsidization in shipbuilding is about 20 percent.⁹⁸

The above approach yields net shipbuilding subsidies of \$2 billion that benefit the fisheries sector. However, as indicated above, this section deals solely with subsidies provided to shipbuilders that are passed on to fishermen. Since we do not know how to allocate these subsidies to the two categories, we will divide them evenly.⁹⁹ Thus, we are left with \$1 billion in

⁹⁷ It is interesting to note the admittedly anecdotal evidence that, in a recent U.S. government-financed fishing vessel buyout program, the buyouts averaged between 50 and 75 percent of the vessels' annual gross revenues. The fisheries in question (U.S. New England scallop and groundfish) are seriously stressed, but the general impression remains that the "true", i.e., market, value of the world's fishing fleets, is well below the replacement cost.

⁹⁸ A modest estimate for an industry sector that OECD rates as one of the most heavily subsidized.

⁹⁹ Anecdotal evidence indicates that some share of subsidies provided to shipbuilders is "passed on" to fishermen who buy the boats. In the U.S. Pacific Northwest fisheries, for example, Norway provided generous subsidies in the 1980s to its shipyards to refurbish vessels for use as factory trawlers in Alaskan waters. Recently, the owners of two of these factory trawlers had to pay a considerably higher tax bill when the IRS ruled that the subsidies -- in this case, \$1.75 million -- constituted taxable income. *World Fishing*, April 1996, p. 4.

aid to shipyards that benefits the fisheries sector.

There is additional circumstantial evidence that suggests that the fisheries component of shipbuilding subsidies must be considerable. This evidence is found in the OECD shipbuilding negotiations. Why, we may ask, did the negotiators of the recently failed OECD Shipbuilding Agreement spend so much time on fishing vessels, and, in particular, why did they explicitly exempt the fisheries sector from the disciplines of the agreement?¹⁰⁰ We suspect that one important motivation was to avoid the application of rules to a sector of the shipbuilding industry that is fraught with subsidies and other anticompetitive practices.

Infrastructure

Infrastructure, or public works spending, has been considered to be a legitimate and universal responsibility of governments, and, therefore, not reachable under trade law. Nevertheless, it is possible for spending in this area to be excessive, "targeted," and to confer trade benefits. This may be inferred from the definition of subsidies in the 1994 Subsidies Agreement, which exempts, i.e., permits, "general infrastructure" in Article 1.1 (a) (iii). One would have to assume, then, that some public works projects may be sufficiently targeted to particular firms or industries that they may qualify as "specific" subsidies.

¹⁰⁰ Article 2 (Scope of the Agreement) of the OECD Shipbuilding Agreement excludes "fishing vessels destined for the building or repairing Party's fishing fleet."

Therefore, the 1994 Subsidies Agreement seems to say, however implicitly, that infrastructure spending may be considered an actionable subsidy if the program is "specific," as opposed to "general," and is made available to commercial users at less than prevailing market costs.

However, the key word is "general," and the fundamental problem remains: What would be considered specific or targeted, as opposed to a general, infrastructure in fisheries? Past GATT panel reports and case law do not shed a great deal of light on precisely how to distinguish between permissible, general infrastructure and impermissible, specific projects.¹⁰¹ Nevertheless, Article 2 of the 1994 Subsidies Agreement discusses "specificity" in detail, and we have to assume that there are specific and general infrastructure programs in fisheries, as well as in any other sector. Accordingly, a specific program would target an "enterprise, or industry, or group of enterprises or industries," and general infrastructure benefits the public at large (e.g., through the building of roads, dams, and bridges) and includes those projects that are generally thought to be the responsibility of governments.

According to trade experts, this distinction depends in large part on the following questions: Does the private sector normally pay for this type of infrastructure? Does the specific infrastructure project clearly benefit

¹⁰¹ U.S. trade experts have explained that "infrastructure" is one of the least clearly defined categories of subsidies in the 1994 Subsidies Agreement. So much so, in fact, that one suggested that an actionable public works program would probably have to clearly target a single or just a few firms.

one firm, a few firms, or one industry sector in a well-defined region? Is the infrastructure program extraordinarily generous on the government's part? etc.

Analysis of fisheries sector infrastructure subsidies is hampered by a lack of budget information. In most countries, the bulk of fisheries infrastructure spending is not handled by the fisheries agency, but by other government agencies or by local authorities. In the United States, for example, the Army Corps of Engineers and local government entities are primarily responsible for port moorage, dredging, and building wharves.

Nevertheless, it is evident that governments spend enormous sums in a number of ways that we may collectively characterize as "fisheries infrastructure." Japan, for instance, spends two-thirds, or almost \$2.5 billion, of its fisheries agency budget on "public expenditures," i.e., infrastructure. In Japan's FY 1996 budget, these "public expenditures" are broken out as follows:

Table 11.

Billions of U.S. dollars	
Fishing ports and villages	2.013 billion
Coastal fishing ground development	0.295 billion
Shoreline preservation	0.162 billion
Disaster rehabilitation	0.004 billion

Source: U.S. Embassy, Tokyo, September 30, 1996

However, other elements in the FAJ budget could possibly be treated as targeted infrastructure, and therefore subsidies, but given the lack of information on how FAJ funds are spent under specific budget lines, we are unable to make that determination with confidence. FAJ budget lines include items such as

- Preservation of fishing ground environment;
- preserving ecosystems;
- rational utilization of the surface of the sea;
- coastal fisheries structural improvement;
- revitalization of fishing villages.

In the EU, as noted in Chapter IV, almost \$40 million of the fisheries budget was spent on "port facilities," but this certainly represents only a small share of total funding by all EU and member state agencies on fishing ports.

In developing countries, national and local government bodies probably provide most of the funding for fisheries infrastructure. In Sri Lanka, for example, a recent five-year Fisheries Development Plan allocates fully one-third of all projected fisheries spending during the period 1995-1999 to infrastructure.¹⁰²

In summary, if Japan spends more than \$2 billion annually on fisheries sector infrastructure, chiefly fishing port development, what is a reasonable estimate for the world? While we do not know the answer to this question, a conservative guess is \$10 billion.¹⁰³

¹⁰² U. Tietze, "Adaptation of National Credit Programs to Fisheries Management Requirements -- A Case Study of Sri Lanka," p. 113.

¹⁰³ Extremely conservative indeed, according to one expert at an international lending organization. However, the absence of solid information for any country other than Japan and the ambiguity of GATT trade law both argue for a cautious and prudent handling of this issue.

Then we would have to ask what share of this infrastructure spending qualifies as specific and targeted, rather than general, and what subset of that specific share has the effect of stimulating fishing effort and capacity. This last question points to a fundamental problem, which is a yawning gap between trade law and the dictates of conservation, at least in fisheries. To be more precise, it would appear that under the 1994 Subsidies Agreement, practically all public works programs fall under the "general infrastructure" category and are therefore permissible. But, at the same time, the bulk of government spending on fisheries sector infrastructure goes to the building and maintenance of fishing ports, a good share of which excessively stimulates effort.

Government spending on fishing ports has obvious effects on the levels and types of harvesting activities. Construction of new fishing ports opens up new fisheries, brings the boats closer to the resource, and reduces the costs of trips to and from the fishing grounds. Deepened ports permit the use of bigger and more powerful vessels. What's more, it appears, at least to some experts in fishery development projects, that the industry seldom pays more than a small fraction of the public's costs of running the ports, and usually no share at all of initial investment and maintenance costs.

All too frequently, then, decisions are made to build and modernize fishing ports mainly in response to pressures from sectors other than the fishing industry, typically the construction and engineering sectors, and the results of these decisions are new and modernized ports that are not cost-effective, and, oftentimes, are not necessary.

In brief, fisheries infrastructure may be an example of a category of subsidies concerning which trade and conservation standards differ significantly. Stated simply, there appears to be a willingness under trade procedures and agreements to give governments a wide latitude to spend in this broad category. Conversely, the tests under trade agreements and investigations for showing that infrastructure projects are specific and potentially confer unfair advantages are extremely difficult. On the other hand, conservation standards are more demanding. In fact, if we apply the precautionary approach to fisheries infrastructure, governments should probably refrain from many of these projects until and unless they can show that the likely environmental consequences are benign, or at least tolerable. To be more precise, if a natural resource (e.g., fish) is overused, governments should not invest in infrastructure projects that tend to encourage and facilitate further use of that resource.

Exercising considerable caution, then, we will use a \$10 billion estimate of annual global fisheries infrastructure spending and assume that 5 to 10 percent of all this spending qualifies as a subsidy that excessively promotes effort and capacity in this sector. This approach yields \$0.5 to \$1.0 billion of undesirable global fisheries infrastructure-related subsidies.

In conclusion, our discussion of what this study terms cross-sectoral subsidies yield the following rough estimates: aid to shipbuilders (\$1.0 billion) and infrastructure subsidies (\$0.5 to \$1.0 billion), and we net these two categories at \$1.5 to \$2.0 billion.

RESOURCE RENT SUBSIDIES

This study has until now focused exclusively on subsidies as they are explicitly defined in the 1994 WTO Subsidies Agreement. However, there is at least one other broad category of subsidies that is implicit, rather than explicit. This more hypothetical category is user fees, namely, the imposition of charges on users of publicly managed natural resources to better manage those resources and recover society's costs.

There is little doubt that consensus has existed for a long time among specialists in fisheries economics in favor of user fees as a legitimate and effective fisheries management tool.¹⁰⁴ There is even support for the general proposition that the higher the share of rents that accrue to governments to be used to cover management costs, the more likely the management regime will be able to effectively regulate levels of effort and capacity.¹⁰⁵ In theory, then, user fees are a practical management tool and generally tend to maximize long-term economic benefits.

¹⁰⁴ For example, Ivar E. Strand and Virgil J. Norton, "Some Advantages of Landings Taxes in Fishery Management," *Allocation of Fishery Resources*, Proceedings of an FAO-sponsored Technical Consultation in Vichy, France, April 20-23, 1980; pp. 411-416. Strand and Norton make the case that user fees present certain advantages as management measures, especially with respect to minimizing production costs, redirecting effort toward underutilized species, and maintaining competition among fishermen.

¹⁰⁵ For example, Thorolfur Matthiasson, "Why Fishing Fleets Tend to Be Too Big," *Marine Resource Economics*, 11, No.3, Fall 1996, pp. 173-9.

According to this model, most natural resources tend to be underpriced, and these lower-than-optimal costs lead to resource overuse. Environmental, or natural, resources are typically underpriced in two ways: through subsidies that reduce operating costs, and through market prices that generally reflect private costs while ignoring the social costs of suboptimal exploitation levels and collateral environmental damage.¹⁰⁶

Seen in this context, user fees in fisheries may be designed at a minimum to cover the costs of management. Most conservatively, these fees may be pegged at levels to pay the "immediate" costs to government of managing the resource. These costs would probably include three major elements: fisheries management, the supporting science, and enforcement.¹⁰⁷ More liberally, fees could be set to meet more ambitious goals, i.e., the recovery of society's "full costs," including costs associated with the impacts of fishing activities on resources other than the targeted species; costs associated with collateral environmental impacts; and, more generally, the cost to

¹⁰⁶ World Bank, *Five Years after Rio: Innovations in Environmental Policy*, p. 7.

¹⁰⁷ It is increasingly accepted that government payments of fishery management costs should be considered as economic assistance. Consider, for instance, the following statement in an OECD study on economic support to the fishing industry: "The costs of management should also be counted as assistance if they are not recovered from the industry in the form of fees or taxes... Stock assessment and enforcement of fishery regulations are main components of such control that potentially is a major benefit to the industry." OECD, Committee for Fisheries, *Economic Support of the Fishing Industry*, January 1991.

society of removing a resource in the present as opposed to in the future.¹⁰⁸

Just as important is the corollary. That is, if, for whatever reasons, governments do not achieve this cost recovery or make some reasonable progress toward that goal, that failure constitutes a subsidy. Simply put, the inability or unwillingness to levy adequate charges for the use of publicly managed resources is a "subsidy" as much as active interventions that directly distort costs and markets.

But how do we move from this ideal model to measures that may be treated in trade law as subsidies? It is suggested here that the most practical approach is to examine the evolving practice of governments and ask where that practice is leading us.

In the United States, publicly managed natural resources usually include some sort of charge for use or extraction. In this sense, fisheries is the exception rather than the rule.

As examples, fees are charged to domestic users of water resources, grasslands, forests, and offshore oil and gas reserves. As a general observation, most of the public discussion of these natural resource

extraction fees deals not with their legitimacy but with their effective level.

Fees charged for removing these other natural resources have gained legitimacy, not only as domestic policy instruments but as measures reachable under trade law. The general principle may be stated as follows: Once it is accepted that states should charge such fees, and, in fact, most of them do, then the failure of other states to conform domestic policies with international practice may be actionable. In other words, states that do not levy such fees or that charge unreasonably low fees are thereby conferring to their domestic industry an unfair advantage.

In the fisheries sector, the right of coastal states to levy fees on foreign fishermen operating in its 200-mile waters is well grounded in law and practice. The 1982 Convention on the Law of the Sea states, in addressing the "utilization of living marine resources," that

nationals of other States fishing in the exclusive economic zone shall comply with the conservation measures and with other terms and conditions established in the laws and regulations of the coastal State. These laws and regulations ... may relate, inter alia, to the following: (a) licensing of fishermen, fishing vessels and equipment, including payment of fees and other remuneration, which, in the case of developing coastal States, may consist of adequate compensation in the field of financing, equipment,

¹⁰⁸ See, for instance, the following statement in a recent World Bank study: "The general principle is increasingly accepted that the price of a resource (or charge for using environmental services) should reflect the marginal opportunity cost involved. The latter should incorporate the economic costs of production, depletion, and externalities, or, where relevant, trade opportunities foregone." Mohan Munasinghe and Wilfredo Cruz, *Economywide Policies and the Environment* (Washington, D.C.: World Bank, 1995), p. 47.

and technology relating to the fishing industry.¹⁰⁹

The above general principle, agreed to in 1982, long before the concerns about fisheries resource overuse and sustainability reached today's levels, seems to mean that fees levied by developed coastal states will probably be used primarily for conservation, while fees charged by developing coastal states may be used for conservation or for industry development.

During the last two decades, in the era of 200-mile EEZs, it has become common practice for coastal states to charge access payments to foreign distant-water fleets for the right to fish in the coastal states' waters. These access fees are for the most part levied by governments of fisheries resource-rich developing countries on the fleets of more developed countries and were discussed in Chapter V under foreign access payments. However, that discussion focussed on the fact that governments, and not the operators of the distant-water fleets, pay a large share of these fees and are therefore providing a subsidy to those fleet sectors. The rights of governments to levy these resource access fees were not questioned, and, as shown above, that right is firmly embedded in both international agreements and accepted practice.

In the United States, a "poundage fee" was charged to foreign fishermen, originally fixed at a rate of 3.5 percent of the

¹⁰⁹ United Nations Convention on the Law of the Sea (New York: United Nations, 1983). Interestingly, all 11 of the "responsibilities" of fishermen operating in foreign EEZs listed in Article 62.4 are essentially management-related.

somewhat arbitrarily determined ex-vessel value of the species harvested by the foreign boats. This method for computing foreign fishing fees was later modified, and the fees peaked at about \$40 million annually in the mid-1980s. Incidentally, these revenues were far below the "costs" to the U.S. government, however defined, of managing these fisheries. And naturally, with the phasing out of foreign fishing in the U.S. EEZ in the late 1980s, the fees were effectively eliminated.

Similarly, a large number of developing countries, mainly in Africa, provide access to their waters to European fishing vessels in exchange for fees, and these EU access payments totaled \$350 million in 1996. Many Pacific Island nations charge fees to foreign distant-water fleets for access to tuna fisheries. As just one example, Kiribati until recently levied a fee of 5 percent of the value of tuna harvests on Japanese tuna vessels.¹¹⁰

Therefore, most, indeed practically all, fishing fees have been and are still levied by governments of coastal states on foreign fishermen. In the context of subsidies, however, we need to examine fees charged by governments to their own fishermen. It is suggested here that governments will almost inevitably have to consider seriously the imposition of fees to domestic users of fish resources. The impetus to charge fees to domestic fishermen will most likely be driven by a number of factors: the desire to reduce overfishing and overcapacity, the need to recover some share of the mounting costs of fisheries management and

¹¹⁰ Forum Fisheries Agency, *News Digest*, Sept.-Oct. 1996.

enforcement, and a natural tendency to align fisheries more closely with policies on other natural resources.

Recent developments in the United States may serve as an interesting and useful case study of how the user fee issue is evolving.¹¹¹

In principle, the U.S. government's right to charge domestic fishermen user fees to recover some share of the costs of management seems logically unassailable. After all, the federal government's efforts to manage the fisheries in the 200-mile EEZ are expended mainly for the direct benefit of the fishermen. In most cases, the commercial users of these fisheries resources are a reasonably discrete and small group. Also, with increasing recourse to limited entry schemes, including individual transferable quotas [ITQs], license limitations, and license moratoria, participation in an ever increasing number of U.S. fisheries is restricted, and, therefore, the participants should pay for the privilege.

There are growing pressures to look at user charges as a potential means of paying for society's considerable investment in marine fisheries and improving resource management. In 1993, the U.S. federal agency responsible for marine fisheries, the National Marine Fisheries Service, was asked to consult with its constituencies and report on the user fee issue.

¹¹¹ This section is based heavily on trends and developments in U.S. fisheries for the simple reason that this writer has more information on the situation in the United States with respect to fishing fees, and not because this issue is in any way a uniquely U.S. problem. Indeed, the issue is a global one.

NMFS conducted such a study and recommended a package of fees, including: an annual 3 percent fee on the landed value of harvests shares in ITQs, a levy of 0.7 percent on the first sale of all domestically produced and imported fish, a separate levy to cover observer costs, and a license fee averaging \$500 for boats in the for-hire recreational fishing industry.¹¹² The package of proposed fees would have generated about \$75 million, approximately 2 percent of the total first-sale value of all U.S. fisheries (roughly \$3.5 billion).

However, resistance by industry to user fees is traditional. The Magnuson-Stevens Act, as recently amended, includes a strict limit on the use of fees, requiring that they "shall not exceed the administrative costs incurred in issuing the permits." At the same time, the law also allowed for exceptions to the "administrative costs" cap, enhancing the government's rights to levy fees on domestic fishermen for management purposes.

Under these amendments, the secretary of commerce:

is authorized (to) collect a fee (of 3 percent of landed value) to recover the actual costs directly related to the management and enforcement of any (i) individual fishing quota program; and (ii) community development quota program that allocates a percentage of the total allowable catch to such a program.¹¹³

¹¹² Office of the Chief Scientist of NMFS, User Fee Proposal, December 30, 1993.

¹¹³ Magnuson-Stevens Fishery Conservation and Management Act, (as amended through October 11,

The secretary may also apply user fees to help fund:

- an observer program in the North Pacific halibut fisheries, not to exceed 2 percent of ex-vessel values¹¹⁴, and
- a portion of Fishing Capacity Reduction Program needs, with fees of up to 5 percent of ex-vessel values.¹¹⁵

However, the full costs to the U.S. federal and state governments for managing its marine fish resources is more than \$0.5 billion annually, of which the largest share is enforcement.¹¹⁶ Thus, the recent changes in U.S. fisheries law are cautious first steps, and the federal and state fisheries agencies have a long way to go with "full cost recovery." To capture the full significance of these measures, we need to look at the longer term. This broader horizon is summarized in an observation included in a report on a recent FAO consultation:

1996); Public Law 94-265; 16 U.S.C. 1854; Section 304 (d).

¹¹⁴ 16 U.S.C 1862; Section 313 (B) (2).

¹¹⁵ 16 U.S.C. 1861 (a); Section 312 (d).

¹¹⁶ The latest amendments to the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1801) appropriate the following sums to carry out the obligations of the act: (1996): \$147 million; (1997): \$151 million; (1998): \$155 million; and (1999): \$159 million. In addition, the Coast Guard's 1997 annual report allocates 12.98 percent of its total operational budget of \$2.713 billion, or \$353 million, to "fisheries law enforcement." Therefore, federal fisheries management and enforcement costs are \$0.5 billion, and, if costs borne by the two dozen states are added, the total U.S. costs are probably about \$0.6 billion.

The total costs of fisheries management, in the absence of subsidies from other sectors of the economy, include the costs of research, statistics, surveillance, service to fishers, etc. It seems unlikely that many world fisheries are currently generating resources sufficient to support these functions where they exist, and hence the costs of coordinating research, data gathering, surveillance, etc. are often subsidized directly or indirectly. One explanation frequently offered, falling under the heading of the Tragedy of the Commons, is that where access to the resource is uncontrolled, the resource rent needed to ensure proper management is not being generated so that the total costs of fishing by all interested parties equals or exceeds revenues.¹¹⁷

Similarly, when OECD's Committee for Fisheries constituted an ad hoc experts group to examine economic assistance to the fishing industries, the analysts suggested a similar basic approach.¹¹⁸ Under "definitions of assistance," the OECD report includes the "lack of government intervention which constitutes an implicit subsidy to the use of the fish resource" and, later on, states authoritatively that

¹¹⁷ FAO, *Report of the Expert Consultation on Guidelines for Responsible Fisheries Management* (hereinafter cited as *FAO, Consultation on Responsible Fisheries Management*), at Wellington, New Zealand, January 23-27, 1995 (Rome: FAO Fisheries Report No. 519, 1995), p. 63.

¹¹⁸ OECD, Committee for Fisheries, *Economic Assistance to the Fishing Industry: Observations and Findings* (Paris: OECD, 1993).

If the management regime does not require fishermen to take into account the full social costs of the fish they harvest, then fishermen can be considered to be receiving an implicit subsidy on the use of the fish resources. This also applies when fishermen are provided access to foreign waters when the access fees are paid by the Government.

In conclusion, there does not appear to be much doubt in the minds of analysts employed by international organizations that resource pricing may constitute a subsidy.¹¹⁹ But how about the 1994 WTO Agreement?

During the Uruguay Round negotiations, the United States proposed that natural resource transfers should be nonactionable if the right to use the resource was obtained through a public auction and made available to all parties on the same terms. This proposal was probably crafted with the needs of the energy and mining sectors in mind, since it had no relevance to the fisheries sector. In fisheries, on the other hand, the Law of the Sea recognizes the rights of states to allocate preferentially to domestic users, and only if and when there is a surplus to the needs of domestic fishermen are coastal states obligated to give fishing rights to foreign flag vessels. Nor are domestic allocations of fishing rights conducted through an auction process.¹²⁰

¹¹⁹ In fairness, it must be noted that the OECD committee decided not to move forward with the economic assistance project.

¹²⁰ This point is developed in Christopher D. Stone, "The Maladies in Global Fisheries: Are Trade Laws Part of the Treatment?", to be published in *Ecology Law Quarterly*, Vol. 24, No. 2, (1997).

May we conclude, then, that, in the absence of adequate user charges, practically all transfers of publicly managed fishery resources to domestic commercial users are potentially actionable subsidies?

If we look again at the 1994 WTO Subsidies Agreement, the link between user fees and trade law appears to be in the definition of subsidies. With this approach, governments should set user fees at certain "adequate" levels, and failure to do so may legitimately be construed as a "subsidy." Using the above reasoning, we may treat a government's failure to charge its fishermen an adequate, or any, price for use of publicly managed fisheries resources as:

- "government revenue that is otherwise due" that is "forgone or not collected," Article 1.1 (a)(1)(ii), or
- as a provision of a (cost-free) service other than general infrastructure, Article 1.1 (a)(1)(iii).

Even before the completion of the Uruguay Round, this indeed was the conclusion reached by the United States in a case brought by its forest products industry against their Canadian competitors, the Canadian softwood lumber case.¹²¹ The original U.S. complaint was brought in 1986, temporarily resolved by a U.S.-Canada memorandum of understanding, and later taken up again and resolved in 1992. In the case concluded in 1992, the United States ruled that the Canadian government's

¹²¹ USITC, *Softwood Lumber from Canada*, Investigation No. 701-TA-312 (Final), USITC Publication 2530 (July 1992).

failure to charge its wood products industry an equitable market-based stumpage fee constituted a preference and therefore a subsidy.¹²²

The United States ruled, in fact, that the low stumpage fees charged by several Canadian provinces were responsible for a net subsidy of almost 3 percent, roughly half of the total Canadian softwood lumber subsidies.

Of course, it will be objected that forests and fish are vastly different resources, and that analogies between the two are crude and misleading. Nevertheless, what's critical at this early stage is the underlying principle. That is, failure by a government to charge adequate natural resource user fees is a subsidy that meets the 1994 WTO Subsidies Agreement's definitions and is reachable under domestic countervailing duty legislation.

¹²² *Final Affirmative Countervailing Duty Determination: Certain Softwood Lumber Products from Canada*, 57 Fed. Reg. 22570 (May 28, 1992) Report at Appendix A of *Ibid.* The Department of Commerce calculated the level of "preferentiality" according to the following basic procedure: The sale of government-managed "goods" confers a countervailable benefit when the price charged is less than, in order, (1) a nonselective benchmark price for the same good; (2) prices charged by government for a similar or related good; (3) prices charged by private sellers of the same good; (4) the government's costs of providing the good; and (5) prices charged for the same good in other jurisdictions. Applying the above methodology to fisheries, the fourth test (government's costs) could yield fascinating results. It is interesting to note that the Canadian respondents, in their critique of the methodology employed by Commerce to calculate the level of preferentiality, argued strongly that the "costs-to-government" approach was the most appropriate.

Even more powerful is the related basic principle that in the absence of private "benchmark" prices, the level of subsidy must be calculated on the basis of the government's costs. In fisheries, one could argue that the fee would have to be determined by reference to the costs of management incurred by governments.

In summary, we are suggesting that while this category of subsidies may not be explicitly addressed in the 1994 WTO Subsidies Agreement, it is compatible with it. More important is the slow but inexorable evolution of policies of individual states on fishing fees. Increasingly, fees charged to domestic fishermen for management purposes are accepted as correct in principle and as helpful, even necessary, tools of regulatory and economic policy.

Using the U.S. example, user fees in fisheries will probably be implemented gradually to deal with specifically defined management objectives. However, as this practice becomes increasingly common, the costs charged to fishermen as fees will become the rule, and, at some point, failure to charge a fair cost (or any cost) will qualify as a subsidy. Once it is accepted that failure to charge user fees is a subsidy, we must also ask about a reasonable level. If, for example, we use "the costs of management" as a guide, those costs are not fully transparent and probably vary markedly from coastal state to coastal state.

Information on the costs that various governments incur in managing fisheries is scanty.¹²³ In the United States, the total

¹²³ This is an area that needs to be researched.

costs to government amount to approximately 15 percent of gross revenues.¹²⁴ In Norway, it has been reported that the ratio of management costs to industry revenues is about 10 percent.¹²⁵ An Icelandic fishery economist observed in a professional journal that "a rough estimate is that the Icelandic Government spends as much, or more, on fisheries management as, for example, on the University of Iceland."¹²⁶ Two Australian fisheries consultants even offered the general comment that "few fisheries management agencies know, in any meaningful detail, the research, enforcement, and other management costs associated with each fishery under its authority."¹²⁷ Therefore, it should be no surprise that this writer was unable to determine whether or not these U.S. and Norwegian fisheries "cost/revenue" ratios are typical, and it is possible that ratios in other countries are higher or lower than in the United States and Norway.

Another approach is to examine user fees that are currently charged by governments to domestic and foreign fishermen. In most countries, fees are not charged to domestic fishermen, or if they are, the rates are extremely low. In Iceland, for example, a

country whose fishery policies are generally considered to be reasonably enlightened, fees were implemented in 1990 to cover the costs of monitoring and enforcing individual transferable quota regulations, but the law caps them at 0.2 percent of landed value.¹²⁸ As shown above, U.S. fisheries legislation authorizes fees for selected purposes in a range of 2 to 5 percent. Australia levies user charges on domestic fishermen operating in all Commonwealth fisheries according to a complex formula that works out to an average of about 2.5 percent of ex-vessel value.¹²⁹ Canada began to implement a system of fees charged to domestic fishermen in 1996, and while the rates are complicated, they average about 5 percent of ex-vessel values in fisheries managed with individual quotas.¹³⁰ Recently, an investor seeking approval of the Marshall Islands for a project to "pelletize" and enrich an area in their zone, offered to give 7 percent of the revenues from the enhanced fish harvests to the Marshall Islands.¹³¹ A number of West African States, including Equatorial Guinea, Guinea Bissau, Mauritania, Morocco, São Tomé and Príncipe, and Sierra Leone, have sought to collect fees amounting to 15 to 20

¹²⁴ Federal and state expenditures for management, science, and enforcement total about \$0.6 billion, and the U.S. commercial fishing industry's net ex-vessel revenues are \$3.8 billion in the last two years.

¹²⁵ Hannesson, "Fishery Management in Norway," p. 21.

¹²⁶ Thorolfur Matthiasson, "Why Fishing Fleets Tend to Be Too Big," *Marine Resource Economics*, Vol. 11, No.3 (Fall 1966), at footnote 3.

¹²⁷ Barry Kaufmann and Gerry Geen, "Cost-Recovery as a Fisheries Management Tool," *Marine Resource Economics*, Vol. 12, No. 1 (Spring 1997), p. 58.

¹²⁸ Ragnar Arnason, "Fishery Management in Iceland," in Eduardo A. Loayza (ed.), *Managing Fishery Resources*, p. 29.

¹²⁹ The Australian user fee system was implemented in 1991, and is intended to recover the government's full costs. Personal communication from Glenn Hurry, of the Australian government, June 10, 1997, during the meeting in Los Cabos, Mexico, of the APEC Fisheries Working Group.

¹³⁰ Barry Kaufmann and Gerry Geen, "Cost-Recovery as a Fisheries Management Tool," p. 61. The fees were forecast to generate C\$43 million in additional revenue, surely far short of the Canadian government's total fisheries management costs.

¹³¹ U.S. Embassy, Majuro (Marshall Islands), April 18, 1997.

percent of the value of the fish.¹³² At the other end of the range, Japan's salmon fishermen have agreed to fees for harvesting Russian-origin salmon in Japan's EEZ that amount to at least 30 percent of ex-vessel values.¹³³

To summarize, if one considers the entire spectrum of fishing fees applied to domestic and foreign fishermen, the range is from a low of a fraction of one percent to one-third or more of ex-vessel values. Just as significant are the facts that fees charged to domestic fishermen are being used increasingly and that, over the long term, the rates are heading up.

Obviously, then, assessing the economic impact of this category of subsidy is at best an informed guess. Our estimate of future levels of fishing fees is a range from 5 to 10 percent. The first level, 5 percent, is somewhat at the lower end of the range¹³⁴

¹³² Gareth Porter has prepared a draft paper on this whole issue, "The Euro-African Fishing Agreements: Subsidizing Overfishing in African Waters," (February 1997) that will soon be published by UNEP. The information on fees as shares of the value of harvests taken by foreign vessels in waters off West African nations is from Danielle Mangatelle, *Coastal State Requirements for Foreign Fishing*, FAO Legislative Study No. 57 (Rome: FAO, 1996).

¹³³ U.S. Embassy, Tokyo, April 2, 1997. Japan agreed to fees for Russian-origin pink and chum salmon taken in 1997 in Japan's EEZ that amount to \$1,056 to \$1,195 per ton. Using recent Japanese official publications, we roughly estimate the average ex-vessel value of marine salmon capture harvests at about \$3,000 per ton. Note that Japan agreed last year to fees for Russian-origin salmon taken in Russia's, as opposed to Japan's, EEZ amounting to more than \$2,300 per ton.

¹³⁴ Incidentally, *The Economist* ("The Catch about Fish," March 19, 1994; p.13) explicitly dismissed this rate as too low. Note the following statement "few

and the higher estimate, 10 percent, seems to roughly approximate the total costs of management of those few countries for which we have such information and is still well within the range of what various governments currently seek from users of their fisheries resources.

Naturally, these user fees will be levied by governments on their own fishermen operating in that nation's EEZ. The operations of distant-water fleets in the EEZs of foreign nations and in international waters have to be excluded. Therefore, we will use \$70 billion in "domestic" catches as the denominator. If we apply the suggested 5 and 10 percent rates to this base, the resulting uncollected fees are \$3.5 billion and \$7 billion, respectively.

CONSERVATION SUBSIDIES IN FISHERIES

This paper has dealt thus far with subsidies that directly or indirectly enhance harvesting operations and capacity, and are therefore, from a conservation perspective, "bad" subsidies. However, in recent years, many governments have paid increasing attention and devoted considerable resources to programs that are intended to have the opposite effect. These programs are designed to enhance the resource base, reduce fishing operations and capacity, and foster "cleaner" harvesting technology, and may therefore be termed "good" subsidies, at least from a conservation perspective.

governments charge even foreign fishermen for the right to fish in their waters, and those that do set the price too low, typically around 5 percent of the value of the catch."

The most common of these environmental subsidies in fisheries are:

- vessel and fishing permit buybacks;
- refitting of vessels to operate in less stressed fisheries;
- stock enhancement;
- retraining of fishermen; and
- R and D in clean harvesting gear.

As a general observation, it appears that this category of subsidies is claiming an increasing share of total assistance levels in the fisheries sector in many countries.

While environmental subsidies in fisheries are varied, this discussion will focus on the major category: vessel buyback programs.

A fundamental objective of some environmental subsidies in fisheries is to reduce fishing effort and capacity.

However, many commentators have noted how difficult it is to induce the exit of capital from fishing because these assets (boats) have little other practical use. For that reason, decapitalization, or disinvestment, in fisheries has to be actively promoted with economic incentives, i.e., subsidies.

In recent years, proposals to study and compare the effectiveness of effort- and capacity-reducing subsidies in fisheries have been tabled in a number of international organizations. In the OECD Fisheries Committee, New Zealand proposed in October 1995 a long-term sustainable fisheries work plan that included a study "of the use of financial incentives to restructure and reduce fishing effort."¹³⁵

¹³⁵ OECD, Fisheries Committee, "Fisheries Issues at the Turn of the Century -- Moving Towards

The Fisheries Agency of Japan has recently shown a markedly increased interest in government-subsidized vessel buyouts, and the EU, which funds capacity-reducing subsidies more generously than anyone else, regularly warns that fisheries sector subsidies may have "positive" as well as "negative" effects. The EU's insistence on distinguishing between what are effectively "good" and "bad" subsidies was made emphatically at the April 1997 meetings in New York of the UN-sponsored Commission on Sustainable Development.¹³⁶

One encouraging outcome of all the interest in effort- and capacity-reducing subsidies in fisheries is the recognition that subsidies should be considered in the context of resource conservation, as well as from a trade standpoint. If "good" subsidies can help resources, then "bad" ones hurt them, and, ultimately, we are dealing with an array of environmental injuries that we can align with the material (economic) injury investigated in, for example, U.S. countervailing duty actions. In other words, whatever one's views of environmental subsidies in fisheries, this category of subsidies has prompted a debate on their conservation effects that parallels existing procedures in trade law that examine economic effects.

Sustainable Fisheries by 2010," Proposal for Future Work Put Forward by New Zealand, October 10, 1995.

¹³⁶ The key language in the CSD's paragraph on "Oceans" reads: "[there is urgent need for] Governments to consider the positive and negative impact of subsidies on the conservation and management of fisheries through national, regional, and appropriate international organizations, and, based on these analyses, to consider appropriate action".

During the last decade, the EU, the United States, Japan, Iceland, Russia, and other countries¹³⁷ have made increasing use of buyouts as a means of reducing effort and capacity in stressed fisheries.

In the EU, the commission's fisheries budget has allocated increasing sums for decommissioning redundant fishing vessels.

The initial phase of this restructuring plan -- the Multiannual Guidance Program (MAGP)¹³⁸ for the period 1987-1991 -- called for the first time for an overall reduction in EU fishing capacity of 3 percent in terms of gross tonnage and 2 percent in engine power. From the beginning, the EU's restructuring initiative seems to have enjoyed stronger support in Brussels than in the governments of the member states. Therefore, in the 1987-1991 period, only two EU members met their reduction targets, while all the others actually increased their capacity, in large part because the governments of the member states continued to provide "capacity-enhancing" subsidies, such as loan guarantees.¹³⁹

¹³⁷ This is merely a selective list. Canada, for example, has also made considerable efforts to reduce fishing capacity.

¹³⁸ Under this structural initiative, each EU member coordinates with industry to develop a co-financed long-term plan, and after the plans are approved by the commission, they may be supported with funds by the EU, the member states, and industry.

¹³⁹ Eric Fleury, *The European Common Fisheries Policy and its Consequences on Fishing Dependent Regions* (Brussels: June 1993) p. 4. The point about inconsistencies between the fisheries assistance policies of the EU Commission and the member state governments seems to be important because it helps explain the difficulties Brussels has experienced in reaching its goals in this sector, and strongly suggests

EU fisheries sector assistance programs had placed a progressively greater emphasis on restructuring in the decade after the worldwide implementation of 200-mile zones. By the end of the 1980s, however, there developed an even stronger recognition that EU fisheries sector structural assistance had to place more emphasis on reducing harvesting capacity.

Responding to the growing fisheries crisis in European waters, the commission decided to promote more aggressively a restructuring of EU fishing fleets to bring them in balance with available resources. Hence, the EU fishing fleet restructuring plan included fleet reduction targets both for the EU as a whole and for the member states. Until recently, the long-term goal of the EU Commission's restructuring proposal was ambitious: to achieve reductions in fleets of up to 40 percent, depending on the fisheries and the size and power of the vessels involved.

Unfortunately, more than a decade of restructuring has not significantly changed the profile of the EU fishing industry. In fact, the EU fishing fleet has increased markedly in number of vessels in the decade and a half from the mid-1970s to the early 1990s. According to Lloyd's Register data, in fact, the number of EU fishing vessels grew from 52,539 in 1975 to 96,100 in 1991. While much of this increase reflects the addition of new EU members during this period, it is striking that total European fishing fleets, including EU and non-EU

that our overall estimate of EU fisheries subsidies may be low because we only have EU budget data and are unable to accurately track spending by the member state governments.

countries, remained the same -- about 110,000 vessels -- in 1975 and 1992. Interestingly, the total European, i.e., EU and non-EU, high-seas fishing fleet remained at the same level -- about 800 vessels -- during the same period.

In fact, the EU's plans for restructuring its fishing fleet have run into serious obstacles, especially from EU members who object to or are unable meet the schedule of decommissioning targets. As a result, in the last few years the commission has repeatedly had to delay agreements on new targets.¹⁴⁰ The commission has been subjected to strong pressure from industry and some member states to relax or significantly modify the restructuring commitments. Presently, during the debates on the next six-year fisheries sector restructuring MAGP programs, the targets are coming under increasing attack. More recently, a number of EU member states have not made sufficient progress toward their capacity reduction goals, and EU Fisheries Commissioner Emma Bonino has openly criticized the U.K. industry for its refusal and/or inability to comply with these targets. Earlier in 1996, Commissioner Bonino complained that since 1986, the U.K. fishing fleet has roughly doubled.¹⁴¹

The next restructuring program for the period 1997-2002 has targets that are significantly less ambitious than the previous goals. At an EU Fisheries Council meeting of October 1996, it was noted that the commission's proposed capacity

reduction rates (40 percent over six years in selected fisheries) were considered to be too high.¹⁴² In April 1997, the council reached tentative agreement, in spite of U.K. and French objections, on a fleet downsizing plan with targeted reductions of 30 percent in "depleted" stocks and 20 percent for "overexploited" stocks.¹⁴³

In summary, the EU fishing fleet has remained at roughly the same level of vessels for the last two decades, in spite of the loss of access to traditional distant-water fishing grounds and the continued poor status of domestic resources. At present, the EU budgets almost \$170 million annually for "adjustment of fishing effort," significantly more than any other country.

In the United States, the government has implemented a vessel buyback program in New England targeting groundfish and scallop vessels and a permit buyback effort in the Pacific Northwest aimed at reducing the number of participants in the salmon fishery. A few years ago, the U.S. Congress authorized extraordinary funding for regional fishing industry economic assistance programs in the Northeast and the Pacific Northwest. In 1994, Congress approved a \$30 million emergency assistance package to New England fishing industry fishermen that provided grants to individual fishermen, some restructuring of loans, and technical and retraining assistance for selected distressed communities.

¹⁴⁰ U.S. Mission to the European Union, December 26, 1996.

¹⁴¹ U.S. Embassy, London, April 5, 1966.

¹⁴² U.S. Mission to the European Union, October 16, 1996.

¹⁴³ U.S. Mission to the European Union, April 16, 1997.

In Iceland, the government has funded modest decommissioning schemes in the fisheries sector. Recently, the Icelandic Marine Development Fund bought out three dozen laid-up small "inshore hook" vessels for a reported 20 to 30 percent of their value, and is currently deciding on their disposition. Inquiries have been received from a number of developing countries.¹⁴⁴

In Japan, fisheries subsidies that could be termed "benign" in their intent have been used for years to ease the difficult transitions of the distant-water industry. A decade ago, for example, Japanese fishermen who were excluded from U.S. and Soviet fisheries appealed to the government for "compensation" and, with help from their conservative Liberal Democratic allies, succeeded in boosting the government's aid package from an initial offer of less than \$40 million to almost \$130 million.¹⁴⁵ More recently, when the government decided to apply a TAC-based management system on half a dozen species, the industry appealed to the FAJ that "any excess fishing vessels be bought out by the government without loss to the fishermen."¹⁴⁶ In the FAJ's FY 1996 budget, about \$35 million is allocated to "fleet restructuring."

Russia presents still another example of fleet reduction subsidies. Shortly after 1991, the Russian government decided to divest itself of a large number of state-owned and -operated vessels and, in the process, incurred enormous losses. During the 1992-1995 period, the Russian Committee of

Fisheries planned on reducing the fishing fleet by 20 percent, and the support, or auxiliary, fleet by 40 percent.¹⁴⁷ Stated another way, the 1992-1995 fisheries plan called for a total reduction of just over 1,000 fishing and support vessels -- out of a 1992 total of 3,200. This downsizing had the greatest impact on the large and medium trawler fleet sectors, and was projected to remove 3.7 million tons of harvesting capacity from the Russian fleet.

Russia's planned reductions -- through scrapping, conversion to other nonfishery uses, and sale to foreign buyers -- are illustrated in the following table:

Table 12.

Russia's Fleet Reduction Plan, 1992-1995		
Type of Vessel	Number of ships	Projected lost harvests
	reduced	(metric tons)
Super factory trawlers	5	27,000
Large factory trawlers	350	2,245,000
Medium trawlers	315	1,022,000
<u>Small/coastal vessels</u>	<u>367</u>	<u>411,000</u>
TOTAL	1,037	3,705,000

Source: Kaczynski, *Status and Trends in Russian Fisheries Sector and Seafood Trade* (1995)

Even after the planned downsizing summarized above, it was estimated that Russia's Soviet-era fishing fleet would continue to be a liability. Early in 1996, for example, a representative of the Committee for Fisheries claimed that some 70 percent of the more than 2,700 fishing vessels still

¹⁴⁴ U.S. Mission to the European Union, April 16, 1997.

¹⁴⁵ U.S. Embassy, Tokyo, October 15, 1986

¹⁴⁶ U.S. Embassy, Tokyo, November 18, 1996.

¹⁴⁷ Vladimir M. Kaczynski, *Status and Trends in the Russian Fisheries Sector and Seafood Trade* (Seattle: Common Heritage Consulting, 1995).

belonging to Russian fishing companies are "practically worn out and must be replaced."¹⁴⁸ Similarly, the Russian Committee for Fisheries projected that 77 percent of the fishing and 60 percent of the support fleet would have to be rebuilt or scrapped by 2001.

Obviously, the Russian authorities were hardly conducting a fire sale of their fishing fleet to promote conservation, but because they had no other choice. Nevertheless, their actions in the early 1990s had the effect of dramatically reducing effort and capacity levels of the Russian fishing industry.

The above examples constitute the briefest sketch of recent developments in world fishing vessel buyback subsidies. An extremely tentative guess is that this category amounts to \$0.5 billion annually. In summary, it's clear that, in some cases, subsidies in fisheries may have the intent and hopefully the effect of reducing harvesting pressure on the stocks and easing the sector's transformation to a more rational match between catching power and available resources.

However laudable all these goals, experts in subsidies generally still do not trust subsidies, while a coalition of government, industry, and environmentalists, for various reasons, are urging them. In fact, we are witnessing a still-unresolved debate on the effectiveness and legitimacy of capacity-reducing subsidies in fisheries.

The enemies of environmental subsidies are legion. Economists question their

efficiency, and politicians their budget implications; trade people consider them subsidies nonetheless and grudgingly conceded a few "green lights" for environmental measures in the Uruguay Round Subsidies and Agricultural negotiations¹⁴⁹; some environmentalists view them as payments to the devil or, more modestly, as measures that are in fundamental conflict with the "polluter pays principle"; even industry doesn't necessarily like them, especially if their competitors are "rewarded" for bad business decisions. The most basic problem with this form of subsidy is that it often does not meet its goals. Both the EU's fleet reduction targets and Canada's plans to decommission salmon vessels in British Columbia have encountered fierce political resistance. Achieving capacity reduction goals seems ever illusive. Quantitative targets are not met, or some goals may be reached but the fishermen simply turn around and reenter the fishery, perhaps with improved equipment financed by the buyout.¹⁵⁰

¹⁴⁹ For an interesting analysis of the unfounded fears of trade experts and industry spokesmen that environmental subsidies will inevitably pave the way for protectionist abuses, see: Robert Youngman, "Greenlighted Environmental Subsidies in the GATT 1994: Vehicle for Protectionism or Catalyst for Progress", *International Environmental Affairs*, Vol. 8, No. 4 (Fall 1966), pp. 337-354.

¹⁵⁰ To avoid such unintended effects, the U.S. National Marine Fisheries Service, in its first \$2 million fishing vessel buyout in New England, actually destroyed by sinking 11 vessels in 1996. However, even if the bought-out vessel is destroyed, the fisherman can use the funds to buy another boat. The mandatory sinkings were reported *sentimentally* in the industry press. See: Rob Jagodzinski, "End of the Line," *National Fishermen*, January 1997, pp. 13-15.

¹⁴⁸ *Pacific Rim Fisheries Update*, May 1966.

A second criticism of various decommissioning programs has an international angle, namely, that they do not prevent the use of these vessels in other, usually foreign fisheries. Thus, their practical effect is to "export overcapacity." As one example, fishing license buyout programs in the EU in the mid-1980s enabled the vessel owners to sell their boats outside EU waters or to convert them for nonfishing use in EU waters.¹⁵¹

A third objection to vessel buyback programs is that they could have the perverse, unintended effect of inducing industry to remain in marginally viable fisheries. Proponents of this view speculate that fishermen may come to expect a government-funded bailout, especially if the buyback program becomes permanent. A fourth criticism is that buybacks remove some boats but do not adequately control those that remain. That is, the vessels that stay in the fishery may be upgraded and become more efficient, undermining the conservation rationale for the program.

Finally, a fifth problem with vessel buybacks is that they could be implemented wastefully, i.e., on industry sectors whose operations do not pose the most dire threat to conservation. In other words, the existence of buybacks may lead to a bidding war among fishermen, and, ultimately, there is some danger that the government's financial resources will be dissipated and not effectively used.

¹⁵¹ Joshua John, *Managing Redundancy in Overexploited Fisheries*, World Bank Discussion Paper (Fisheries Series) (Washington, D.C.: World Bank, 1994), p.10.

Nevertheless, the debate on the effectiveness and appropriateness of environmental subsidies generally and what we call conservation subsidies in fisheries has hardly been resolved. At the same time that one hears all the arguments against them summarized above, one hears another story. The rationale in support of conservation subsidies in fisheries may not be as well developed intellectually, but if one were to assemble its main components, they would probably include the following.

There is, first of all, a practical matter of budgets and politics. That is, whatever their shortcomings, conservation subsidies will almost certainly be with us for some time to come. It is clear that they represent considerable and increasing financial commitments in a number of developed countries. In the EU alone, the commission and the Italian government have recently submitted proposals obligating Brussels and Rome to spend \$250 million in 1997-1999 to retire and refit southern Italian driftnet vessels and to compensate the affected fishermen. Industrial countries, especially those with large fisheries budgets, will have a hard time for obvious political reasons simply eliminating or significantly reducing subsidies. Rather, it will be easier for them to "redirect" these subsidies in more environmentally benign directions. In the EU, for example, after 1990, funding for decommissioning programs was tripled and aid levels for modernization and construction projects were significantly reduced.¹⁵²

¹⁵² Clare Coffey, "Introduction to the Common Fisheries Policy: An Environmental Perspective," *International Environmental Affairs*, p. 300.

Stated simply (and perhaps somewhat cynically), if conservation subsidies are funded with monies that would otherwise be spent on "bad" subsidies, may we not consider that transfer as an indirect, or implicit, benefit?

In addition, this type of program can be "targeted" to address the most dire resource problems. Presumably, this aspect of conservation subsidies should enable governments to use them more effectively or, at least, to avoid their wasteful use.

In a similar vein, conservation subsidies in fisheries have the potential to become effective in a single payment. In other words, unlike conventional subsidies that are paid out year after year, a well-designed buyout program can remove a vessel permanently in one year. Therefore, this type of "subsidy" may be more cost-effective over the long term.

There are also more general political points, namely, that environmental subsidies signal to industry government's support for managing this resource on a sustainable basis. In the international arena, environmental subsidies may, if successful, prompt the world trading system to use subsidies law more effectively and proactively in support of conservation ends.

These are long-range and still somewhat vaguely defined goals, but that does not necessarily render them less worthwhile.

A related question regarding these subsidies in fisheries is how to accommodate them with trade law. Since fisheries were

excluded from the product coverage of the Agreement on Agriculture, conservation subsidies were not covered by the environmental provisions of that agreement. The Agreement on Agriculture provided a much broader cover for several forms of "structural adjustment assistance" and "payments under environmental programs," the latter including "payments ... as part of a clearly defined government environmental or conservation program."¹⁵³

Unfortunately, the 1994 WTO Subsidies Agreement, which was negotiated essentially to meet industrial trade needs, included a much smaller "environmental window" limited to "assistance to promote adaptation of existing facilities to new environmental requirements imposed by law and/or regulations."¹⁵⁴

The absence of an environmental cover in trade law for effort- and capacity-reducing subsidies in fisheries has prompted a number of questions. Are environmental subsidies in fisheries as vulnerable as any other subsidy? Would a WTO "green light" for environmental subsidies in fisheries have the

¹⁵³ Uruguay Round Multilateral Trade Negotiations, Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations, *Agreement on Agriculture* (Annex 2), paras. 9-12.

¹⁵⁴ 1994 WTO Subsidies Agreement, Part V: Non-Actionable Subsidies, Article 8 (c).

beneficial effect of encouraging their greater use? Should there be constraints in trade law on the use of subsidies in fisheries for conservation purposes? This study makes no attempt to answer these questions but simply points out that environmental subsidies in fisheries need clarification in trade law.

All things considered, environmental subsidies in fisheries, whatever their shortcomings, are probably preferable to the conventional, effort- and capacity-enhancing type, and should, for practical reasons, play some role in reordering the priorities of governments in managing fisheries. Exactly what that role is remains to be determined, and that is the question being debated today in a number of major fishing countries. It would also appear that the EU will play a major part in the outcome of this debate, given the simple fact that it has devoted such generous financial resources to environmental subsidies.

Ultimately, the tasks at hand are, first, to improve the design and implementation of conservation subsidies in fisheries to achieve the maximum environmental benefit and reduce their unintended, collateral harmful effects, and, second, to integrate them into subsidies law at least as well as environmental subsidies have been accommodated in the WTO Agreement on Agriculture.

THE AGGREGATE LEVEL OF SUBSIDIES IN WORLD FISHERIES

This study confirms the previous conclusions of others about the inherent

difficulty of analyzing subsidies.¹⁵⁵ The main reasons should be obvious from the preceding pages: subsidies exist in many different forms and use a variety of funding mechanisms; some are budgeted, while others are not; they are frequently administered by a number of different Government agencies; recourse to their use may be inconsistent and cyclical; their impacts tend to be indirect and diffuse rather than direct and easily traceable; and generally available information on their use, objectives, and funding is often lacking.¹⁵⁶

As a result, we had little choice but to use a selective and descriptive approach. In the previous sections, we have reviewed categories of fisheries sector capacity- and effort-enhancing subsidies and suggested the following admittedly rough and tentative global estimates:

¹⁵⁵ Americo B. Zampetti, *The Uruguay Round Agreement on Subsidies: A Forward Looking Assessment*

¹⁵⁶ A good short review of the analytical issues in assessing budgeted and unbudgeted subsidies in the fisheries sector may be found in OECD Committee for Fisheries, *Producer Subsidy Equivalent/Quantification of Fisheries Support/A Pragmatic Approach* (Paris: OECD, 1991).

Table 13.

Estimates of Global Fisheries Subsidies (US \$ Billions)		
Category	Low	High
Budgeted subsidies		
1. Domestic	3.0	3.5
2. Foreign access	.5	1.0
Unbudgeted subsidies	6.0	7.0
Cross-sectoral subsidies	1.5	2.0
Resource rent subsidies	3.0	7.0
TOTAL	14.0	20.5

Source: Author's Estimates

The fact that these estimates fall in a broad range is not surprising: Transparency is generally insufficient; information on major players like China and most of the developing countries is woefully inadequate; and some categories of assistance, like "upstream" subsidies and user fees, are inherently difficult to analyze.

Even in the more narrow and technical context of normal trade investigations, there is apparently considerable latitude. One good example is Norway's subsidies to its Atlantic salmon farmers. In 1991, the United States ruled that these subsidies amounted to 2.27 percent ad valorem, but the EU decided in early 1997 to apply a countervailing charge of almost 3.68 percent, an increase of more than 50 percent.¹⁵⁷

¹⁵⁷ ITC, *Salmon from Norway*, at B-28; U.S. Mission to the European Union, March 21, 1997. The EU decision on subsidies is still preliminary. One may object that the two cases were investigated half a dozen years apart and may not have precisely the same scope. On the other hand, it is hard to believe that Norway, given all the scrutiny from U.S. and EU subsidies and dumping investigations that it has endured in recent years, would deliberately increase assistance to this sector.

Therefore, the estimates given in this paper are rough and illustrative, and are provided in ranges to give reasonable approximations of their incidence on a global basis. At the same time, we feel that in developing these estimates we have exercised prudence and caution. In particular, our focus on the fisheries agency budgets of national governments has inevitably overlooked other funding sources.

Two other sources of subsidies that stand out are, first, assistance provided by national government agencies other than the one responsible for fisheries, and, secondly, assistance given by subsidiary and local government entities. In the latter camp we include the U.S. states, the EU member states, the Chinese provinces, the Japanese prefectures, and so on.

Evidence suggests that subsidies provided by subnational government entities may be highly significant. As one example, the United States found, in its positive determination in a 1986 subsidies investigation concerning Canadian groundfish that of 55 Canadian government programs conferring subsidies, 11 were federal, 6 were joint federal-provincial, and 38 were provincial.¹⁵⁸

Given the fact that this study did not reach below the national level, except occasionally, the estimates probably err on

¹⁵⁸ USITC, *Certain Fresh Atlantic Groundfish from Canada* (Investigation No. 701-TA-257-Final), USITC Publication 1844, May 1986, at A-69.

the low side, perhaps by a considerable margin.

In summary, our estimates of environmentally harmful global fisheries sector subsidies are, to use round numbers, \$15 billion to \$20 billion, depending on the low and high estimates for the various subsidy categories. However, these estimates are so rough that they are better expressed as approximate shares of world capture fisheries first-sale revenues. Given global ex-vessel sales of about \$80 billion, our estimated levels of subsidies amount to about 20 and 25 percent of world revenues. Generalizing further, the most reasonable conclusion would be to say that effort- and capacity-enhancing, i.e., "bad," subsidies in world fisheries amount to about one-fifth to one-fourth of global revenues.

Finally, the study seems to indicate that environmental subsidies in fisheries, or their major component, i.e., vessel buybacks, account for at most about 5 percent of all subsidies provided worldwide in this sector. Simply put, just as trade experts insist that all subsidies misallocate resources, distort markets, and are therefore bad from a trade point of view, it also appears that practically all subsidies in fisheries are bad from a conservation standpoint.

Another way to represent these global fisheries sector subsidies is to organize them by major types in each category. In this way, we have a sort of taxonomy of subsidies in fisheries:

Table 14.

Category	Major Types
Budgeted subsidies	Development grants State investments Foreign access payments Market promotion Price supports
Unbudgeted subsidies	Subsidized loans Loan guarantees Loan restructuring Fuel tax exemption Income tax deferral Accelerated depreciation
Cross-sectoral subsidies	Aid to shipyards "Targeted" infrastructure
Conservation subsidies	Vessel/permit buybacks
Resource pricing subsidies	User fees

Source: Author's Table

Still another way to look at fisheries subsidies is to place them in the larger context of total economic support and compare this support level with competing food products. If we add a very rough estimate of global trade protection (tariffs and nontariff barriers) in fisheries of, say, 10 percent,¹⁵⁹ we would get a measure of total

¹⁵⁹ According to an FAO-funded study, the Uruguay Round produced the following fish tariff results (figures are trade weighted): EU-10.7 percent; Japan-4.1 percent; and USA-0.9 percent. Average post-Uruguay Round fisheries tariff levels in the developing countries are generally higher than in the industrial countries. And we have to take into account the trade effects of nontariff measures (quantitative restrictions, import licenses, state-trading, etc.). Aggregating all the above tariff and nontariff barriers, we tentatively propose 10 percent as a conservative measure of total global support in this sector. A U.S. government fisheries trade expert has told me that, if anything, this estimate may be too low. See, Agnes Filhol, *Impact of the Uruguay Round on International Fish Trade* (Rome: FAO

support in fisheries in the 30 to 35 percent range.

An OECD analysis of global average food subsidies suggests that government assistance to the fisheries sector is comparable to subsidies provided to producers of competing protein foods.

Table 15.

Average Global Food Subsidies (including trade measures)	
Product	Subsidy (%)
Wheat	48
Coarse grains	36
Rice	86
Oilseeds	24
Sugar	48
Beef (and veal)	35
Pork	22
Poultry	14
Lamb and mutton	45
Eggs	14

Source: OECD, *Agricultural Policies, Markets, and Trade in OECD Countries* (1996)

In conclusion, we might say that this study suggests that total economic support (subsidies and trade protection) in fisheries is between about one-fourth and one-third of total revenues. Seen in this context, subsidies in the fisheries fall in the same approximate range as in the pork and beef sectors.

However, there are two crucial differences: First, subsidies paid to pork and beef producers are governed by the reduction commitments of the Uruguay Round Agreement on Agriculture, while fisheries subsidies escaped these disciplines. Second,

while there are certainly serious environmental problems in agriculture, and subsidies probably have a generally aggravating effect on them, there is not much reason to believe that agricultural subsidies collectively constitute a significant threat to the resource base. In fisheries, on the other hand, knowledgeable analysts within and outside government are making precisely that latter allegation.

CONCLUSIONS

This study is simply a first rough attempt to organize available information on subsidies in fisheries into useful categories and hazard some educated guesses at their global level and environmental impacts. In so doing, it suggests a number of conclusions, some more firm than others.

For purposes of clarity, we may organize them in two groups, dealing with:

- (1) analytical and methodological issues and
- (2) with more substantive matters.

With respect to analytical issues, future investigations of subsidies in fisheries may help bridge many of these gaps. A better understanding of budgeted subsidies requires more data, but, presumably, gaps in information can be bridged, especially with the notification requirement included in the 1994 Subsidies Agreement. Unbudgeted and underbudgeted subsidies are harder to assess with confidence for a variety of reasons. Indirect and "upstream" subsidies, like infrastructure

and shipbuilding, are also particularly resistant to analysis.¹⁶⁰

Certain other categories of fisheries subsidies do not fit neatly into the context of current trade law. As examples, environmental subsidies in fisheries are not adequately addressed in the WTO Agreement and the user fee issue remains to be clarified. And, naturally, information on subsidies in "transitional" and developing countries is scarce, and, therefore, our global estimates are based in part on projections of partial information.

Therefore, future studies should examine the following:

- fisheries subsidies in the developing nations;¹⁶¹ the level of state

¹⁶⁰ An even more fundamental problem -- for trade experts as well as for analysts of environmental issues -- is how to best calculate these and other categories of subsidies. One view is to use the "costs to government" yardstick, but another approach is to examine "the economic benefits to the recipients" of the subsidies. Obviously, the two are not the same, especially for subsidies like loan guarantees, which, if carefully administered, could cost government relatively little. A U.S. government expert on subsidies recounted to this writer the "theological" debates in the WTO's Subsidies Committee on this issue and noted that the official U.S. view on this question is that a proper assessment of subsidies should take into account their full economic benefits, and not simply the costs to government.

¹⁶¹ Some have asked this writer about the role of foreign assistance and international development aid organizations in promoting the growth of the fishing industries in developing countries. This issue was not included in the scope of this study, but according to World Bank sources and a few studies, it does not appear that foreign and development assistance has played a significant role. See, for example: FAO, *A Survey of Assistance*. This report covers the second half of the 1980s, and concludes that roughly \$500 million in bilateral and international developmental

investments in fisheries, both in "transitional" economies and in the developing countries;¹⁶²

- the costs to governments of "soft" loan programs;
- the costs of tax preference programs;
- the impact in the fisheries sector of subsidies provided to the shipbuilding industry and for fisheries infrastructure; and
- how the user fee issue fits into trade law.

The most obvious means to begin to do the above would be to utilize more actively the subsidies notification requirement in the 1994 WTO Subsidies Agreement.¹⁶³

Even more fundamental is how to assess in a meaningful way the impact of subsidies on resources. Assessment methodologies all use market indexes, whether they aim at

assistance was provided annually to developing countries' fisheries sectors, the bulk of which was used for aquaculture, infrastructure, and training, and not for programs that enhance fishing effort and harvesting capacity.

¹⁶² One encouraging tentative conclusion of this study is the evidence that state ownership may be a form of subsidy whose significance is declining. The reasons are fairly obvious: the demise of the Soviet Union, economic reforms in China, and the wave of privatization in many developing countries. As a result, it seems that if current trends continue, statist overinvestment in the fisheries harvesting sector will continue to decline, at least relatively.

¹⁶³ Interestingly, in its initial subsidies notification to the WTO, Korea reported a total of 133 subsidies, broken out as follows: prohibited -- 16; actionable -- 32, and nonactionable -- 85. Of the 32 actionable subsidies reported by Korea, 13, or more than a third, are fisheries programs. "Seoul Decides to Submit Subsidy Plan to WTO," *Seoul Segye Ilbo*, February 10, 1995, translated in the Foreign Broadcast Information Service, EAS, February 21, 1995, p. 56.

calculations of a level of subsidization per product, a producer subsidy equivalent, or a "price wedge." This study also monetized them by roughly estimating their global level in terms of shares of aggregate costs and revenues. Still, this writer feels that efforts should move forward to identify some other means of estimating their impact on resources. Toward this end, fisheries experts should make a greater effort to participate in the natural resource accounting exercises under way within universities, national governments, and international organizations.

Next come the findings regarding substantive issues:

This study's key finding is that subsidies in fisheries approach 20 to 25 percent of the sector's revenues. If we assume that the sector's aggregate costs and revenues are roughly equal, then costs are being suppressed by about 20 to 25 percent.¹⁶⁴ These subsidies are clearly promoting excessive levels of effort and capacity. Most of them promote harvesting operations and capacity, directly and indirectly, through grants, capital cost subsidies, tax preferences, aids to shipbuilding, and subsidized access to both domestic and foreign resources. Therefore, subsidies have

¹⁶⁴ Of course, fishery economics holds that, under open access regimes, costs and revenues will eventually be about the same. However, FAO calculated in 1993 that costs are far greater than revenues and proposed a \$54 billion estimate of this disparity. This study does not address this issue. However, even assuming that global costs are considerably greater than revenues, the cost-suppressing effect of subsidies would probably still be in the 15 to 20 percent range, surely a significant level.

to be considered, to some degree at least, a causal factor of the resource crisis in this sector and not just a symptom of ineffective management.

Commentators have focused heavily on the connection between subsidies and overcapacity. Clearly, though, subsidies not only stimulate investments in new and upgraded harvesting capacity, but they also promote the operations of existing capacity.¹⁶⁵

In other words, subsidies go not only to the boats, but also to fuel, insurance, labor, distant-water fishing rights, and free access to domestic resources.

In a related sense, it is noteworthy that market promotion and price support programs constitute a relatively small share of fisheries subsidies. Therefore, the structure of subsidies in fisheries differs markedly from those in agriculture.¹⁶⁶

It also appears that affluent countries account for the majority of subsidies in fisheries. In fact, the OECD nations and China are probably responsible for as much as three-quarters of the total. In this respect,

¹⁶⁵ For example, *FAO Consultation on Responsible Fisheries Management* states (p. 18) that "the fundamental problem with [fleet size and effort control] is confusion between access control which regulates investment in fishing capacity and effort control for the purpose of regulating fishing mortality on the stock."

¹⁶⁶ The lion's share of agricultural subsidies are provided by affluent (OECD) countries, and two-thirds of these subsidies consist of market and price support measures. OECD, *Agricultural Policies, Markets, and Trade in OECD Countries: Monitoring and Evaluation* (Paris: OECD, 1996).

fisheries subsidies are similar to those in agriculture.¹⁶⁷

At the same time, it is undeniable that subsidies in industrial countries (and China) have significant effects on developing countries. These impacts are three-fold:

First, subsidies that pay for access arrangements support continued operations by (mainly) European and East Asian distant-water fleets off Africa and in the Western Pacific. These subsidized operations reduce the fishing opportunities available to local fishermen, and, in most cases, the payments may not compensate adequately for the full economic value of the resources.

Second, there is scattered evidence that subsidized access arrangements are beginning to compromise local food needs. Distant-water fleets tend to concentrate on the more lucrative fisheries for species that are favored by the markets of the industrial countries.

Third, there are presumed trade implications. The combination of developed countries' subsidies to their distant-water and to their domestic (coastal) fleets almost certainly minimizes trade opportunities that rightfully should be available to the resource-rich developing countries. Clearly, the foreign access and domestic subsidies reviewed here, in combination with border measures, must have meaningful trade-distorting and price effects that benefit the fishermen of the

¹⁶⁷ In agriculture, the ratio of OECD to developing country subsidies appears to be extremely lopsided. In fact, one unpublished and uncitable study puts agriculture subsidies in OECD countries at over \$300 billion and in the developing countries at just \$10 billion.

industrial countries and deny trade opportunities to fish exporters in the developing countries.¹⁶⁸

Fisheries subsidies have particularly negative environmental impacts. This is because subsidies in fisheries, in combination with ineffective management, are threatening the viability of the resource base, and because their effects on conservation are not limited to the territory of the country providing the subsidy but have significant international, or "spillover," implications.

Subsidies in fisheries are also highly non-transparent in the sense that about three-quarters or more are not budgeted,¹⁶⁹ and a good share of budgeted subsidies are controlled by government agencies other than those responsible for fisheries. The major categories of unbudgeted subsidies in the fisheries sector are lending and tax policies and resource pricing.

Finally, environmentally harmful, i.e., effort- and capacity-enhancing, subsidies far

¹⁶⁸ It may be worth pointing out that according to the latest FAO data, the growth in world trade in seafood products appears to have slowed. While global exports doubled from \$17.2 billion to \$35.7 billion from 1985 to 1990, they then increased at a more modest pace to \$47 billion in 1994. Also, global fishery exports in 1994 were broken out almost evenly between developing (\$23.8 billion) and industrial (\$23.2 billion) countries, a split that arguably does not reflect the allocation of resources between the two groups.

¹⁶⁹ This large share of unbudgeted subsidies helps to explain why so many fishery experts tend to think that subsidies in this sector are a marginal issue. That is, they are not accustomed to treating as subsidies Government incentives that can not be found in the budgets of fishery agencies.

outweigh those whose effect is environmentally benign. In fact, our global estimates suggest that no more than about 5 percent of all subsidies provided to the harvesting sector support conservation. Therefore, there does not appear to be much basis to the appeals of those who call for a careful delineation and weighing of "good" and "bad" subsidies as a necessary precondition to effective international action.

In conclusion, while this study points to a host of questions, it also suggests strongly that subsidies are a significant factor in undermining the sustainable use of the wild resources in many parts of the world.

Several recent studies have highlighted the urgency of the situation in world fisheries and the obstacles to reform based on sustainable use. Essentially, much of FAO's work in the last half-dozen years has focused on the threat to the resource posed by continuing overfishing and overcapacity. Recently, an OECD-sponsored study has reviewed in detail the management options and pointed out how difficult it is to effectively regulate fishermen.¹⁷⁰

International organizations are giving closer scrutiny to the impacts of subsidies in natural resource sectors, including fisheries. And the environmental consequences of subsidies are receiving more attention than their trade effects. Recent meetings of FAO's Committee on Fisheries reviewed the linkages between fisheries sector subsidies

and overcapacity in harvesting operations. This same theme was visited in the April 1997 session of the UN Commission for Sustainable Development.

With respect to fisheries, the picture that emerges collectively from this work is not encouraging. Common themes that run throughout recent World Bank analyses of natural resource sectors are the needs to: (1) establish market-based incentives through the elimination of open access regimes and the introduction of secure property, or harvest, rights; (2) ensure long-term sustainability through the capture of resource rents by means of user fees or royalties; and (3) implement subsidy reform, especially as regards environmentally perverse subsidies.

Unfortunately, all three reforms have a long way to go in most of the world's fisheries. Tellingly, two of the three generic issues -- user fees and subsidy reform -- may be addressed under the broad theme of "subsidies."

Against this background, it is particularly frustrating that many governments have until recently seemed particularly unwilling to discuss this issue, even in an analytical context.

Reform of subsidies in fisheries will almost assuredly yield many dividends. In particular, elimination or substantial reductions in effort- and capacity-enhancing, {i.e., bad} subsidies would:

- reduce pressure on the stocks;
- free up fiscal resources for other uses
- enhance economic efficiency through removal of price distortions; and

¹⁷⁰ OECD, Directorate for Food, Agriculture and Fisheries, Fisheries Committee, Ad Hoc Expert Working Group on Fisheries, *Synthesis Report for the Study on the Economic Aspects of Management of Marine Living Resources* (Paris: OECD, 1966).

- stimulate increased trade.¹⁷¹

Ultimately, introducing subsidy reform and market-based incentives will enhance the fishery sector's long-term economic sustainability and society's general welfare. In this broader context, it may be noted that the World Bank has begun to examine the contribution of natural resource sectors to national wealth, and has developed methodologies for measuring the wealth of environmental assets that take into account resource depletion and collateral environmental degradation. Unfortunately, this natural resource accounting exercise could not accommodate the fisheries sector, a startling indication of its poor management and economic performance in the eyes of most economists.¹⁷²

Therefore, putting marine fisheries on a sustainable track will require bold actions on a number of fronts, including reform of subsidies. This general conclusion inevitably leads one to think of next steps. While it is not the purpose of this study to promote specific negotiating strategies, its conclusions do seem to suggest the broadest outlines of an overall approach.

¹⁷¹ These points are taken mainly from World Bank, *Five Years after Rio*, p.4, and from the Report of WTO's Committee on Trade and Environment, November 14, 1996.

¹⁷² The World Bank did not include fisheries among the natural resource sectors for which it performed sustainability assessments because the resources are hard to assess and excessively mobile (complicating matters of jurisdiction) and, in a revealing judgment, the management regimes so ineffective that there are probably no sustainable economic rents in the sector. World Bank, *Expanding the Measure of Wealth: Indicators of Environmentally Sustainable Development*, pp. 9 and 17.

With respect to subsidies in fisheries, such a strategy would ideally include three main elements:

1. effort- and capacity-enhancing subsidies must be eliminated, reduced, or more strictly disciplined, preferably through a rules-based regime;
2. effort- and capacity-reducing subsidies have to be better designed and implemented -- to maximize their efficiency and minimize their injurious collateral environmental impacts -- and must be integrated into trade law with appropriate environmental coverage;¹⁷³ and
3. the "full-cost recovery," or resource pricing, issue also needs to be accommodated more explicitly in trade law, with the results that user fees are recognized as normal and legitimate government charges, and failure to levy these fees at adequate levels is treated as a subsidy.

Conversely, reform of fisheries subsidies alone will not put this sector back on a

¹⁷³ Future efforts to provide WTO cover for environmental subsidies in fisheries will necessarily broaden the scope or increase the number of "green-lighted" subsidies in the WTO. Such a trend will assuredly be resisted by many trade experts, some of whom feel that the concessions to environmental subsidies in the 1994 Uruguay Round were excessive. See, for example, the following statement in an OECD report: "there was general concern that the UR text, which gives a green light for certain types of environmental subsidies, ... may be excessively permissive, and open an undesirable exemption from the general disciplines against the use of subsidies." OECD, *Trade and Environment: Environmental Subsidies*, Report on the Meeting of Management Experts (September 13, 1994), p. 12.

sustainable path. Undeniably, improved and more effective management, both in the domestic and international spheres, is a fundamental requirement. Increasingly, experts seem to agree that improved management must involve the introduction of market-based incentives, most likely through implementation of property, or harvest, rights in fisheries.

Thus, the ideal response would be a many-faceted and internationally agreed approach dealing with property (harvest) rights, user charges, and subsidy reform. Preferably, such a reform will be coordinated and multilateral, pursued in part in the WTO and in part in nontrade forums. Examples of opportunities in WTO include: (1) the current discussions in the Committee on Trade and Environment, (2) the renegotiation of the UR Agriculture Agreement in 2000, and (3) a formal trade complaint under the 1994 Subsidies Agreement. Possibilities in international organizations other than WTO include: (1) a fisheries agreement in FAO, and (2) inclusion of fishing vessels in the coverage of the OECD Shipbuilding Agreement.

On the other hand, in the absence of such a coordinated and comprehensive strategy, there is always domestic political action, or suasion, leading, one hopes, to effective unilateral reforms. Norway's recent experience with subsidies shows that it is possible for governments to reduce them without binding international commitments. Certain developments in the EU, Japan, and the United States also give hope that unilateral actions, often spurred by budget considerations, may yield positive results. And we should not forget that, as shown in the discussion of the world fishing fleet's

age profile, there is some reason to believe that the problem will eventually solve itself.

Some categories of subsidies that are not so clearly addressed in trade law may be more effectively reformed in the domestic political sphere. One suspects that this may be the case with user fees and infrastructure. It may be noted that without an international agreement, subsidies provided to the energy sector have been significantly reduced during the past decade in a large number of countries.¹⁷⁴

Nevertheless, the prudent conclusion would seem to be that remedial actions should be implemented domestically and internationally sooner rather than later. For if corrective measures, including reform of subsidies, are not initiated soon, it is likely that the crisis of sustainability in world fisheries will go on, becoming a chronic and intractable problem, and perhaps even get worse before it gets better.

¹⁷⁴ For example, the World Bank has identified global reductions in fossil fuel subsidies from about \$114 billion in 1990-91 to \$58 billion in 1995/96. World Bank, *Expanding the Measure of Wealth: Indicators of Environmentally Sustainable Development*, p. 46.

Selected Bibliography

The following bibliography gives a selected list of published sources that proved helpful in preparing this study. In addition to sources that are cited in the footnotes, it also lists materials that, while not cited, proved helpful in understanding and conceptualizing the issues. This study relies heavily on "institutional" sources, i.e., reports, analyses, papers, and proceedings of meetings issued by international organizations and individual governments. The most important sources of these materials were the Food and Agriculture Organization, the Organization for Economic Development and Cooperation, and the World Bank.

To make this bibliography more useful to the reader, it concentrates, although not exclusively, on published sources that are generally and freely available to non-government researchers. Some sources of information, such as the unclassified reporting cables and U.S. government translations of the foreign press, are not listed here (although many are cited in the footnotes).

Finally, instead of simply listing them alphabetically, the references are organized mainly according to the originating international organization and government agency.

Treaties, Agreements, Laws

Magnuson-Stevens Fishery Conservation and Management Act, (as amended through October 11, 1996), Public Law 94-265.
OECD, Council Working Party on Shipbuilding. Agreement Respecting

Normal Competitive Conditions in the Commercial Shipbuilding and Repair Industry (Chairman's Proposal). Paris: OECD, 1994.

Uruguay Round Multilateral Trade Negotiations, Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations. Agreements on Subsidies and Countervailing Measures, and on Agriculture (Marrakesh, Morocco, April 15, 1994) Washington, D.C.: USTR, 1994.

United Nations, Final Act of the Third United Nations Conference on the Law of the Sea. The Law of the Sea, United Nations Convention on the Law of the Sea. New York: United Nations, 1983.

Ministry of Agriculture, Forestry, and Fisheries, Government of Japan. Fisheries Statistics of Japan 1994. Tokyo: MAFF Statistics and Information Department, 1996.

Commission of the European Communities. Proposal for a Council Decision on Specific Measures to Encourage Italian Fishermen to Diversify out of Certain Fishing Activities. Brussels: December 1996.

U.S. Government Studies and Reports

U.S. Department of Agriculture (Economic and Research Service). Estimates of Producer and Consumer Subsidy Equivalents: Government Intervention in Agriculture, 1982-1986. Washington, D.C.: USDA, 1988.

U.S. International Trade Commission. Fresh and Chilled Atlantic Salmon from Norway

(Investigation No. 701-TA-302, USITC Publication 2371), April 1991.

Maritime Administration, U.S. Department of Transportation. Report on Foreign Shipbuilding Subsidies. Washington, D.C., 1993.

Maritime Administration, U.S. Department of Transportation. Maritime Subsidies. Washington, D.C., 1993.

National Marine Fisheries Service (NMFS), NOAA, Department of Commerce (Commerce). Our Living Oceans -- Report on the Status of U.S. Living Marine Resources 1995. Washington, D.C.: NOAA Technical Memorandum NMFS-F/SPO-19, 1996.

NMFS, NOAA, Department of Commerce. Our Living Oceans -- The Economic Status of U.S. Fisheries 1996. Washington, D.C.: NOAA Technical Memorandum NMFS-F/SPO-22, 1996.

NMFS (Office of the Senior Scientist for Fisheries), NOAA, Department of Commerce, Analysis of the Potential Economic Benefits from Rebuilding U.S. Fisheries. April 1992.

NMFS (Office of International Affairs), NOAA, Department of Commerce. Argentine-European Union Fisheries Agreement. IFR-94/08.

NMFS (Office of International Fisheries), NOAA, Department of Commerce. Chinese Fisheries Management. IFR-92/11L.

NMFS (Office of International Fisheries), NOAA, Department of Commerce.

Fisheries of the U.S.S.R., 1976. Washington, D.C., 1977.

NMFS (Office of the Senior Scientist for Fisheries), NOAA, Department of Commerce, Resource Fee Proposal. Washington, D.C., 1993.

NMFS (Office of International Fisheries), NOAA, Department of Commerce. World Fishing Fleets: An Analysis of Distant-Water Fleet Operations. Washington, D.C.: NOAA Technical Memorandum NMFS-F/SPO-14, 1993.

Food and Agriculture Organization

FAO. Review of the State of World Fishery Resources. Rome: FAO Fisheries Circular No. 710, 1990.

FAO. World Fisheries Situation (prepared in preparation for the International Conference on Responsible Fishing in Cancun, Mexico on May 6-8, 1992). Rome: 1992.

FAO. Marine Fisheries and the Law of the Sea: A Decade of Change -- Special Chapter (Revised) of the State of Food and Agriculture 1992. Rome: FAO, 1993.

FAO, Fishery Resources Division. Review of the State of World Fishery Resources: Marine Fisheries. Rome: FAO Fisheries Circular No. 920, 1997.

FAO. Chronicles of Marine Fishery Landings (1950-1994): Trend Analysis and Fisheries Potential. Rome: FAO Fisheries Technical Paper No. 359, 1996.

FAO. The State of World Fisheries and Aquaculture. Rome: 1995.

FAO. Fisheries Credit Programmes and Revolving Loan Funds: Case Studies. Rome: FAO Fisheries Technical Paper No. 312, 1989.

FAO. The Fishing Industry in the Russian Far East. Rome: FAO Globefish Research Program, 1994.

FAO, Fisheries Department. Current Situation, Trends and Prospects in World Capture Fisheries. Rome: 1995.

FAO, Committee on Fisheries. Priorities for Major Program: Fisheries over the Long and Medium Term and for the 1996-1997 Biennium. Rome: 1995.

FAO. Report of the Regional Consultation on Institutional Credit for Sustainable Fish Marketing, Capture and Management in Asia and the Pacific (Manila, Philippines, July 3-7, 1995. Rome: FAO Fisheries Report No. 540, 1996.

Filhol, Agnes. Impact of the Uruguay Round on International Fish Trade. Rome: FAO Globefish Research Program, 1995.

Insull, David, and J. Orzeszko, A Survey of External Assistance to the Fishery Sectors of Developing Countries. Rome: FAO Fisheries Circular No. 755, 1991.

Organisation for Economic Co-operation and Development

OECD, Committee for Fisheries, Ad Hoc Expert Group on Fisheries. Synthesis Report for the Study on the Economic Aspects of Management of Marine Living Resources. Paris: 1996.

OECD, Committee for Fisheries, Ad Hoc Experts Group on Fisheries. Producer Subsidy Equivalent -- Quantification of Fisheries Support: A Pragmatic Approach. Paris: 1991.

OECD, Committee for Fisheries. Fisheries and Environment. Paris: 1991.

OECD, Committee for Fisheries. Economic Assistance to the Fishing Industry: Observations and Findings. Paris: 1993.

OECD, Committee for Fisheries. Study on Economic Assistance to the Fishing Industry: General Survey and Country Chapters. Paris: 1991.

OECD, Committee for Fisheries. Economic Support of the Fishing Industry: Effects on Efficiency and Trade. Paris: 1991.

OECD, Committee for Fisheries. Over-Exploitation of Fish Resources: Outline of a Study. Paris: 1991.

OECD, Committee for Fisheries. Inventory of Assistance Instruments in the Fishing Industry and Management Systems. Paris: 1993.

OECD. Trade and Environment: Environmental Subsidies. Paris: 1994.

OECD. Industrial Policy in OECD Countries: Annual Review 1994. Paris: 1994.

World Bank and Other Development Banks

Expanding the Measure of Wealth: Indicators of Sustainable Development. Washington, D.C.: World Bank, 1997.

Monitoring Environmental Progress: A Report on Work in Progress. Washington, D.C.: World Bank, 1995.

Munasinghe, Mohan (ed.). Environmental Economics and Natural Resource Management in Developing Countries. Washington, D.C.: World Bank, 1993.

Munasinghe, Mohan, and Wilfredo Cruz. Economywide Policies and the Environment: Lessons from Experience. Washington, D.C.: World Bank, 1995.

Lovei, Magda, and Charles Weiss. Environmental Management and Institutions in OECD Countries: Lessons from Experience. Washington, D.C.: World Bank, 1997.

Hamilton, Kirk, and Ernst Lutz. Green National Accounts: Policy Uses and Empirical Experience. Washington, D.C.: World Bank, 1996.

Dixon, John A., Richard A. Carpenter, Louise A. Fallon, Paul B. Sherman, and Supachit Manipomoke. Economic Analysis of the Environmental Impacts of Development Projects. Manila: Asian Development Bank, 1992.

Serageldin, Ismail. Sustainability and the Wealth of Nations. Washington, D.C.: World Bank, 1996.

Five Years after Rio: Innovations in Environmental Policy. Washington, D.C.: World Bank, 1997.

Advancing Sustainable Development: The World Bank and Agenda 21. Washington, D.C.: World Bank, 1997.

Pezzey, John. Sustainable Development Concepts: An Economic Analysis. Washington, D.C.: World Bank, 1992.

John, Joshua. Managing Redundancy in Overexploited Fisheries World Bank Discussion Paper 240: Fisheries Series. Washington, D.C. The World Bank, 1994.

World Bank Paper on Harvesting the Waters: A Review of Bank Experience with Fisheries Development (prepared for a Fishery Development Donor Consultation, October 13-15, Paris, France).

Other Books, Articles and Manuscripts

Fleury, Eric. "The European Common Fisheries Policy and its Consequences on Fishing Dependent Regions." Brussels: U.S. Mission to the European Union, June 1993.

Forney, Matt. "Between the Lines: China's Sparse Budget Masks Some Troubling Trends." Far Eastern Economic Review, March 20, 1997.

Hannesson, Rognvaldur. "Fishing Capacity and Harvest Rules." Marine Resource Economics, Vol. 8, Summer 1993, pp. 133-143.

Herrick, Samuel, Jr., Byron Rader, and Dale Squires, "Access Payments and Economic Benefits in the Western Pacific United States Purse Seine Tuna Fishery." Marine Policy, Vol. 21, No. 1 (1997), pp. 83-96.

Japan's External Trade Organization. China's Tuna Fishery. Tokyo: 1995.

Kaczynski, Vlad M. Status and Trends of the Russian Fisheries Sector and Seafood Trade. Seattle, WA.: Bothell, 1995.

Le Bail, J. "Tiers-Monde et Zones Economiques Exclusives: La Difficile Conquete d'une Nouvelle Frontiere." Unpublished and undated article. Lloyd's Register of Shipping. Statistical Tables 1988. London: 1988.

Matthiasson, Thoroflur. "Why Fishing Fleets Tend to Be Too Big." Marine Resource Economics, Vol.11, No. 3, Fall 1966, pp. 173-179.

Mufson, Steven. "Major Speech Puts Li Peng in Spotlight." Washington Post, March 2, 1997.

Pacific Rim Fisheries Update. "China Christens Plans to Be a Fishing Superpower." September 1996, Vol, 5, No. 24, p. 9.

Mace, Pamela M. "Developing and Sustaining World Fisheries Resources: The State of the Science and of Management." Keynote Presentation at the World Fisheries Congress, Brisbane, Australia, July 1996.

Saywell, Trish. "Fishing for Trouble." Far Eastern Economic Review, March 13, 1997.

Smith, Courtland L., and Susan H. Hanna. "Measuring Fleet Capacity and Capacity Utilization." Canadian Journal of Fisheries and Aquacultural Science, Vol. 47, 1990, pp. 2085-2091.

Strand, Ivar E., and Virgil J. Norton. "Some Advantages of Landings Taxes in Fishery Management." Allocation of Fishery Resources, Proceedings of the Technical Consultation on Allocation of Fishery Resources held in Vichy, France, April 20-23, 1980, pp. 411-416.

Weber, Peter. "Net Loss: Fish, Jobs, and the Marine Environment." Washington, D.C.: Worldwatch Paper 120, 1994.

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