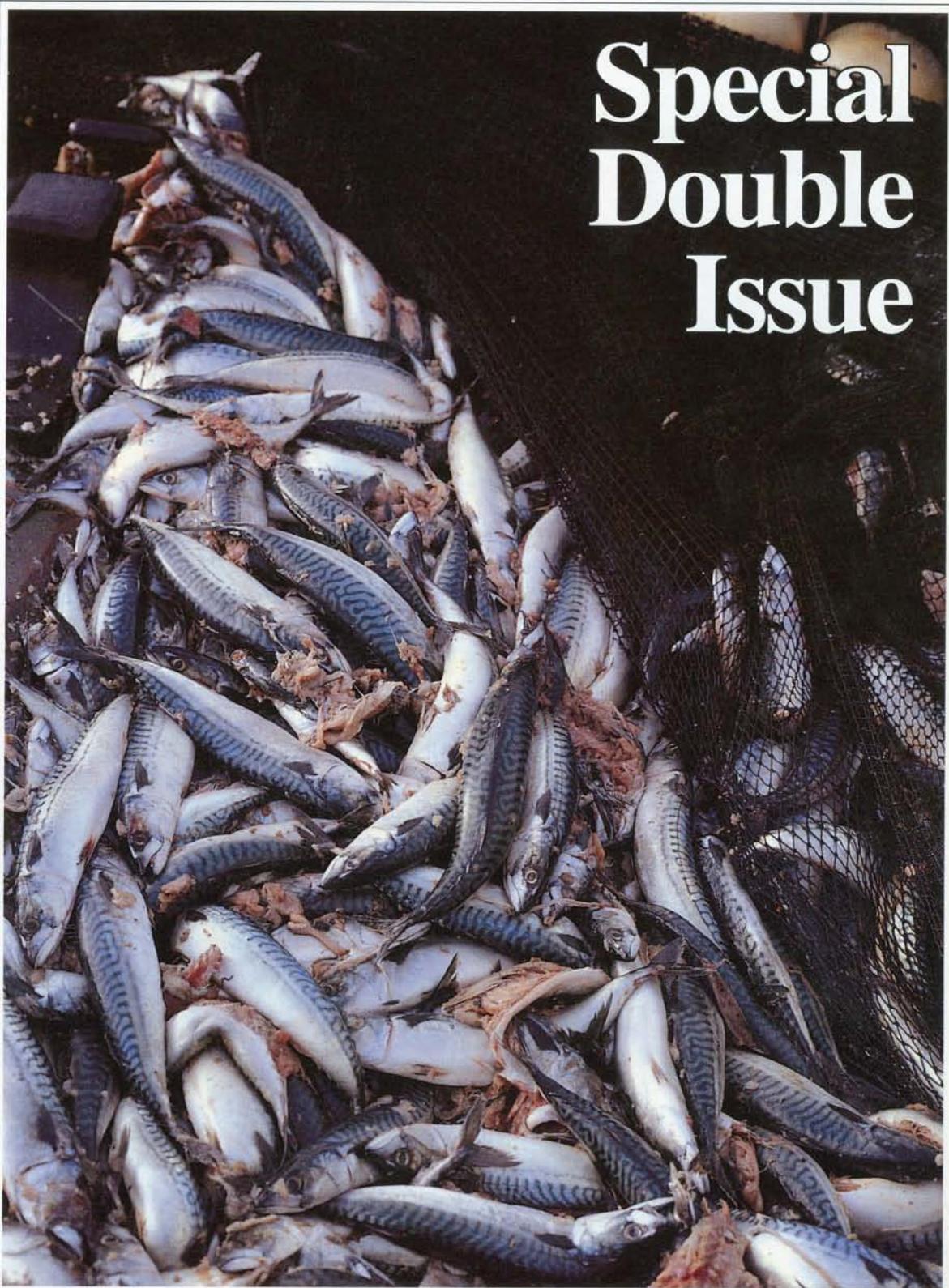


# The Ecologist

Vol 25 No 2/3 March/April, May/June 1995

- The Politics of Overfishing
- Deforestation of the Deep
- Commons or Open Access?
- Chaos Managers
- Privatizing Fish

## Special Double Issue



Overfishing  
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See inside back cover

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**Cover:** Discarded mackerel at Ullapool in Scotland (Mike Jackson/Environmental Picture Library). *The Ecologist* is printed on recycled paper, whitened with hydrogen peroxide.

# Introduction

The Editors



Peter F Anson

Peter F Anson's line drawings are taken from his book, *Fishermen and Fishing Ways*, George G Harrap & Co. Ltd, 1932 (republished by EP Publishing Ltd, Yorkshire and British Book Centre, New York, 1975)

**"We are heading into another renewable resource disaster... We have far too many vessels chasing too few fish, worldwide."**

Edward Loayza

Fisheries Adviser to the World Bank

**"Quite simply, there are too many people chasing too few fish."**

James McGoodwin

*Crisis in the World's Fisheries*

That the world's seas are being seriously overfished, few would disagree. Nine of the world's 17 major fishing grounds are now in precipitous decline, and four are "fished out" commercially. Total catches in the North-West Atlantic have fallen by almost a third over the past 20 years. Such is the decline of cod stocks in the once-bountiful fishery of the Grand Banks off Newfoundland in Canada that in 1992, the fishing grounds were closed indefinitely; in Europe's North Sea, the stock of mackerel has crashed 50-fold since the 1960s, while the herring fishery, which had to be closed altogether from 1977 to 1982, has never recovered to its former levels; and catches in the depleted fisheries of the Gulf of Thailand have only been maintained because an expanding trawler fleet has been fishing the grounds harder and harder.

With an estimated 70 per cent of global fish stocks "depleted" or "almost depleted", the UN Food and Agriculture Organization (FAO) — which in 1991 was enthusiastically predicting that global fish catches would continue to increase — now acknowledges: "The ocean's most valuable commercial species are fished to capacity."

It is a crisis that numerous fishing communities the world over have long foreseen and repeatedly warned against. As their fishing grounds have been opened up to the global economy — and their way of life transformed through mechanization, the commodification of labour, the devaluation of local knowledge and the need to repay loans — so fishing peoples have sought to highlight the destruction caused to their livelihoods, their environment, their communities and their identities. They have blockaded fishing grounds to prevent industrial trawlers from operating; they have opposed polluting industries; they have resisted new technologies and defended or revived proven techniques; and they have held rallies to protest against management regimes imposed by distant bureaucracies and to challenge the networks of power that have shifted control over fishing grounds to agents who owe no allegiance to any one place or community.

**Acknowledgements:** Special thanks for assistance with this special issue of *The Ecologist* go to all the contributors, in particular to Mike Hagler and Brian O'Riordan. Thanks are also due to (in alphabetical order): Gunnar Alum, Ian Baird, Herman Peralto Bouroncle, Consumer Association of Penang, Paul Durrenberger, Michael Earle, Greenpeace, Gladys Hingco, Nancy Harmo-Jenkins, Intermediate Technology Development Group, International Collective in Support of Fishworkers, George Kent, Henning Koch, Gísli Pálsson, Mark Leonard, Desley Mather, Sebastian Matthew, Kenny McCaffrey, Emma Must, NACFAR Philippines, Dave Pessel, Rodolfo Samgajon, Claire Slatter, Women and Fisheries Network, the staff of Yeovil Public Library — and Penny Ross.



Hulton Deutsch

Viewed from the perspective of inshore fishers\*, explanations that blame the fishing crisis on "too many boats chasing too few fish" are not only facile but dangerously misleading. Few deny that there is massive overcapacity in the industry. But "overcapacity" cannot be reduced to "too many boats" or "too many people" fishing. To frame the problem in terms of sheer numbers is to render invisible the deep-seated structural causes of overfishing: the patterns of consumption that fuel the international trade in fish; the pressure to meet such demand by investing in boats and gear that rapidly exhaust the available fish stocks and drive their owners into debt and bankruptcy; the subsidies allocated to bigger and bigger ocean-going industrial fleets at the expense of artisanal fishers, in the hope of bailing out ailing national fisheries; and the emergence of predatory, highly-mobile holding companies who "pulse fish" the world's waters in the same way that they play the world's markets — moving in while the going's good, pulling out when it gets bad.

Lumped together as "too many vessels" or "too many people", all fishing interests become one, their differences obscured and the conflicts arising from those differences depoliticized. Key questions are thus brushed aside: Which boats are too numerous? The three million canoes, skiffs and workboats that catch most of the world's foodfish and provide a living for about 20 million fishers and their families? Or the few thousand highly-capitalized ships of the industrial fishing corporations whose disproportionate share of the world's catch is destined as much for factory-produced fishmeal (used as animal feed) as it is for human consumption? And besides the boats and people, what about the equipment used? Can the huge nets of the highly-capitalized trawler fleets — nets which scoop

up whole shoals of fish — be equated with the hooks and lines of artisanal fishers? And further, who gives who the right to fish which fishing grounds? Who should manage those fishing grounds for whose benefit?

### Whose Public Resource?

For the estimated 100 million people — men, women and children — who depend on fishing for their livelihoods, such questions are no mere hairsplitting. Governments in both North and South are reasoning that if "too many boats/people are chasing too few fish", then what is needed is to reduce the number of boats and the numbers of fishers: to that end, they are drawing up plans to "decommission surplus capacity", scrapping boats and making fishers redundant. The European Union is expecting to decommission some 40 per cent of its fishing vessel capacity; the Malaysian government is in the process of halving the numbers of its inshore fishers; while the Canadian government is looking for other employment opportunities for its 35,000 recently laid-off fishworkers.

Almost invariably those who are made redundant are those whom the authorities deem the most "uncompetitive" and "inefficient" — which usually means those who catch the *least* fish. This in turn often means those who are most dependent on fishing for their living and least integrated into the global economy. In the UK, the survivors of this restructuring will be those fishermen and companies who have amassed the most "track record" and quota. The Malaysian government, while cutting the number of inshore fishers, is planning to expand the industrialized deepwater fishery. In Canada, managers of Fisheries Products International, the parastatal corporation that owned much of the deep water fleet, are not being "retrained for new jobs", but are turning their attention to the fisheries of regions such as Russia and South-East Asia. Cutting the number of boats and people, whilst simultaneously increasing the size and efficiency of the remaining boats, will not reduce fishing effort in relation to the number of fish available.

In the face of such criticism from fishworkers and others, policymakers frequently justify restructuring by reference to the so-called "Tragedy of the Commons". Because fish stocks are owned by no one, it is argued, there is little or no incentive for individual fishing interests to conserve them, resulting in a "free-for-all" that leads inexorably to their overexploitation. The solution, it follows, is to impose property rights, either by limiting access to fisheries through licences, or better still, by

\* The activities associated with catching, processing and marketing fish have historically been culturally gendered. In most fishing societies, this was reflected in the language — in English, for example, the men who fished were "fishermen", whilst the women who were engaged onshore in fishery-related activities were "fishwives". More specifically, both women and men were often described in terms of their principal role in the fishing economy — thus "riggers" were the men who looked after the ship's rigging and "gutting quines" (in Scotland) were the women who gutted the fish.

Such subtleties of language have largely been lost or the terms (such as "fishwife") become derogatory. The words that remain — "fishermen", "fisher", "fishworker" — either render the role of women in the community invisible or fail to distinguish between very different interest groups within the industry. We have attempted to be as specific as possible in our use of language. Where referring to men who fish, we have generally used *fishermen*; where referring to men, women and children engaged in fishing, we have used *fisher*. *Fishworker* has been used to mean "anyone involved in the fishing industry". We have, however, also tried to take account of the preferred terms in the communities being discussed. "Fishermen" tends to be the term most employed within fishing communities in the North to refer to those who catch fish; "fisher" is its corollary in the South.

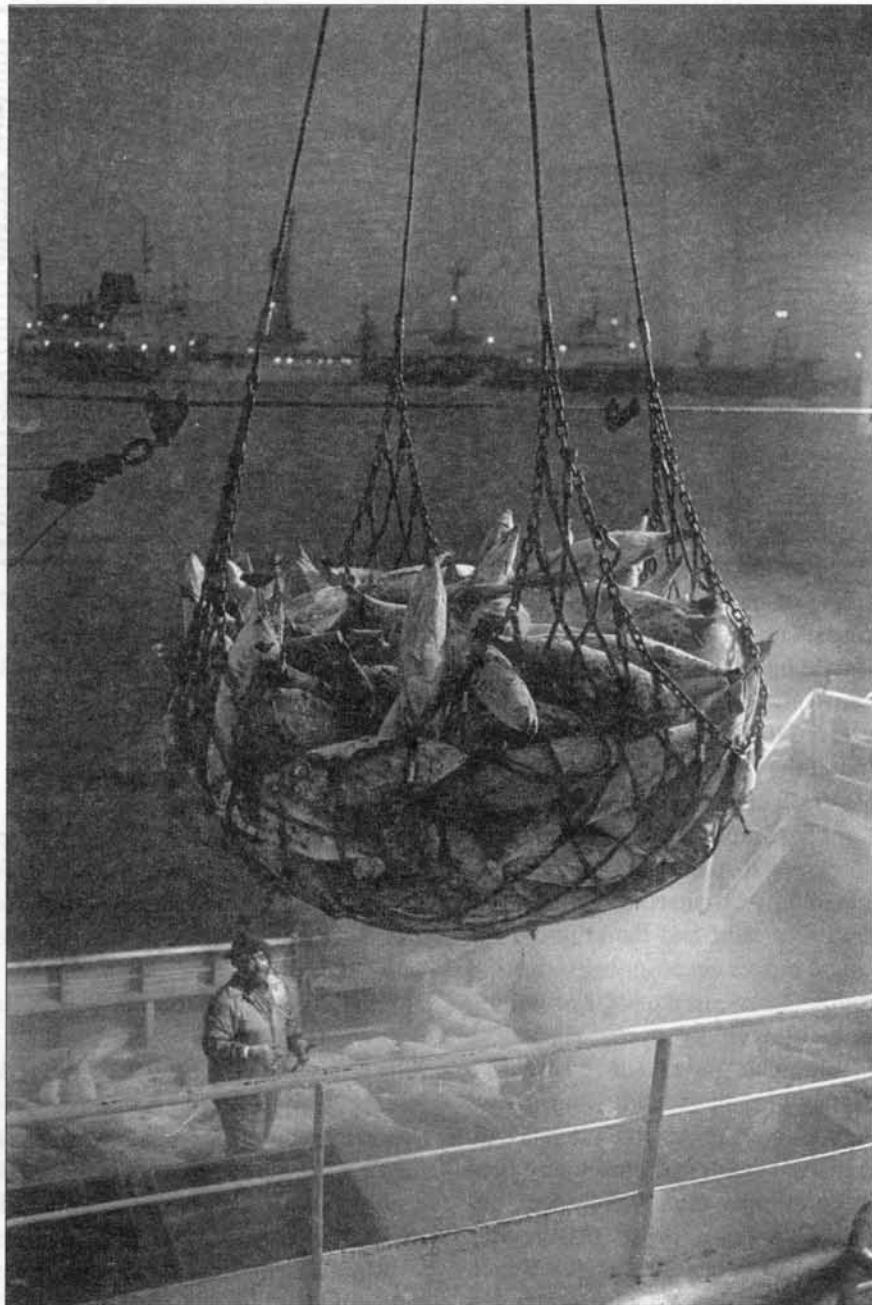
allocating title deeds to predetermined quantities of fish in the form of "individual transferable quotas" (ITQs). The discipline of the market — a market not of freshly-caught fish on the slab, but of scientifically-estimated stocks still swimming in the sea — will weed out "inefficient" skipper-owners and deckhands in the North and replace them with a "professional" fishing force of full-time "*bona fide*" fishermen, versed in the arts of log-book keeping and quota management. It is a policy also aimed at thinning the ranks of subsistence artisanal peasant fishers in the South to develop what the World Bank envisages over 15 or 20 years will become a new generation of "modern entrepreneurs". It is a familiar recipe and one that has already been applied in other sectors of the global economy: a programme of rationalization, redundancy and privatization.

## A Tragic Fallacy

But the "Tragedy of the Commons" view is based upon a fallacy.

Coastal commons have only rarely been a "free-for-all". Small-scale skipper-owners and artisanal fishers, when their fishing grounds have not been taken over by forces beyond their control, have frequently proved to be more than capable of managing their fisheries sustainably, and have often done so through successive generations for centuries. Throughout history, and in many places still today, coastal fishing grounds, which supply the bulk of the world's fish, have been subject to a multitude of community regulations stipulating who should fish where and when, and with what fishing gear. In most of these commons, access has been controlled by the community; rules concerning access and effort have evolved over generations as participants in the fishery have learnt, through trial and error, what their waters will and will not tolerate.

The "open access" to coastal waters that economists erroneously portray as characteristic of the commons has, in fact, resulted from the devaluation of such local knowledge systems and the dismantling of community control through market



*In the South African harbour at Cape Town, deep-frozen tuna fish is loaded from a Taiwanese fishing-vessel to a ship which will take the fish to a Japanese cannery in Puerto Rico.*

forces and outside investors whose commitment to the marine environment and to fishing as a way of life is only as deep as the profits that can be made from their exploitation. Access to the seas is now determined by access to capital, rather than by membership of a community. It is "open" in the sense epitomized by the British deepsea trawling industry's advertising slogan: "Anyone can buy a trawler and go fishing — if he's got the cash."

Moves to privatize fish stocks through property rights serve simply to reinforce this process. Small fishers without the "track record" or cash needed to accumulate quotas will lose their stake in the fishery and be denied access to the sea. Those who acquire it in this "free-for-all-who-can-afford-it" will be the powerful actors who have overinvested in the exploitation of the oceans and who are now advocating transferable quotas "because it's one way to take a public resource and use it to get them out of a bad investment."

## Chasing Too Few Fish?

If the current perception that there are "too many fishermen" needs to be clarified, then so too does the view that they are chasing "too few fish." Too few fish? For whom? And for what? To permit the world's overcapitalized fishing fleets to operate profitably? To feed the millions in the Third World who, in some areas, though not all, have seen their relatively low *per capita* consumption of fish decline in recent years? Or to supply the growing luxury market in the North, where levels of consumption of fish are on average nearly three times as high as in the South, and where some countries, notably Japan, have doubled their *per capita* fish consumption since the Second World War.

These are definitions of scarcity that are generated by social and economic expectations rather than a reflection of levels of fish stocks. A lower consumption of fish in the North would permit higher consumption in the South. A lower level of capitalization in the fleet might allow it to remain profitable.

## Too Great a Catch

The only other meaning of "too few fish" is that there are simply not enough fish left to regenerate fish stocks to former levels. But, in most instances, that is not the case. Fish will regenerate to the extent that there is a healthy unpolluted marine environment to accommodate them. Pollution is indeed a major problem and one that needs urgently to be addressed: coastal waters the world over are serving as industrial waste dumps and, in many areas, the marine environment may now be degraded beyond recovery. But fish stocks are resilient and often increase rapidly where pollution is curbed. Where they fail to recover, it is not because there are too few fish, but generally because too many of them are being caught.

This may seem to be a pedantic distinction, but consider what happens if we rephrase the cliché "too many fishers chasing too few fish" to read "too many fishers *catching too many fish*". This analysis does not automatically suggest a need for redundancies but instead raises an entirely different set of questions: Are all fishers catching too many fish? Or just

some? And if some, then who? And how many of them? What has led these fishers to catch too many fish? What pressures are they under to overfish? And how may those pressures be relieved?

Answers to these questions are not to be found in wiping out a considerable section of the industry, but in identifying the structural causes that lead some fishers to overfish; not by reference to a fashionable and erroneous theory of common property, but through detailed examination of the rise of overfishing over the last century and in the last decade.

This special issue of *The Ecologist* aims to piece together some of the abundant documentary evidence and oral testimony concerning the enclosure and overfishing of coastal commons; to explore some of the ways that fishing communities have suggested for limiting fishing effort without threatening millions of fishworkers with redundancy; and to lend support to those numerous fishing groups, North and South, who insist that the crisis of overfishing cannot be solved within a system that denies people control over the resources on which their livelihood depends.

## Glossary

### General

#### *Artisanal fishing*

Subsistence or small-scale fishing. Generally carried out in small, open boats (traditionally canoes and similar craft) which are now often motorized, using simple nets and lines. Artisanal fishers provide the back bone of fisheries in most countries of the South, contributing significantly to local food security, employment and income.

#### *Commercial Fishing*

Non-subsistence fishing. Most commercial fishers work from relatively small mechanized trawlers, driftnetters and liners. Generally owner-operated, catching fish for both local and distant markets.

#### *Industrial fishing*

In fisheries parlance, fishing for fishmeal species, but used here to cover any highly-capitalized, technologically-advanced fishery.

#### *Fishworker*

Any man, woman or child engaged in the fishing industry — whether as crew member, small fisher, processing worker or fish seller.

### Acronyms

#### *CFP*

The Common Fisheries Policy of the European Union.

#### *EEZ*

Exclusive Economic Zone. Areas, normally 200 miles, around a nation's coast where the nation has full jurisdiction over fishing rights, as defined in UNCLOS (see below).

#### *ITQ*

Individual Transferable Quota. Permits owned by individual fishermen allocating a given quantity of fish or percentage of the TAC (see below).

#### *MSY*

Maximum Sustainable Yield. The maximum number of fish that fishery biologists consider can be removed every year from a fishery without stocks diminishing.

#### *TAC*

Total Allowable Catch. The amount of fish of a given species that fish management ordains can be caught in a given fishery in one season.

#### *TURF*

Territorial Use Rights in Fisheries. The allocation of territorial rights over a fishery to fishing communities.

#### *UNCLOS*

United Nations Convention on the Law of the Sea, signed in 1982, which allocated EEZs stretching 200 miles from the coast. Became international law in 1994.

### Fish Management

#### *By-catch*

Untargetted fish or other wildlife caught and often discarded by fishermen.

#### *Demersal Fish*

Fish that inhabit the lower regions of the sea.

#### *Pelagic Fish*

Fish that swim near the water's surface.

#### *Inshore Fishing*

Working within a few miles of the coast in shallow waters.

#### *Offshore Fishing*

Working up to 200 miles off the coast but still regionally based.

#### *Distant Water Fishing*

Working hundreds or even thousands of miles away from a boat's home port.

### Fishing Gear

#### *Driftnetting*

A form of pelagic fishing where very long nets are left floating in the water to catch whatever fish may swim into them.

#### *Gillnet*

A net with a kind of mesh designed so that fish get caught in it by their gills.

#### *Longlining*

Fishing with the use of lines up to 10 miles long with many hooks attached.

#### *Setnet*

A net fixed in the water, usually close to the shore.

#### *Seine*

A net that hangs in the water and is used to encircle fish. A purse-seine tightens up around the enclosed fish like a purse.

#### *Trawling*

A form of demersal fishing where one or two boats pull a large sock shaped net over the sea bed, or through mid-water. In North America known as "dragging".

# The Politics of Overfishing

Simon Fairlie, Mike Hagler and Brian O'Riordan



Peter F. Anson

*Three interlocking processes underlie the history of intensive overfishing that has brought the world's fisheries to the brink of biological and economic collapse: the enclosure of local fishing grounds; the creation of global markets for fish; and the build-up of industrial fishing fleets. Fishing grounds which were managed by local communities, often for centuries, have been prised open to the global economy and laid waste by over-capitalization, rampant overfishing, boom and bust cycles, debt and redundancy. The solutions now proposed by apologists for centralization and industrialization are to privatize fish stocks and to cut fishing fleets by weeding out the "inefficient" fishers that are least to blame for overfishing. Local fishing communities around the world are voicing alternative measures — for example, restricting technologies and bringing fishing grounds back under community control.*

## I FISHING THE COMMONS

**"THIRD FISHERMAN:** Master, I marvel how the fishes live in the sea.

**FIRST FISHERMAN:** Why as men do a-land — the great ones eat up the little ones."

William Shakespeare  
*Pericles*

There are still shrimp in the waters off the Pacific Coast of Mexico — though considerably fewer than there were 50 years ago.<sup>1</sup> For many coastal fishing communities, however, the shrimp may as well not exist. They are banned from harvesting them by a government fearful there will not be enough juvenile shrimp for subsequent catches for the export market. As a result, the local coastal communities dread the summer shrimping season. As anthropologist James McGoodwin reports:

"Local food supplies dwindle, adult community members become irritable and restless, the incidence of violent crime increases, and some children eat dirt or sand to allay the gnawing hunger in their bellies."<sup>2</sup>

Meanwhile, the surrounding estuaries and lagoons teem with shrimp. Local fishers who brave the soldiers deployed to guard this "national patrimony" against "internal pirates" risk fines and imprisonment should they be caught "poaching".

### Managing the Commons

Such processes of expropriation are familiar to coastal communities the world over as their fishing grounds have been transformed into resources for the wider economy. These communities have long managed their fishing grounds for local needs — devising a wide variety of methods for deciding who has the right to fish in a given place or at a given time, what fishing gear may be used, who has the right to trade or eat the fish which are caught, and which species may be caught at what times of the year.

Indeed, according to R E Johannes, a pioneer researcher on conservation measures in the South Pacific area:

"almost every basic fisheries conservation measure devised in the West was in use in the tropical Pacific centuries ago."<sup>3</sup>

Simon Fairlie is an Associate Editor of *The Ecologist*; Mike Hagler is fisheries campaigner for Greenpeace International; Brian O'Riordan is Fisheries Policy Adviser with the Intermediate Technology Development Group (ITDG).

## Commons' Rules

Coastal fishing communities the world over have evolved numerous rules — often unwritten — to regulate their fisheries. Some govern who may fish, in what season and in what areas; others stipulate what sort of fish may be caught; others relate to what kind of fishing gear may be used; and still others govern onshore activities such as processing, net-making and marketing. These rules are the outcome of perpetual observation and daily social interaction, involving not only those who fish but the many others who participate in the fishing economy from the shore. The following are just some of the many ways of regulating access to fisheries used in different communities:

- Many communities — such as the Marovo of the Solomon Islands, Moluccan coastal communities in Indonesia or Cree Indians in Canada — invest control of fishing resources in the hands of clan leaders, "fishing bosses" or councils who retain the power to decide who fishes where.
- Lobstermen in Maine have evolved an informal system of harbour gangs which operate self-proclaimed and self-policed communal territories that are defended by the use of threats or by violence, if necessary. These lobstermen have found that it is desirable, in terms of conservation, to impose a limit on the number of pots each fisherman may use.
- The Cocamilla people from the community of Achual Tpischka in the Peruvian Amazon, when they observed that their lake was being overfished by commercial fishermen from district and provincial capitals, made a rule that only subsistence fishermen should be permitted to fish the lake.

Jørgen Schytte/Still Pictures



Fishing in Mymensingh, northern Bangladesh

- In Raritan Bay in New Jersey, US, in the 1950s and 1960s, fishermen chasing perch-like fish known as porgies formed their own marketing cooperative with a system of quotas known as the "give-away" programme. Any boat that caught more than its quota was obliged to give away the surplus to less fortunate boats in the cooperative.

- Fishermen in some communities in Newfoundland and Japan decide who should occupy favoured fishing spots by holding annual lotteries for these spots administered by local fishing councils. The Japanese councils make their decisions by consensus — that is to say, they talk every matter through until there is universal agreement.

- In communities in Donegal, Ireland and amongst the Cree of St James Bay, Canada, all fishermen competing on a given day for a particularly propitious stretch of water agree to form a queue and fish in turns.

- The Kaiama community living near Lake Ou in Southern Nigeria open the lake for fishing for a two-day period only once every seven years. The date is announced beforehand on the regional radio station and the fishery is open to anyone — it is free to members of the community while outsiders pay a fee. The event, which is a source of high income both for the fishers and for the community, attracts hundreds of participants.

Sources: McKay, B. and Acheson, J. (eds.), *The Question of the Commons: The Culture and Ecology of Communal Resources*, University of Arizona, Tucson, 1987; Berkes, F. (ed.), *Common Property Resources: Ecology and Community-Based Sustainable Development*, Belhaven Press, London, 1989; *Maritime Anthropological Studies MAST* bi-annual journal, Anthropological Sociological Centre, University of Amsterdam, Het Spinhuis, OZ Achterburgwal 185, 1012 DK, Amsterdam, THE NETHERLANDS.

Among measures he lists are closure of areas, closed seasons, bans on taking small fish, provisions allowing a portion of the catch to escape and restrictions on the amount of gear. The same wide range of measures is found in other areas of the world. Ade Olomola of the Nigerian Institute of Social and Economic Research lists nine different mechanisms used in Nigeria by communities to control their fisheries, including restrictions concerning gear, area, timing and size of fish, and the

prohibition of the use of chemicals and of magic.<sup>4</sup> Such community management is not confined to the less industrialized nations. An equally long list, for instance, could be compiled of the tenurial and technical measures employed by fishing communities on the Atlantic seaboard of North America — from the Cree Indians<sup>5</sup> based around the Hudson Bay down to the inshore fishing fleets of Newfoundland and the lobstermen of Maine.<sup>6</sup>

Some of these rules and restrictions are customs which date

# "Fish for the Poor" Competing with Chickens

Fish has long been known as the "food of the poor". Yet increasingly, it is becoming a food of the rich. The international trade in fisheries products has been growing rapidly, at an annual rate of about 18 per cent in the 1970s and nearly 10 per cent in the 1980s, and the net flow is from poorer nations to rich ones. In 1988-1990, developed nations imported 76 per cent by weight of the food fish traded internationally — about 14 per cent of total world fish production — while developing countries imported 24 per cent. Much of the trade is in high-value products such as shrimp, tuna, squid and salmon, but fishmeal for animal feed and fertilizer is also a significant component.

While the export trade has boosted foreign exchange earnings for Third World governments, its impact on many local communities has been severe. In many countries, such as Malaysia and Surinam, exports have increased while total production has dropped, resulting in significant declines in the amount of fish available for local consumption. However, major exporting countries such as Senegal, India and Mexico have maintained *per capita* supplies despite the drain of the export trade.

*Per capita* figures for fish supplies give no indication of how the supplies are distributed. Malnutrition generally results not from a lack of food in the community but from the skewed distribution of the food that is available. The inequity results because some people are too poor or too powerless to make an adequate claim on the food that is available. In a market economy, fish products, like other foods, tend to gravitate towards those who can pay for them. Fish ceases to be seen as "food for the poor" and becomes instead a market commodity, yielding profits for those who control the market. A net gain of benefits to the nation as a whole (in terms of foreign exchange earnings, for example) can mean a net loss to the poor. In Senegal, for instance, "species once commonly eaten throughout the country are now either exported or available only to the elite."

In the period 1988-1990, Northern consumers ate almost three times as much fish per head as people in the South. Moreover, this gap is widening in many regions. In the years 1978-1988, the amount of fish eaten in Europe rose by 23 per cent and in Asia by some 27 per cent, the latter accounted for largely by a doubling of Japan's post-war fish consumption. In Africa, however, the *per capita* supply decreased by 2.9 per cent, and in South America, it decreased by 7.9 per cent.

## Competing with Chickens and Pigs

In addition to the trade in fish for direct human consumption, some 30 per cent of the world's fish catch is converted into fishmeal and half of this is exported to developed nations to serve as poultry and pig feed. In 1990, the fishmeal trade amounted to about 16 million tonnes in live weight equivalent. Fish used as feed produces far less nutrition for humans than would be obtained by eating the fish directly. Moreover, while the "low quality" fish used for feed is most likely to be consumed by poor

people, the pork, chicken or other products that result from the use of the fish for feed would otherwise probably be consumed by richer people. Using fish as feed thus redirects fish from the poor to richer consumers. Some of the raw material that is used for making fishmeal would be welcomed by poorer people for their own consumption. Fisheries sociologist John Kearney illustrates the conflict:

"Boys from the neighbourhood near a fish processing plant in Talcahuano, Chile, jump into the backs of the moving dump trucks that carry jack mackerel the single block from the wharf to the processing plant. The boys kick as many fish as they can out of the truck before it reaches the plant, while others gather the fish from the pavement to take home or sell on street corners."

Poor people are, in effect, in competition with livestock for low-quality fish products. The substantial profits to be made from raising pigs and poultry assures that it is the animals which win that competition. However, given the large quantities of fish that are discarded as by-catch, under judicious management it should be possible to provide edible food for the local poor while maintaining a profitable fishmeal industry from the genuine waste.

## The Lion's Share

The new law of the sea as set out in UNCLOS has affected the worldwide allocation of fish in two stages. First, with Exclusive Economic Zones (EEZs) extending everywhere out to 200 miles from the coastline, developed countries gained larger increases in jurisdiction over fishing grounds than developing ones. For instance, five developed countries — the US, France (through its island protectorates), Australia, New Zealand and Japan — now between them control 33 per cent of total EEZ area.

Second, because UNCLOS mandates that "surplus stocks" in an EEZ be made available to fleets from other countries, many developing countries which do not have the capacity to exploit their EEZs fully are licensing foreign vessels to fish in their waters — the catches are counted as being of the countries whose flags these vessels fly. Overall, more than a third of the fish caught off the West African coast, for example, is now taken by foreign fleets. Such licensing results not only in the effective export of fish but also of jobs.

The worldwide competition for the world's fisheries is depleting fish stocks and steadily increasing prices. Under these conditions, the fish that remain tend to move away from the poor towards the rich. For many people, the impact of declining fisheries amounts to little more than an inconvenience — they can get their food and protein elsewhere. For those who depend on fish in their diets, however, the prospects are ominous.

George Kent

A full copy of George Kent's article "Fisheries, Nutrition and Nutrition Rights" is available from the author, Department of Political Science, University of Hawai'i, Honolulu, Hawai'i 96822-2281, USA. Fax: +1 (808) 956 6877.

back to a time beyond recall; others are more recent responses to changes in conditions in the fisheries. In some cases, their main purpose is to prevent other fishers gaining access to the stocks; in others, the aim is to prevent conflict or to distribute the benefits of the fishery equitably; and in still others, they are a direct response to the threat of stock depletion.

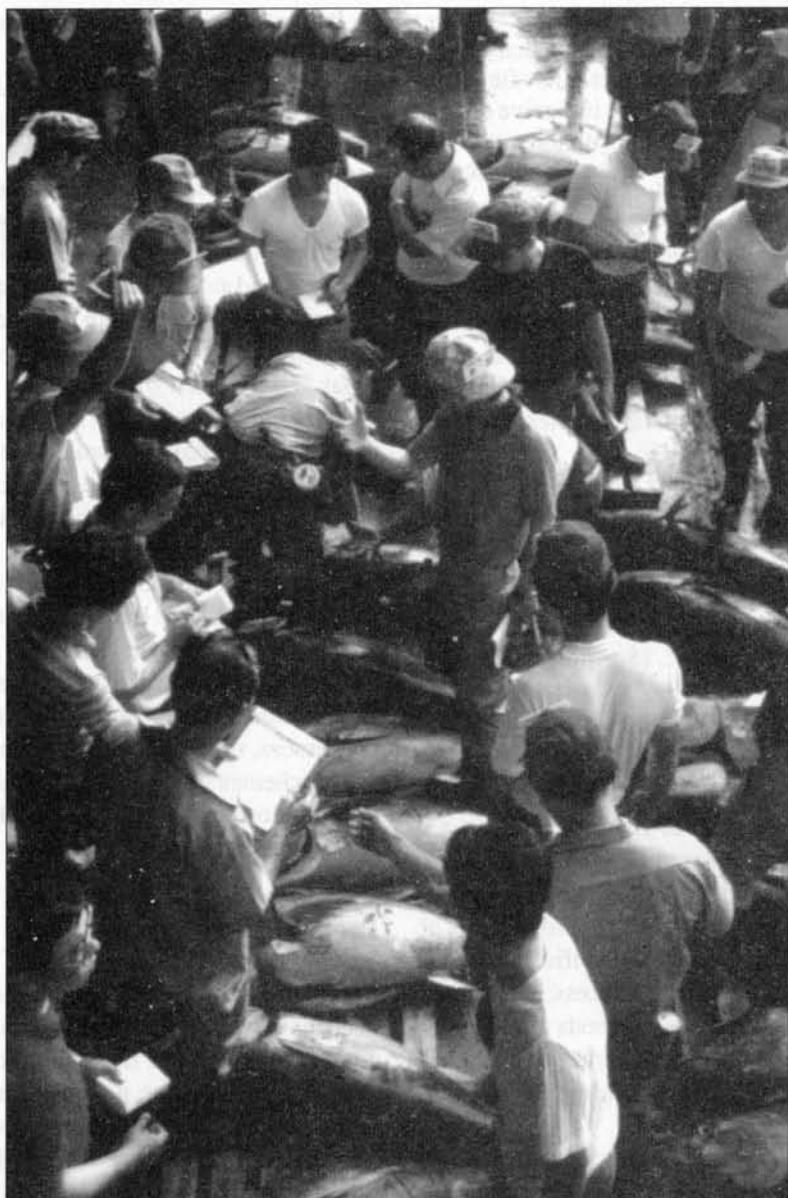
Even today, over half the fish eaten in the world is estimated to come from such inshore marine "commons",<sup>7</sup> with men largely being responsible for catching the fish and women and children for marketing and processing it. Indeed, as the World Resources Institute notes:

"In the majority of tropical Asian countries, artisanal fisheries contribute more than 50 per cent of animal protein intake."<sup>8</sup>

Besides providing fish for local consumers rather than the international market, artisanal fisheries are labour intensive, thus helping to alleviate the chronic rural unemployment that has often accompanied the development of coastal areas. Moreover, they require small amounts of capital; are extremely fuel-efficient; have a direct interest in the sustainability of their fish stocks, since they cannot move their fleet or capital elsewhere; and discard virtually no usable fish.

## Occupational Pluralism

Despite these attributes, coastal commons have long been viewed as an obstacle to "progress" by fishery administrators and economists. One reason lies in their relative independence from the market economy and the limits which their way of life itself places on their "productivity". Thus, in contrast to present-day commercial fishing fleets which are driven by the need to catch as great a tonnage as possible of a certain species of internationally-saleable fish, small-scale fishers are more likely to be interested in securing only sufficient numbers of a variety of different species to provide for local or subsistence needs.



Alex Olah/The Environmental Picture Library

*Bluefin tuna are now so overfished that at the daily auction in Tokyo, it is not unusual to see a single specimen sell for \$30,000. A few years ago, one giant sold for \$83,500. Only a tiny percentage of the Japanese can afford to eat good "toro" which costs about \$75 for two bite-size pieces.*

Traditional fishing economies — where fishing is rarely the only means of livelihood — are also seen as standing in the way of the development of highly-capitalized and technologically-advanced fishing fleets, crewed by an elite of professional, full-time "bona fide" fishermen. After all, many small-scale fishers are part-timers, standing (in the words of a Swedish saying) with "one boot in the boat and the other in the field".<sup>9</sup> More than one observer has commented that in Pacific Island communities such as Vanuatu and Marovo, "almost no one is willing to be a 'full-time anything'.<sup>10</sup> Women for example, may tend family farms, where their husbands or sons also work when not at sea; women are also invariably involved in craft production, in addition to processing and marketing fish.

Within fishing communities, such occupational pluralism has a number of advantages. Pursuing more than one occupation — be it as a farmer, boat builder, industrial worker, rope-maker, lumberjack or crafts artisan — helps to spread the risks of fishing. A small acreage of

land or a second occupation gives a fishing family something to fall back on when the weather is bad or when fish stocks fall.<sup>11</sup>

When a fishing community spreads the risks in this way, the risks are also spread for the fish. Whereas a dedicated commercial fishing fleet tends to find ways of increasing fishing effort when fish are scarce so as to maintain catch levels, maritime or riverine peasants are more likely to turn their hand to other occupations until the fishing picks up. In this respect, the lack of technological ability to overfish may sometimes be rooted in the lack of any *need* to overfish. Not only is there little reason to get tangled up in profit-seeking fisheries development schemes or to embrace new technologies that would increase production at the expense of the community's security. There is also every reason to avoid such schemes. As Swedish fishery expert Orvar Löfgren notes of Scottish peasant fishers in the 19th century:

"The fisherman's reluctance to increase production for more distant markets may well be a highly rational strategy ... New, more highly capitalized technologies demanded a

type of risk-taking which few crofter fishermen could afford, especially since a lack of capital meant that new equipment had to be financed with outside credit, often on unfavourable terms. A changeover to a more intensive deep sea fishery also meant greater involvement with the market, and here the fisherman's possibilities of influencing prices and other market conditions were small indeed".<sup>12</sup>

To fisheries administrators, however, occupational pluralism is equated with inefficiency and "backwardness". In 1897, for example, a Swedish fishery commissioner wrote that "the combination of fishing and farming has here, as elsewhere, paralysed the development of the two livelihoods"; twenty-two years later, an economist reporting on Scottish crofters advised:

"Specialize and separate the crofter and fisherman. Either can be made profitable if well understood. Both lead to double failure when combined".<sup>13</sup>

The prejudice against part-time fishers lives on today in the attempts by industry and government to distinguish between "bona fide" fishermen and "part-timers". (See pp.86-96).

## Dismantling the Commons

Not surprisingly, the industrialization of fishing has been accomplished by dismantling commons regimes and forcing fishers and fishworkers into the market economy. In some cases, this has been achieved through the outright expropriation of fishing grounds, as in the case of Mexico's Pacific shrimping grounds; in others, by rewriting the rules of access; and in still others, through opportunistic activities by interests attracted by a high-value commodity. Increasingly, local fisheries are being "enclosed" — overwhelmed, invaded or undermined — by other fisheries.

In Europe, the process was most pronounced in the nineteenth century, when the development of the railways, and later of refrigeration, enabled fish to become a much more widely-traded commodity. Driven by outside investors, new fisheries quickly developed. These involved bigger and more sophisticated boats and fishing gear, required good market connections and necessitated a degree of capital investment that was usually beyond the means of the traditional peasant fishing family.

As the fisheries expanded, so control over what was becoming an industry became increasingly concentrated. In Britain, fishing fleets amalgamated into large, vertically-integrated trading companies, handling all aspects of fishing, curing and marketing. By 1968, the Hull trawler industry was controlled by just three large corporations, Associated Fisheries, Ross and Boston Deep Sea. Trawlers had, in effect, become factory workers, spending long periods in a floating work camp, and then returning to their urban homes. By 1970, the number of fishing boats in the UK with a carrying capacity of more than 15 tonnes had declined to 2,142 — as compared to 41,723 in 1872.<sup>14</sup> As the vast majority of the boats that went of service were only just over 15 tonnes, a large number of small fishermen were squeezed out and numerous fishing communities deprived of their major source of income in the process — and the major North Sea fisheries were on the brink of collapse because of the build-up in the 1950s and 1960s of 100-tonne-capacity vessels.

It is a story that has been repeated in other European maritime countries. Indeed, the coastline of Western Europe is now strewn with one-time fishing villages and communities that have been forced to cease fishing.<sup>15</sup>

In the South, efforts to harness fisheries for "national economic development" have involved a similar process of dispossession, displacement and economic concentration. Encouraged by international aid agencies such as the World Bank and the UN Food and Agriculture Organization (FAO), Third World governments have sought to create modern industrial fishing fleets in order to boost their foreign exchange earnings, creating what John Kurien of the Centre for Development Studies in Kerala, India, has termed a "technological dualism" in the fish economy.<sup>16</sup> Since only a small minority — many of whom do not fish — have access to the more capital-intensive fishing craft and gear, a new class of "non-worker owner" has emerged in the wake of such modernization.

In addition, the increased costs of production to keep up with changing trends has exacerbated the dependence of many fishers on merchant-financiers, often leading to indebtedness and a gradual loss of control over the means of production. The World Bank actually advocates "explorations of mechanisms to utilize processors, middlemen and moneylenders as intermediaries in credit schemes", even though it acknowledges that "such schemes are often criticized as giving such groups an unfair advantage over the fishermen".<sup>17</sup>

## Inequities of Power

Internally, fishing communities have become divided, not only in terms of wealth but also in terms of power: those with political connections outside the community are increasingly able to circumvent the rules governing the fishing commons and to dominate the decision-making process.

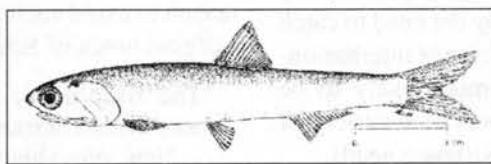
Meanwhile, the growth of international trade in fish — at one time considered to be the "protein of the poor" — has led to rapid increases in prices and to a decline in availability and quality. Following the introduction of trawlers in Kerala, India, for example, the amount of fish consumed locally declined from 19 kilogrammes per person in 1971-1972 to around nine kilogrammes in 1981-82.<sup>18</sup>

Invariably, in both North and South, such enclosure has led to overfishing. In the Gulf of Thailand, where the Thai- and Malay-owned trawler fleets have grown considerably since the 1960s, coastal fisheries are now seriously depleted. Thai trawlers are facing declining returns from continued investment (the catch dropped from 298 kilogrammes of fish per hour spent fishing in 1961 to 39 kilogrammes per hour in 1980)<sup>19</sup> and are catching an increasingly high proportion of juvenile fish which have an economic value only as fishmeal. By harvesting juvenile fish, Thai trawlers are exacerbating the problem of declining catches by catching fish before they are able to spawn.

Nonetheless, the Thai-owned fleet — which now dominates the region — has continued to expand both in numbers (from 7,407 trawlers in 1986 to 12,905 in 1990) and in size of boats.<sup>20</sup>

Like the industrial fleets from other countries, the fleet has grown into a predatory international flotilla, beyond the control of both community fisheries and (to a degree) national governments, with an insatiable demand for new fishing grounds.

Black Sea anchovy



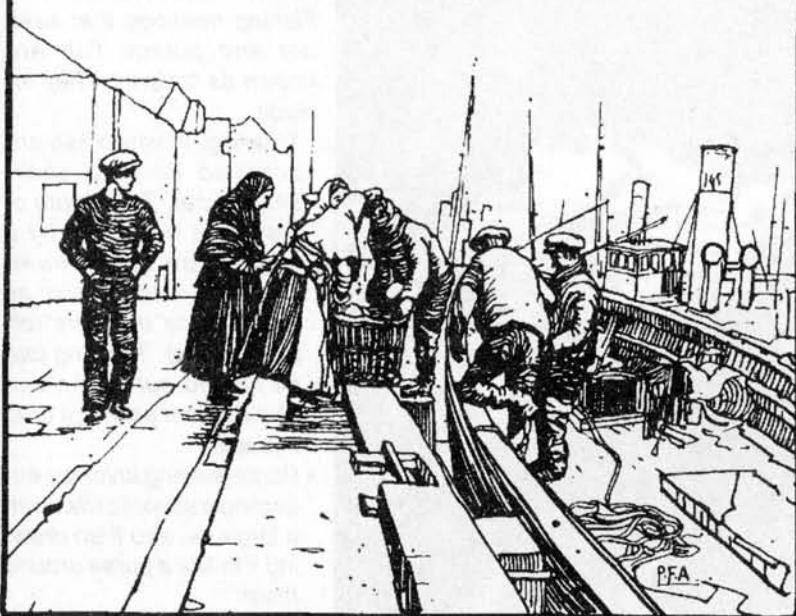
## II THE DYNAMICS OF INDUSTRIAL OVERFISHING

*"The earth was not designed to provide stock shareholders with a healthy return on investment."*

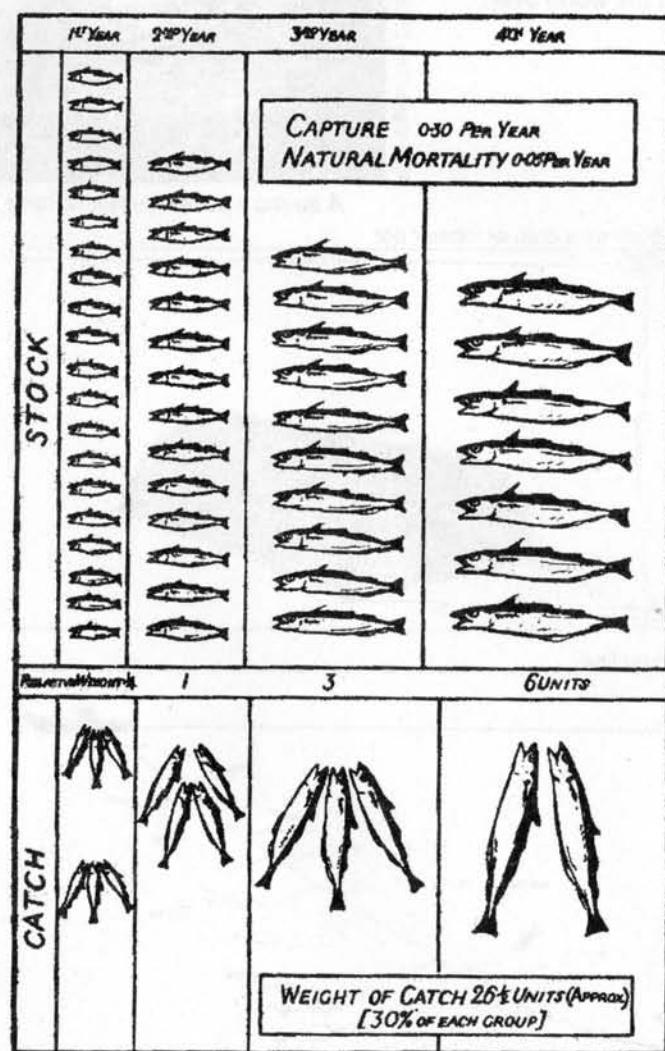
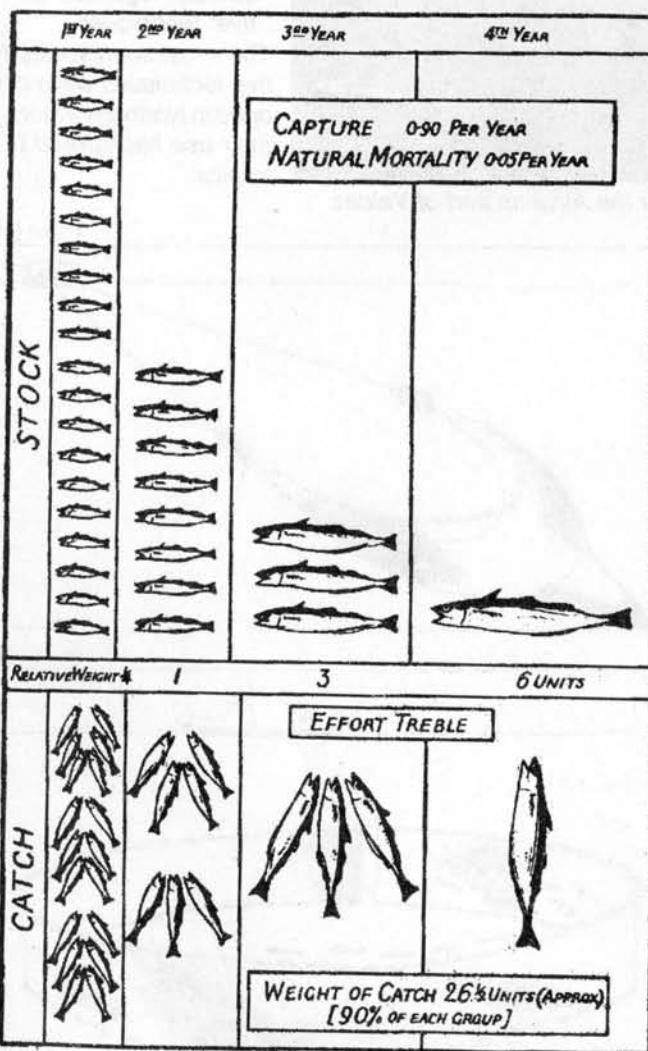
Ray Rogers, ex-fisherman  
Nova Scotia  
1992

Indeed, the development of industrial fisheries has been founded on a policy of systematic overfishing—compensating for declines in fish stocks by intensifying fishing activity. When fish become scarce, and hence fetch a better price, the dedicated industrial fishing enterprise does not relax fishing pressure to allow fish stocks to recover; instead, it invests in larger boats or more sophisticated equipment so as to fish more "efficiently" (that is, ruthlessly) or to search for fish further afield.

Peter F Anson



Michael Graham was one of the first fisheries scientists to explain the problems caused by overcapitalization in fishing. His diagrams compare two hypothetical fisheries, one which catches 90 per cent of each year's class of fish (left-hand diagram) and one which catches just 30 per cent (right-hand diagram). The fishery putting in triple the effort initially has higher catches; in the third year of fishing, however, the catches of both fisheries are exactly the same, while thereafter, the catch of the more intensive fishery declines to less than that of the 30 per cent fishery. The extra fishing effort has been wasted while the spawning stock of the fish has been drastically reduced.



Michael Graham

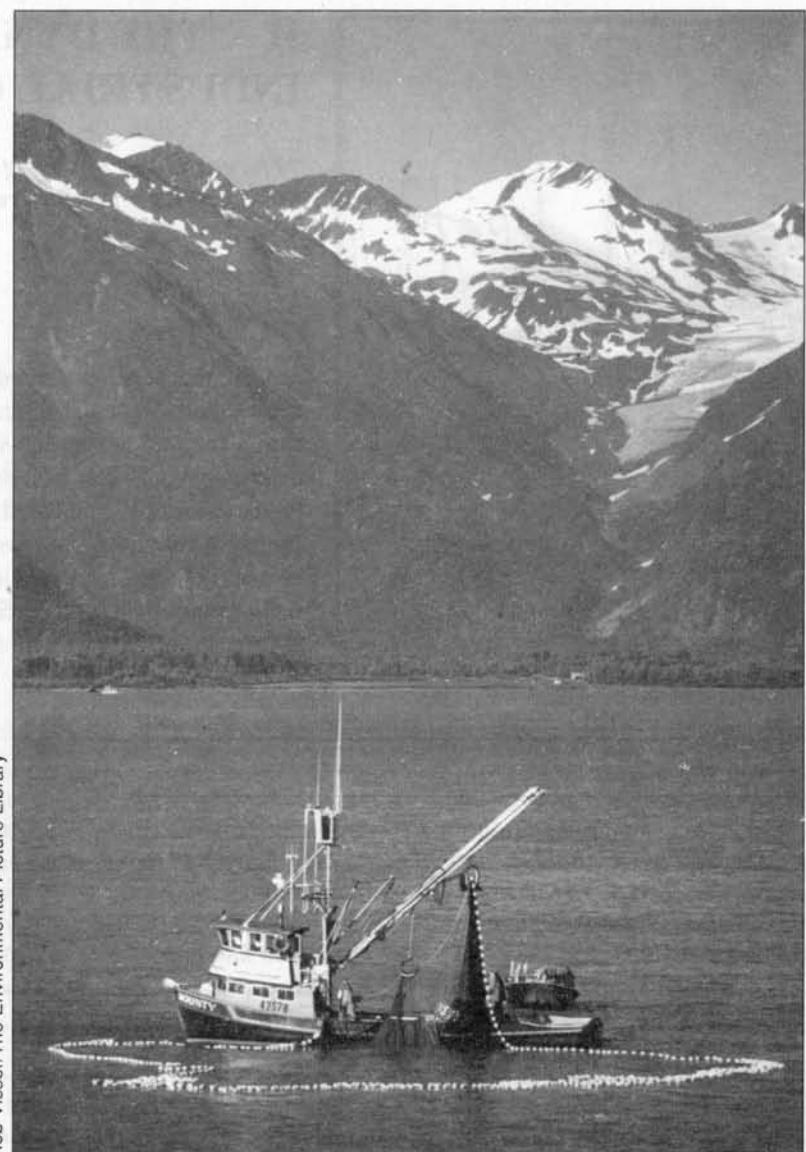
## PASSIVE FISHING GEAR

Fishing methods which rely on waiting for fish to come into contact with the gear are termed "passive".

They include:

- Pots and cages, used for catching crustaceans in particular;
- Set nets, pound nets and traps — nets fixed in such a way that fish can easily swim into them but only with difficulty escape;
- Hooks and lines — a long line can be over a kilometre in length and contain more than 400 baited hooks;
- Gillnets — nets which trap fish in their meshes by their gills. They can be either anchored (set nets) or free floating (driftnets).

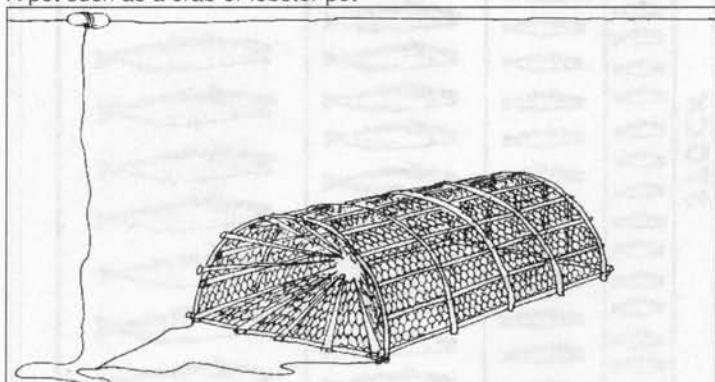
These and many other similar techniques are found the world over.



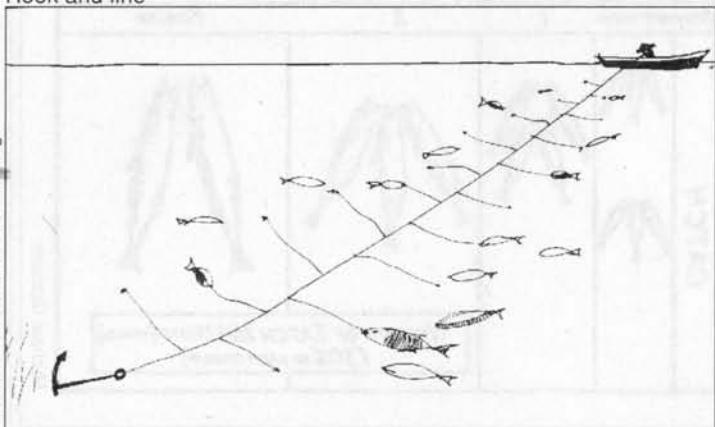
Rob Visser/The Environmental Picture Library

A salmon purse-seiner fishing near the Alaskan port of Valdez

A pot such as a crab or lobster pot



Hook and line



Consumer Association of Penang

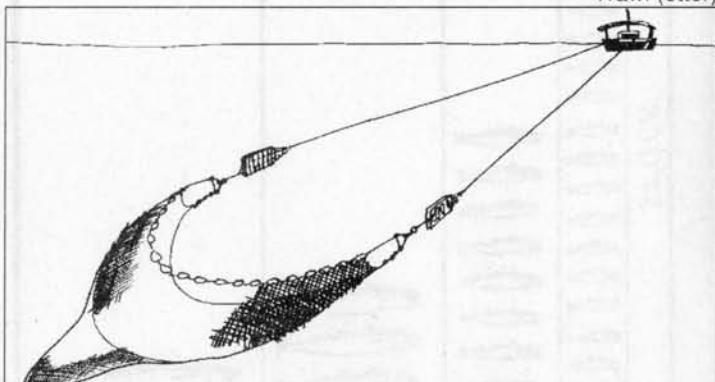
## ACTIVE FISHING GEAR

Fishing methods that seek out and pursue fish are known as "active". They include:

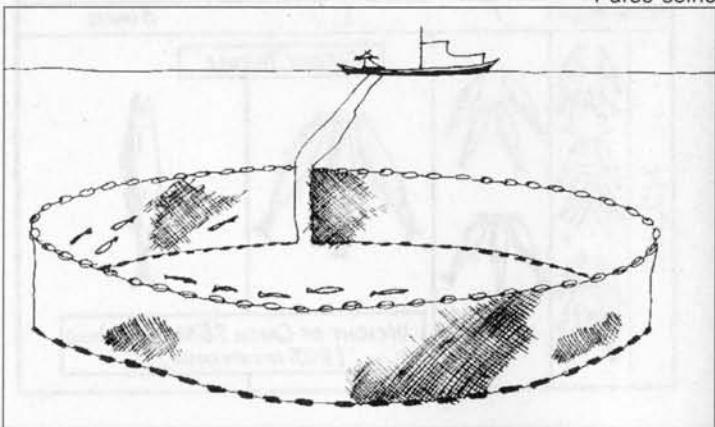
- Trawling, in which fish are scooped up in a sock-shaped net. The mouth of the net is held open by a large beam (beam trawling) or by vanes known as "otterboards" or "doors" (otter trawling). Trawling can be carried out on the sea bed (bottom trawling) or in midwater.
- Purse-seining involves encircling a school of fish with a large net and then drawing it in like a purse around them.
- Driftnetting is in theory a passive technique. But because of the sheer size of some nets — the notorious "walls of death" drift-nets can be up to 50 kilometres long — it is almost impossible for fish and other marine life to skirt around them, and so they are frequently regarded as "active" techniques.

The most sophisticated active techniques were developed in Northern waters, but their use has spread to the tropics.

Trawl (otter)



Purse-seine



In Europe, for example, by the second half of the nineteenth century, British trawlers were going as far as north as Iceland and as far south as the Portuguese coast to compensate for declining stocks in the North Sea. As these waters became exhausted as well, bigger and better-equipped fleets of boats voyaged still further afield — to the Barents Sea north of Norway and to the west coast of Greenland. By the 1960s, huge 300-foot, stern-trawler, factory-freezer ships, first developed by the Scottish whaling firm Christian Salvesen<sup>21</sup> and often operating in "packs" of two hundred or more, were "plowing the best North Atlantic grounds like disk-harrows in a field... reducing fish-stocks to a borderline point".<sup>22</sup>

In the late 1960s and early 1970s, the bubble burst. The Atlantic herring fishery declined catastrophically after 1966. A few years later the world's largest fishery — anchovies off the coasts of Peru and Chile — collapsed completely. Other fisheries such as haddock, Atlantic halibut and Atlantic cod were also showing serious signs of depletion. Meanwhile, in the early 1970s, Iceland, alarmed about its dwindling fish stocks, progressively extended its national coastal fishing zone from three miles to 200 miles, and a large number of other countries



Sandeels are a source of food for seabirds but are now being caught for fishmeal.

followed suit. The United Nations Convention on the Law of the Sea (UNCLOS), signed in 1982 and becoming international law in November 1994, formally ruled that nations had sovereign rights over all fish to be found within an Exclusive Economic Zone (EEZ) extending 200 miles out from its coastline.

Since these zones include the vast majority of the continental shelf areas, far richer in fish than the deep seas, it seemed as though the days of the distant water fleets were numbered — and to an extent they were. The UK factory freezer fleet, once the biggest

in the world and highly dependent on Icelandic waters, was disbanded and many other large ships were scrapped. In his fine epitaph to the factory trawler fleets, William Warner writes:

"Today, the most massive harvesting power in world fishing is no more. Not since 1974 have the annual armadas of one thousand or more distant water fishing vessels crossed and recrossed the Atlantic."<sup>23</sup>

Optimistically, he went on to predict: "What the decline of factory trawling has meant, therefore, is that the threat of commercial extinction no longer exists."

## Drawing on Nature's Capital

In the decade running up to the collapse of the Canadian East Coast fishery in the 1990s, there was mounting criticism of the Department of Fisheries and the Ocean (DFO) from Newfoundland's 25,000 inshore fishermen. Bernard Brown, a communications officer for the DFO describes how in earlier times, the inshore fishing communities had viewed the offshore waters as security — a form of "natural capital" which could not be drawn on; and how when they began to comprehend that an offshore fishery, sanctioned by the DFO, was exhausting this security, their view of the world changed:

"You can go back to time immemorial, there have always been fishery failures. Sometimes localized to one bay, sometimes the entire East Coast, the South Coast, wherever. The fish failed for a year or two, or even three or four. It made for tough times. When it was bad enough, government would step in with some little bit of assistance to

help people stay alive. Not on today's scale. But it really didn't mean too much because people lived off the land and off the sea anyway. But the important thing is that people understood that it was a natural thing. The fish failed. They didn't understand why. They just understood that they did. But they knew that the failure would only last for so long. The fish would come back. That was as certain as God. The fish will come back.

"So there was never despair among the people and never a reason to blame anyone for it, the government or anyone else. It was a natural thing. And of course there only was an inshore fishery. They always knew that they could not fish out the sea. They couldn't destroy the resource. And I doubt that anyone even had a concept of destroying the resource. It wasn't even imaginable.

"But come the fifties, the offshore fishery started. And it was a European fishery. The Northern cod landings peaked at something over 800,000 tonnes in the early

seventies, but over that period people began to realize — and I think it took until the early eighties before most people in the inshore knew — that an irrevocable change had taken place. That now you could have a fishery failure that was not a natural thing but caused by the fishermen themselves. Now they could have a failure and maybe the fish would not come back. And that gives you a totally different inshore community.

"They now have a new understanding of fishery failure. Instead of saying, 'Never mind; the fish will come back,' what stands between them and permanent failure is a few politicians in Ottawa... That's when it became mass criticism. Almost like a revolution. I would say that the mass criticism from the inshore that hit the DFO was qualitatively different from anything that had gone before. Almost the whole inshore rose up and said 'DFO, you're blowing it.'

Source: Finlayson, A. C., *Fishing for Truth*, Institute of Social and Economic Research, Memorial University of Newfoundland, 1994.

# The Bio-Economics of Non-Communication

In 1981, *BioScience* published a paper by Colin W. Clark, a Canadian professor of mathematics, entitled "Bio-Economics of the Ocean". The main purpose of the paper was to outline some of the policy options — Individual Transferable Quotas (ITQs), licences, territorial use rights — that, in his view, would "resolve" the "Tragedy of the Commons" (see pp.60-64). The paper is interesting because Clark rephrases the "Tragedy" as a variant of the well-known game-theory model, the "Prisoner's Dilemma", in a way that inadvertently makes the shortcomings of the tragedy theory transparent.

In Clark's model, two competing fishermen (A and B) exploiting a resource can either cooperate to conserve the resource, or else compete to extract maximum individual benefit and thus deplete it.

"Which strategy," asks Clark, "will the two exploiters adopt? First we must assume that there is no collusion or cooperation between the exploiters." From A's point of view, if B adopts a conservative strategy, A stands to gain more by depleting the resource than conserving it. But if B depletes the resource, A still stands to gain more by depleting than by conserving it.

"In both cases A's best strategy is to deplete the resource. The same analysis applies, by symmetry, to B. Hence the 'solution' to the non-cooperative exploitation game is for both exploiters to deplete the resource."

Clark does concede that there is another way of resolving matters:

"Our illustrative resource game also has a cooperative solution, with both players cooperating to conserve the resource and therefore maximize total profits. But how can this desirable outcome be achieved, given that each individual exploiter always has an incentive to 'cheat' on the cooperative solution?"

What makes Clark's paper so revealing is that, as a mathematician, he not only details the argument with some clarity, but also dispassionately ponders the potential fallacies in his construction, and then blithely dismisses them as human factors irrelevant to the arithmetical perfection of his proposition.

"We must assume," he says, in discussing his model of the fishermen's dilemma, "that there is no collusion, or cooperation, between the exploiters." And indeed, for the model to survive, we must. If the two fishermen get together in a pub and agree not to fish a certain area after a certain date, or to fish on alternate days, or not to employ a certain type of fishing gear, the model looks decidedly shaky. And if these fishermen can secure the voluntary, or even reluctant, agreement of their colleagues in the area, then the model of the "fishermen's dilemma" means nothing in practice. As anthropologist Arthur McEvoy has commented, the tragedy of the commons necessarily involves "people who do not talk to each other."

Clark's assumption that every fisher always has "an incentive to 'cheat' on the cooperative solution" is also questionable. Most people find themselves fairly frequently in situations where, in strict economic terms, it would

be advantageous to lie — but where a variety of other social pressures, such as friendships, morality, the desire for a reputation for honesty, the expectation of a parallel degree of honesty from one's colleagues and so on, compel them — by and large — not to lie.

There is no reason to believe that fishermen are any less bound by such social considerations than any other group of people. To assume that fishermen "always have an incentive to cheat", that they constitute a kind of "*homo economicus*" that is completely immune from most social pressures, is an absurd hypothesis upon which to base an analysis of fisheries.

The question of honesty does, however, figure strongly in questions of fishery policy. It is accepted that fishermen lie frequently and even consistently to fish biologists and fishery managers — the "fishcrats" as US fishermen dub them — about the quantities of fish they are catching. This dishonesty is often cited as an important factor in accounting for the notorious inaccuracy of scientific estimates concerning fish stocks — and conversely the notorious inaccuracy of scientific estimates is frequently cited by fisherman as a justification for lying about catches. In a competitive situation, skippers sometimes lie to each other. But this does not mean that fishermen will "cheat" when they perceive a cooperative agreement to be mutually beneficial. Judging from the evidence of a large number of anthropologists, they usually don't.

## Another Round of Overfishing

But overfishing did not cease — far from it. By 1992, FAO had recorded 16 major fishery species whose global catch had declined by more than 50 per cent over the previous three decades — and in half of these, the collapse had begun after 1974.<sup>24</sup> Yet the world's recorded marine fish catch rose from almost 60 million tonnes in 1974 to 86 million tonnes in 1989, since when it has declined to about 84 million tonnes.<sup>25</sup> Despite the scrapping of the Leviathans of the factory-freezer class, the number of still large and increasingly sophisticated boats competing for a greater variety of fish over a wider expanse of the ocean has grown. According to FAO, between 1970 and 1990, a period during which the global marine catch increased by about 44 per cent, the number of large fishing vessels and their

total tonnage approximately doubled.<sup>26</sup> The dynamic of overfishing — compensating for declines in fish stocks by increasing fishing effort over a wider area — has thus continued unabated.

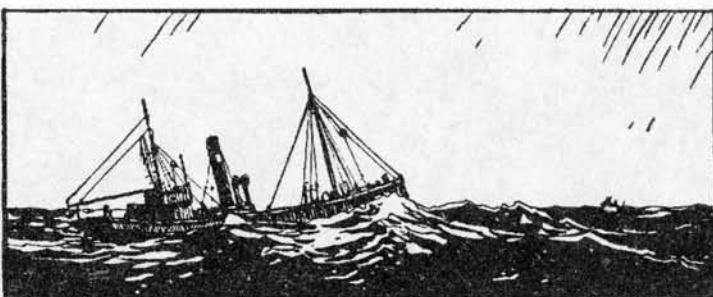
The problem of overfishing is compounded by industrialized fleets "targeting" one species of fish after another. As Pacific cod stocks diminished, attention turned in the 1980s to Alaskan pollock. Russian processing ships entered into joint ventures with US trawlers until pollock catches peaked in 1986 and went into serious decline. Other less well-known whitefish are now being fished as a cod substitute: the deepwater orange roughy (which only spawns after the age of 30 and hence takes many decades to build up depleted stocks) is now being caught in New Zealand and in the waters around the Faroe Islands (see pp.97-105). After the collapse of the herring and Peruvian anchovy

fisheries in the early 1970s, massive Norwegian midwater trawlers, capable of scooping up 500 tonnes of fish in a single haul, set upon schools of the unappetizing blue whiting in the North Atlantic.<sup>27</sup> South American pilchards and Japanese pilchards have also been heavily fished for fishmeal. Total world catches of all three of these species declined by more than 50 per cent in the years before 1992.<sup>28</sup>

With the collapse of the North Atlantic herring stocks, the Danish fishmeal industry turned to other species of small fish such as pout and sandeel, which is a food for herring, whitefish and seabirds. A 1995 EC-funded report from the Danish Ministry of Fisheries dismissed the possibility that fishing for sandeels reduces stocks of table-fish, despite warnings from North Sea fishermen to the contrary. A leading article in *Fishing News* commented that many would view the report as "flying in the face of common sense."<sup>29</sup>

But, as so often in fisheries disputes, common sense has little to do with the actions taken by the fishing industry. Trapped on a technological treadmill, which itself supports powerful political interests, investment in modern fishing is such that the possibility of *not* exploiting an available fishery — let alone disinvesting — is simply not an option. The process has been reinforced by onshore developments in processing and marketing. Investments in commercial cannneries, for example, create a demand for a minimum throughput of fish to ensure regular operations and to service loan repayments.

The resulting "ratchet effect" continues because of government subsidies and political connections enjoyed by the industry.<sup>30</sup> According to FAO, global fisheries are currently operating at a loss calculated conservatively to be \$54 billion a year.<sup>31</sup> For every dollar's worth of fish landed in 1989, \$ 1.77 was spent to earn it.



Peter F Anson

### III BRAVE NEW OVERFISHERY

*"The penetration of the oceans by the industrial revolution has only begun, and it will not stop."*

Elizabeth Mann Borgese  
International Oceans Institute

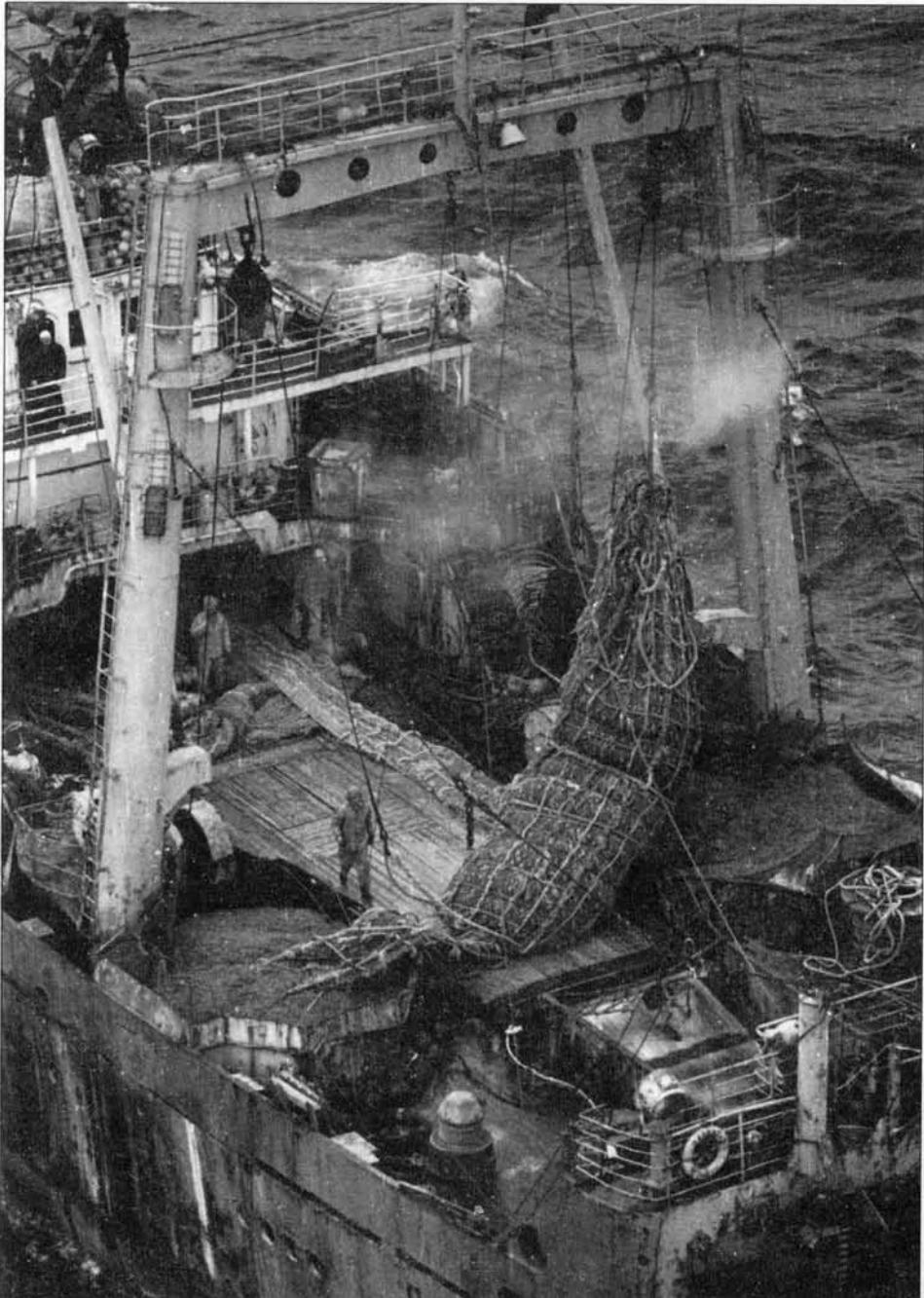
1991

The ratchet effect takes hold in the initial stages of a new fishery or fishing method.<sup>32</sup> Governments, attracted by the prospect of higher employment and more economic growth, are keen to encourage the fishing industry to achieve higher yields through further investment. After a certain level of efficiency is achieved, however, yields start to decline. Then, when fishing communities or fishery managers finally call for reductions in the catch, industry appeals to government for help or special consideration because substantial investments and jobs are at risk. Powerful financial interests apply pressure to politicians charged with making management decisions. The typical government response takes the form of subsidies, direct or indirect, which mask the real problem — the need for often dramatic cutbacks in fishing effort.

*Fish processing ships or "klondkyers" in the waters off Shetland in Scotland*



Graham Burns/Environmental Picture Library



A Soviet trawler hauling aboard a catch of krill in Antarctica near the South Orkney islands and emptying it into a hopper. Krill (*Euphausia superba*) is a shrimp-like crustacean that abounds in the Antarctic, and provides an essential foodstuff for whales, seals, finfish and seabirds. In the early 1980s, some scientists were estimating a safe harvest of krill of 50 million tonnes — more than half the world's marine catch: but others warned that krill stocks were highly unstable and that they might be threatened by the depletion of Antarctic ozone layer as well.

Only the Soviet Union fleet (and now the Russian fleet) has targeted krill. The crustaceans do not keep well and are difficult to process and market — they are occasionally used in Japan as a constituent of fish paste sausages and in Russia for low-grade fishmeal. In the last decade, fishing for krill has been dampened by the increased availability of soyabean oil and meal. But if the soyabean industry slumps for any reason, there is likely to be increased demand for "marine protein" — and krill may become a target for long-distance fleets not only from Russia but from other countries too.

## Subsidizing Overcapacity

Thus, at the very moment when fishing overcapacity has reached crisis levels, there is another frenzy of investment in global fisheries expansion and technology. While everyone from the World Bank to the Worldwide Fund for Nature (WWF) is warning that there are "too many boats chasing too few fish", bigger more efficient fishing fleets equipped with the latest technologies are rolling out of the shipyards of Germany, Spain, Norway, Korea, Japan, Chile, the US and elsewhere, either for export or to upgrade the domestic fleet.

Much of the bill is picked up by national governments in the form of subsidies to fishing companies and shipbuilders. In Japan, the fishing industry enjoys a credit balance, from government and the commercial sector combined, of some \$19 billion.<sup>33</sup> In Europe, between 1983 and 1990, EU support for fisheries rose from \$80 million to \$580 million, much of it for the construction of new vessels, modernization of old ones and for "exit grants", encouraging the export of redundant vessels to distant countries.<sup>34</sup>

Spain, for example, provides heavy subsidies to its shipbuilders to attract foreign as well as domestic fishing vessel construction projects. It recently invested \$42 million into rebuilding its distant water fleet, part of a project worth over a billion dollars.<sup>35</sup> It also cooperated with a Liberian-based company to build fifteen 105-metre-long factory supertrawlers, completed in 1994 at two Spanish shipyards.<sup>36</sup> Each of these 8,000 horse-power ships is designed to process 198 tonnes of fish a day into various products, including roe and fishmeal. A Russian fishing company has leased these sea-going factories to compete with hundreds of other vessels from several nations, all engaged in heavy, round-the-clock fish extraction and processing operations in the already depleted fisheries in the Okhotsk and Bering Seas.

Spanish shipyards also share a US\$200 million order to build and deliver 50 deep-freezing tuna and swordfish longliners in kit form to Indonesia, a country which sees fish taking over from oil and gas as one of its main sources of foreign exchange earnings. The Indonesian government has announced plans to procure over 81,000 new fishing vessels in the next five years,

*Some of Senegal's 35,000 small-scale fishworkers pull in fishing nets at Mbao. The European Community signed a fishery agreement with Senegal 16 years ago to allow EC boats to fish in its waters. Senegal now accounts for 80 per cent of the fish — primarily hake and sole — exported from African, Caribbean and Pacific countries. Senegal earns around £130 million a year in foreign exchange from fish exports, most of which services the interest payments on its foreign debt.*

*In 1992, the agreement with Senegal was renewed for two years, allowing EC trawlers — mainly Spanish, French, Italian and Greek — to take 57 per cent more fish, despite warnings that fish stocks were precariously low. Catches are already dwindling in the six-mile nearshore area reserved for small-scale fishers. The trawlers discard large quantities of fish, sometimes as much as 90 per cent of the catch, keeping only the high-value species: the discards generally die. When the trawlers come inshore, they sometimes collide with local boats, cut through nets and cause injuries and deaths. Another two-year deal has been agreed between Senegal and the EC but still has to be approved by the European parliament.*



Betty Press/Panos Pictures

for which it needs investments of over \$4 billion, of which \$3.2 billion is expected to come from foreign investors and the balance from local companies.

Ironically, these new fishing vessels are being constructed at a time when there are many boats for sale at bargain prices on the world's secondhand market, for example, in Japan, Taiwan and Russia. Secondhand Japanese and Taiwanese tuna longliners, Taiwanese purse-seiners and trawlers, and East German trawlers are selling for as little as \$1,000 per tonne hold capacity; newly-constructed vessels are six to ten times this price.<sup>37</sup> In Kaohsiung, Taiwan's main fishing port, 300-tonne-hold capacity stern trawlers less than five years old are being offered for as little as US\$300,000. Countries with ambitious plans to expand fishing capacity, like India and Indonesia, make excellent targets for the dumping of this vast fishing overcapacity by countries desperate to rid themselves of it.

Some of the assistance for this expansion of the Third World fleets is provided by development aid agencies and banks. The Canadian overseas development assistance agency, CIDA, recently helped "facilitate" the sale of 46 redundant Canadian

trawlers to Namibia, South Africa, Argentina, Chile, Senegal, the Caribbean and other Southern nations. The boats, originally owned by National Sea Products (NatSea) and Fisheries Products International (FPI), the two giant Canadian seafood corporations that played a major role in the destruction of cod stocks on the Grand Banks, are likely to wreak similar damage to fish stocks in their new destinations.<sup>38</sup>

Meanwhile, the leading fishing nations of the world plan to avail themselves of the most up-to-date technology. The brave new world of fishing will use vessels specifically designed to conduct "pulse fishing" operations — that is, hitting one area hard, fishing stocks right down, then moving on when yields drop to uneconomic levels in the hope of returning some years later if the overfished stocks have recovered.<sup>39</sup> Completely automatic trawl nets that detect electronically the approach of a school of fish and automatically pay out or retrieve warp to place the net directly in the path of the oncoming shoal are now appearing on the market. The "Gloria" supertrawl net, developed in Iceland, measures 110 by 170 metres at its mouth, large enough to swallow a dozen Boeing 747 jumbo jets.<sup>40</sup>



Chris Stowers/Panos Pictures

*A tuna cannery belonging to a Philippine/Indonesian joint venture in north Sulawesi. Women are the majority of those employed in canneries. Mechanization dictates a new rhythm of work and, by creating a demand for a minimum throughput of fish, adds to the pressure on fish stocks.*

## Exporting Destruction

The new trawlers are designed to suit the needs of an increasingly mobile private sector which is becoming adept at shifting fishing fleets in the hope of locating better fishing opportunities elsewhere. Global reach can be achieved through multilateral and bilateral access agreements between countries, commercial joint-ventures, charter arrangements and other mechanisms. These can often be secured by offers of development aid and low interest loans, or by threats of cutting off aid or denying access to markets.<sup>41</sup> The legality of the process can be facilitated through use of a flag of convenience. Moreover, UNCLOS mandates that "surplus stock" in a nation's EEZ must be made available to foreign fleets if the country itself does not exploit them.<sup>42</sup>

Thus, the European Union (EU) — while it officially aims to decommission 40 per cent of the capacity its fishing fleet — is, in fact, providing "exit grants" to fishing companies to relocate their boats away from European waters. The EU has forged contracts to fish in the waters of countries such as Senegal, Morocco and Angola, over the heads of the local fishermen in the countries concerned. Last year, the EU helped clear many diplomatic hurdles and provided grants to enable Spanish fishing companies to secure a five-year agreement providing access to Argentine fisheries for up to 70 big trawlers involving joint projects worth \$230 million.<sup>43</sup> Mario Olaciregui, president of a leading Argentinian fishing concern, Harengus SA, spoke out against the deal:

"EC grants would simply transfer the problem of idle tonnage from Spain to Argentina . . . The only beneficiaries would be Spanish banks, whose unwise loans to finance shipbuilding would be repaid with EC taxpayers' money."<sup>44</sup>

## The Multinational Purse-Net

Despite such warnings, geographical diversification and fleet mobility are key elements of the strategy now being employed by many large corporations to spread the risks of their unsustainable fishing activities. Increasingly, Northern corporations are teaming up with corporations from the South and from countries of the former USSR to build global fishing networks. The Spanish multinational seafood giant, Pescanova SA, for example, now owns a global network of some 30 companies in 18 countries in Africa, Asia, and Latin America, most of them desperate for hard currencies and job creation. Another seafood giant, Arctic Alaska (working out of Seattle and recently bought up by the world's largest chicken company, Tyson Foods, which has renamed it Tyson Enterprise Seafoods), has set up a joint venture with the Indonesian seafood company, Ika Muda, based in Jakarta, to supply two, specially-built, multi-purpose fishing vessels to fish in Indonesian waters. Ika Muda, in turn, is the parent company of another Seattle-based company, the fish processor Ocean Beauty Seafoods.<sup>45</sup> Arctic Alaska also has joint ventures in



Jimmy Holmes/Environmental Picture Library

*In communities where fishing is the main occupation — for children as well as adults — it tends to pervade social institutions, rituals, folktales and popular myths. Small-scale fishers have an intimate knowledge of the marine ecosystem they fish; many young boys have been enticed into leaving school to take to the sea.*

Russia linked to a processing contract in Shanghai. The fish is purchased in Russia, shipped to China where it is filleted and frozen, and then transported to the US.<sup>46</sup>

For the companies involved, the advantages of such joint ventures lie not only in smoothing their access to foreign fisheries but also in the possibilities of exploiting cost differences between countries. In the shrimp and prawn industry, for example, the shuttling of fish products around the globe in pursuit of "comparative advantage" is already common:

"The largest shrimp processing industry in Europe is situated in Groningen, in the north of The Netherlands. The industry imports prawns from Malaysia and Sri Lanka . . . and then takes them, along with prawns from The Netherlands, to Poland and the Baltic states to be peeled. This is for two reasons. The first is because the labour costs of women workers in these countries are much lower. The second reason has to do with the laws on hygiene and the environment, which are supposedly more lax [there] than in The Netherlands."<sup>47</sup>

Using such global networks, corporate fishing fleets have been able not only to survive the overexploitation of individual fishing grounds but to emerge with their market position strengthened.<sup>48</sup> In the late 1980s, for example, Canada's Fisheries Products International (FPI) bought less than two per cent of its fish from outside Canada. With the collapse of the cod fisheries in 1992, however, FPI lost 94 per cent of its North Atlantic fish resource. But the strong balance sheet built up

over years of unsustainable exploitation off Eastern Canada has enabled FPI to transform itself from a North Atlantic fishing company to an international seafood conglomerate. Its plants now rely for 87 per cent of their supplies of cod, pollock and flatfish on regions abroad such as Russia, Alaska and Scandinavia. FPI's revenues have jumped by more than two-thirds since 1988; it has bought two large overseas companies so as to gain access to more fish and is hunting for more. One of the acquisitions has given the company a foothold in the shrimp business, so that shrimp — most of it bought in East Asia and sold in the US — now makes up almost a third of FPI's business.<sup>49</sup>

The emergence of this new league of global players in fish stocks has serious implications for the future of the world's fisheries. No government holds its world-roving fishing companies accountable in a comprehensive manner for ecological or social damage in other countries' waters.

From the beginning of this century, when Dutch and Norwegian vessels were brazenly fishing in Scottish waters banned to British vessels<sup>50</sup> to the present-day incursions of Thai-owned trawlers into the restricted waters of neighbouring Burma and Malaysia, it has proved notoriously difficult for governments to enforce conservation measures upon foreign vessels. The increasing globalization of the world's fishing fleet and the emergence of fishing multinational companies can only serve to hinder the efforts of national governments and local fisheries to protect their fishing grounds from overexploitation.



## IV A TRAGEDY OF ERRORS

***"The assumption that common property is the same thing as open access is historically inaccurate. It also leads to arguments that restrictions on access are the only effective means of resolving commons problems, arguments that, when implemented, have led to tragedies of people dispossessed of their livelihoods."***

Bonnie McKay and James Acheson  
*The Question of the Commons*, 1987

All governments and development bodies now admit that there is a problem of overcapacity and overfishing. But their response has not been to apply the brakes to the technological treadmill, or to confront the political interests that benefit from its acceleration. Instead, they have sought refuge in a striking economic theory that masks what, in effect, is emerging as yet another round of enclosure, expropriation and redundancy.

In 1954, Canadian fishing economist H. Scott Gordon published an influential paper entitled "The Economic Theory of a Common-Property Resource: The Fishery". He argued that the fisheries were a commonly-owned resource to which all people had rights of access, and that this situation inexorably led in time to overfishing with too many fishers chasing too few fish:

"There appears . . . to be some truth in the conservative dictum that everybody's property is nobody's property. Wealth that is free-for-all is valued by none because he who is foolhardy enough to wait for its proper time of use will only find that it has been taken by another . . . The fish in the sea are valueless to the fisherman, because there is no assurance that they will be there for him tomorrow if they are left behind today."<sup>51</sup>

Thus a booming open-access fishery would inevitably attract increasing numbers of fishers until it became so overfished that it became difficult for participants to make a profit. When this occurred, the sensible behaviour for all individual fishers would be to increase their fishing effort so as to catch a higher proportion of the dwindling supplies of fish than their competitors, thus precipitating further stock declines.

In 1968, *Science* magazine published an article by Garrett Hardin which, over a short period, became one of the most cited

works in environmental literature. The essay is the copyright of the American Association for the Advancement of Science, but its title, "The Tragedy of the Commons", has entered the public domain.

Essentially, Hardin made much the same observations as Gordon, but specifically in relation to cattle grazed in "a pasture open to all" and more generally to natural resources around the world. A commonly-owned resource, he argued "remorselessly generates tragedy" since the individual gain to each user from overusing the commons will always outweigh any individual losses he or she has to bear owing to its resulting degradation.

"Ruin is the destination towards which all men rush, each pursuing his own best interest in a society that believes in freedom of the commons. Freedom in a commons brings ruin to all."<sup>52</sup>

### A Chorus of Angry Anthropologists

Hardin's thesis stimulated a debate that thrives to this day. It is hard to find a serious discussion on fisheries policy that does not either mention explicitly "The Tragedy" or else refer to the problems supposedly caused by "open access". A number of influential economists, mathematicians, scientists and fishery managers see in the thesis a neat encapsulation of the problems that face the global fishing industry.

Hardin's model, however, has been challenged as fundamentally flawed. Within academic and policy-making circles, anthropologists in particular have pointed out that far from being in a precarious state of "open access", commons regimes have always been regulated — indeed, without such regulation they would not have endured for as long as they have. In most cases, the constantly-evolving, complex systems of customary rights and duties that regulate access to fishing grounds emerge from everyday discussions, which may or may not be formalized through some kind of community council or similar arena, where problems can be raised, criticisms aired and disputes resolved.

Critics of Hardin also argue that the people described in his essentially economic analysis do not act like real people at all. Anthropologist James McGoodwin writes:

"What I find most objectionable about the Tragedy of the Commons model, at least when it is applied to the fisheries, is the cynical view of the mentality, character and personality of fishers implied in the explanation of how the tragedy develops. That view essentially assumes that as overall yields for a given level of effort dwindle, fishers inevitably develop a greedy 'take all you can and take it now' approach to the fisheries."<sup>53</sup>

McGoodwin goes on to cite fellow anthropologist Arthur McEvoy, who observes that the "farmers in Garrett Hardin's 'Tragedy of the Commons' are . . . as radically alienated from each other as they are from the grass on which they feed their cows."<sup>54</sup> As McEvoy remarks, "Hardin's commoners don't know how to talk to each other."<sup>55</sup>

Indeed, where rapid resource depletion has occurred in commons regimes, it has been occasioned, in most cases, not by brute competition *within* the community, but through interference from *outside*, most frequently from a market economy which neither recognizes nor respects the often subtle rights and

responsibilities by which the commons has been managed.<sup>56</sup> There are, few deny, sometimes Tragedies of Open Access; but many apparent Tragedies of the Commons are, upon investigation, revealed instead to be Tragedies of Enclosure.<sup>57</sup>

## Enter Quotas — Exit Fishers

Despite — or rather because of — its failings, Hardin's theory has considerable appeal for the fishery economists who increasingly "manage" national fisheries in the industrialized countries. The theory ignores the role played by market forces in the fishing crisis, placing the blame for overfishing instead upon an excess of inherently greedy and competitive fishers.

The solution, the economists argue, is to reduce the number of fishers by limiting access to fishing grounds through the

imposition of property rights. Three main mechanisms for doing this have been identified: limited entry through licensing; individual transferable quotas (ITQs) in the more industrialized fisheries; and territorial property rights (TURFs) in artisanal fisheries (*see Box below*).<sup>58</sup> These mechanisms have been adopted by the World Bank as the most appropriate means for achieving an "orderly and fair exit [of fishers] from the industry"<sup>59</sup> — and are increasingly being adopted by national governments.

The mechanism that draws the most enthusiasm from economists and corporations is a quota system — particularly one based upon transferable quotas representing stocks of fish that can be traded between fishers and fishing companies. The quota solution began to rear its head in the 1970s and almost immediately attracted the support of corporate fishing companies. In 1973, US economist Francis Christy, who had co-authored an

## TURFs

Although Individual Transferable Quotas (ITQs) are the favoured mechanism for introducing property rights in Northern waters, in nearly all the fisheries of the South, where there are many more small-scale fishers and where fishery management bureaucracies are embryonic, ITQs are not yet seen as a practicable option.

Economists following the "Tragedy of the Commons" thesis have therefore proposed instituting Territorial Use Rights in Fisheries (TURFs) into the fisheries of Third World countries. In many respects, TURFs appear to be similar to community-managed commons. US economist Francis Christy, writing in *Ceres*, the magazine of the UN Food and Agriculture Organization, observes that in some places:

"fishing communities have traditional proprietary interests in adjacent resources. Unfortunately many of these systems have broken down, sometimes due to a market economy in which short-term incentives have outweighed the costs of incurring community disapproval. In the past, both government and development agencies have misguidedly supported destruction of traditional TURFs, unaware either of their existence or their value."

The acronym (which incidentally introduces a farming metaphor) is presumably judged to be necessary because the expression "commons" has become tainted by the Tragedy thesis which (wrongly) associated commons with "open access".

Any move to revive community commons — even under

another name — is to be encouraged. However, there are two elements in the TURF approach that have to be considered with caution.

First, there is a danger in imposing artificial community solutions from the top down. After 20 years of TACs, MSYs, ITQs and the CFP, fishing communities may not be too enthusiastic about the prospect of TURFs.

Second, swayed by the Tragedy thesis, writers such as Christy consider that the crucial importance of TURFs lies in the fact that they establish "exclusive use rights", grouping ITQs and TURFs together as two facets of the same process.

This is a grave mistake. Commons systems may well involve exclusive rights — but they do not necessarily do so. Some commons are open to all comers, provided they meet certain qualifications or

abide by certain agreed customs or rules; some involve exclusive property rights; and some assign different kinds of property rights to different sets of people.

The defining element in a commons regime lies not in the structure of its property rights, but in the fact that power to manage it is embedded in the local community. It is this that encourages a long-term interest in the sustainability of the resource, and that enables people to resolve problems of equity and conservation by "talking to each other".

If TURFs are not subject to community management, they risk becoming simply another limited entry programme that favours an elite with connections to the government.



Whose TURF is it anyway?

Jimmy Holmes/The Environmental Picture Library



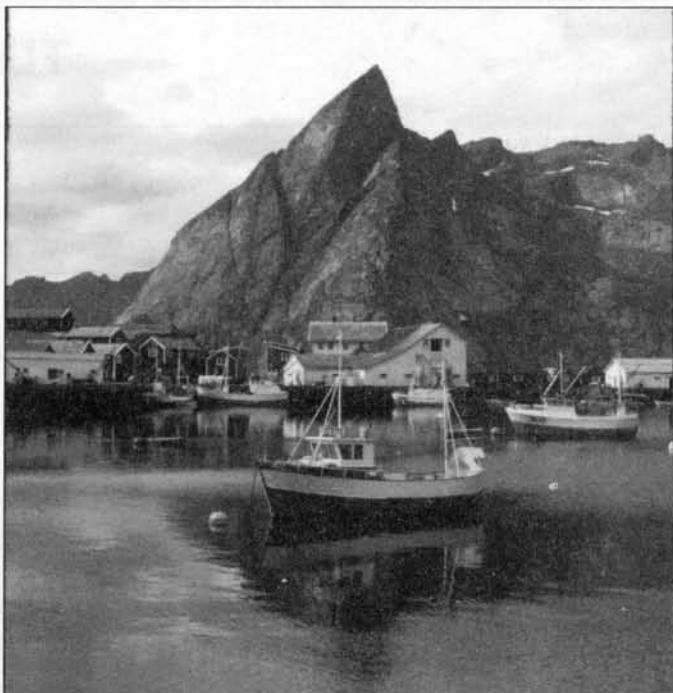
Fishing boats in the Lofoten Islands off the north-east coast of Norway, 60 years ago (above) and today (right). The fishery, which concentrates on mature cod coming down from the Barents Sea to spawn every year, is reputed to be the biggest cod fishery in the world.

The Lofoten fishery has had a turbulent history, involving two changes of management regime. A law passed in 1816 gave local landowners property rights to fishing areas which they tried to rent out at prices that many fishing families could not afford. After repeated protests, the system was abolished in 1857 and free access to Lofoten waters granted. However, this did not solve the conflicts: the fishing grounds became dominated by the largest and most powerful boats. Protests against these boats came to a head in the "Battle of Trollfjord" in 1890 when a large number of fishermen attacked a steam seiner that had blocked access to the fjord. The incident resulted in the Lofoten Law of 1897 which handed management of the fishery over to local community councils.

This co-management system, which still survives

to this day, maintains a policy of free access to the fishery, but has strict rules governing what gear may be used. Fishermen are now also protected by the 1938 Raw Fish Act which gives fishermen's cooperative sales-organizations the authority to set minimum prices.

In 1990, however, cod stocks collapsed because of overfishing in the Barents Sea; the collapse led to calls for the repeal of the Raw Fish Act and for the introduction of ITQs "with the authorities in favour and the fishermen against." But the implementation of minimum mesh sizes, more selective trawl nets and a rigorous enforcement and licensing system in the Barents Sea has helped stocks regenerate. The Barents Sea now contains the only healthy cod stock in the North Atlantic — a switch to an ITQ management regime on the Lofoten Islands has so far been averted.



Leslie Garland/The Environmental Picture Library

important work on the "failure" of the commons as early as 1965,<sup>60</sup> wrote a paper advocating "Fisherman Quotas".<sup>61</sup> This paper was published with supporting comments from Austin Laing, Director General of the British Trawlers Federation (BTF), the organization representing the cartel of Hull trawler-owners. Laing described an arrangement of "company quotas" whereby stocks of cod off Iceland were shared out between a small number of companies. He observed ruefully that the arrangement had to be registered as a restrictive practice under UK anti-trust legislation. This was a sore point with the BTF which, in the 1950s, had felt it necessary to defend its activities through newspaper advertisements declaring:

#### "Restrictive Practices in Fish — Nonsense!"

Anyone who tells you that Britain's distant-water trawling industry is a monopoly is talking through his hat. Pure undiluted bunk! Anyone can buy a trawler and go fishing — if he's got the cash."<sup>62</sup>

And cash is what will more and more determine access to the seas, should ITQs and other market mechanisms become widespread. A redistribution of resources is already taking place in the areas where ITQs have been introduced, such as Iceland,<sup>63</sup> New Zealand and the United States.

An additional danger of powerful interests accumulating quota is that ITQs are likely to take resources away from communities. Faced with a quota programme in its most important fisheries, the Alaskan native organization, Sealaska, warned,

"We will see the disappearance of traditional Native community fishing fleets as the ITQs shift from rural to urban areas and from residents to non-residents. Our experiences with the limited entry [licence] system tell us this is a certainty".<sup>64</sup>

As fisheries become "privatized", so powerful, outside interests are appropriating resources that were formerly apportioned in a more equitable manner. Indeed, the defining element of commons regimes lies not in the structure of their property rights, but in the fact that power to manage is embedded in the local community. It is this that encourages a long-term interest in the sustainable use of the resource, and that enables people to resolve problems of equity and conservation by "talking to each other". Transferable quotas have the potential to close such dialogue by removing control over resources from the community and allocating it to an inaccessible investor some 3,000 miles away, who may have no long-term incentive in protecting the resource.<sup>65</sup>

# Changing Gear

## Options for Small-Scale Fishers in the South

Of an estimated 10 million full-time and 10 million part-time fishermen in the Third World, at least three-quarters use small-scale "artisanal" technologies. Together with their families, dependents and others involved in processing or distribution, this means that well over 100 million people in the South are dependent upon small-scale fishing for some or all of their income. The contribution of this small-scale sector to employment and food security should not be underestimated. Ghana's fleet of 8,000 canoes catches 70 per cent of the country's marine fish landings, while Senegal's 35,000 small-scale fishers take a similar percentage of its national catch.

Governments and development organizations have encouraged many small-scale fisheries to modernize, offering them the promise of a higher income and standard of living. The World Bank's long-term aim is to "make modern entrepreneurs of traditional artisans" and to "integrate the individual, family and community into the national economy". Experience in the North suggests that such a policy would launch the world's remaining small-scale fisheries down a slipway leading to overcapitalization, overfishing and human redundancy.

If local fisheries in both North and South are to bypass this trajectory, they need to choose their tools carefully. New technologies involve a Faustian exchange: short-term benefits bring long-term ramifications. Fishing communities have to weigh up all of these aspects when assessing whether to adopt new technologies.

### • Higher Income

Larger, more efficient boats and technologies offer fishers the prospect of bigger profits or higher wages. This is clearly a crucial factor in a fishworker's acceptance of a new technology, though a rise in income for the few may be at the expense of employment for the many. More capital-intensive technologies may also degrade the resource base, leading to the eventual collapse of the fishery.

### • Toil

Some new technologies, notably motorization, can spare fishworkers hours of back-breaking work, such as rowing or hauling nets. This may often be worth the extra expense of the equipment and fuel costs. However these benefits are sometimes more valuable to the boat-owner than to the fishworker. Workers on mechanized boats, particularly on the high seas, can be reduced to the status of machine operators or factory hands, working for low wages under harsh and unsafe conditions that contravene international conventions on workers' rights.

### • Range

Small boats are restricted in the distance they can travel. Not only are many of them unable to cope with offshore conditions and severe weather; their low carrying capacity renders them uneconomic over a long distance because of the time and fuel spent ferrying the catch back to port. A boat fishing in the remote, icy waters of the Arctic, for example, clearly needs to be of a certain size and seaworthiness.

This is not to say that small-scale fishers cannot operate far offshore. Indigenous fishers in the Philippines, Indonesia and Thailand fish from rafts known as *roppong* anchored up to 50 miles from shore, whilst others fish waters 6,000 feet deep.

The need to travel far for fish, however, must be viewed in perspective: over 95 per cent of the world's marine catch is taken from within 200 miles of the coast. Often boats fish far from home (and in someone else's waters), only because they have overfished their own home grounds or because their EEZs, with little continental shelf, are relatively unproductive.

### • Safety

Larger more modern boats are often perceived to be safer. The risks with crew's lives taken by non-seagoing boat-owners have sometimes led crewmen to demand bigger, safer boats. However there is nothing intrinsically safe about either large modern boats or small-scale traditional craft. In Spain, the practice of lengthening boats in order to increase hold capacity is alleged to make the boats less seaworthy. There is no substitute for good design and safe practice.

Independent skippers and owners are at an advantage here: they can make decisions about safety for themselves.

### • Fuel Efficiency

FAO figures for comparative fuel efficiency group together all boats of up to 100 tonnes, which consume on average more than a tonne of fuel to catch a tonne of fish. They therefore do not reflect the fact that several million fishers in the Third World use no fuel at all; nor that a large number of fishermen using outboard motors certainly do not use a kilo of fuel to catch a kilo of fish and could not afford to do so. One Newfoundland fisherman reported that his father in a season harvested 200 tonnes of codfish from a cod-trap, using only 45 gallons (less than quarter of a tonne) of fuel.

According to British fisheries expert David Thomson, a canoe fisherman using an outboard motor may use one tonne of fuel to catch 10 to 40 tonnes of fish, while a modern trawler may use the same amount to catch three to four tonnes. The fuel efficiency for trawl fisheries for cod has been calculated at 20 calories of fuel for every calorie of protein produced, as against five to ten calories of fuel for a canoe powered by an outboard motor. Aquaculture for shrimp and Atlantic salmon uses around 50.

### • Active and Passive Gear

Small-scale fisheries tend to use passive techniques in which the gear is static (such as a set-net, a lobster pot or a cod-trap) or free-floating (such as a driftnet) and hence rely upon fish coming into contact with them. Larger-scale fisheries often actively pursue the fish with techniques such as trawling or purse-seining. However, there are exceptions. The so-called "wall of death" driftnets up to 50 kilometres long are, in theory, a passive technique.

Passive techniques are relatively energy-efficient, and so long as they are not used too intensively, they allow a proportion of the fish to escape. Active techniques, on the other hand, particularly when used with electronic fish-finding devices and navigational aids, can home in

on the last sizeable shoal of a depleted fish-stock. Moreover, as fishing techniques become more active, there is a tendency for them to become less selective; in other words, they catch more species and so involve a higher discard rate of unwanted fish.

#### • Adaptability

Small-scale fisheries tend to be more adaptable. The low cost of the gear, the proximity to the resource and the fact that there may well be alternative sources of income allow small-scale fishers to adapt to seasonal changes and fluctuations in available fish-stocks, as well as to demand. Industrial fishing boats, however, are less versatile, more concentrated upon a specific fishery — year-round "mono-species fishing". When fish are scarce in a particular location, the first strategy of a large boat is to seek them out elsewhere. When fish are abundant and the price low it will need to catch as many as it can.

#### • Market Diversity

Small-scale fisheries often serve domestic households and local and regional markets, which are reliable and adaptable. Most varieties of edible fish can be sold, so there is little wastage through by-catch. Large-scale fisheries, however are dependent upon an inflexible and centralized distribution system, reliant on large-scale processing factories and freezer plants. Processors will buy only certain target fish, so that there is a large amount of wasted by-catch. Processing firms and their plants are notoriously vulnerable to changes in supply or demand and frequently are forced to close down. Derelict processing plants are a familiar sight in many coastal areas.

#### • Community Control

The high capital costs of modern energy-intensive fishing equipment, and the need to repay the foreign exchange borrowed for such investments often mean that a proportion, sometimes all, of the fish must be exported. The supply of fish to local processors and marketers is reduced and the local economy undermined, while the fishery becomes vulnerable to fluctuations in currency values and world market prices. Where export requires sophisticated marketing or packaging, there is often a need to

import technology and materials whose value may be greater than that of the fish. For example, in canning factories in Senegal, the packaging technology, tin cans and tomato sauce are all imported.

#### • Food Security

In many poor countries, such as Bangladesh, fish constitutes a large proportion of the animal protein consumed. This fish is mainly caught in small-scale fisheries which, because they serve local markets and employ large numbers of local people, help to ensure that high protein food reaches people who need it most. When export species are targeted, the supply of fish for local consumption can be drastically reduced and prices can rise phenomenally, putting fish out of the economic reach of poorer people.

#### • Cultural Identity

Artisanal fisheries usually involve a wide variety of skills and local crafts, such as the construction of wooden boats and the manufacture of nets. Although these skills are an important element of cultural identity and provide important links between different members of the community, they are often perceived by outsiders to have little value other than as a tourist attraction. Centralized production of boats and other gear undermines local artisans and creates dependence on distant sources of supply. Once destroyed, local skills are extremely hard to revive.

#### • Gender Divisions

There is often a wide division of labour within fishing communities, with women taking on fish processing, marketing and the preparation and maintenance of fishing gear. In some areas, notably West Africa, women have become owners of gear and financiers of small fishing operations.

In an industrialized fishery, bulk purchase, mechanical processing and distant marketing are generally controlled by interests outside the community, while net-making and other traditionally female activities are taken over by centralized factories, which do employ women but at low wages and in poor conditions.

#### • Independence

Because small-scale technologies are affordable, their users can often remain independent, rather than beholden to investors or large companies. This, for some, is adequate recompense for

lower income. Highly technologically competitive fisheries very often lead a skipper/boat-owner into debt and not infrequently into bankruptcy.

### A Precautionary Approach

The considerable advantages attached to small-scale fishery suggest that fishing communities and development agencies should adopt a cautious approach to new technologies for catching and processing fish. This does not entail an ideological opposition to all new technology or a romantic attachment to "primitive" methods, but rather a careful assessment of all the effects of introducing a new technology into the community.

For instance, the sudden introduction of outboard motors to a previously sail- and oar-powered fishery may bring with it a variety of interrelated costs and benefits: relief from toil but higher energy costs; greater range but conflict with other fisheries; larger catches but increased pressure on stocks; greater financial returns but higher levels of debt; a greater or lesser degree of safety; different fishing patterns, different target fish, different markets and greater dependence on outside suppliers; a changed relationship between skipper and crew or between fishers and their families; and a host of other repercussions.

Many technologies tend to reward individualistic behaviour and confer an initial advantage upon pioneer users who choose to ignore the fact that "soon, everyone will have them." It may be that co-operative stock-enhancing technologies, such as artificial reefs or protected spawning areas, bring greater long-term benefits at less expense. The challenge is to retain or develop technologies which are not simply technologically efficient in the short term, but economically, environmentally and socially enriching for the community as a whole.

Brian O'Riordan

Sources: Thomson, D., "Conflict Within the Fishing Industry: Large-Scale vs. Small-Scale", *Appropriate Technology Journal*, Vol 12, No 3, 1985; Falke, C. & Kautsky, N., "Aquaculture with its Environment: Prospects for Sustainability", *Ocean and Coastal Management* 17, 1992.

## V THE OTHER TRAGEDY

*"The essence of dramatic tragedy... resides in the solemnity of the remorseless working of things."*

A N Whitehead  
*Science in the Modern World*  
quoted in Garret Hardin  
"The Tragedy of the Commons"

*"The human being is not in any sense the agent of choice. Let no one say that man is the agent of technological progress... He can decide only in favour of the technique that gives the maximum efficiency."*

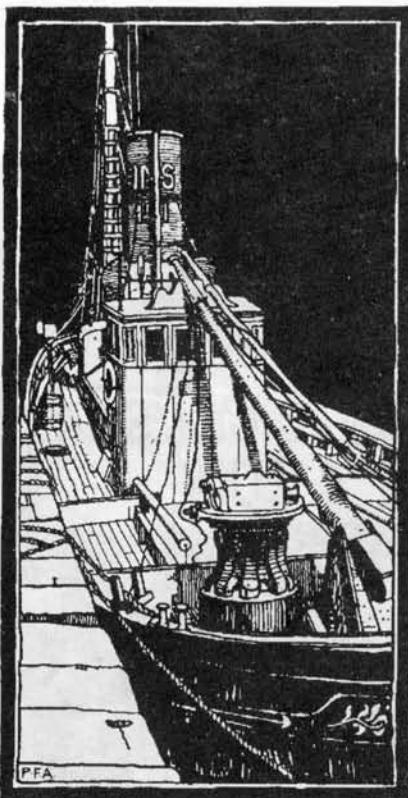
Jacques Ellul  
*The Technological Society*

The allocation of property rights is a response to the much repeated statement that "too many vessels are chasing too few fish". For "too many vessels", read "too many people". The not very hidden agenda is to cut the fishing fleet and get a large number of boats and fishermen (particularly part-timers) out of the industry. Blaming "too many vessels" for the crisis caused by overfishing offers a highly misleading interpretation. In fact, "too much fishing effort" is to blame: too many boats using too-efficient technologies are spending too much time fishing. Another resolution of this tragedy, argue many groups of fishermen and fishworkers, would be to limit the technologies rather than the numbers of people or boats fishing.

### "Soon Everyone Has It"

Fishing communities have often fought off the enclosure of their commons through resistance to new technologies that they view as destructive. In the nineteenth century, for example, Cornish and Scottish fishermen protested repeatedly against the introduction of trawlers because they "damaged the ground".<sup>66</sup> In the Lofoten fishery of Norway in 1890, handliners, gillnetters and longliners joined forces to demand a prohibition of the new seine nets, which was enacted the following year.<sup>67</sup> As late as the 1960s, Portuguese handline fishermen who had long fished in Newfoundland waters were not initially interested in modern trawler work, because they perceived that this would simply decrease the numbers of jobs available without raising wages.<sup>68</sup> After the Second World War, Scottish fishermen in Stornoway cut the lines and threw back the fish of the first ring-netters — the predecessors of the purse-seiners that were soon to mop up the last of the herring.<sup>69</sup> Crew in Indonesia, who were the recipients of various innovations from a development aid project burnt them when they realized that they were undermining the traditional social structure of the fishery.<sup>70</sup> Trawlers have been burnt or attacked by small-scale fishermen in India, Malaysia and other Asian countries. In many Newfoundland communities, until the collapse of the fishery in 1992, there was vociferous resistance not only to trawlers but also to gillnetters and seiners.

Such technological scepticism cannot be lightly dismissed as "gear conflicts", "peasant conservatism" or "Luddism". In many cases, the technology is perceived to be inequitable or socially disruptive. But sometimes commoners also recognize



that an innovation which might increase efficiency when applied to a limitless resource can be highly inefficient when the resource is limited. This paradox is succinctly explained by a Maine lobsterman, interviewed by anthropologist James Acheson, describing his misgivings concerning the replacement of traditional wooden traps with more effective and expensive metal ones:

"Everyone ought to stay with wooden traps. We'd be a lot better off if they did. The men who are now going to metal traps are better off. But they won't be for long.

Soon everybody will have the damn things. When that occurs we'll all be catching the same amount of lobsters. It will just cost us a lot more for gear."<sup>71</sup>

Here, the pressure comes not from "more people" but from more "efficient" technology. The penalty envisaged by the lobsterman (because he has confidence in the ability of the commons to control overfishing) is greater expense for no additional benefit: overcapitalization. The lobsterman's statement is remarkably similar (even in its choice of phrasing) to an observation made by British fishery biologist Michael Graham almost 50 years before. Graham had noted how, although the North Sea trawler fleet had undergone several technical improvements between the period 1909-1913 and 1928-1932, the total catch did not increase; in fact, it declined slightly. The expensive improvements, said Graham, looked foolish and he added:

"Indeed one of the strangest and most sardonic effects is on the position of the inventor. His invention is first hailed as just what is required to remedy the fallen catch per ship with the old gear. The novelty produces excellent trips of fish at first. Those who use it say, 'You must be up to date'. But soon everyone has it; and then, in a year or two, it reduces the stock to a new low level. The yield goes back to no more than before, perhaps less; but the fisherman must still use the new gear. He was better off without it; but owing to the depleted stock, he could not manage without it now. He needs the additional fishing power that it gives, in order merely to stay where he was before it came in, so he has to accept the expense."<sup>72</sup>

That is, if he can bear the expense. Yet, as Acheson points out, there is another resolution to the "metal trap tragedy" other than that foreseen by the lobsterman: that a number of lobstermen could be forced out of the industry by rising costs, leaving the resource to an elite of metal trap owners. Similarly, if the costs of trawling increase significantly while stocks remain stable, then a proportionate number of trawlers are likely to leave the industry — with no great benefit to anyone except the manufacturers of the equipment.



A Greenpeace banner at Ullapool harbour in Scotland protesting against oil pollution of the fishing grounds. Greenpeace activists recently occupied the Brent Spar oil platform in the North Sea in protest at the Shell oil company's being licensed to dump the rusting platform in the sea instead of taking it ashore for dismantling. The North Sea is one of the most polluted stretches of water in the world. Aside from industrial waste and sewage sludge from ships, estuaries and wastepipes, DDT, PCBs, zinc, copper, chromium, nickel and mercury can all be found in its waters — and thus in its fish too. Pollution levels can also be significant in farmed fish because of the high quantities of antibiotics and chemicals used in their rearing.

## The Tragedy of Technology

What the lobsterman and Graham are suggesting is that there are two potential kinds of tragedy that can occur in a limited resource. The mis-named Tragedy of the Commons operates where there is unlimited open access for people; the Tragedy of Technology occurs when there is unlimited open access for new technologies, irrespective of whether access is limited for people or not. In practical terms, the Tragedy of Technology only occurs where commons regimes are undermined and, as a result, a bureaucratic focus on what is believed to be "efficiency" is allowed to take hold. The two tragedies are thus inextricably linked.

A Tragedy of Technology lies at the root of objections, voiced by Canadian mathematician Professor Colin Clark, to a limited entry licensing system:

"A licence programme does not directly counteract the common property problem: licenced vessels still compete for a common resource . . . For example, vessel licences were introduced into the British Columbia salmon fishery in 1968, but the total fleet capacity actually increased thereafter, as small boats were progressively replaced by larger, more sophisticated vessels."<sup>73</sup>

A tragedy of technology can also occur in a situation in which

catches are limited by quotas. One of the main arguments put forward in favour of quotas is that they facilitate "more efficient techniques". Indeed, according to US economist Francis Christy:

"this freedom to adopt the most efficient vessels, gear or techniques is the most important advantage of the fisherman quota approach."<sup>74</sup>

Where quotas are fully enforced, the main advantage of any innovation is that it helps the fisher not to catch more fish, but to catch them more economically — which usually means locating and hauling in the best source of fish before competitors do. As soon as everyone has the gear, then much of the initial advantage for which the gear was bought is lost. The squid-jigging fishery in the Sea of Japan relies on very bright lights to attract squid to the boats. Vessels with more powerful lights "rob" squid from boats with dimmer lights: this explains why, from space, the Sea of Japan appears the most highly-lit area of the world at night-time. It is easy to see that this "tragedy" could still continue even if the fisher's catch were limited by quotas. The denouement of such a tragedy is that those who are slow to acquire the new technology may decide that it makes more sense to get out of the fishery by selling their quotas to another fisher who needs extra quota to justify the expense of the new gear.

## Limiting Technology

Limited entry, licensing, quotas and other restrictions upon human access to resources will do little to check the Tragedy of Technology as it remorselessly imposes new techniques upon technologically-saturated fisheries. Redundant technologies do nothing but threaten stocks or add to the expense of harvesting a finite resource and force more people out of the industry — denying ever-increasing numbers of people access to natural resources, making them redundant and breaking up communities.

Such "solutions", however, are being mendaciously presented as the only option available. Yet restrictions on technologies, particularly if enforced by commons regimes, are a practical alternative. They are, admittedly, not a high-income strategy. But they tend to distribute the benefits of the fishery equitably at a rate of remuneration that will not attract large numbers of new entrants into the industry. And they are central to the demands of many fishing groups.

For example, there have been vehement calls for trawler bans amongst many coastal fishing communities, notably in the South where the impact of trawling — a technology designed for Northern waters — has been particularly severe upon the more fragile and complex marine ecosystems of the tropics. The introduction of trawlers into South-East Asia and surrounding regions in the 1960s and 1970s sparked often violent conflict. In Malaysia, inshore fishers, having learned of the effects of motorized trawlers upon the livelihoods of their fellow fishers in Thailand a few miles to the North, burned the very first trawler to arrive and threatened the life of its skipper. In the early 1970s, the conflicts escalated, culminating in a naval battle involving some 50 boats.<sup>75</sup> In 1977, representatives of the inshore fisherfolk from nine local communities petitioned the Malaysian government to impose more restrictions upon the trawling fleet, and in particular upon those boats that could easily fish inshore waters. One of their number stated:

"The trawlers approved by the government 10 to 15 years ago are strongly opposed by the small inshore fishermen whose income is small and who use traditional nets. We should be concerned with the government's policy of too much dependence on modern science and technology . . . The root cause of the present scarcity of fish is trawler fishing. The trawler overturns the soil on the seabed and scoops up all the small fish and fry."<sup>76</sup>

In the early 1980s, the Malaysian government brought in certain measures to prohibit trawlers from inshore waters — but also embarked upon a programme of halving the numbers of inshore fishers and expanding the deep water fleet. Since then, foreign trawlers, some of them armed with automatic weapons, have continued to encroach upon Malaysian waters and local fishers have seen their catches decline.<sup>77</sup> By 1995, the Penang Inshore Fisherman's Welfare Association was calling for a complete ban on trawlers.<sup>78</sup>



Pete Fryer/The Environmental Picture Library

*At work on a small trawler in the North Sea. Trawling gear was designed for Northern waters and is used by many relatively small-scale, family-owned boats. However, beam trawling in particular has been criticized, especially by other fishermen, for its destructive effects. Academic researchers are also critical: in 1995, a report from the Netherlands Institute of Fishing Research suggested that the marine food chain was being severely disrupted by beam trawling.*

At a June 1994 conference of the International Collective in Support of Fishworkers, held in Cebu in the Philippines, over 100 delegates from 30 countries advocated a complete ban on demersal (bottom) trawling in tropical waters. They claimed that no effective management practices have been applied to trawl fisheries, and that enforcement regimes entrusted with keeping trawlers out of restricted waters have consistently failed to protect resources, the marine environment and the livelihoods of fishing communities. Besides, the main catches of trawlers are shrimp for export to the North and by-catch "trash" fish. Shrimp exports contribute nothing to the nourishment of local people, while the capture and discard of dead by-catch fish reduces traditional sources of protein for local communities and the means of livelihood for artisanal fishworkers.

In some instances, demands for trawler bans have met with success. Trawlers have been banned since 1982 from most Indonesian waters<sup>79</sup> and have been restricted, to some degree, in a number of other countries — largely because of vociferous protests from inshore fishermen. Potentially, such bans considerably enhance the power and the prestige of the independent small-scale fishing sector. Firstly, they set a precedent for the subordination of the offshore sector to the inshore sector. It is the "boundless" ocean that provides the "natural capital" for the coastal fisheries: that "capital" should only be drawn upon with great caution and with the consent of the coastal communities which derive their income from it.

Secondly, banning more capital-intensive fishing techniques such as trawling may help to provide a basis for the establishment or reestablishment of democratic local fisheries, managed by local fisherfolk, and to provide food for people who need it. The success of such fisheries shows that the project of providing access to resources and to the means of production for a large number of needy people does not have to be at odds with the protection of those resources. This is a lesson that many in the North — those who insist that the problem is uniquely one of "too many people chasing too few fish" — belatedly need to learn.

# All It Takes is a Few Rocks

## Artificial Reefs to Protect Fish

In a dance-like, effortless motion, fisherman U-sing Ji-uma curves his right leg backward to the rudder with his foot as he leans forward to synchronize the move with a hand steer. The brightly-painted traditional Muslim fishing boat swings its head away from the beach and, picking up speed, rattles towards the open sea.

Turning the boat into an extension of himself is not the only art the 41-year-old fisherman has mastered while growing up in the Muslim fishing village of Paak Baang Thephaa in southern Thailand's Songkhla province. In the village of 200 families, U-sing is the only person who knows by heart every spot in the sea in front of their village where there are undersea rocks. He is now heading towards one of them — Dase Rock, named after the first fisherman who found it generations ago.

U-sing's memory and the mountains on the shore are his map; when the third tip of the mountain on the left meets with the first tip of the mountain on the right, U-sing stops his boat. Underneath the waves is Dase Rock.

"We use this naturally rocky spot to be the base of our *uyam*," explains village leader Jeseng Yisubo, referring to a human-made fish refuge or reef, a traditional fishing aid.

"We enlarge it by adding more rocks, cement blocks and wood to the spot. Fish will come to this refuge, giving us a place we can fish. Moreover, the *uyam* prevents big trawlers from coming in close to our shore. If they do, their nets will be destroyed by the pile of our *uyam*."

Other fishermen tie a piece of rock to one end of a bamboo pole and coconut leaves to the other. The poles are then thrown into the water. Drawn down by the weight of the rock, the poles hit the seabed. The poles and coconut leaves on the surface serve as flags to mark the position of the *uyam*, while underneath the waves, the rocks serve as a refuge which attracts fish. Each *uyam* is marked by several of these coconut flagpoles to warn trawlers to keep away — or risk damage to their hulls.

The Paak Baang Thephaa *uyams* illustrate how long-overlooked indigenous knowledge can tackle modern problems. "If each fishing village builds a *uyam* in front of their village, they can serve as a barrier against these fine-net trawlers," says Jeseng, another fisherman. "It is an effective way to protect our shore, which is our livelihood."

Complaints against fine-net trawlers are common among all small fishermen along this coast. It is illegal for trawlers to violate a three-kilometre offshore zone, but lack of enforcement over the past 30 years has resulted in the coastal seas being swept clean.

As foreign income from Thailand's fish export industry grows, small fishing communities are plunging deeper into hunger and debt.

Village elder Badol Sef-assan from the village of Naa Samian reminisces over the abundance of the seas in the past.

"Before, I could just put a pot of water on the stove, go out to sea and come back swiftly with some fish to cook. It's completely different now. My children do not know what used to be abundant in my day. It's sad."

Officials complain about the lack of equipment and personnel to cope with straying trawlers. Villagers, meanwhile, complain of rampant corruption in the bureaucracy as the root cause of legal impotency. The conflicts have also stirred latent ethnic resentment in the south of Thailand, where most of the small fishing villages belong to the Muslim minority of a Buddhist country.

According to the Small Fishing Communities Integrated Development Project based in Songkhla, fine-net trawlers were first introduced to Thailand in 1961 to increase yields. From 200 trawlers in 1963, this number had increased to over 10,000 twenty years later.

Traditionally, small fishermen needed to go less than half a kilometre offshore to find their catch. The advent of fine nets has forced them to change their equipment to survive. "We need to go further out to sea to catch fish," says Badol. "We are then in debt because we have to buy bigger boats and engines."

Ironically, when the authorities recently decided to be stricter in enforcing the three-kilometre zone, it was the small fishermen who became their main target — another classic

example of how a top-down policy has gone awry because of a lack of village oversight. Says village leader Jeseng:

"The authorities should have based the rules on the types of fishing equipment, not on the distance. Big trawlers use nets that stretch from the sea surface to the ground. The nets are so big that they often have to use two trawlers to handle them, sweeping clean any area they pass. When they come near our shore, you have to wait at least four to five days before you find fish in the sea again. It is these trawlers that should be barred. Small fishermen like us make our living within the coastal area. If all boats are barred, it is the end of us."

These troubles forced leaders of fishing villages in Songkhla province to put their heads together in an attempt to negotiate with the fishery officials and the trawlers. Offering support, the Small Fishing Communities Integrated Development Project provided the fishers with a forum to analyse their problems and discuss solutions. The result was the formation of the Songkhla Small Fishermen's Group, which now has 200 members in eight villages.

"Rich trawlers have associations to speak for them. But we poor people had nothing. We figured it was time for us to do something," says Sama-ae Prasit, who was elected the group's deputy leader.

With the bargaining power of a group for the first time, Sama-ae reports that the authorities have finally promised to turn a blind eye to small fishing boats within the limited zone. The group has also appointed representatives to talk in person to owners of big trawlers.

"I told them that they are so rich that their wealth will long outlast their children. We, meanwhile, are struggling day to day. They must also think of us," says Sama-ae. Some trawlers listen; others do not. "But it's better than doing nothing," he says.

The building of a fish refuge or *uyam* is an outgrowth of the fisher group's conservation activities.



Sanitsuda Ekachai

"We were trying to find some way to cultivate more fish in our nearly empty sea. We looked back at what our forefathers did and we decided to try the *uyam* again."

Village elder Badol says it is common knowledge among fishermen that fish are especially abundant where boats have sunk. Traditional *uyam* — made mainly by piling up wood under the sea — is based on this observation. Some fishermen, he recalls, had used rocks to make these fish refuges deep in the sea. "But all of them were destroyed by trawlers. That's why we stopped making *uyam* for a long time."

Songkhla fishermen from different villages who have built *uyam* at their villages report similar results: an increase in fish and other sea life near the refuge.

"This is a true conservation method," says Badol. "We people need houses to shelter us. So do the fish. Small fish can live here without being disturbed. Squids also need shelter to lay eggs. Fish I haven't seen for a long time have come back. The *uyam* really works."

Only those fishing methods which do not exhaust fish supplies are allowed. Fine nets are forbidden. Many still feel, however, that

the *uyam* may be nothing more than the equivalent of aspirin for fishers who are afflicted with terminal cancer.

For instance, prawn farms — notorious for polluting the seas and destroying mangrove forests, a home for young fish — have been established near the villages. Fish depletion means that it is no longer possible for the younger generation to be independent fishers like their fathers. Girls leave to work in factories, whilst boys mostly end up working as labourers for their fathers' enemies — the trawlers.

As the indigenous arts of fishing disappear among young people, drug addiction has dramatically increased. Heroin use is common on trawlers.

"Eighty per cent of the fishing communities have drug problems," says Banjong Nasae, coordinator of the Small Fishing Communities Integrated Development Project. "This is the start of an AIDS bombshell in fishing communities."

Elder Badol is worried. "There are too many problems beyond our control. They need to be solved by the authorities."

Yet members of the small fishermen's group feel they are at least going in the right direction to defuse their crisis. They are confident that more *uyam* along the coast can keep their seas trawler-free, thus allowing nature to bounce back. But equally important is the process of working together which they say helps

strengthen community camaraderie. Says village leader Sama-ae

"Once again, the community is coming together to solve common problems. We have many more problems yet to solve. Our unity, however, will make our work a lot easier. The poor are weak. The only way to fight back is to work as a group. We are doing exactly that."

In the North, artificial reefs are regarded as a slightly crackpot idea by many fishery managers. But inshore fishermen frequently create such reefs by dumping waste materials such as vehicle tyres on fishing grounds to prevent trawler access. For example, fishermen have created a no-go zone for trawlers in an area off Grimsby in Britain called Showaddywaddy. Said one fisherman:

"It contains all sorts of old junk, including cars. No one will take a trawler anywhere near that area for fear of losing their nets".

Sources: Ekachai, S., *Seeds of Hope: Local Initiatives in Thailand*, Thai Development Support Committee, 409 3rd fl. TVS Building, Soi Rohitsook Pracharat-bampen Road, Huay Khwang, Bangkok, 10310, THAILAND, 1995; "Ministry Backs Reefs Made From Tyres to Protect Fish Stock", *The Guardian*, 16 January 1995.

## VI RESURGENT FISHERIES COMMONS

*"It becomes increasingly difficult to say what are practical suggestions, when one's research tends to show that what is politically feasible is usually too minor to make any difference, while changes significant enough to be worthwhile are often unthinkable in practical political terms."*

Philip Raikes  
*Modernizing Hunger*

The failure of the fishing industry is a failure of capitalism. The imperative for capital expansion and the drive for efficiency have created, in a very short time, an industry of monumental inefficiency.

Yet there is some cause for optimism in this crisis. A legion of groups and organizations representing small fishermen has grown into a movement. These groups are now beginning to form alliances with some powerful environmental and



Peter F Anson

conservation organizations, which in turn have come to realize that not only are the interests of small-scale producers not necessarily opposed to those of the environment, but that the very survival of such producers depends on their commitment to sustaining and nurturing their environment. Together these groups have come up with a wide variety of solutions and alternatives to the faltering orthodoxy of rationalization, "expert" management and technocracy.

### The Precautionary Approach to Fisheries

With the growing recognition that the existing techniques of fisheries science — Maximum Sustainable Yields and single species stock assessments — are inadequate management tools for the complex ocean environment, some scientists and environmentalists are proposing a new approach known as the Precautionary Approach to Fisheries.

The principle of the precautionary approach is to conduct fisheries activities in a manner that gives a high level of certainty that the marine ecosystem will not be upset or damaged. This principle should apply at all times, even when the stocks are abundant; to apply it only when stocks are low is a reactive response — the very opposite of precaution.

The precautionary approach is applied to fisheries in a number of ways:

- **Fisheries stocks must be maintained at levels of abundance which are not substantially below their range of natural fluctuation.**

Current fisheries management, in an attempt to maximize yields, typically aims to maintain stocks of a given species at levels well below half their original abundance. Such massive reductions in abundance can have an unpredictable effect upon the abundance of other prey and predator species, which in turn can have repercussions upon the target species.

A precautionary management objective would be to reduce fish stocks to no less than 75-80 per cent of their unfished level. At this level of mortality, predator species are less likely to be adversely affected, and so fish stocks and catches will be more stable. Indeed, annual catches from recovered stocks with a much larger number of spawning adult fish would not necessarily be any lower than those obtained from today's depleted stocks; and catches per unit of fishing effort would be much higher, leading to lower costs to the fishery with obvious benefits for local fishing communities.

- **New fishing gears and techniques must be evaluated before being introduced to a fishery.**

Most fishing gears catch unwanted fish and other species which are discarded — usually dead — by the fishery. Some gears, particularly those in contact with the sea bottom, can also cause severe disturbance to the marine habitat. To avoid these destructive side effects, fishing gears should be widely tested before they are used on a commercial scale. Those which result in excessive levels of by-catch or substantial disturbance to the habitat should not be allowed unless they can be modified to reduce these effects to minimal levels.

- **Closed areas must be established to protect the marine habitat.**

In some cases, ecological changes resulting from damage to habitat may be difficult to detect in the short-term. A precautionary approach would set aside large areas where fishing gears which might come in contact with the sea bottom are not allowed. This would also allow its recovery if it has already been damaged.

These three principles are mutually supportive. Because abundant stocks require much less fishing effort for the same level of catch, there is therefore less incentive for fishermen to use destructive and non-selective fishing methods. Similarly, large parts of the habitat can be closed with only minimal impact on the fishery.

The concept of a precautionary approach is relatively new in fisheries management, and there is enormous resistance from the fishing industry to the changes that its adoption would imply. It remains to be seen if the political will exists to divert the industry from its current destructive spiral and to put fishing on an ecological footing.

Michael Earle

**Michael Earle** is a biologist working on alternative approaches to fisheries management.

## Tools for Negotiation

Ultimately the impetus to regain community control over fisheries must come from a resurgent commons. In seeking to regain consensus control over fishing grounds, fishworker movements, environmental groups and others have put forward a number of demands to government or proposals which they hope will stimulate wide discussion. These include:

- **Precautionary Principle**

Fisheries conservation and management measures must be based on the emerging principle known as the Precautionary Approach to Fisheries (see Box, p.70) rather than Maximum Sustainable Yield (see pp.74-79). Fishing activities should be conducted in a manner that gives a high level of certainty that the risk of irreversible ecological damage is negligible, and should actively guard against market forces which continuously press for maximum utilization.

- **The Right to Fish**

The right of access to common resources for subsistence purposes should be safeguarded wherever possible, within the limits set by a precautionary approach to conservation, and with due respect for traditional use structures. The principle of equitable access for subsistence should not be sacrificed for the goal of maximizing yield for a few.

- **Nutrition Rights**

Fisheries policies should attempt to redress the gross disparities in access to food between different parts of the world and different groups of people. Nutrition rights need to be articulated more fully as regards: overall fish food supplies for the population; fish food supplies for the poor; the nutritional status of those who work in fishing. The precautionary principle should apply with respect to nutritional impacts.

- **Rights of Local Communities**

Customary marine tenure systems operating at local levels should have equal standing in national and international law with other property systems. Customary, informal and usufructuary rights should be recognized as having legal standing, even when they are not codifiable. Local fishers, coastal communities and individuals who live therein should have full and affordable negotiating rights concerning any decision that affects them, and access to affordable dispute resolution and third party settlement procedures to redress harm that may occur.

- **Knowledge**

In decision-making about the management of fisheries, the views of all interested parties — fishers (professional, traditional, indigenous or part-time), scientists, managers, inhabitants of coastal communities, processors and consumers — should be considered. The validity of vernacular knowledge systems should be recognized and no knowledge system should be viewed as politically neutral.



*Fish carriers in Goa, India, where fishers have protested for many years against the activities of trawlers with hunger strikes and huge processions*

Neil Cooper/Panos Pictures

- **Part-Time Fishermen**

The rights of part-time fishers to participate in the industry and in its management should be respected particularly in seasonal fisheries and in areas where having more than one occupation is a risk-spreading strategy, either in terms of nutrition or in terms of environmental conservation. The management of fisheries should not be consigned solely to a professional élite with specific interests.

- **Technologies**

It should not be presumed that a technology may be used simply because it is more efficient. Where use of a technology conflicts with any of the above principles, consideration should be given to restricting or banning it.

- **Enforcement**

Enforcement of conservation or other measures within a marine community or a fishery should be carried out wherever possible by members of that community or fishery. Professional conservation officers and fish managers should either be recruited from fisheries, or obliged to work for a period in the fishery.

Outlining such demands and proposals, however, is only a beginning. Without continuous pressure from fishing groups, environmentalists, sympathetic academics and all those who care about the future of coastal communities and the oceans, government and industry will be slow to accede to the demands made upon them.

Even where they do, there are further questions to be asked. Just who will be implementing these measures? Who will decide what is and what is not "precautionary"? Who will be responsible for monitoring nutrition rights or safeguarding the right of access to common waters? All too often, those in power have shown a canny ability to adopt the language of their opponents and, in so doing, to redefine it.

The above proposals should not, therefore, be viewed as indispensable prescriptions, inviolable ideals or models cast in the stone of ideology — but as tools for negotiation in the long struggle to maintain and reclaim community control over common resources.

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# Deforestation of the Deep

## Fishing and the State of the Oceans

Mike Hagler

*"We are heading into another renewable resource disaster... It's like deforestation, but you can't see it under the ocean."*

Edward Loayza

Fisheries Adviser to the World Bank

Peter F Anson



*Marine scientists do not know to what extent present levels of overfishing are causing permanent damage to the marine ecosystem. Current management criteria assume that if fishing pressure is reduced, fish stocks will rise back to former levels. But heavy fishing can have an impact on non-target species, on predator/prey relationships, on genetic diversity and on the condition of the sea floor. There is, in fact, no reason to assume that this "deforestation of the deep" will not have long-lasting affects.*

No one denies that a high percentage of the world's fisheries are being overexploited. According to the United Nations Food and Agriculture Organisation (FAO), 69 per cent of the world's fisheries are either overfished, fully fished, depleted or recovering from prior overexploitation. In the North West Pacific, all fisheries are in one of these conditions.<sup>1</sup> Yet, like many others, FAO takes it for granted that, over time, fish stocks can be rebuilt:

*"In the short to medium term, nations will need to constrain production in order to facilitate stock rehabilitation. In the case of some longer-lived demersal species and some tunas, the time required for rebuilding may take up to, or even exceed, ten years."<sup>2</sup>*

Nowhere in its latest 1995 report, *The State of World Fisheries and Aquaculture*, does FAO consider whether some of the damage being done to marine ecosystems through overfishing might be irremediable. It is assumed that, if fishing pressure is reduced, then stocks will bound back to former levels.

There is some evidence to support this theory. During the two World Wars, when fishing effort in the oceans was drastically reduced, fish stocks recovered remarkably quickly (though not necessarily to former levels of abundance). The Peruvian anchovy fishery, after its collapse in the early 1970s, has recently undergone a dramatic recovery — the catch in 1993 rose to about 60 per cent of its 1970 level.

On the other hand, stocks can and do fail to return and fisheries can die. For instance, despite negligible fishing effort over the last century, the English salmon fishery is a tiny fraction of what it was before the Industrial Revolution. And despite a moratorium in the late 1970s and early 1980s on herring fishing in the North Sea and the disappearance of the once huge herring drifter fleet, stocks are still nowhere near the levels of last century.

In other words, no one really knows to what extent fish stocks can recover from overfishing. When fishing stops, fish stocks do start to rise, but there is no guarantee that they will climb to former levels. In the absence of any reliable information, the FAO declines to discuss the matter.

Mike Hagler is a fisheries campaigner with Greenpeace International.



## Cod Moves in Mysterious Ways

The sanguine approach of FAO and fishery managers in general to the long-term implications of overfishing owes much to the methodology used to determine whether a fishery is overexploited or not. The guiding principle of fisheries management is Maximum Sustainable Yield (MSY) — the conjectural highest amount of fish that can be caught in each season without preventing stocks from regenerating. It is by calculating the MSY that the FAO has assessed that 69 per cent of the world's fisheries are heavily exploited.<sup>3</sup>

MSY is a mathematical formula derived from the science of population dynamics and based upon factors such as spawning mass, the annual recruitment of new fish to the exploitable population, and fishing effort. The assumption underlying the calculation of MSY is that if overfishing occurs, only one of the factors in the equation — fishing effort — has to be altered and everything will be put right. "Factors" such as total declines of marine biomass, marine pollution or the destruction of coral reefs, seagrass beds and other habitats vital for fish breeding, rearing and feeding do not come into the equation.

Essentially, MSY is a form of brinkmanship in which fishery managers attempt, as a matter of principle, to extract maximum yields from a natural resource, on the assumption that, if they get it wrong one year, they will be able to get right the next.

Such a scientific balancing act can only succeed if the calculations upon which decisions are based are infallible — of course they are not. A large number of errant factors continue to plague fisheries scientists in their attempts at adequate assessment of stocks. For example:

- **Misreporting.** Since most of the available information comes from the fishing industry itself, it is almost bound to be biased; unreported or misreported catches are the rule. The imposition of quotas based on MSY gives fishermen a strong incentive to discard smaller and less valuable

fish which will not be accounted for in the figures.

- **By-catch.** Fish from one species caught and jettisoned by boats targeting a different species — "by-catch" — are not usually included in any equation of the MSY for the target or "by-catch" species.
- **Time Constraints.** A longer time series of data than is currently employed, particularly with longer-lived fish such as cod, is required before a meaningful estimate of stocks can be made. "It

lives reliable MSYs. Attempts are now being made to develop more innovative models that take into account species interaction and fleet interaction. But in the view of many scientists and economists,<sup>5</sup> these intellectually appealing models may only result in adding a new layer of complexity and cost to management, with little if any benefit.

Until now, the collapse of a fishery has provided the only reliable and undisputed measure of the state of a given fish stock. In some cases, scientists have taken to issuing forecasts that are "precautionary", but these are frequently overridden



*For centuries, inshore fishermen have insisted that trawling destroys sea bed vegetation. "It destroys the flowers of the land below the water," complained English fishermen in 1376. "They takes the flowers off the rocks the fish eats," said a 20th century Newfoundland.*

will be at least five years from now before it can be known with any useful degree of probability how many fish are in the stock today," said Canadian sociologist Alan Christopher Finlayson in 1994.<sup>4</sup>

- **Species Interaction.** The population of one species may be affected by fluctuating levels of another species which is its food, or by competition from another species at the same level in the food chain.
- **Fish Migration.** It is often not known to what extent fish stocks move in and out of sampling areas and regulatory regions.

These and other factors have regularly confounded scientific attempts to estab-

by managers and politicians who set quotas higher for political reasons — thus rendering the "scientific" nature of the process even more rarefied. European Union (EU) member states, for example, regularly ignore scientific advice when setting their annual quotas: when scientists from the International Council for the Exploration of the Seas recommended a 40 per cent cut in the 1995 hake catch, EU ministers agreed to a mere five per cent cut. In the EU, as elsewhere, it seems that a fishery must be proven to be on its deathbed before any remedial action is taken. This will continue to be the case as long as Maximum Sustainable Yield remains the principal objective of fisheries management and it is assumed that the technical problems involved in making scientific assessments can be solved.

*A factory trawler fishing for pollock in the Bering Sea off Alaska discharges into the sea its by-catch, which has been ground into fishmeal.*



Rob Visser/The Environmental Picture Library

## By-Catch and Discards

Beyond these difficulties surrounding the recovery of individual species lie much deeper questions relating to the health of the marine environment as a whole. Many of these have come to the fore with the increased consideration being given to problems associated with by-catch and discards.

By-catch is captured fish that are not the target species of the fishery. Discards are fish which are thrown back because, for various reasons, they are considered undesirable; they are of the wrong species, the wrong size (usually too small but sometimes too big), inferior quality or surplus to quotas. Until recently, the complex issue of by-catch and discards was largely ignored by fishermen, scientists and managers who typically felt that they were an unavoidable by-product of fishing about which little could be done. Recently, however, it has come to be recognized that throwing fish overboard occurs on a far larger scale than many scientists had imagined and that it has far-reaching effects for the entire marine ecosystem. Annual global discards in commercial fisheries have been conservatively estimated at 27 million tonnes<sup>6</sup>—equivalent to more than one-third the weight of all reported marine landings in commercial fisheries worldwide.

A recent study from Alaska suggests that Bering Sea red king crab discards amounted to about 16 million animals in

1990, more than five times the number actually landed.<sup>7</sup> It is not yet known how many of these discarded crab (many of them juveniles) survive after they have been thrown overboard back into the sea. The economic and biological implications of these discards may be a serious problem for red king crab stock dynamics and management. In 1994, it was reported that:

“almost three-quarters of a billion pounds of fish were caught and then thrown back by Alaskan fishing boats because they weren’t what the boats were trying to catch. Fishermen say there’s so much waste because under the current management system, they are forced to rush and catch as much as they can before the quota is reached and the fishery shut down.”<sup>8</sup>

In the North Sea, according to figures published by the International Council for the Exploration of the Seas (ICES), about half of the haddock and whiting caught for human consumption is discarded every year, usually because they are too small or of an inferior quality. ICES also estimated that as many as 80 million cod may have been discarded in the cod fishery off the northern coast of Norway in the 1986-1987 season because they were too small to market. The estimated waste was almost 100,000 tonnes.<sup>9</sup> In 1986 and 1987, two billion kilograms finfish from the Gulf of Mexico were dumped overboard.<sup>10</sup>

Worldwide, the shrimp and prawn

trawler fisheries are reputed to have the highest levels of by-catch-discards of any fishery—about 16 million tonnes a year.<sup>11</sup> In some shrimp fisheries, up to 15 tonnes of fish are dumped for every tonne of shrimp landed. Most of this by-catch is thrown back either dead, dying, or likely to be consumed in its weakened state by predators.

By-catch also consists of non-commercially-fished species which may provide an important food for commercially sought-after fish or endangered fish or may themselves become endangered by being caught. By-catch thus has a serious knock-on effect, not only for commercial fish stocks, but also upon biological community structures in marine ecosystems.<sup>12</sup> The effects, however, are so complex that scientists have so far been unable to incorporate them into their models, and have done little more than highlight the magnitude of the problem and the need for more urgent measures to be taken.

To some extent, by-catch is a problem associated with more industrialized forms of fishing. Where there exist informal or multi-species local markets, particularly in Third World countries, small-scale fisheries can often sell or give away for domestic consumption a wide variety of edible fish species. Industrialized fisheries, however, usually concentrate on one particular species, and the cannery or processing ship to which they are delivering will only be interested in buying this one species. Processors often will accept

fish only of a certain size or quality. Sometimes, as in the herring-roe fishery, only a small part of a wholly-edible fish is considered marketable, the rest being jettisoned or turned into fishmeal.

However, while the commercial market is selective, most kinds of industrial fishing gear are not. A standard commercial trawl net designed for cod, for example, can catch anything from a shrimp to a whale. Large-scale driftnets can capture unwanted swordfish, sharks, birds and marine mammals. Trials of alternative gear and modifications to gear have demonstrated that the amount of by-catch can be reduced, but fishing companies and national fisheries are reluctant to adopt devices that might make them less competitive. It has so far proved difficult to apply these measures unilaterally.

In some coastal countries of the Third World, where local fishing provides critical protein unobtainable otherwise, by-catch from large-scale, export-oriented, commercial fisheries is sometimes kept and made available for distribution at local fish markets, often with disastrous social and economic consequences. While such distribution can have nutritional benefits, it also runs the risk of lowering prices to the point where local, small-scale and artisanal fishing become uncompetitive.

## Walls of Death and Ghost Nets

Other destructive impacts can also be grouped loosely under the heading of by-catch. Many species of marine wildlife besides fish are affected by the indiscriminate nature of many commercial fishing operations. Indeed, the by-catch of marine mammals such as dolphins and birds is probably the form of by-catch best known to the general public.

Commercial tuna purse-seine

fisheries have been the source of one of the most long-standing problems in marine mammal by-catch. In the eastern tropical Pacific region, an estimated seven million dolphins have perished since 1959, when the US tuna fleet started setting their huge nets — the legal limit of such nets is 2.5 kilometres — on herds of dolphins to catch schools of tuna swimming below them. Today, dolphin deaths

particularly marine mammals, seabirds, turtles and sharks, one of the sharks an endangered species. The United Nations General Assembly has unanimously called for a moratorium on the use of large-scale driftnets on the unregulated high seas, but the technique is still being used today in many areas.

A fleet of about 600 Italian vessels continues to use driftnets up to 22 kilo-

metres in length per vessel in the Mediterranean Sea, where sperm whales, wrapped in curtains of driftnets, have been found dead on beaches. Angry Spanish pole-and-line tuna fishermen engaged last year in marine battles with competing French and British tuna driftnetters, who, the Spanish claimed, were continuing to operate with illegal driftnets in the North Atlantic in contravention of EU regulations.

Trawl and longline fisheries pose major threats to the survival of a variety of albatross species — particularly in the oceans of the southern hemisphere, but also, to a lesser extent, in the North Pacific and North Atlantic. The Japanese tuna longline fleet operating in the Southern oceans kills an estimated 44,000 albatrosses annually.<sup>13</sup> The albatrosses dive for the bait on the hooks on the lines, get caught and drown. An Australian Nature Conservation Agency report has revealed that of the world's 14 species of albatross, six are experiencing serious population declines and that fishing constitutes the single largest threat to their survival.<sup>14</sup>

Another form of "by-catch" involves the unknown quantities of marine life killed or injured but not brought on board or even seen. There are, for example, serious, yet unquantified, levels of wildlife mortality due to lost and abandoned fishing gear that continues to catch and kill any creature which comes into contact with it — a phenomenon known as "ghost fishing".



A sunfish caught in a Japanese driftnet in the Tasman Sea

in this fishery are decreasing because of an international agreement in 1992 to bring the fleets under control. But little is known about the numbers of dolphins and other marine animals captured and killed in the other purse-seine tuna fisheries in the rest of the Pacific and in the Atlantic and Indian Oceans.

The "wall of death" driftnets used in the high-seas fisheries of the North and South Pacific, the North Atlantic and the Mediterranean have also caught enormous numbers of marine wildlife,

## The Marine Web

By-catch has, until recently, been dismissed as one of the regrettable side-effects of fishing. But it is becoming increasingly obvious that the side-effects of overfishing can be even more serious than the damage done directly to target fish stocks. Every fish species occupies a niche in a complex marine habitat. If that species is heavily fished, it is not simply the target population that is affected, but the entire ecosystem with which it is associated.

For example, predator/prey relations may be disturbed, threatening marine biodiversity in potentially irreversible ways.<sup>15</sup> In 1968, Johannes Hamre of Norway's Institute of Marine Research examined the effects of the depletion of key fish species upon the ecosystem off the coast of northern Norway in the Barents Sea. He writes:

"The two largest fish stocks in the North-Eastern Atlantic, the Norwegian spring spawning herring and the Barents Sea capelin, have been depleted in recent years. The herring collapsed in the late 1960s, and [the stock] has not yet been rebuilt, and the capelin was depleted in the middle of the 1980s. These are the main stocks of plankton feeders in the area, and represent the key species in a context of predator/prey relationships. The dominating predator, the North-Eastern Arctic cod, has perished in recent years due to lack of food. Crowds of underfed seals have moreover invaded Norwegian coastal waters and thousands of dead seabirds have drifted ashore on the north Norwegian coast. These dramatic events demonstrate that the upper trophic levels of the ecosystem of the area are out of balance."<sup>16</sup>

In 1990, cod stocks in the Barents Sea collapsed catastrophically. They have since recovered—although no-one knows for how long.

The collapse of capelin stocks in the Atlantic has also been associated with changed humpback whale distribution and fertility around Newfoundland,<sup>17</sup> the drastic decline in the guillemot gull population around Bear Island in the Barents Sea,<sup>18</sup> and reductions in puffin populations off south-east Newfoundland in the late 1970s.<sup>19</sup>

The depletion of pivotal species in an ecosystem can dramatically affect the

community structure, often resulting in a reduction in species diversity<sup>20</sup> and unforeseen disruptions or permanent alterations to the ecosystem. Overfishing can result in a form of ecological degradation or debasement, in which the fish community changes from one dominated by large fish, particularly bottom-dwelling species or those with habitats close to the coasts, to one characterized by small, short-lived, mid-water species.<sup>21</sup> FAO notes that while stock levels of many pelagic (surface-dwelling) fish have been subject to wild fluctuations over the last few decades, catches of more commercially-valuable demersal (bottom-dwelling) species such as cod, haddock and hake—fish which are caught by bottom trawls—have undergone a steady decline.<sup>22</sup>



Often, when ecosystem are disturbed, renewable resources of the greatest economic value to humans are replaced by organisms of considerably less value.<sup>23</sup> The dragging of heavy fishing gear over the sea bed in the case of bottom-trawl fisheries in near-shore areas not only kills crustaceans but can also lead to firm-rooted aquatic plants being supplanted by dense suspensions of floating plankton algae. After repeated trawls through their habitat, communities of lobsters, crabs, large clams and mussels may be replaced, sometimes permanently, by small burrowing insects and worms.<sup>24</sup>

### Farming the Seas

The scale of modern fishing also raises evolutionary questions. In heavily exploited stocks, such as plaice, haddock and cod in the North Sea, far more adult

fish are killed by fishing than by natural causes and hence fishing becomes the dominant selective factor.<sup>25</sup> In many instances, fishing selects for faster growing fish that mature early, have a shorter life span, and a smaller adult size. Studies of the impact of present-day fishing on North Sea plaice show that the fish are reaching sexual maturity at smaller sizes than they did in 1900. Fishing can also reduce genetic diversity within a species when a stock size is greatly reduced from natural levels.<sup>26</sup> Research on heavily over-exploited orange roughy stocks in New Zealand has revealed a significant loss of genetic diversity in the population.<sup>27</sup> (See pp.97-104)

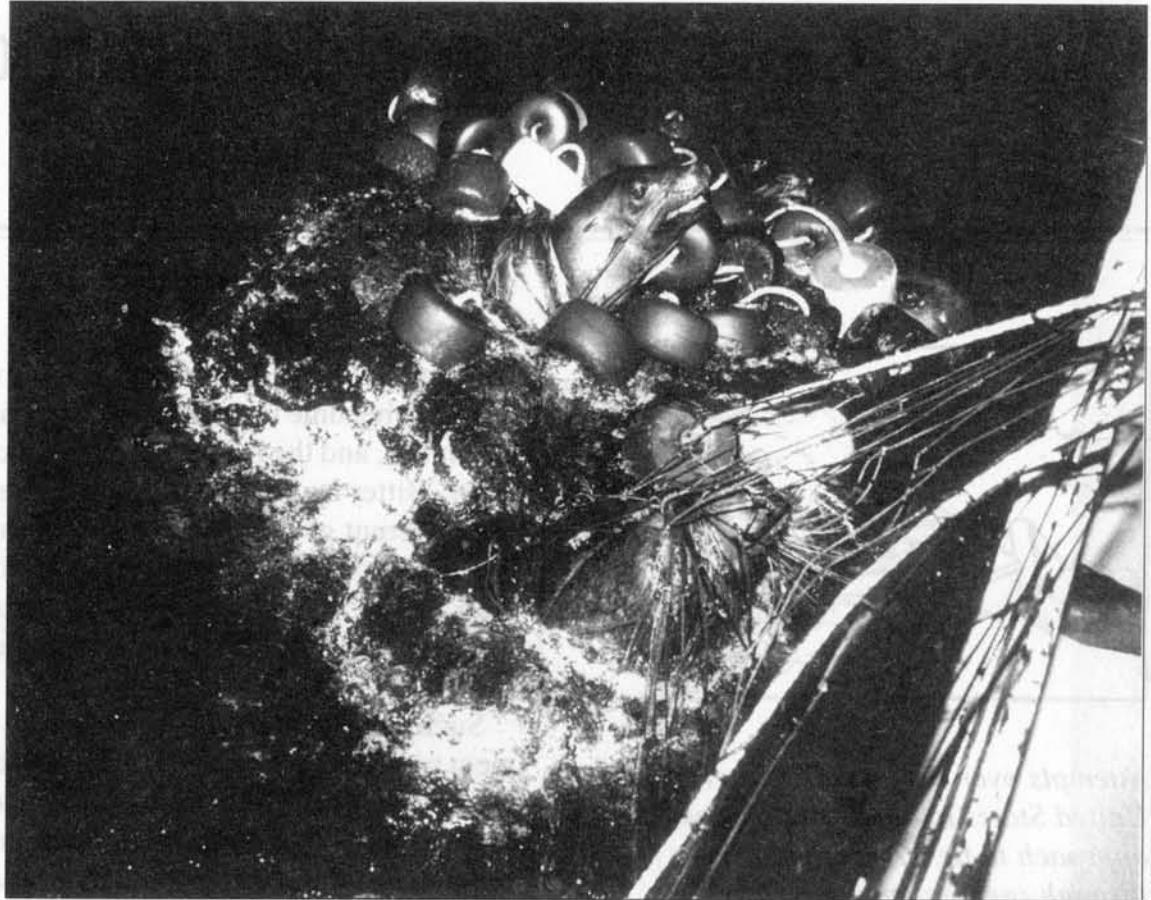
Very little is understood about the long term consequences of these dynamics. Some scientists speculate on the potential of what might be called "evolutionary management": running fisheries in such a way that fish are harvested selectively at different stages of development so that a targeted stock evolves the properties most appealing to human predators.<sup>28</sup>

This would be evolution driven by market forces. In effect, this is a first step towards stockbreeding or farming. Modern fishing lore abounds in farming metaphors. Fishing grounds are "fenced off" for exclusive use, trawlers are said to "plough" the sea bed, driftnetters are seen to "rake" the seas, fish eggs are cultured in "hatcheries" and "sown", and the "crop" is eventually "harvested" and ground into fishmeal. "Farming the seas" is being increasingly held up as the future of sustainable management.

For many people, whether fishers or environmentalists or both, this would be a tragic outcome. The sea remains the last great wilderness and the last refuge of the hunter. There are many, however, who accept that loss of wilderness is the price that must be paid for human rapacity.

They should not assume, however, that progress towards farming the oceans necessarily brings with it sound husbandry. So far, it has consisted of ruthless clearance, or as the Chief Fisheries Adviser to the World Bank, Edward Loayza, puts it, "deforestation, but you can't see it". Enthusiasts of farming the seas should reflect that upon land, what has often grown back after repeated attacks upon wilderness has not been rich diverse forest, nor even a sustainable monoculture, but degraded woodland, scrub, poor grazing land and ultimately desert.

*Sea lions entangled  
in an abandoned  
gillnet in the  
Galapagos. They  
were cut free shortly  
after this photograph  
was taken.*



H Walker/The Environmental Picture Library

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# Chaos, Consensus and Common Sense

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Peter F Anson



*Attempts over the last 20 years in the United States to adopt a more consensual approach to fisheries management through regional councils have, in general, not been successful. At the root of the problem lies the radical difference in views of nature taken, on the one hand, by scientists, whose approach is linear and Newtonian and, on the other, by fishworkers, whose understanding of the marine environment is more akin to the non-linear outlook of chaos theory. Interviews with New England fishermen illustrate some of the difficulties of communication and dialogue.*

As human knowledge of nature has expanded, human societies have become increasingly confronted with environmental dilemmas, and the potential for conflict has increased accordingly. Bitter and even violent arguments among fishers who use different gear or who originate from different communities or nations have continued to hit the headlines, the recent "tuna wars" among British drift-netters, Spanish pole-and-line fishermen and the French driftnet fleet being only one example.

Such conflicts are exacerbated by contradictory government policies which, whilst acknowledging the importance of protecting the livelihoods and life-style of thousands of small-scale fishing families and their communities, nevertheless pay heed to the advice of economists who argue that governments "must manage fisheries more strictly and help winnow out the number of fishing vessels, especially the comparatively "inefficient", small commercial boats."<sup>1</sup>

In an effort to assuage some of these conflicts, some governments have retreated from "top-down" policies, turning instead to more consensual forms of decision-making, such as those based upon regional fishery councils composed of representatives of different interest groups connected with fisheries. They have recognized that, to be effective, management programmes must draw on a broad range of experience and expertise, and that policies that are not understood, accepted and complied with by people at large will be expensive, if not impossible, to administer. People who believe they have participated in creating policy are more likely both to accept and police it.

So far, however, few of the experiments in this direction have been successful. Conflicts have been difficult to resolve; many people, it seems, do not feel that they have been able to "participate" in the proceedings and a workable consensus has not been achieved. Policing costs have been so high that they have strained budgetary resources — and all the while, fish stocks have continued to decline, in some cases irremediably.

## Different Ways of Seeing

The United States has been a pioneer of Regional Fishery Management Councils, set up under the 1976 Fisheries Conservation and Management Act which secured the US's 200-mile EEZ.<sup>2</sup> The primary intended function of the eight councils was to produce regionally-appropriate plans to protect and

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harvest fish stocks. The councils comprise fishery management officials and scientists and the representatives of various interest groups such as environmentalists, fishermen, fleet-owners, processors and sport fishers, but voting tends to be heavily weighted in favour of commercial interests such as fish buyers and processors and cannery owners.

At the outset, hopes were high for this form of consensual fishery management. However, few have been satisfied with the process or the results. Stock crisis has followed stock crisis, and the biomass of important food species has declined.

Prominent among the many reasons cited for the failure of the Regional Councils to protect fish stocks is the inability of different groups to reach agreement on key questions. While members of different interest groups may agree on the need to lessen pressure on the fish stocks, and even that humans are largely responsible for this pressure, one group may blame technological advances; another the sheer number of those fishing; a third the widening range of simultaneous predation on too many species in the food chain; a fourth coastal degradation and pollution of breeding areas; a fifth changes in the environment; and a sixth a combination of all these factors and the human inability to manage adequately a system of such complexity. All seem to agree, however, that council plans have been insufficient, inappropriate, probably incorrect and — by the time they are implemented — out of date.

At the root of several management impasses in the fisheries councils lies a fundamental divide about the nature of nature. In the New England Council, for example, fishery managers stand on opposite sides of a chasm across which

dialogue is difficult, and consensus well nigh impossible. Each side regards its position (whether derived from scientific research or practical experience) as "just plain common sense".

areas and sub-regions in the marine ecosystem, specific species and generations, and certain ports of call and their landing figures. It tries to define perimeters and parameters and to utilize differential equations to describe processes that change smoothly over time. A specific number of variables are identified, measured and monitored over specified periods of time within an overall context that is regarded as constant.

Thus, most fishery managers speak of the reproductive processes of fish stocks as if there were neither interactions among overlapping generations, nor unique environmental events affecting generations differently. For example, many formulae for predicting fish populations assume that there is a constant level of natural mortality of, say, 20 per cent, from one year to the next, simply because there is "no known technique for monitoring natural mortality".<sup>4</sup> Holding such variables constant adds credence to the presupposition that there is an identifiable and mathematically expressible relationship between the number of cod, for instance, that are found in a given area from one year to the next.

The classic expression of the linear view of population dynamics was expounded by John Maynard Smith in his 1968 book, *Mathematical Ideas in Biology*.<sup>5</sup> He asserted that populations either remain

relatively constant, or regularly vary around some presumed equilibrium point. In the case of commercial fisheries, biologists frequently assume that it is fishing effort that accounts primarily for deviations from the norm and, in the last decade especially, have moved to maintain stocks by attempting to regulate human predation. As one manager put it, "if we can't manage the fish, we'll have to manage the fishermen."



Mike Jackson/The Environmental Picture Library

*Monitoring a fish catch. Fishing boats in many areas are now subject to continual surveillance and increasingly are expected to provide computerized log-books and carry satellite monitoring equipment. In some fisheries, the costs of administration are as high as the costs of catching the fish, leading some free-marketeers to advocate the privatization of fisheries management. Some fishermen have accused the officers of the Scottish Fisheries Protection Agency — which is expected to show a profit — of targeting certain vessels with a view to cutting costs.*

## Managing the Fishermen

The first group, consisting of the majority of the biologists, economists, statisticians and ecologists on the Council — most involved in marine research and in state or federal agencies — see Nature as a "linear" system in which a periodic order or simple repeated pattern can be quantified. This group tends to study defined

## "Don't They Understand that Fish Swim?"

Fishermen in the Regional Council are thus cast in an ambiguous position of being both (participant) managers and managed. In addition they — and other fishworkers and their families — are seldom skilled in the "discourse of managers", often find it difficult to articulate what they "know" in language comprehensible to those who would manage them, and are frequently viewed (and view themselves) as deficient in the language and knowledge of science. They are far less capable of bringing "rigorous, scientifically informed" arguments to the negotiating arena; where their attempts to express themselves may be dismissed as "muddle-headed opportunism". They have thus been at a disadvantage in expressing a view of nature which is at odds with that of the scientists.

The majority of fishworkers that have participated in the New England RFMC do not see Nature as random. "Things don't just happen," said one, "There's always got to be a reason". But they do view it as essentially unpredictable. "If I knew everything that was going to make one fishing trip a winner and another a loser, I'd be God". The world as a whole — fish stocks, the weather, the market, actions of government — is viewed as subject not only to cause and effect, but also to disequilibrium.

This is a perspective that is beginning to find some support among scientists. The newly-defined scientific paradigm of chaos theory argues that the dynamics of systems can unfold in a non-random but unpredictable fashion; it has been applied in the study of different fields ranging from weather patterns and stock market cycles to the behaviour of flowing water and fibrillations (irregular contrac-

tions) in the human heart (see Box below).<sup>6</sup> Such phenomena are labelled "unpredictable", only because those studying them do not (indeed probably cannot) take into account all the small but relevant perturbations when modelling the system. These perturbations, though ignored, trivialized or excluded, can prove critical in determining both calculated and real outcomes. The principle is depicted in a well-known nursery rhyme:

"For want of a nail, a shoe was lost; for want of a shoe, a horse was lost; for want of a horse, a rider was lost; for want of a rider, a message was lost; for want of a message, a battle was lost; for want of a battle, a war was lost; for want of a war, a kingdom was lost — and all for the want of a nail."

As the rhyme suggests, every little movement has an effect, and the significance of this effect can snowball. This is the es-

## Chaotic Fisheries A Challenge to the Sinecure of Prediction

Over the last few decades, scientists have calculated fish stocks by reference to the concept of Maximum Sustainable Yield (MSY) — the greatest number of fish of a given species that can, theoretically, be taken from a stock in a particular year without the stock declining. Over the years, various adaptations of MSY have come into favour: Maximum Economic Yield (MEY) is the level of sustainable fishing that gave the best economic returns; the  $F_{0.1}$  rule, a complicated mathematical formula based on fish mortality and fishing effort, was used by the Canadian Department of Fisheries and Oceans to set a target slightly lower than MSY. Despite their variations all these models are based on the assumption that by "tuning" a small number of linear functions, some kind of equilibrium can be established in every fishery.

In practice, as fisheries continued to fail, it soon became clear that this was not the case. In the 1970s, a new generation of fish biologists and mathematicians such as Robert May, John Beddington and Colin Clark (working in the US, UK and Canada respectively) came up with more sophisticated models which showed that exploitation at or near MSY would in fact lead to collapse of the fishery. In an influential article published in *Science* in 1977, five scientists argued that the interdependence of different species, the complexity of predator-prey relationships, and the unpredictability of environmental, social and economic factors made the establishment of equilibrium and the prediction of levels of stock almost impossible. For example, while normally about 40 billion haddock join the North Sea stock every year, in 1967, there were 375 billion, while in 1987, the figure was less than 10 per cent of the average. The article ended with this brief sentence: "The consequences and management implications defy crisp summary."

Over the subsequent years, scientists from around the world, now armed with sophisticated computer systems,

have come up with a bewildering array of models that attempt to elucidate one aspect or another of the complex natural and human-induced processes that govern fish populations. Some have shown how fish population dynamics obey laws that are not linear but "chaotic" — that is, they are subject to wild fluctuations which, though they may not necessarily be random, can be of a complexity whose pattern is not observable over a normal human time-scale.

Some of the most sophisticated modelling has been carried out by Jacqueline McGlade, now of Warwick University, UK. She has demonstrated how the famous "butterfly effect" applies to the fisheries. Minute differences in environmental conditions can be rapidly amplified and lead to enormous differences in the numbers of fish.

McGlade has also produced extremely complex models of the haddock fishery in Nova Scotia, which take into account a large number of biological, economic and social factors such as the weight, mortality and fertility of the fish, the number and expense of fishing boats, the price of fish, the elasticity of demand and the behaviour of fishermen. Under different conditions, the fish stocks will exhibit different degrees of chaotic fluctuation. For example, under some conditions the fishery might oscillate over a long time-scale between one situation where fish are relatively common but command a low price, and a second situation where fish are a rare and highly priced "luxury".

McGlade is involved in an ambitious "integrated fisheries management" project — with the magico-managerial name of Project Prospero — whose object is to:

"improve the global management of living marine resources by integrating scientific, legal, economic and anthropological information in the decision-making process using new sets of conceptual tools that go beyond existing approaches."

McGlade argues that the "sinecure of prediction" of MSYs and

sence of "the butterfly effect", described by meteorologist Edward Lorenz in 1979 when he found that a minuscule error in the initial conditions punched into a computerized climate model resulted in a totally different final scenario. A butterfly flapping its wings in Rio de Janeiro, Lorenz argued, could thus precipitate a tornado in Texas.<sup>7</sup>

Much the same view of nature was expressed by one New England fisherman who said that he once knew a man who:

"changed a whole stretch of shore and the fishing because he drained a little piece of marsh for his son to build a house when he got married. But when you try to talk to these people [fishery managers] about how things like that must be going on all the time, all over the place, and what that must mean to the fish and the fishing, they just look at you, throw a

bunch of equations at you, and imply that because you don't go fishing according to equations, you can't be expected to understand how things really work".

Fishermen are keenly aware of the extent to which small changes can have major effects: for instance, a minor mechanical problem can lead to the loss of a vessel with all deckhands. They also reject much of the research and analysis taking place because they believe them to be insensitive to such realities. Another fisherman remarked:

"By God, those people are stupid! Year after year, they come out here with their charts and graphs and measuring tools and go to the same spot at the same time and try to catch fish so they can compare this year's stock with last year's and ten years ago and so on. And they mumble about

'replicability' and 'sampling procedures' and like that. Jesus! Don't they understand that fish swim?"

## Tinkering and Fine Tuning

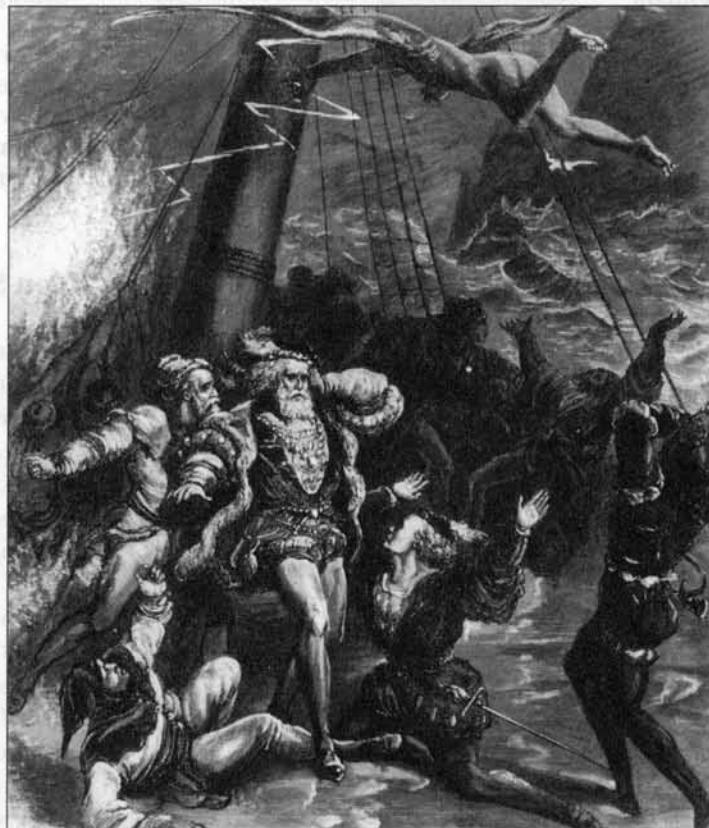
Correspondingly, fishermen often resent the management plans imposed on them:

"Every time there's a drop in landings, the fishcrats say 'how do we cut back on fishing?' There are other reasons why fish landings can go down. And that's not to say that there isn't overfishing right now. But you aren't going to solve all — maybe not even most — of the things that go wrong in the industry with a management plan. Sometimes nature has a mind of her own, just like a fish does. And you know we don't really know enough about how it all fits together. Hell! We don't really know enough

TACs should be replaced by "building up long term goals in which to overcome the exigencies of boom and bust cycles."

A simpler and less managerial approach has been proposed by James Wilson and Peter Kleban of the University of Maine. They argue that for chaotic natural and social environments, "conventional management approaches, such as quotas" are "unworkable" because they impose a "large, costly and basically impossible measurement burden". They suggest:

"The alternative is to turn to long-term ecologically adapted policies . . . Fishing can create mortality and other effects on the system that defeat the evolutionary strategies of each species; or fishing can operate in a way that is roughly consistent with the operation of the system itself. For example, the ability of nets to completely decimate spawning aggregations may very thoroughly defeat otherwise effective anti-predation strategies of prey-fish, with long-term effects upon predator fishermen. A rule prohibiting fishing on spawning aggregations would define away that predatory capability. Gear that was selective by size or species would also move toward defining the predatory capabilities of fishermen. Even licensing rules



The shipwreck in Shakespeare's *The Tempest*. Fisheries science aspires towards the benign management of nature epitomized in the play's main protagonist, Prospero — but all too often human attempts to control nature are confounded by its unpredictability.

can have this effect . . . The emphasis of management should be on *how* effort is applied (ie. the characteristics of inputs) rather than on *how much* effort is applied (ie. the quantity of outputs.)"

The authors go on to suggest that this qualitative approach, rather than the present quantitative approach, would be more credible to fishermen:

"The practical management of chaotic fisheries rests upon information about the relatively stable ecological parameters of the fishery. This is the kind of knowledge that fishermen can be expected to acquire through observation and experience . . . A theory of chaotic fisheries is consistent, not only with the perspective of fishermen . . . but also with the kinds of institutions and management techniques

fishermen are likely to devise for the governance of fisheries."

Inshore fishermen, who for centuries have been complaining about the long-term effects of certain kinds of fishing gear, might agree.

about how just one stock works in and of itself, let alone how that stock fits into the whole picture. And these people aren't just tinkering, you know; they're shovelling sand in by the ton."

Over time, fishermen have come to a perspective on the natural phenomena that underwrite their livelihood. From the point of view of fishery managers, however, the technological leap that has occurred in the 20th century has created a problem rarely, if ever, encountered before — the ability to overfish and wipe out regional stock in a matter of months — and the impact of this exponential increase in the technological ability to deplete stocks, they believe, has not yet been incorporated in the fishermen's view. Fishermen, however, claim, often justifiably, that the regulations now being imposed are unjustifiable and inconsistent interference.

An example of the chasm between fishery managers and industry personnel was the 1990 legal dispute between Dr William W Fox, then head of the National Marine Fisheries Service (NMFS), and a group of commercial fishermen and buyers. The industry group filed a civil suit in the US District Court because a gillnet ban:

"was imposed [by the NMFS] . . . without benefit of new data or information . . . and even though . . . a substantial part of the commercial quota is likely to go unharvested."

The trade paper, *National Fisherman*, reported:

"Fox argues that poor information leads to honest differences of opinion. 'It depends on what you do with uncertain data. You can say: "Well this doesn't prove there is a problem, even though it may imply it. Therefore we aren't going to take any action until we can prove it." My view is . . . to act in a conservative manner in the face of uncertainty'."<sup>8</sup>

The court agreed with Fox's conservative stance and dismissed the case. The reaction of fishermen, however, was that eliminating the means of earning a living for a particular group of fishermen was hardly a "conservative" or "precautionary" action as far as they were concerned. Said one New Bedford scalloper:

"It's just one more uncertainty in a fisherman's life. Weather, the fish, the boat, and now the fishcrats — and they're the most changeable of all. Hells bells! We could learn to live

with anything if the damn Feds would just put something in place and then leave it for a while. But you never know what they're going to do and they're always tinkering. 'Fine tuning' they call it."

The "tinkering" with the regulations in an apparently fruitless attempt to achieve equilibrium is a source of frequent complaint from fishermen. Another made this comment:

"It took me more than a decade to learn something about how it is out there, how to be a good fisherman — and then I'm only right some of the time, because any little thing can make a big difference. But regulations change everything, all of the time. It used to be that you worked out (with a little margin of risk) when you needed a new set [of nets]. Nowadays, if I buy new nets this week, there's likely to be a new net regulation next week — and mine will have an illegal size mesh, the wrong codend or something. And I'm stuck with thousands of dollars of useless net."

## Chaos Theory? So What?

It is not easy to determine whether such common complaints from fishermen should be viewed as justifiable criticisms of "rigid dogmatic thinking" or as examples of "muddle-headed opportunism". Fishermen can be just as insistent in calling for changes in the regulations as the "fishcrats". Some cynics might allege — and indeed some fishermen might admit — that fishermen "learn to live" with stable regulations mainly by finding loopholes in the system and ways around the rules.

For the time being, at least, most fishery scientists are unwilling to accept criticisms of their methods coming from either fishermen or chaos theorists. Seven fisheries biologists working in New England fisheries management were questioned in 1993 as to their stance on the usefulness of linear and non-linear approaches to the understanding of fisheries dynamics. None saw chaos modelling as having any potential for improving their understanding of biological systems. The following three responses are typical of all seven:

"If management were left up to us [marine biologists], we could do something. But in the final analysis, scientific evidence doesn't matter;

it's what plays in the political sector. In any case I don't buy chaos as a useful tool in biology."

"Non-linear models don't tell us anything we don't already know about natural systems. But when you have to gather data, analyse it, and produce projections for the conditions of the stocks that will help write management plans, what do you suggest we do? The people up the line expect our analyses to follow a certain format. You have to do it by the book or they just send it back down. Besides, if chaos theory is correct, then the world is so full of such trivialities that non-linear theorists must find it as difficult as linear-based theorists to map a trajectory accurately. So what profit is there in the exercise? If fishermen have an intuitive sense of chaotic theory, so what?"

"Chaos is New Age pseudo-science crap. I don't know anyone who is seriously concerned with fisheries management that bothers with it. Once you've used it descriptively, what real utility does it have for management regimes? You don't really believe the fishermen when they talk like that, do you? They're just putting you on."

## You Say Potato . . .

Ultimately, the utility of any management scheme is measured not so much by its internal consistency or the accuracy of its projections, but by the extent to which people comply with its implementation and send back reliable information for assessing its dynamics. Willingness to comply with rules is grounded in the perception that these rules "make sense" and that they are based upon input from those most immediately and importantly affected by these rules.

Despite a high level of participation by representatives of the fishing sectors in the production of management plans, many fishermen believe that their contributions are trivialized, ignored or ridiculed, and that their concerns are dismissed as manifestations of greed or economic opportunism.

On the other hand, fishery managers themselves may equally feel alienated by the process. Aside from constraints such as shortage of personnel, inadequate funding and so on, they find themselves derided for being "removed from reality", for their lack of concern for the lives of

those affected by their recommendations and for presenting intrinsically flawed stock assessments. Other participants also believe themselves to be excluded: public action groups who monitor council activities complain of their lack of representation on the council or on committees. As one who regularly attended the New England Council's sessions explained:

"We're mocked by everybody as unrealistic busybodies with a pie-in-the-sky attitude about saving the world. The only time we're taken seriously is when we use the courts — and then people *really* get hostile."

All those participating in the New England Regional Council bring along their own "intellectual baggage": their own view of the world and nature, which colours what they think they hear and what they understand others to say. Despite "the best will in the world" to work together, a real dialogue is difficult if not impossible when participants with differing axioms, assumptions and concepts are often, without realizing it, talking a different language. People will talk past each other, will assume there is disagreement, or, at crucial late stages, accuse each other of bad faith — a bad faith which, they may feel, justifies their own use of dubious practices or non-compliance. Scientific exploration of chaotic, non-linear processes may have the potential to some extent to reconcile the language of the scientist with that of the fisherman, though it has so far shown little tendency to do so.

In a world where human attempts to manage Nature are increasing, a growing number of issues will need to be debated by people coming from diverse social and cultural standpoints. It is crucial that time is taken to address the basic reasons why it is difficult to find solutions to common problems in non-common contexts. Otherwise we shall find ourselves echoing the despairing words of one long-time council member: "Sometimes it seems the more we try, the worse things get."

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*Binni, a famous Icelandic skipper, was reputed to have said to a less successful skipper, "You know why you don't catch fish? It's because you don't think like a cod!" Few fishery managers have yet acquired the ability to think like fish.*

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# Commons versus Open Access

## The Collapse of Canada's East Coast Fishery

David Ralph Matthews

*Nowhere have the consequences of managerial espousal of the "Tragedy of the Commons" theory been more starkly illustrated than in the crash in cod stocks off Canada's East Coast. In 1980, the Canadian government, ignoring the needs and advice of inshore fishermen to restrict predatory technologies and overcapacity in the fishing fleet, introduced a policy which limited the access of individual fishermen to inshore fisheries and favoured the more "efficient" boats of the offshore trawler industry. These policies led to the complete collapse of the cod fishery in 1992, and the enforced redundancy of over 25,000 fishermen and some 10,000 workers in fishing-related occupations. The voices of fishermen from several different coastal communities testify to the inadequacy of Canadian government fisheries policy.*



Peter F. Anson

*"The federal government should take a licence away from two foreign draggers and give it to 150 fishermen. Then we'd have a better province to live in."*

Newfoundland fisherman  
1986

In February 1992, the operators of the Canadian draggers (trawlers) fishing for cod off Canada's East coast voluntarily tied up their fleet. They had been allocated plenty of quota by the Canadian government, but when they went to the offshore spawning grounds, the fish were too small to be worth catching. Even their high-tech filleting machines could not cut a profitable fillet off such tiny carcasses. Two weeks later, Canadian Fisheries Minister John Crosbie, announced that, as a result of new information from government fisheries scientists, he was suspending the winter fishery.<sup>1</sup> And on 2 July 1992, the whole inshore fishery for northern cod was closed down, putting some 25,000 fishermen out of work.<sup>2</sup>

According to Crosbie, the reason for the collapse was that:

"during 1991, severe oceanographic conditions were a prime factor leading to the loss of half the total biomass and about three-quarters of the spawning biomass of the northern cod stock".<sup>3</sup>

In fact, the finger of blame for what has been described by Newfoundlanders as "a catastrophe of apocalyptic proportions", "one of the great failures of human history" and "possibly the worst ecological disaster this side of the Amazon" clearly points not to "oceanographic conditions" but to the build-up of a large offshore dragger fleet using high-tech equipment.

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Hulton Deutsch

*Curing cod in Newfoundland in 1874. An Italian visitor in London wrote to the Duke of Milan in 1497, describing the excitement surrounding John Cabot's sighting of a New-Found-Land in the far west of the Atlantic where "the sea is full of fish which are taken not only with the net, but with a basket in which a stone is put so that the basket may plunge into water". The English, according to the writer, were saying that they could now bring in so many fish that England would have "no more business with Iceland" and that from this newfound country, "there will be a very great trade in the fish they call stock fish" and which today are known as cod. Soon boats sailed from ports in the West of England every summer, picking up Irish labourers on the way to work in the drying and salting plants established on the Newfoundland shore, and returned in the autumn. In the century after their "discovery", the Newfoundland fishing grounds were also fished by French, Portuguese and Spanish boats — and have been the scene of fishing disputes ever since.*

The Canadian government is now spending millions of dollars to retrain fishermen for other jobs.<sup>4</sup> But attempting to reemploy the bulk of inshore fishermen elsewhere suggests that the path is being cleared for a brave new fishery where corporate factory-freezer draggers, employing a fraction of the former workforce, scour the fishing grounds.

## Coastal Transformation

For 450 years, the fixed gear fishery in Newfoundland, the principal centre of the Canadian East coast fishery, had caught large quantities of high quality cod and other fish at a low cost, providing the economic basis for hundreds of often isolated coastal communities.<sup>5</sup> The techniques employed — principally handlining and stationary cod-traps — were passive ones (they did not actively pursue the fish or catch them by disturbing their milieu) that mirrored fluctuations in fish abundance: when fish stocks declined, so did fixed gear landings, the catch serving as a reliable index of fish abundance.

The coastal way of life was, however, transformed in the latter part of the twentieth century by major technological developments in the fisheries. The introduction in the mid-1960s of medium-sized vessels known as "longliners", assisted by nearly 100 per cent low-interest state loans, had been putting pressure on those who still used smaller traditional boats of 30 feet or less.<sup>6</sup> The greater size and electronic sophistication of longliners allowed a single boat to manage 100 to 150 nets with only a small crew and to fish much further offshore — though this did not prevent them from fishing in the inshore waters as well in competition with the smaller boats.<sup>7</sup>

Meanwhile, the processing and freezing of fish in commercial plants was gradually replacing domestically-salted fish. This trend tended to proletarianize fishworkers and reduce their independence, but nevertheless did provide a source of income for part-time fishermen and their families. Since the decline of logging as a source of part-time employment in the 1970s<sup>8</sup> and

of seal hunting as a result of animal rights actions in the 1980s, many seasonal fishermen and their families had reduced economic options.

A much greater threat to the coastal fishery, however, was posed by the rise of the offshore dragger or trawler fleet. The Grand Banks of Newfoundland, a large continental shelf stretching more than 200 miles out into the Atlantic and one of the richest fishing areas in the world,<sup>9</sup> had for centuries attracted fishing boats from Spain, Portugal, Britain and elsewhere, providing European consumers with an abundant source of dried cod. The large draggers had begun to fish in the area before the Second World War, but in the 1950s and 1960s, with the rapid growth of European distant-water fleets of factory-freezer trawlers, fishing pressure on the Grand Banks increased enormously. By 1977, when Canada extended its EEZ to 200 miles, cod stocks had been fished down to an all-time low.

Canadian fisheries experts and fishermen had high hopes that the 200-mile EEZ would build up cod stocks. But large foreign draggers continued to fish ruthlessly just outside the 200-mile limit at levels between 20 and 30 times higher than those allocated by the North West Atlantic Fisheries Organization.<sup>10</sup>

## Licensing the Man, Not the Boat

The means chosen by the Canadian government in the late 1970s to manage its newly-secured 200-mile fishing grounds was a policy based on reducing the numbers of fishermen, rather than restricting the size of boats or the methods of fishing. "Tragedy of the Commons" rhetoric began to infiltrate Canada's scientific fisheries bureaucracy, widely-regarded as one of the most extensive and advanced in the world. In 1976, a government document entitled *Policy for Canada's Commercial Fisheries* observed that:

"In an open-access, free-for-all fishery, competing fishermen try to catch all the fish available to them, regardless of the consequences. Unless they are checked, the usual con-

sequence is a collapse of the fishery: that is, resource extinction in the traditional sense, repeating in a fishery context the tragedy of the commons".<sup>11</sup>

The policy maintained that entry to the fisheries had to be limited "universally" and recommended reducing the number of fishermen employed in the principal fisheries in Atlantic Canada. In 1979, the government delegated the task of deciding how the inshore fishery should be cut — for instance, by licensing certain boats or licensing certain fishermen or establishing quotas — to a commission, chaired by C R Levelton of the DFO.

John Eastcott/Yva Momatiuk/TCS



After the cod moratorium declared in 1992, fishing boats are pulled up in Newfoundland, out-of-use.

The Levelton report concluded that three different categories of non-transferable licence should be issued to "regular fishermen, apprentices and casual fishermen".

A popular target in debates about reducing pressure on the inshore fishery was the large numbers of part-time fishermen who derived the rest of their income from other activities such as logging or hunting. Indeed, a term which entered national fishery policy vocabulary around this time — "*bona fide* fishermen" — clearly signified full-timers in an attempt to exclude part-timers. The elimination of "dabblers" and "moonlighters" was seen by some as a way of establishing a limited, full-time labour force that would be easier to regulate.<sup>12</sup>

The Minister of Fisheries at the time, Romeo LeBlanc, endorsed the Levelton report by invoking the "Tragedy of the Commons" theory:

"If you let loose that kind of economic self-interest in fisheries, with everyone fishing as he wants, taking from a resource that belongs to no individual, you end up destroying your neighbour and yourself."<sup>13</sup>

In 1980, the national government began to implement the Levelton report's recommendation of discriminatory licences. Limited access became a key part of the Canadian government's response to overfishing, while licensing itself remained largely beyond community control.

## "If You Can't Beat 'Em, Join 'Em"

But while the government claimed "absolute discretion to issue fishing licences",<sup>14</sup> it made no attempt to limit fishing effort by restricting fishing technology or the size of boats, the route advocated to reduce overfishing by the provincial government of Newfoundland and a growing number of fishermen. For instance, draggers are equipped with electronic sensor devices that allow them to home in on a dense body of fish and virtually annihilate it. In theory, immature fish can escape through the

mesh of dragger nets; in practice, when fish are densely congregated, the meshes rapidly clog up and everything is hauled up, big or small. Hundreds of millions of immature dead and dying fish have been dumped by draggers in Canadian waters in the past 15 years.

Indeed, on the basis of wildly over-optimistic estimates of the amount of cod available (See Box, pp.92-93), the national government actually encouraged, through grants and subsidies, the build-up of a Canadian fleet of draggers around two newly-formed parastatal companies, NatSea and Fisheries Products International (FPI). The draggers operated by full-time fishermen were expected to compete with European trawlers.

Despite angry protests from the entire Canadian inshore fishery, the Department of Fisheries and Oceans imposed catch limits for the offshore fishery far above any

sustainable level.<sup>15</sup> In effect, the government was helping the conventional "tragedy of the global commons" to be played out offshore while claiming to be tackling a similar tragedy inshore.

## Regional Resistance and Union Betrayal

Many voices opposed the government's "Tragedy" analysis of the causes of overfishing, its licensing solution and its encouragement of the dragger fleet. Arguing that the fisheries were not the "free-for-all" government scientists imagined, a group of Newfoundland academics had formed the Committee on Federal Licensing Policy in 1974 out of concern for the implications of large-scale redundancies in the fishing communities, pointing out that:

"entry to the inshore fishery, far from being wholly uncontrolled (as is often assumed), has long been regulated according to customary rules and regulations emanating from the local level,"<sup>16</sup>

— an explicit rebuttal of the "Tragedy of the Commons" argument. (See Box, p.89). They also stressed that, as the survival of many coastal communities depended upon "occupational pluralism", limiting access to fishing would imply "the staggering cost of reducing a substantial proportion of the remaining rural population of Newfoundland and Labrador to urban centres."<sup>17</sup>

## "Gentlemen's Agreements"

Until recently, the Newfoundland fishery was one of the most successful and vigorous examples of a community-controlled fishery within the industrialized world. Although, during the 1980s, the traditional regulatory mechanisms were beginning to break down, largely as a result of government interference, all the communities studied had their own ways of resolving conflicts among fishermen and of regulating access to the fishing grounds to prevent overfishing.

For example, each community had its own system of allocating cod-trap berths — the sites where cod-trap nets are set. In the two smallest communities, Charleston and King's Cove, and in the largest, Bonavista, berths were retained in family possession from year to year and could be handed down from one generation to the next. To an extent, these berths represented an informal system of private property. However, berths were not regarded as transferable property; if a family failed to use its berth, then it could be claimed by whoever first set their nets in the berth. In Bonavista, there was some pressure to set up moorings early in the year, around March, to signal that a berth was held, even though it was acknowledged that ultimately this could not stop an unused berth

from being seized by an outsider. There was also some erosion of this custom by younger fishermen, particularly those from other fishing communities. In King's Cove, moorings formerly did not need to be set up more than a few days before the start of the season:

"Elderly people always respected where another fella put his gear. It was an unwritten rule. But now, we got a fresh batch who observes no rules or regulations."

In both Grate's Cove and Fermeuse, the allocation of cod-trap berths was regulated by a lottery run by a locally-elected committee. In Grate's Cove, according to one older fisherman, the system had been introduced some 35 years before because competition to secure the best berths led fisherman to risk their lives, setting out in winter weather to claim a site, and also led to quarrels. The committee:

"sets berth draws and if one fella's trap is too close to another fella's, you can complain to the Cod-Trap Committee and they can straighten it out. There are five on the committee."

In Grate's Cove, there were a sufficient number of berths to allow every local fisherman to enter the draw. However, in Fermeuse, the number of consistently high-yielding berths was limited and so the draw was restricted to a recognized number of fishermen who retained the right to participate in it from one year to the next. Only when one fisherman dropped out could another — one who perhaps had indicated his seriousness by setting cod-traps in other less-favoured positions — become eligible to participate in the draw.

These two lotteries represented slightly different forms of property regimes. Whereas the Grate's Cove lottery represented a method of allocating common resources uncontroversially throughout the community, the restricted draw in Fermeuse represented a form of "joint" property, inaccessible to other fishermen in the community and thus a form of community-regulated "limited access".

In addition, many other customary fishing and harbour laws had been developed by the communities. In Grate's Cove, a draw was also held for salmon berths, and dates were set for removing salmon nets from the water. In Grate's Cove, Fermeuse and Bonavista, there were different regulations limiting the use of gillnets. The "gentlemen's agreement" in Grate's Cove that gillnets should be out of the water by 15 August represented a

direct limitation on the right of longliners to fish inshore waters so as to ensure that sufficient fish came near shore to be caught by handlines:

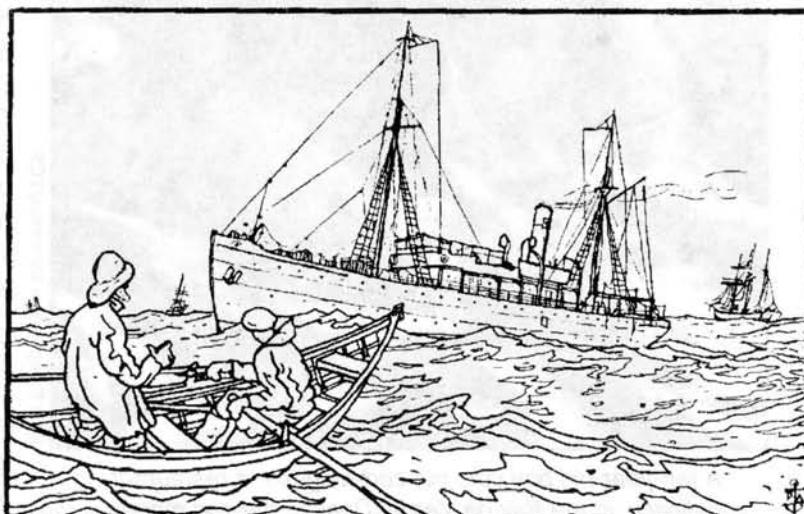
"Gillnets out after 15 August. Then handlining. This gives everyone a chance to make money in the fall of the year. Its been that way since the old people's day and everyone abides by it."

The extent and authority of these local

regulations differed from one community to another. In Charleston and King's Cove, they were not very evolved, perhaps because the communities were small enough to allow disputes to be resolved at an informal level. At Grate's Cove, they were well-established and respected. At Fermeuse, they were also well-established, but a serious decline in the number of cod, an increase in full-time and part-time fishermen and relatively small fishing grounds for the size of the community had heightened local tensions and exacerbated a territorial conflict with a neighbouring community.

In the much larger community of Bonavista, however, community regulations were less well-developed. The reason for this may be that Bonavista was a less cohesive body of individuals fishing over a much broader territory which overlapped with the territory of other communities. Any attempt to regularize access to fishing grounds — for example, by the introduction of a lottery or a draw which several Bonavista fishermen were in favour of — would have meant acknowledging the territorial claims of neighbouring communities from which Bonavista fishermen were poaching.

Of the five communities studied, some were clearly more successful at regulating their fisheries than others for a number of complex reasons. What is not known is how successful each community would have been had a policy of community control been supported by the national government rather than undermined by it.



A FRENCH TRAWLER ON THE NEWFOUNDLAND BANKS

Peter F Anson

Economist James A Crutchfield pointed out in 1979 in the *Journal of The Fisheries Research Board of Canada* that the part-time problem was not a simple one, because:

"there are obviously many fisheries in which part-time participation is dictated by the availability of fish, weather conditions on the ground or concentrations of fish sufficiently dense to harvest them economically."<sup>18</sup>

In addition, fisheries economist and professor of economics at the University of British Columbia Anthony Scott described in the same journal the exclusion of part-timers as clear discrimination:

"There are many conceivable alternative discriminatory systems: entry can be rationed by race, colour and creed... by bribery of officials; by queuing; and by lottery. The arbitrary expulsion of part-time and 'sport' fishermen with low catches... should take a prize for high-handed inefficient discrimination."<sup>19</sup>

With the election of Brian Peckford as Premier of Newfoundland province in 1980 on a "nationalist" platform of regional self-sufficiency, the views expressed by the Committee were incorporated into Newfoundland government policy. Peckford's administration wasted no time in declaring itself strongly opposed to the national government's 1980 licensing programme: "The Provincial government has taken the view that the right to fish is a local birthright," it announced in 1982. "We would put limitations on the number of larger boats and the amount of gear; not the number of fishermen."<sup>20</sup>

The Newfoundland Fishermen, Food and Allied Workers Union, however, supported the introduction of licences. Forced to choose between the interests of 8,000 members who were full-time fishermen and 15,000 part-timers, the Union had, in the late 1970s, opted for the full-timers, referring to them as "*bona fide*" fishermen, as opposed to "moonlighters".<sup>21</sup> By 1980, the Union was arguing that the government should "licence the man and not the boat".<sup>22</sup>

With Union support, the national government not only refused Peckford's request that social considerations concerning local communities should take precedence over the demands of economic rationalization, but also denied the new provincial government any say over the implementation of the new licensing policy.<sup>23</sup>



## "Letters from God"

The brute effects of government policy upon fish-stocks were seen in the 1992 collapse of the cod fishery. But the effects of government interference upon established fishing communities in the East Coast region were more subtle.

Between 1984 and 1986, the author, together with John Phyne, then of McMaster University, carried out over 100 interviews with mainly full-time fishermen from five fishing communities on the Newfoundland coast. Three of these communities — Charleston, King's Cove and Grate's Cove — had populations of about 250; one, Fermeuse, had 546 inhabitants, and one, Bonavista, with a population of 4,605, was then the largest inshore fishing community in Newfoundland.

Each of these communities, by virtue of its size, geographical position and access to fishing waters and other resources, had developed distinct and very differing approaches to the management of its fisheries, and hence articulated different responses

A ten-year-old boy cuts out cod-tongues, a restaurant delicacy, in the Bay de Verde. Despite the cod moratorium in 1992, spawning stock has declined by about 99 per cent in each successive year.

to the increasing regulations imposed by the government.

The distinction between full-time and part-time fishermen embodied in the 1980 licensing system met with mixed reactions. Not surprisingly, full-time fishermen were often glad to face less competition, and welcomed any measures that made access more difficult for relatively wealthy "moonlighters" — in particular, teachers and other professionals with incomes that by rural standards were regarded as astronomical.

However, the majority of Newfoundland fishermen were part-timers, and in small communities, such as Charleston and King's Cove, many people shifted back and forth between fishing, logging and a number of other occupations according to the season and the market. This mixed economy made the licensing system something of an anomaly and very difficult to apply consistently. In fact, few fishermen who obtained full-time licences actually fished full-time — and could not have done so even if they had wanted to. As one Charleston fisherman observed, "Some fellows holdin' full-time licence got other jobs... There's a lot of people with full-time licence shouldn't have them."

The advantage of holding a full-time licence was not necessarily very important in terms of being able to catch cod. Rather, its value lay in entitling licence holders to sell their fish before part-timers — a privilege that had been negotiated and introduced with

vigorous support from the Newfoundland Fishermen's Union. The situation was complicated still further by the fact that separate licences were required to fish many protected (but highly commercially valued) species such as crab, salmon and lobster. Not only were these licences extremely difficult to obtain — according to one fisherman, "no one can get a crab licence without a letter from God" — they were also just as likely to be owned by part-timers as full-timers. One Charleston fisherman's assessment of the situation was typical:

"There's nobody knows what a part-time fisherman is. There's part-time fishermen with lobster, salmon and groundfish licences, and they don't go out in a boat. Oh, they might get a salmon net or two to get one to eat, but that's all they do . . . A full-time fisherman should be able to get into it all [ie. all species] and make a living at it. I'm classed as a full-time fisherman and all I can do is catch a few cod-fish and squid."

Hostility was directed not only at those who held such species licences and failed to use them, but also at those who, through the licences, acquired what was felt to be a disproportionate percentage of the stock:

"There's a fellow here fishing 500 lobster pots single-handed, making [Can.] \$25,000 or \$30,000. It'd be better to divide the licence up between two or three fellows with 100 pots apiece. Then they could all get some lobster. Now one fellow gets a big haul and the others have to sit ashore and do nothing."<sup>24</sup>

The new licensing system and the arbitrary way it was implemented contributed to a division among fishermen according to their interests and produced quite a level of animosity in smaller communities that had enjoyed a reputation for community cooperation and amiability. As one Charleston fisherman commented:

"There are more rows over a part-time and full-time licence than anything. If a fellow got 'em [a full-time licence], I don't tell him he shouldn't have 'em. But in my mind he shouldn't have 'em."

## "Taking the Flowers off the Rocks"

In some communities, however, the greatest arguments did not revolve around the government's arbitrary licensing system, but around questions relating to different fishing technologies. The most common focus of conflict was between those who fished for cod with traditional methods and those who used gillnets. Traditionally, cod is caught either by "handlining" with a hook and line, or by setting "cod traps" — fixed nets deployed in the

form of a hook into which the cod can swim easily, but from which they can escape only with difficulty. The gillnet, introduced into the Newfoundland fishery in the 1970s, is anything from 15 to 50 metres long, made of a fine monofilament mesh on which fish catch their gills when they swim into it. Gillnets are usually operated by the larger longliner boats which may carry between 150 and 300 such nets. The national government programme in the 1980s of encouraging both gillnetters and longliners through subsidies and loans was seen as a way of establishing a core of financially secure, full-time fisherman.

The extreme bitterness felt against gillnetters resulted not only from the fact that this capital-intensive technology enabled, and indeed obliged, its operators to catch a much larger share of the fish, but also that it restricted access to the fish for other fishermen. Gillnets are usually set in the same shoal water areas in which handlines and traps are set. A series of gillnets can create an impenetrable wall which prevents the fish reaching the



Fishing nets and buoys pulled up at Rose Blanche. One Bonavista fisherman claimed that "the biggest curse in Newfoundland is when they sent a government fisheries official to Iceland and he came back with the gillnets." Other fishermen from Bonavista, Fermeuse and Grate's Cove respectively characterized the net as "nothing but a frigging nuisance", "the ruination of the fishery" and "a menace".

John Eastcott/Yva Momatiuk/TCS

trap sites and which tangles the hooks and lines of the handliners.

There was also considerable resentment from traditional fishermen that the price negotiated with processing plants by the Union for gillnetted fish was 20 per cent higher than that for trap-caught fish — even though the latter were fresher:

"There is one thing I see as a crime. I go out there and I hoist my trap and I bring my fish back alive, and the man next to me brings in fish that have been in the gillnets three or four days that are rotten, and they get more. That's something I'd like to see the union fight."

(continued on page 94)

# Fishing for Truth



John Eastcott/Yva Momatiuk/TCS

For many years, the notion that marine scientists are capable of calculating fish stocks and from them deriving a reasonably accurate Total Allowable Catch (TAC) or Maximum Sustainable Yield (MSY) has remained sacred — challenged only by fishermen themselves and by a handful of maverick academics. But the catastrophic failure of Canadian scientists to predict the 1992 collapse of the Northern cod fishery in the face of repeated warnings from inshore fishermen has resulted in a severe crisis of confidence in Canadian fishery science, one that is likely to spread to other nations.

Ironically, the Canadian Department of Fisheries and Oceans (DFO) prides itself — probably rightly — on having one of the most advanced fisheries science departments in the world. When, at the end of the 1970s, Canada fought for and gained control of a 200-mile EEZ, which had been overfished to crisis point by international fleets of factory trawlers, great faith was placed in the ability of this highly-funded and experienced body of scientists to calculate TACs that would allow an exclusively Canadian fleet to fish at an intensity that would allow stocks to build up to former levels.

In the early 1980s, cod stocks did indeed rise — it could hardly have been otherwise given the drastic reduction in fishing effort resulting from the expulsion of foreign trawlers. But almost from the beginning, the DFO scientists delivered annual estimates of cod populations that were subsequently shown to have been wildly overestimated. More astonishingly, as years passed, while the scientists obtained information which showed that their

earlier predictions had been overestimated by as much as 100 per cent, and retrospectively revised these earlier predictions to fit the new evidence, they continued to publish TACs which both common sense and empirical evidence should have suggested were as over-optimistic as their earlier assessments.

By the middle of the 1980s, the inshore cod fishermen were already observing that their catches of cod were going down — even though the offshore sector's catch was still rising. They were beginning to question the accuracy of the scientific assessments. While the offshore fishery was demanding bigger quotas, the inshore fishermen were already starting to demand smaller ones to preserve the stock.

It was the publication in 1986 of a report by Keats, an independent fisheries scientist at the Memorial University of Newfoundland, commissioned by the Newfoundland Inshore Fisheries Association, that first exposed the inconsistencies in the DFO figures. On the strength of this evidence, inshore fishermen and most of the rest of the maritime community in Newfoundland stepped up their attack on the DFO scientists, forcing the government to commission two reports in 1987 and 1990 which confirmed (the first tacitly, the second openly) that scientific predictions of cod stock had gone severely awry. As a result, TACs were revised downwards, but not sufficiently or in time; as late as January 1992, DFO scientists were still maintaining that "there was a reasonably healthy northern cod spawning biomass of between 300,000 and 500,000 tonnes". A few weeks later, it became abundantly clear that there was nothing of the sort and a total moratorium was placed on cod-fishing.

*Idle fisherman at the wharf of Bay de Verde, some of the more than 35,000 fishermen who have lost a large part of their livelihoods now that the fish have gone.*

## A Promise of Abundance

How could one of the world's most prestigious fisheries science institutions have been so mistaken, and have continued to compound its mistakes when some 25,000 fishermen were telling it that it had got it wrong? Some of the answers can be found in a remarkable series of interviews with DFO scientists carried out by sociologist Alan Christopher Finlayson and published in 1994 in his book, *Fishing for Truth*.

Finlayson's analysis shows clearly how ostensibly objective observations are, in fact, mediated by "interpretive flexibility". The scientists freely admitted that their estimates about stock levels were riddled with uncertainty, and their predictions were invariably made with the *caveat* that they were only accurate within a certain margin of error — for example, plus or minus 25 per cent.

However, government policy demanded a precise figure — a quota based on Total Allowable Catch — that carried with it the weight of objective scientific support; and furthermore this figure needed to be socially and politically tenable. By a series of institutional Chinese whispers, cautious scientific estimates were translated into politically expedient hopes and thence into public promises. DFO scientist Jake Rice offers a plausible explanation of how early forecasts for a 15 per cent growth rate in the annual Canadian cod fishery — outlined to the public in a 1980 report entitled *A Promise of Abundance* — were reached:

"I was told in the late 1980s that the scientists in the mid-1970s did indeed claim it [the prediction of stock growth] was unrealistic. They were pressured to do the calculations, though, by the carrot of international negotiations. Picture the scientists given this choice:

(a) You do calculations you are unsure of. The calculations show how much could be gained if Canada wins jurisdiction over the stock. The argument wins Canada control over 2J3KL [a North Atlantic fishing zone] cod. Or

(b) if you aren't sure, you don't predict. Without numbers to prop up Canada's arguments, the case for extended jurisdiction is weaker and likely to be lost. 2J3KL keeps getting hammered by [foreign] distant water fleets.

Anyone, given such choices, will probably go for the uncertain projections."

Finlayson goes on to wheedle out of his scientific interviewees a collective acknowledgement that it was forces such as these that continued, even in the face of massive public cynicism, to translate scientific uncertainty into confident predictions of abundance, right up until the moment that stocks collapsed.

### Mumbo-Jumbo

The Canadian fisheries scientific establishment was, therefore, justified to an extent in feeling that it had become the public scapegoat for policy decisions made in its name. However, Finlayson goes on to demonstrate that the research procedures and the analytical methods adopted by the scientists themselves were inherently socially and politically biased.

Over the 1950s and 1960s, the main focus of fisheries science changed from marine biology to population dynamics. The mathematician replaced the biologist, the calculator replaced the microscope. Increasingly complex models of fish population movements were elaborated, and to build up these models, vast amounts of data were required.

Some of this data could come from research vessels, but the great majority had to come from the fishing vessels themselves. This information was likely to be biased — fishermen have vested interests in declaring or not declaring catch — but in the off-

shore sector at least, this was not an insuperable problem. By 1986, the DFO had an observer on board almost every fishing vessel over 100 foot in length.

The problem for the DFO was the inshore sector. The many different fishing techniques, the irregular seasonal participation in the industry, the problem of assigning a "catch per unit of effort" to such multifarious activities and the fact that most inshore fishermen could not be bothered to keep log-books while others could not read or write — all these factors discouraged scientific contact with the inshore fishery and predisposed scientists to take their data from the off-shore sector. As Dr. Edward Sandeman, Director of the Science Branch of the DFO in Newfoundland, confirmed:

"We ignored the inshore cod fishery. The reason being that it was extremely difficult to study . . . It was just too big an area to cover with the people we had. When the fish went offshore into congregations, we could much better devote our time on those congregations. So you're right. We did ignore that area to a large extent".

In other words, the fishery scientists established harmonious relations with the off-shore sector — largely controlled by two publicly funded corporations, FPI and NatSea, who had consistently lobbied for higher quotas — and derived a large amount of their data relating to catch per unit effort studying large sophisticated fishing vessels that could home in on the biggest shoal of cod in a very wide area. According to DFO scientist Jake Rice:

"Industry . . . has been incredibly cooperative in making available to us really detailed records of their best skippers. They will try to match vessels . . . Both FPI and NatSea have vessels that are the same in everything but name . . . They're providing all this information to us and they've come through with what we've asked."

By contrast the inshore fishermen are viewed by most scientists as uncooperative and archaic — "intractable" to modern scientific methodology. In Sandeman's words:

". . . the majority of them have a litany of mumbo-jumbo which they bring forth each time they talk to you. About where the fish are and why they're not here. They relate it to things like the berries and the trees. Sometimes observations of that sort have some value, such as 'When the wind is such-and such a way, you get catches.' That's acceptable."

### Laughing stock

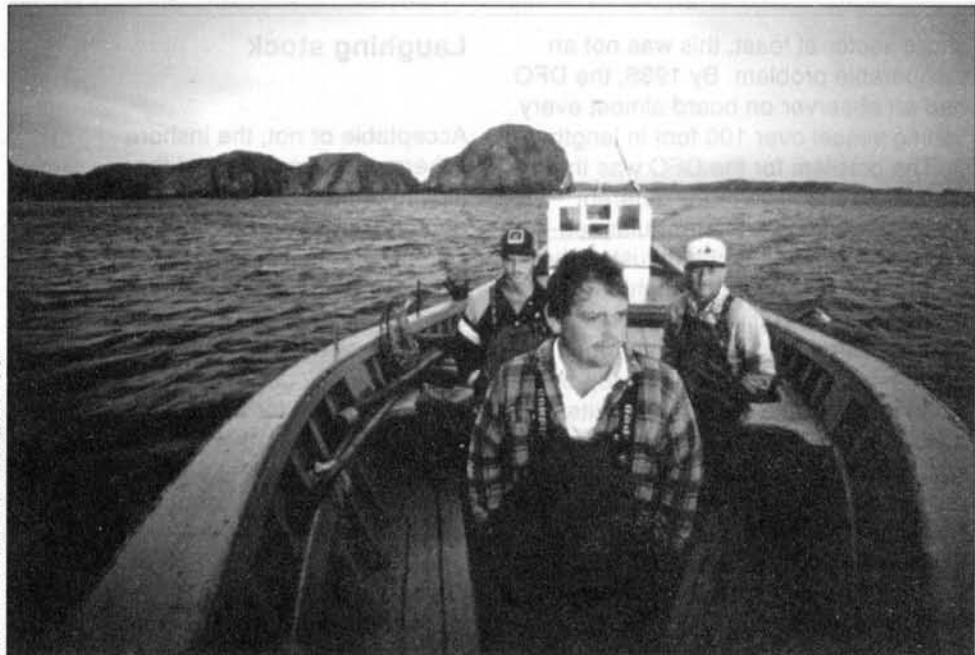
Acceptable or not, the inshore fishermen's knowledge of the movement of fish proved to be a good deal more accurate than the scientists'. The collapse of the fishery, which the inshoremen had been predicting with increasing vehemence over the previous decade, finally occurred in 1992. The humiliation for the scientists was absolute. Another fisheries scientist, J-J Maguire, agreed with Finlayson that "there's not a fishing wharf in Newfoundland where a DFO fishing scientist could go and not be laughed off."

Such humiliation has caused the DFO scientists to retreat to a precautionary approach. As Finlayson observes:

"All that science is willing to claim is that too much Northern cod is being caught and that quotas should be reduced to protect the resource, exactly what the inshore fishermen have been saying for years".

Finlayson's objective is not to debunk fisheries science, but to place it within its social context; to emphasize, as Icelandic fishing researcher Gísli Pálsson puts it, that "scientific understanding of the environment is a social construction". Once that is understood, then fishermen and scientists will be better placed to co-operate. If scientific assessments of TAC continue to be regarded as objective truth — if they are not recognized as being susceptible to political manipulation and inherently predisposed towards easily quantifiable industrial fisheries — then fish scientists may become the laughing-stock of the world. With the livelihoods of not just 35,000 Newfoundland fishworkers but many millions of inshore fishermen at stake, it will be bitter laughter.

Sources: Finlayson, A. C., *Fishing for Truth: A Sociological Analysis of Northern Cod Stock Assessments from 1977-1990*, Institute of Social and Economic Research books, Memorial University of Newfoundland, St. Johns, Newfoundland, 1994 (CAN\$ 24.95); Myers, O., "Democracy or Bureaucracy: Fisheries at the Crossroads", *Fisheries and Marine Policies Review*, Vol 2, No 1, St John's, Spring 1993.



Finally, gillnetting was seen by many as a threat to the long-term fishery:

"The longliners got everything overfished around here. Gillnets was the greatest disgrace ever done this country. I say they should be done away with altogether."

"Before the gillnets come, the fish came from everywhere. But since the gillnets and longliners started, every year is getting worse and worse."

Ironically, even the gillnetters themselves were unenthusiastic about gillnetting. Far from being successful "highliners", many of them were finding that the debts incurred to pay for boats and gear could not be covered by cod-fishing and required the possession of a number of protected species licences. A crab licence was preferable; otherwise a salmon licence and probably lobster and herring licences as well. In other words, to remain profitable, the gillnetting fleet needed to maintain a quasi-monopoly on the entire inshore fishery.

Small wonder, then, that gillnetters without protected species licences were flooding the fishing grounds with nets in order to recoup their own losses — or that, as one respondent observed, "There's a movement from longliners to trapboats." A 60-year-old fisherman from Bonavista described how he had resumed trap-netting to pay back the debt incurred on a longliner:

"When my son got a longliner, we all went out together. We thought we'd do better that way. Now he got to sell it. The gillnetting is not paying for it. He got it on a loan and is having a hard job paying it back . . . We're not using the longliner now. We uses a trapboat".

The pressure on inshore fishermen did not come only from gillnetters. The 43 herring-licence holders in Bonavista — who paid an annual fee to retain their licence — had been unable to take any herring for three years, because the fish had already been taken by larger, more sophisticated herring seiners:

"What happens to us is the seiners. The seiners takes up the quota."<sup>25</sup>

The large offshore druggers, owned by the major fish processing companies, Fisheries Products International of St John's and National Sea Products of Halifax, Nova Scotia, were also frequently criticized for overfishing and destroying the sea bed:

*Fishermen return empty-handed from cod fishing to Twillingate. After the collapse of the cod fishery, the disgraced Canadian Department of Fisheries and Oceans is now trying to regain support from fishermen by taking a hard line against Spain and the European Union in the recent dispute concerning Spanish boats fishing for turbot on the Grand Banks outside Canada's 200-mile EEZ.*

"They smothered us. They ruined the ground, see. They takes the flowers off the rocks the fish eats."<sup>26</sup>

One fisherman suggested that:

"The federal government should take a licence away from two foreign druggers and give it to 150 fishermen. Then we'd have a better province to live in."

The futility and the insecurity of these new technologies was summed up in the reminiscences and observations of one old Bonavista fisherman:

"On me ninth birthday they took me out. There was not engines, only sails. I made \$88 that year. Me father put it in the bank . . . I fished all me life with a piece of wire crooked up and trusted the fish to swim into it. And I never had a cent of government [welfare] . . . There was always good fishermen and always will be. People got larger boats to me brother and myself and can't make a success of it."

### **"So Many Regulations, It's Not Funny"**

If the complaints of traditional fishermen about fishery policies showed certain similarities throughout the five Newfoundland villages, the strategies adopted to deal with them differed markedly. Each of the communities had over many decades developed its own systems for regulating access to the fishing grounds. (See Box, p.89)

Such systems were devised by communities to ensure equitable distribution and a sustainable resource and, where necessary, to limit access to the more long-standing members of the community. In some cases, these measures were reinforced by rulings from the national Fisheries Department. When government rulings or regulations conflicted with local practice, however, local regulations tended to be undermined and seeds of disrespect sown. In Fermeuse, one fisherman challenged the authority of the cod-trap committee in the law courts, which decided in his favour and forced the committee to allocate the fisherman an extra berth. This attack on the community's right to control access to its fishing grounds led to a widespread loss of confidence in the authority of the traditional regulations. One fisherman commented:

"It is no good making harbour laws, 'cos it don't stand up with the Fisheries [Department] in St John's [capital of Newfoundland]."

Another observed:

"Because of the upheaval over the extra trap berth that was brought in a couple of years ago, our fishermen's committee has not been together . . . From my point of view, we got disillusioned when we couldn't prevent federal Fisheries from putting that extra berth in. Now if we can't have impact upon a minor decision like that, I don't know."

It was in Bonavista that fishermen were most vociferously opposed to government regulations and policies. Whereas in the other communities, fishermen tended to object to specific policies which conflicted with local practice, in Bonavista the overwhelming majority of fishermen were opposed to government regulation in general, voicing comments such as:

"I don't see much sense to none of what the government does today. A lot of regulations don't make it no better."

"They got so many fucking regulations, it's not funny."

The level of alienation was so pronounced that some believed that the government was deliberately trying to destroy the inshore fishery in the province:

"They [the government] is trying to kill the inshore fishery . . . They'd sooner me be on a dragger than paying me 28 cents a pound."

"They're trying to shut down the inshore fishery . . . It's a hard proposition too. Fifty per cent of Newfoundland is in the inshore fishery."

## Community Rights

Within five years of these interviews, the collapse of the fishery in itself provided sufficient evidence of the failure of the limited-entry policy pursued by the federal government. The collapse of the fishery was in keeping with the warnings of these fishermen that stocks were being depleted by offshore draggers and the use of new inshore technologies.

If and when the Newfoundland inshore fisheries are revived, it is to be hoped that the government will have learnt from its mistakes. Much could be gained by the government formally allocating to each community the property rights in its local community fishing grounds and thereby recognizing community regulatory practices. This

would give renewed confidence to local fisheries committees and encourage them to enforce judgements concerning the use of various fishing methods and technologies in their waters.

This is not to argue that the government should withdraw altogether from regulation of the Newfoundland fishery. On the contrary, many fishermen call for more state activity to ensure that inshore fishing grounds are protected from overfishing by predatory offshore fleets; and there is an important role for the government to play in resolving territorial disputes between communities. But there is now a clear need for the state to work more directly with inshore fishermen, rather than *for* them — and most definitely not *against* them, as has too often been the case in eastern Canada over the last 10 years.

# Capitalism Nature Socialism

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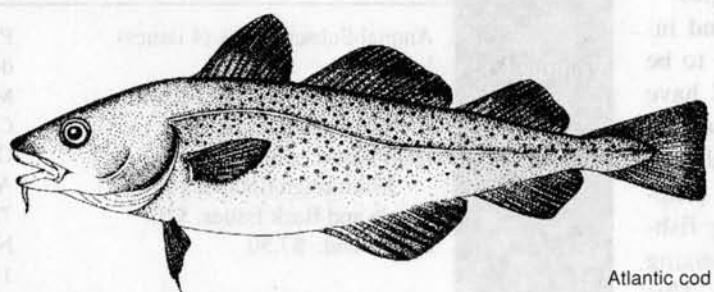
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## Notes and References

1. Within Canada's 200-mile fishery regulation area, fishing grounds have been divided into sub-sections and a Total Allowable Catch established for each season in each sub-section area.
2. The closure in July 1992 was initially a two-year moratorium on the Canadian inshore exploitation of cod. In September 1993, however, the ban was extended to the whole of Eastern Canada, and in spring 1994, all recreational fishing for cod was forbidden. The moratorium is now indefinite. Because cod do not mature and spawn until approximately seven years of age, government fisheries officials now estimate that it will take at least two reproductive generations of cod before any fishing will be possible and a minimum of 14 years for any commercial cod fishing.
3. Myers, O., "Democracy or Bureaucracy: Fisheries at the Crossroads", *Fisheries and Marine Policies Review*, Vol 2, No 1, Spring 1993, p.4.
4. However, as most Newfoundland fishermen have only elementary schooling, they are unlikely to qualify for training which would enable them to make a significant occupational transition. Furthermore, many of the occupations for which they do qualify for training, such as working heavy equipment or in construction, have high unemployment rates in Newfoundland — even prior to the collapse of the cod fishery, the province's unemployment rate was over 24 per cent. As a result, a recent report to the Canadian House of Commons documented that retraining programmes have had virtually no effect in enabling former fishermen to move into non-fisheries occupations.
5. Newfoundland has only been part of Canada since 1949, when the province voted in a referendum to join the Canadian confederation, following the bankruptcy of its own independent government in 1933 and 16 subsequent years of rule by a British government commission. Newfoundland's widely-dispersed fishing communities were regarded by the Canadian authorities as "isolated" in the modern context; in the late 1960s, the national government embarked on a policy of community resettlement around 74 selected growth centres; over 100 communities were evacuated before vehement public opposition halted the programme.
6. In the mid-1980s, however, the government turned these loans over to the banks to manage at usual interest rates. When the skipper could not afford to make his loan repayments because of lower catches and higher costs for petrol, the banks foreclosed. Thus, although skippers technically own million dollar vessels, they are more "co-misadventurers" with their crew members than "capitalists". A "longliner" vessel should not be confused with "longlining", a form of fishing carried out in many regions involving long fishing lines strewn along the sea bed with many hooks and bait attached. Longliners are usually owned by a "skipper" who often fishes with his brothers, sons, nephews and other male relatives. Most boats have a crew of four to six persons. The catch of each boat is usually divided equally among the crew, including a share to the skipper, but with one additional share "for the boat"; for example, a four-person crew would have five shares.
7. As these nets smothered the fishing grounds, it was almost impossible for fish to escape being caught. But although the catching potential increased enormously, the quality deteriorated because fish caught in nets drown and begin to rot, unlike those in cod traps which are alive until being lifted.
8. Logging as a part-time occupation declined due to greater mechanization and unionization of the labour force, where full-timers were preferred.
9. Worldwide, the continental shelves are the richest fishing grounds; there are fewer fish to be caught in the deep sea. In most areas, the continental shelf extends only a few miles into the sea and is thus well within a country's 200-mile EEZ. The Grand Banks and Labrador Banks of Canada is exceptional in that, lying some 20 to 40 feet below the surface, they begin some 30 miles offshore and extend in places well beyond the EEZ. These shoal areas are the meeting place of the Gulf stream and the Arctic current, providing the ideal conditions for plankton, the microscopic vegetation on which most fish depend, directly or indirectly. Hence they are areas of high fish fertility and large numbers of fish.
10. Letter from Richard Cashin, President, Newfoundland Fish, Food and Allied Workers' Union, *Financial Times*, 28 July 1993. The North West Atlantic Fisheries Organization comprises those Western European and North American countries which have traditionally fished the North West Atlantic (primarily the continental shelf off Canada). The Organization allots quotas in three portions: to Canada, the European Union and other countries. However, the regulatory structure and the allocated quota are non-binding. The recent dispute between Canada and Spain was prompted by a Spanish vessel fishing for turbot just outside Canada's 200-mile EEZ because Spain has not accepted the lessened quota allocated to the EU by the Organization.
11. Environment Canada, *Policy for Canada's Commercial Fisheries, Supply and Services Canada*, Ottawa, 1976.
12. MacKenzie, W. C., "Rational Fisheries Management in a Depressed Region: The Atlantic Groundfishery", *Journal of the Fisheries Research Board of Canada*, No. 36, 1979, pp.811-854.
13. Speech by Hon Romeo LeBlanc, then Minister of Fisheries and Oceans at the 50th Anniversary meeting of the United Maritime Fishermen, Moncton, New Brunswick, 19 March 1980. LeBlanc has recently been appointed Governor General of Canada.
14. Canada Fisheries Act.
15. In the inshore fishery, there were a range of catch limit regulations: for some species, such as herring, there were total tonnage quotas for specific regions; however, for groundfish — fish which feed near the sea bed such as cod, sole, turbot and halibut — no inshore catch limits were set. The only regulation affecting these species was the number of fishing licences made available. In the offshore or deep sea fishery, quota limits were set for each sub-region, and the fishing was harvested by the fishing vessels of the major fish processing corporations. It was primarily the inadequacy of these regulations and limits which led to the overfishing of cod and other fish.
16. *Report of the Committee on Federal Licensing Policy*, Memorial University of Newfoundland, St John's, 1974, p.18.
17. Ibid., p.22
18. Crutchfield, J. A., "Economic and Social Implications of the Main Policy Alternatives for Controlling Fishing Effort", *Journal of the Fisheries Research Board of Canada*, 1979 p.748.
19. Scott, A., "Development of Economic Theory on Fisheries Regulation", *Journal of the Fisheries Research Board of Canada*, 1979, pp.726-31.
20. Quoted in Copes, P., "Fisheries Management on Canada's Atlantic Coast: Economic Factors and Socio-Political Constraints", *Canadian Journal of Regional Science*, 1983 p.26.
21. Newfoundland Fish, Food and Allied Workers' Union, "Full-Time Fishermen Get Priority", *Union Forum*, March 1979, p.17 and "Licensing: Prompt Action Needed", *Union Forum*, July 1979, pp.13-14.
22. Newfoundland Fish, Food and Allied Workers' Union, "Licence the Man, not the Boat", *Union Forum*, March 1980, pp.21-22.
23. The basic principle of fisheries regulation in Canada is that fish in the water are the responsibility of the national government, while fish in the boat (that is, after being caught) are the responsibility of the provincial government. Thus licences to fish came under the jurisdiction of the national government. Fishermen who were unhappy with the categorization (full-time, part-time, recreational) could appeal to a committee, set up by the Newfoundland Fish, Food and Allied Workers' Union on authority granted to it by the national government. In this whole regulatory process, the government of Newfoundland was largely excluded.  
Most appeals were from fishermen who had been designated part-time but who contended they were full-time. Fishermen were declared part-time if there was no evidence that they had fished full-time during the preceding season. But as fishing is largely a seasonal activity, full-time and part-time designations were largely arbitrary in that many fishermen categorized as full-time sought alternative work in the off-season. However, those who did not fish during the main summer fishing season risked being reclassified as part-time. The only major penalty for being part-time concerned the priority given to full-timers under union contracts with various fish processing plants. The combination of the licensing policies and contracts gave considerable power to the Union.
24. Salmon and lobster are high-income, inshore species, the catch of which has been closely regulated for generations. Possession of a salmon or lobster licence was often guaranteed to double an inshore fisherman's annual income, even though the seasons for these species were relatively short. Crab were not actively pursued until the mid-1960s, largely because they require highly-specialized gear and especially-equipped longliners; neither these nor the onshore processing facilities were available in Newfoundland until this time.
25. Herring are a "schooling" fish which "strike in" to each bay and section of coast in approximately the same week each year. The herring-licensing structure therefore limited herring catches to a specific tonnage in each bay. Schools of herring can, however, strike in on one side of a bay several days before reaching the other side. Fishermen in communities on one side could harvest the complete quota for the bay before the schools moved to the other side of the bay.
26. To some extent, these companies chose to fish in different sub-areas of the continental shelf. As a result, when the Department of Fisheries and Oceans set quotas for each sub-area, they were in effect setting a quota for a particular corporate enterprise.



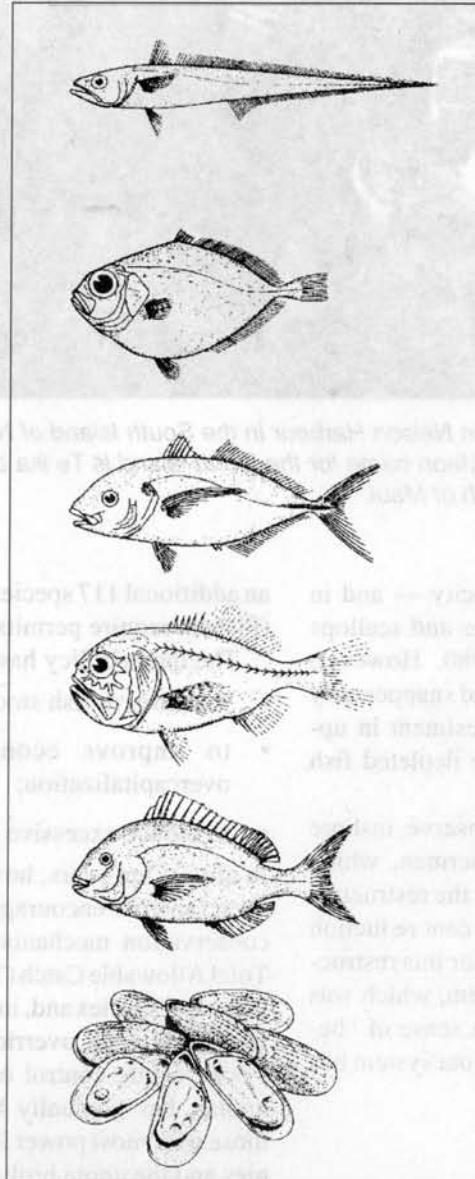
Atlantic cod

# Closed Competition

## Fish Quotas in New Zealand

Leith Duncan

In New Zealand, a system of transferable quotas governing the quantities of certain types of fish allowed to be caught in particular areas was introduced in 1986 as a means of protecting fish stocks and is now widespread. Yet these quotas have failed dismally to achieve their goal. Catch limits, sometimes set far above sustainable levels, have often been exceeded by a combination of exemptions, poaching and deceit. The main effect of the quota system has been to exclude small-scale and independent fishermen from fisheries, which fall increasingly under the control of large, profit-seeking corporations. Individual Transferable Quotas in New Zealand are thus more than a management tool — they are part of a particular political and social agenda.



NEW ZEALAND SEAFOOD: (from the top) HOKI, DEEP SEA DORY, TREVALLY, ORANGE ROUGHY, SNAPPER, GREENSHELLS

Governments and fish industrialists have often claimed that if fishers and fishing companies hold private property rights in fish stocks, they will have a long-term stake in maintaining the stocks at a healthy level and will thus make every effort to conserve them.

Nowhere has this belief been tested more thoroughly than New Zealand. There, property titles to a wide range of fish stocks have been handed out since 1986 in the form of Individual Transferable Quotas (ITQs), which are defined as rights:

“to harvest a specified tonnage of Total Allowable Catch (TAC) from a stock in a given Quota Management Area.”

The results inspire little confidence in a private-property approach to fisheries conservation.

### Restructuring the Coastal Fisheries

ITQs were introduced in New Zealand in response to overexploitation of the country's fishing grounds, which in turn had arisen largely because of overcapitalization of the industry. For more than a century, the New Zealand fishing industry has followed a familiar process of expansion from small-scale, traditionally-managed coastal fisheries, many of them operated by indigenous Maori, to highly-industrialized, vertically-integrated corporate conglomerates primarily serving the export market. New Zealand corporations now control virtually all fisheries in the country's 200-mile Exclusive Economic Zone (EEZ), established in 1978; 90 per cent of the catch is exported, the main markets being Japan and other Asian countries, the US, Europe and Australia.<sup>1</sup>

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Before the 1960s, the government operated a system of restricted licences: entry into the fisheries was rigidly limited and there were controls on the gear that could be used, the areas that could be fished, and the ports at which boats could land their catch. After 1963, the licensing system was replaced by a system involving vessel registration, and permits to fish were issued as of right. Fisheries became "open access" and the fishing fleet was expanded with the help of government investment incentives, grants, allowances and tax breaks. Subsequently, with the establishment of the 200-mile EEZ, a modern deepwater fishery developed.

By the late 1970s, however, it was clear that the fishing industry was over-capitalized — that is, there was too much capacity — and in 1978, the issuing of new permits for rock lobster and scallops were suspended, as were those for wet-fish in 1980. However, limited entry into fisheries such as rock lobster and snapper only resulted in increased fishing effort through investment in upgrading boats and gear rather than enabling the depleted fish stocks to rebuild.<sup>2</sup>

The failure of these various policies to conserve inshore stocks led the Federation of Commercial Fishermen, which represented mainly owner-operators, to lobby for the restructuring of the coastal fishery with the aim of a 40 per cent reduction in coastal fishing effort.<sup>3</sup> The main tool selected for this restructuring was an individual transferable quota system, which was introduced in 1986. Many fishermen now feel a sense of "betrayal... and disgust" at the way in which the quota system has developed.

## Enter Quotas

In New Zealand, an Individual Transferable Quota for a given species of fish is issued in perpetuity, and can be bought, sold or leased amongst New Zealand residents and companies which have less than 20 per cent foreign ownership. A quota holder cannot have more than 20 per cent of the Total Allowable Catch (TAC), defined in terms of tonnage and revised annually, for any given inshore area, or 35 per cent for any deep sea fishery. Quota holders until recently had to pay an annual rent, based on the amount of quota or percentage of the TAC held rather than the amount of fish actually caught.<sup>4</sup> This is now being replaced by a "full cost recovery scheme", whereby quota holders have to pay the costs of the administrative bureaucracy. Many fishers see the system as one that is primarily a revenue-collecting scheme for



Fishing boats in Nelson Harbour in the South Island of New Zealand. The Maori name for the North Island is Te ika a Maui — the fish of Maui.

the government.

When quotas were introduced in 1986, they were allocated to owner/operators or fishing companies on the basis of their "catch history" over a number of preceding years. However, a proportion of the quota was bought back by the government at a cost of NZ\$42 million, in order to keep total quota allowance in line with the estimated allowable catch for different species and as a means of compensating fishermen who agreed to fish less than they did before. At present, the system covers 32 species in 169 different management areas, but under the September 1992 "settlement" of Maori fishing claims lodged under the 1840 Treaty of Waitangi,

an additional 117 species can be brought into the quota system.<sup>5</sup> (Fishers require permits to fish for non-quota species).<sup>6</sup>

The quota policy has three main objectives:

- to conserve fish stocks by reducing overfishing;
- to improve economic efficiency by reducing overcapitalization;
- to reduce excessive government regulation.<sup>7</sup>

In almost ten years, however, New Zealand's experience has been far from encouraging in achieving these objectives. The conservation mechanisms within the quota system such as Total Allowable Catch (TAC) limits, prohibitions against dumping quota species and, in some cases, minimum mesh size, have frequently been overridden, causing further declines in fish stocks, while control of the fisheries, through ownership of quotas, has gradually become concentrated in the hands of those with most power in the marketplace — the larger companies and the quota brokers. An examination of the three major aspects of the quota system — conservation, allocation of the catch and enforcement of the rules — suggests that ITQs are not the panacea that the government, fishery managers and some fishermen had hoped for.

## Conservation

To regulate fishing activity, the New Zealand quota system relies heavily upon a single measure to control "output": the annual Total Allowable Catch (TAC), a limit per species set annually by the Minister of Fisheries after fishery scientists have assessed fish stocks and he has consulted with Maori groups, the fishing industry, environmental and recreational groups and other interested parties.<sup>8</sup> The TAC can only assist,

in practice, in conserving fish stocks if it is set within the limits of sustainability, which in turn have to be defined, and if it is adhered to by fishermen and fishing companies. The quota system thus depends upon the reliability and accuracy of fishery science and the degree of voluntary compliance with — and the effectiveness of — enforcement mechanisms.

There is widespread uncertainty, however, as to whether scientific assessments of fish stocks are accurate, or indeed whether they can ever be so.<sup>9</sup> Even the Ministry of Agriculture and Fisheries has considerable doubts; in its reports on the assessments of quota species, the statement, “it is not known if long-term catch levels at the level of the Total Allowable Commercial Catch (TACC) are sustainable” occurs, with minor variations, in connection with 34 out of 43 of the stocks listed.<sup>10</sup> Many believe that the primary reason for this uncertainty is the inability of procedures to assess the current state of a single species to take into account the relationships between different marine species, predator/prey relationships and other factors (*see pp.74-79*).

In such cases, the final chosen figure of the TAC is likely to be contentious — a lower figure being chosen when the advice of scientists with a precautionary approach is taken, a higher figure when wishful thinking or pressure from influential interests prevail. The final assessment often reflects the aspirations of those most closely involved with the stock’s exploitation.

In several fisheries in New Zealand, TACs have been set so high that quota owners have not been able to catch their full quota. A 1990 ministerial briefing observed that:

“three major fisheries in New Zealand, those for hoki, squid and rock lobster, are presently unconstrained by their TACs ... In the immediate future, the industry will be unable to catch the orange roughy TACs. This would lead to a situation where the four largest New Zealand fisheries were effectively managed on an ‘open access’ basis.”<sup>11</sup>

In practice, for some species a restricted number of fishermen or companies are allowed to catch as many fish as they can.

The final decision on TACs seems to owe more to the lobbying of the powerful fishing industry than to the best science available or the concerns of conservationists. The orange roughy fishery on the Chatham Rise, an underwater ridge stretching out to the east of the South Island from off Banks Peninsula to beyond the Chatham Islands, is a stark example.

Orange roughy is an unusual fish species, living at depths in excess of 1,000 metres. It is believed to live to about 150 years old, and to spawn only after reaching the age of 30; as a result, only about one to two per cent of the total stock are added per year. Orange roughy is in demand, not because of any distinct characteristic, but because its flesh is suitable for whitefish fillets and can therefore substitute for other fish, such as cod, haddock and redfish, whose stocks are in decline. Most orange roughy is exported, primarily to the US.

The orange roughy fishery began in the late 1970s. Subsequent research has estimated that the total biomass of the species was then about 400,000 tonnes. Now government scientists

estimate it at between 10 and 17 per cent of its unfished state — but one estimate has placed it as low as 7.5 per cent. By most standards, the fishery would be regarded as “collapsed”. While recent surveys remapping the sea bed have discovered extensive areas of potential new roughy grounds, follow-up surveys have failed to find new stocks.

The New Zealand fishing industry, however, is proud that “orange roughy is the engine that has built the deep water fishery”.<sup>12</sup> Ownership of orange roughy quotas has provided the security of access necessary for financing deep water fleets, infrastructure, processing plants and marketing networks. But catches have to stay high to pay off debts incurred by this investment and to maintain profitability; these immediate incentives override any long-term concern for ecological sustainability. As orange roughy collapses deep sea dory is being promoted.

In the stock assessment for orange roughy for the 1993/4 season to set the TAC, government and industry scientists recommended that

Chatham Rise orange roughy catch limits be substantially cut to 3,400-5,900 tonnes, arguing that under both low and high risk scenarios this would give the stock a 50 per cent chance of rebuilding.

However, the Minister of Fisheries, Doug Kidd, left the TAC at 14,000 tonnes, seemingly as a result of intensive lobbying by the orange roughy quota owners, a decision which prompted Greenpeace to initiate judicial proceedings against the Minister in December 1993. Despite the obvious urgency of the matter, these have yet to come to court. Meanwhile, the TAC for the 1994/95 season has been reduced from 14,000 to 8,000 tonnes, a reduction that is too little and too late.



S La Plant/Key-Light Image Library

A net full of orange roughy, caught in New Zealand's remote southern, sub-antarctic oceans with bottom trawls operating at depths of 3,000-4,000 feet.

# On Course to a Corporate Fishery

In the United States, industry representatives and other advocates of ITQs have been candid about their motives for introducing ITQs. According to business consultant David Wallace, ITQs are "designed to reduce overcapitalization. Concentration or consolidation is an objective of the management system." Another proponent, Mark Lundsten, a member of the Seattle-based Fishing Vessel Owners' Association, testified before Congress: "ITQs are a natural solution to our overcrowded, inefficient open-access system. They will promote the efficiency of American fishing companies, 'big business' companies, by providing a market-driven harvesting rights plan."

A representative of the US National Marine Fisheries Service (NMFS), which advocates ITQs in some situations, agreed at the same Congressional hearing that ITQs might indeed further the concentration of big corporations:

"This could happen, as experienced with grocery stores, agriculture and other such enterprises . . . To the extent that larger firms are relatively better capitalized, they may be able to obtain more shares relative to their needs for efficient operation than smaller firms."

In some ITQ fisheries, there are limits on the amount of quota that any one company can purchase. However, there are many ways companies can get around these measures. Even in the US, where corporate reporting requirements are more stringent than in many countries, it is not difficult for companies to create *ad hoc* subsidiaries for quota-holding purposes. The Seafarers International Union of North America points out that:

"The NMFS does not have the resources or the expertise to track through the myriad of front companies, purchase agreements and other financial tools commonly employed to hide actual ownership and control. The agency would need a fleet of Securities and Exchange Commission lawyers to even begin the job."

Companies can also circumvent quota ceilings through security agreements, defaulting debtors and buying up quotas at auctions. In a bankruptcy auction in February 1995, the world's largest manufacturer of earth-moving equipment, Caterpillar, bought up hundreds of thousands of Alaskan halibut and sable-fish quotas.

## The Decline of the SCOQ Fishery

Other companies that own ITQs include the British-based National Westminster Bank (through a wholly-owned subsidiary) and the largest accounting group in the world, KPMG (through a US affiliate). Both own ITQs in the surf clam and ocean quahog fishery (SCOQ) off the US East Coast, probably as collateral or in a brokering capacity.

Large food firms such as General Mills and the Campbell Soup Company (and, until recently, Borden) also reportedly controlled significant amounts of SCOQ quota as of 1992. Exact details are hard to establish because records of an NMFS investigation into issues such as corporate control were deliberately destroyed after the East Coast Fisheries Federation requested a copy of the report under the US Freedom of Information Act. Clams are an important product ingredient for these companies, which therefore have, according to a Seafarers' Union representative:

"a strong incentive to garner as much of the resource rights as they can and the capital resources to bid up the price of ITQs far beyond what a fishermen could profitably (or actually) afford to pay."

The ITQ system and the influence of the food processing industry have not had a beneficial effect upon the SCOQ fishery. According to one crewperson, the fleet can now "kill more clams [because] we have more time to catch them and the plants want choice clams". This "high-grading" may well be one reason why, according to 1993 NMFS figures, landings of clams per unit effort are steadily decreasing, an indication that stocks are becoming depleted. Within two years of ITQs being implemented, one-third of those working in the fishery had lost their jobs, while numerous crew members who survived the lay-offs now have to work longer hours for lower wages.

## Legalized Theft

A fervent advocate of ITQs is John Tyson, president of Tyson Foods, the world's largest chicken producer and distributor in the world with revenues of more than \$5 billion. In 1992, Tyson bought Arctic Alaska Fisheries Corporation, the US's largest owner and operator of factory trawlers and one of its leading fish processors; around the same time, Tyson also acquired the Louis Kemp seafood company. Tyson expects ITQs to offer "some control of the amount of the product available", and a company spokesperson has stated that "the future of the fishery up there [North East Pacific waters] is dependent upon getting some sort of ITQ system." Tyson himself makes no secret about his aim to acquire additional ITQs:

"If we develop what the customer wants, and Tyson were to get its quota and we were able to go to somebody else that has a quota and say, 'sell us your quota because we have a customer and we can all make more money together' — I don't see anything wrong with that."

Other groups do. Sealaska, the regional native corporation for south-east Alaska, has predicted that ITQ systems would squeeze lower-income native fishermen out of the industry. "We will see the disappearance of traditional native community fishing fleets," commented Sealaska, "as the [ITQs] shift from rural to urban areas and from residents to non-residents. Our experiences with the limited-entry system tells us that this is a certainty."

But the native community and other small investors will have to fight against the combined might of the overcapitalized Seattle-based factory-trawler industry which can no longer catch enough fish to stay profitable, and which is counting on ITQs to extricate itself from the threat of bankruptcy. Trawler owners such as Tyson talk of "maximizing efficiency" and "ensuring continuity of supply"; what they actually mean is legalized theft. In the words of Vince Curry of the Pacific Seafood Processors Association:

"They're driving ITQs because it's one way to take a public resource and use it to get themselves out of a bad investment."

Jed Greer

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The apparent ability of the fishing industry to sway governments against the peer-contested advice of their scientists is vividly evident in the orange roughy controversy. As one group of eminent fishery scientists have warned:

"There is remarkable consistency in the history of resource exploitation: resources are inevitably overexploited, often to the point of collapse or extinction . . . Wealth or the prospects of wealth generates political and social power that is used to promote unlimited exploitation of resources."<sup>13</sup>

## Enforcement

Once the TACC has been set each season, it is divided up among the various quota holders according to the percentage or quota they possess. However, there are several different ways — legal and illegal — of exceeding the quota.

Fishing is an uncertain business. It is not always easy to catch the desired amount of a particular species or to obtain the right quota portfolio to match the species mix, particularly in multispecies fisheries.

To address this problem, fishermen may legally exceed their quota by up to 10 per cent in one year or carry over 10 per cent to the following year to allow for flexibility in balancing their annual landings against the quota they hold;<sup>14</sup> they can make a "surrender payment" for overcaught fish; and they can trade quotas for a related species (by-catch trade-off). In addition, they are permitted to catch or fish against another's quota — a complexity which adds to the difficulties of offences being detected.

As a result, TACs in quota-managed fisheries are often considerably exceeded. Between the 1987/88 and the 1991/92 seasons, for instance, the quota for snapper in Quota Management Area II, the southern half of the North Island's east coast, was exceeded by 11 per cent, 33.7 per cent, 118 per cent, 147 per cent and 137 per cent in each successive season. In 1992/3, mackerel quota overruns reached up to 500 per cent in some areas, yet no penalties were applied.

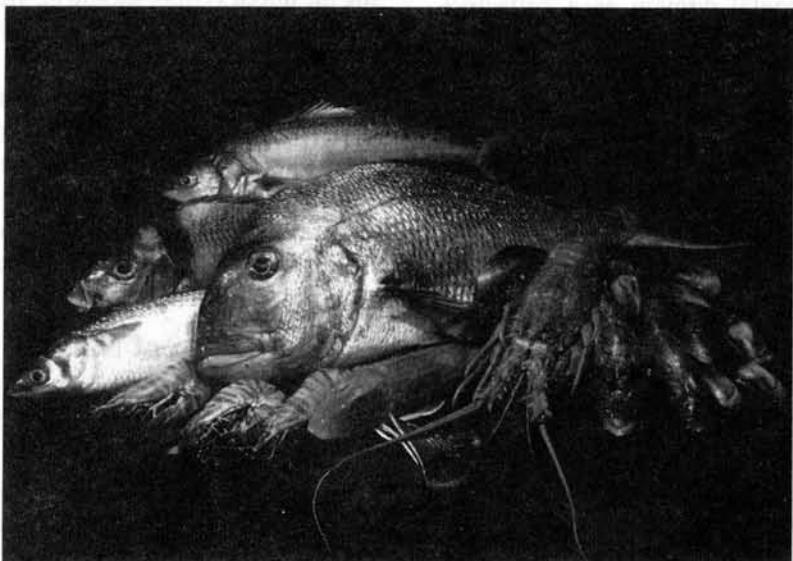
Beyond these legal infringements of the quota lie a wide variety of illegal activities, such as high-grading (dumping lesser value fish at sea), poaching, fishing out of season and selling fish on the black market, which are widespread in many, if not most, industrialized fisheries. The ITQ system is no exception.

During the 1993/94 season, the New Zealand Ministry of Agriculture and Fisheries (MAF) undertook more than 60 enforcement initiatives, including military operations, against poaching and black market dealing. Eight successful major prosecutions against people and companies involved in quota fraud resulted, leading to fines totalling NZ\$2.5 million and seizure of property worth NZ\$11.8 million. Recent prosecutions involved cases of joint venture super-trawlers fishing for

hoki inside the prohibited 25-mile coastal zone; rock lobster poaching that in some areas was equivalent to more than half the regional TACC and over a third of the national TACC; and allegations that as much as 80 per cent of fish available on the domestic market had been funnelled through the black market.<sup>15</sup> One industry representative commented that the costs of litigation to both the government and the fishing industry had not been considered when the ITQ system was introduced.<sup>16</sup>

Whether the illegal catch under the ITQ system is proportion-

ately greater than it would have been under different management regimes is hard to establish. But a large number of illegal activities are going on, sometimes carried out by quota-owners intent upon increasing profits or cutting losses, sometimes by non-quota-owners who wish to gain a share of the fishery. In either case, the theory that the ITQ system ensures that fish stocks are exploited *only* by property owners with a long-term interest in the stock's sustainability clearly does not hold in practice.



G Mason/Key-Light Image Library

New Zealand seafood: snapper, kahawai, guarnard, rock lobster, mussels.

## Allocation

Some problems of poaching and the black market are inextricably linked with the issue of initial quota allocation. When quotas were first allocated in 1986 according to "catch histories", small-scale fishermen were deliberately excluded. An official report prior to the introduction of ITQs published a table showing that 50 vessels, representing less than 1.3 per cent of the coastal fleet, landed 45.2 per cent of the coastal catch, while 2,500 vessels, out of a total fleet of nearly 4,000 boats, accounted for just 4.3 per cent of the catch.<sup>17</sup> If the genuine intention of restructuring had been to reduce the coastal fishing effort by 40 per cent, as fishermen were asking for, then reduction should have started with the 50 largest, company-operated vessels.

Instead, restructuring was orientated around "professionalizing" the industry, in particular by eliminating "part-timers". For many Maori living in small communities, fishermen who also worked in other seasonal industries (such as forestry or meat works), and subsistence or so-called "lifestyle" fishermen, the allocation of quotas aggravated already high levels of unemployment, causing major hardship. Newspaper accounts estimate that there were about 3,000 redundancies between 1983 and 1986.<sup>18</sup> Meanwhile, corporate part-timers — such as Fletcher and Carter Holt Harvey, who had interests in other activities such as construction, forestry, pulp and paper — acquired most of the quotas.

Nor was any provision made for crew members. The "catch history" record by which quota was allocated accrued to owner-operators, not to deckhands. When excess quota was bought

back by the government, no compensation was given to crewmen for the loss of their jobs.

In short, the right to fish was officially allocated to those who had the might. As one commentator summed up:

"The 1980s management procedure was, firstly, to commodify access to the fish species most under threat, in the form of catch 'quota'; and then to award these rights to the major commercial operators as a free gift, *pro rata* according to their documented histories. The small-scale and 'informal' operators, and the local people who thought they enjoyed an environmental domain as a collective heritage and source of sustenance, were told that they do not 'own' it at all. Effectively, ownership (all commercial catch rights) were awarded to the large commercial operators."<sup>19</sup>

Since 1986, most of the quota has been garnered by large companies. In 1993, the three largest companies, Sealord, Sanford and Amaltal, owned more than 50 per cent of the quota, while the top 30 companies, many of them part of conglomerates, owned more than 75 per cent. Recently, one of the big three, Sanford, bought up the sixth largest company, Wanganui Trawlers, a concentration which, by government dispensation, remains within the law and brings control by the "Big Three" to more than 60 per cent. Acquisitions are still continuing. According to the MAF director of quota enforcements, Dave Wood:

"MAF fisheries investigations have revealed that some entities have gone to extraordinary lengths, by way of shelf companies and other mechanisms, to avoid the intent of the quota aggregation legislation."<sup>20</sup>

The effect upon smaller fishing communities of this aggregation has been serious, and there are now relatively few independent fishermen left in New Zealand. A comparison of studies done in the area north of Auckland — known as "Northland" and the only region where any attempt was made to assess the socio-economic impact of the ITQ system before its introduction — suggests that direct and indirect employment lost in capture fisheries has been replaced through the introduction of oyster and mussel farms. Nonetheless:

"The loss of local holdings of these [quota] rights, with the dramatic decrease in the number of locally-based fishing vessels, has had a major impact on small Northland

communities. The local economy has been seriously affected by the decrease in the number of boats. When one considers that fishing multipliers [the indirect economic benefit to the community] have been estimated . . . to be 3.1 for each fishing dollar and 3.2 for every fisherman, and also the great historical importance of fishing in the area, the implementation of the Quota Management System was nothing short of an economic disaster to many small communities in the Northland region."<sup>21</sup>

It is in this context that much of the poaching activity undermining the quota system should be viewed. The history of poaching throughout the centuries shows that it is frequently carried out by those who feel they have been unjustly treated in the allocation of fish and game resources; in the context of New Zealand's ITQ system, there are many who may feel aggrieved at their treatment. One formerly prominent fishermen's representative said recently, "I never thought I would see the day when I would ever say, 'Get whatever you can out of it. Just don't get caught.' But that is how disgusted I am now."<sup>22</sup>

## Capitalization of Nature

In 1990, a government investigation into the effects of the quota system stated that it was:

"struggling to provide the necessary information for management decisions which can control fishing at sustainable levels and ensure sustainability of the fishery resources. This is reflected in:

- A lack of sufficient information about the fish;
- Difficulties in reducing catches and quota;
- Insufficient constraint on individual fishing activity;
- Problems in ensuring compliance."<sup>23</sup>

The ITQ system in New Zealand has not provided a conservative precautionary approach that encourages social cooperation to keep fishing at sustainable levels. At root, ITQs are more than just a component of management: they are part of the capitalization of nature and society in the interests of global investors and large corporations. ITQs may reduce the numbers of competitors, but not the competition; and hence they have done nothing to curtail the political and social power that is used to promote unlimited exploitation of resources.

**NEW ZEALAND  
ORANGE ROUGHY**

NEW ZEALAND SEAFOODS

THE BEST OF NATURE

New Zealand Fishing Industry Board

# From Catch Kings to Quota Kings

## Global Trends in Fish Quotas

The quota system is gaining acceptability in many countries around the world. Besides New Zealand, it is already operational in Australia, Iceland, Canada, the United States, Italy, The Netherlands, Norway and Japan. There have, as yet, been few attempts to introduce quotas into Third World countries since problems associated with equity, scientific management and enforcement are, as yet, judged to be too great.

### Australia: The Single Purpose Vessel

In Australia, the ITQ experience has been similar to that in New Zealand, though the system has been less widely applied. ITQs were first introduced into the bluefin tuna fishery in 1984. Their introduction, according to a paper submitted to a 1992 OECD seminar on ITQs:

"led to a rapid and substantial adjustment of the fleet. Within two years the number of boats fell by around 70 per cent. However, the efficiency gains from the adjustment were to some extent eroded because many departing operators redirected their effort toward other fisheries, some of which were overcapitalized . . . The South Australian fleet . . . was comprised mainly of large, purpose-built, specialist tuna vessels in contrast to the New South Wales and Western Australian fleets which were predominately multipurpose boats. The South Australian operators . . . were willing to offer higher prices for quota than their New South Wales and Western Australian based counterparts. As a result a relatively small number of South Australian corporate owners gained the vast majority of the quota."

### Iceland: The Biggest Theft in History

Iceland, although a tiny country, is the second largest fish producer after Norway. Quotas were introduced in 1983 in response to what Icelandic fishing economist G P Gíslason described as a "tragedy of the commons"—declining fishing catches relative to increased fishing effort.

Public concern has centred around concentration in the industry. Since 1984, the number of boats owning quota has declined by 25 per cent, while the amount of quota owned by the ten largest companies increased from 19.5 per cent to over 26 per cent by 1992. These changes, although not staggering, have caused considerable anxiety in a society heavily dependent upon fishing. In recent parliamentary elections, campaigners characterized the quota system as "the biggest theft in the history of Iceland".

The tendency of fishing companies to sell the catch directly to foreign markets without processing it in Iceland has compounded the concern, particularly among



Peter F Anson

processing workers, who are mainly women. Some Icelanders are questioning:

"the privileged access of either fishermen or boat-owners, the 'Lords of the sea' (*saegreifer*), as the latter are sometimes called, to the most valuable national resource, arguing that fishing is becoming like Third World mining where raw materials are exported with little return to the national economy."

Another effect of quotas has been the disappearance of the prestige customarily given to top fishermen. Whereas the top skippers (highliners) were once referred to as *aflakóngur*—"catch kings"—now they are known as *kvótakóngur*—"quota kings". In 1989, the winner of the annual Fishermen's

Day award for the highest catch refused to accept his prize, arguing that the contest was unjust since some skippers were barred from the competition owing to the small quota assigned to them. The organizers decided to scrap the contest. Prowess in fishing is no longer a matter of hunting skill, or even luck, but of the ability to amass quota.

### Peru: Selling a Failed Model

Peru is one of the few Southern countries where an attempt is being made to introduce an ITQ system. Vessel quotas were applied to the anchovy fishmeal fishery in the years 1968 to 1971 when it was the world's biggest fishery in an effort to stem overfishing. But these quotas were notoriously ineffective since anchovy shoal in vast, easily catchable quantities, and vessels were obliged to discard enormous amounts of dead fish if they stuck to their quota.

The World Bank is now applying pressure on Peru to introduce ITQs in conjunction with the privatization of the country's extensive fish-meal processing industry, which is likely to be bought up by mainly Chilean and Chinese investors. A World Bank-funded seminar on ITQs held in Lima in 1992 concluded that ITQs were unsuitable for the Peruvian fishery, but the World Bank still considers that a quota system is the only alternative for because it considers it more profitable, easily-monitored and in tune with a free market economy. The fisheries trade union, SNP (National Society of Fishing), opposes ITQs, stating that they are being introduced by "foreign assessors who have come to Peru, claiming to impose an administrative model which has failed in other countries".

The World Bank's 1992 *Strategy for Fisheries Development* cites ITQs as one means of "controlling access to fisheries resources" and proposes "efforts to restructure the operations of parastatal organizations and fisheries co-operatives". Peru's huge fishmeal industry is the obvious place in the South to start such a project.

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5. Many Maori fishers were among the part-time fishers excluded from fishing when ITQs were introduced. Many Maoris believed that the exclusive property rights aspect of the ITQ system was contrary to the 1840 Treaty of Waitangi, an agreement between Maori peoples and the British Crown. In the English version of Article 1, the chiefs ceded "sovereignty" to the Crown, but in the Maori version, they ceded "governance". Article 2 guarantees to the chiefs "full exclusive and undisturbed possession of their lands and estates, forests, fisheries and other properties which they may collectively or individually possess" (English version), while Article 3 extended royal protection and imparted all the rights and privileges of British subjects. The Maoris took their claims concerning ITQs to court which resulted in a High Court injunction in November 1987 against more fish species being brought into the ITQ system. In 1989, the Maori Fisheries Act granted 10 per cent of quota to the Maoris and made provision for a trading company to operate it. In addition, it provided for Maori traditional and subsistence fishing. In the 1992 Deed of Settlement (the so-called Sealord Deal), the Crown financed Maori peoples in a 50/50 joint venture with Brierley Investments to buy Sealord Products Ltd (New Zealand's largest fishing company) and granted 20 per cent of the quota for all new species brought into the ITQ system. Maori peoples were to agree that this was a full and final settlement of their commercial fishing claims. There is, however, considerable dissension from Maori who did not want their Treaty rights extinguished. See Walker, R., "The Treaty of Waitangi and the Fishing Industry" in Deeks, J. and Perry, N. (eds.), *Controlling Interests: Business, the State and Society in New Zealand*, Auckland University Press, 1992.
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8. The Minister first sets the TAC for a species and then "may, after allowing for the Maori, traditional, recreational and other non-commercial interests in the fishery . . . specify the Total Allowable Catch to be available for each quota management area in respect of each species or class of fish subject to the quota management system" (*Fisheries Amendment* 1986).
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# Who is Weeping Crocodile Tears?

## Britain's Fishing Industry & the EU Common Fisheries Policy

Simon Fairlie

*Save Britain's Fish is a single-issue campaign, calling for the withdrawal of the UK from the European Union's Common Fisheries Policy (CFP) and full national control of British coastal waters. It is supported by the majority of British fishermen who believe that UK fish stocks can be managed more sustainably and more equitably by themselves than by Brussels. But the campaign is opposed by a powerful sector of the industry, mainly based in Scotland, which believes that the CFP can be reformed from within. The Save Britain's Fish campaign has in a very short time successfully drawn attention to the inadequacies of the CFP; but it ignores, at its peril, the structural conflicts that exist within the UK industry.*



Peter F. Anson

The British fishing industry is divided. Since Britain's entry into the European Economic Community (EEC) in 1973, a fault line has been rumbling within the industry. At issue is the EU Common Fisheries Policy (CFP), under which Britain's waters are open to other EU fleets and Britain's fishermen are subject to a raft of regulations governing the conservation and allocation of fish stocks.

As conflicts between British fishermen and other EU fleets have increased, the fault line in the industry has widened into a chasm. The issue is not whether to support the CFP as it stands — as John Goodlad of the Shetland Fisherman's Association remarks, "I have never met a single fisherman who is pro-CFP"<sup>1</sup> — and fishermen are largely in agreement as to what is wrong with it. The dispute is between those who believe the CFP should be reformed or dealt with from within, and those who believe that the only hope for the UK fishing industry is to withdraw from the CFP and reclaim control over UK waters.

Simon Fairlie is an Associate Editor of *The Ecologist*.



*Barrels of salted herring stacked on the quayside beside herring sailboats at the old harbour in Scarborough.*

The division is a legacy from the days when the UK marine fishery was based on two main species, cod and herring (see p.107). Today the industry is still broadly dominated by these two sectors: the "whitefish" fleet (catching cod, haddock, plaice, sole and other fish) which consists of relatively small boats scattered around Scotland and the rest of Britain; and the "pelagic" fishery (catching herring and mackerel) which supports some much bigger vessels, largely based in Scotland (and also at Killybegs, Co. Donegal, Ireland).

The gulf between these two sectors has become manifest with the rapid rise of Save Britain's Fish (SBF), a movement that unequivocally advocates Britain's withdrawal from the CFP. Its supporters — probably the majority of British fishermen — are drawn from the whitefish fleet and include the largest English fishermen's organization, The National Federation of Fishermen's Organizations, many regional associations and the Scottish Whitefish Producers' Association. The other side — those who wish Britain to stay within the CFP — is supported in particular by the Scottish pelagic fishery and is headed by the Scottish Fishermen's Federation with the support of other Scottish associations including those from Clyde and Shetland.

## What is the CFP?

The EU Common Fisheries Policy was signed a matter of hours before the UK and Ireland started negotiating in 1970 for

membership of the EEC. The EEC's original six members (France, Germany, Italy and the Benelux countries) had belatedly realized that the UK and Eire brought with them considerable fishing resources. If a 200-mile Exclusive Economic Zone (EEZ) in the waters around coastlines was formalized — as seemed increasingly likely under the UN Convention on the Law of the Sea — then the accession of the UK and Eire would virtually double the area of productive fishing grounds available to European Community members. Before negotiations with the potential new entrants began, the "six" therefore rushed in as a *fait accompli* a policy that gave all member states full access to these waters:

"Member States shall insure in particular equal conditions of access to and use of [their] fishing grounds . . . for all fishing vessels flying the flag of a Member State and registered in Community territory."<sup>2</sup>

Britain's future 200-mile zone was thus signed over to the European Community before it had even become established in international law. The UK fishing industry has never forgiven Westminster for this act of betrayal.

But there was worse to come. When Spain, together with Portugal and Greece, joined the EU in 1986, it brought with it precisely the opposite of what Britain had contributed: by far the largest fleet in Europe and relatively poor fishing grounds. An only slightly increased quantity of fish now had to be divided among almost twice as many fishermen.

# Herring, Cod and the Freedom of the Seas

Prior to the industrial revolution, Britain could boast apparently inexhaustible supplies of a wide variety of fish. But by the first half of the nineteenth century, the rivers and estuaries that once teemed with salmon were overfished and polluted — and the marine fishing industry was embarked on a course that was to lead to an inexorable decline in fish stocks and the economic collapse of the industry. Two species in particular were the focus of this explosion of fishing effort — herring and cod.

## Herring

In the eighteenth century, a Scottish vicar bemoaned the fact that no one was exploiting the vast shoals of spawning herring off the coast of Scotland, of which he observed:

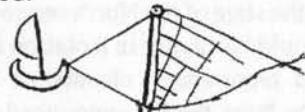
"the strongest whale dares not pierce through them, seeing he could not move his fins for the immense throng and therefore browses behind the herring like a horse eating at the face of a hayrick."

Despite an Act for the Encouragement of the White Herring Fishery approved by George II in the eighteenth century which gave herring fishermen complete freedom of the seas, local fishermen throughout Britain were content to do little more than "browse" off these immense pelagic shoals.

It was in the nineteenth century that the Scottish herring fishery was developed from a subsistence occupation into a commercial industry. Large subsidies were offered to capitalists in 1808 to invest in herring fishing, mainly to provide an occupation for peasants evicted from their lands to make way for sheep during the Scottish Clearances. Within a few years, Wick in north-east Scotland had become the centre of a thriving fishery for "the silver darlings".

Over the next 150 years, an enormous driftnet fishery based on the British east coast was maintained without terminal overfishing. Herring became a staple food — the only animal protein unrationed during the Second World War. The fishery collapsed in the 1960s when Norwegian and Danish purse-seiners attacked the shoals, mainly for fishmeal. By the time stocks recovered in the 1980s, albeit to a fraction of their former level, herring had become associated with war-time austerity, and a generation of British children, brought up on frozen cod and fish fingers, had never acquired a taste for it. Today, most British-caught herring is exported.

## The "Trawle"



The history of cod fishing has its roots in the invention of the trawl net. In 1376, a group of aggrieved fishermen petitioned the King of England:

"The great and long iron of the 'wondyrchoun' runs so heavily and hardly over the ground when fishing that it destroys the flowers of the land below the water, and also the spat of oysters, mussels and other fish upon which the great fish are accustomed to be fed and nourished. By which instrument in many places the fishermen take such quantity of small fish that they know not what to do with them, and they feed and fat their pigs with them, to the great damage of the Commons of the Realm and the destruction of the fisheries".

This instrument was a beam trawl. From its beginnings, it posed three persistent problems: it damaged the sea bed; it caused overfishing; and it produced large amounts of trash fish. Complaints, confrontations and conflicts concerning trawling persisted for 500 years.

In 1863, a Royal Commission with the eminent Darwinian T H Huxley on the Board heard evidence from inshore fishermen who claimed that trawling had ruined the east coast grounds. The Commission, however, cleared trawling and recommended that the "complicated, confused and unsatisfactory laws" relating to open sea fishing should be repealed to provide "unrestricted freedom of fishing". In 1868, a host of fishing regulations were swept away by Act of Parliament.

But the agitation against trawlers continued and even trawlermen themselves became concerned. To allay any further doubts about the future of the fisheries, an International Fisheries Exhibition involving more than 1,500 companies was held in London in 1883, at which Huxley pronounced:

"The cod fishery, the herring fishery, the pilchard fishery, the mackerel fishery and probably all the great sea fisheries are inexhaustible: that is to say, nothing we do seriously affects the number of fish. And any attempt to regulate these fisheries seems consequently, from the nature of the case, to be useless."

The fishermen at the congress, including the trawlermen were incensed; they wanted regulation. Twenty years later, Britain's first research vessel, christened *Huxley*, confirmed what fishermen could plainly see: that many stocks were becoming seriously overfished.

## Cod

The response to this depletion was not to regulate, but to move the fishery further abroad in a quest for cod. From 1881, the trawler fleet consisting of shorter-range sailing smacks was replaced with longer-range steamers, and fishing moved further and further beyond the North Sea to waters around Norway, Iceland and Greenland. By the 1950s, huge 300-foot factory trawlers were ploughing the North Atlantic for months on end. Large vertically-integrated fishing corporations, based in Hull, used the new medium of television to broadcast the virtues of frozen cod and fish fingers — there were no commercials for kippers (smoked herring).

The seas, however, were not 'inexhaustible'. As stocks declined, Iceland closed her fishing grounds, and in the early 1970s, the Hull trawler fleet was scrapped. "Freedom of the Seas" had proved to be the freedom for larger and larger boats to fish them to near-depletion.

With the Hull fleet gone, prospects were brighter for inshore fishermen, particularly since British waters were to be closed to foreign fleets by the establishment of the 200-mile Exclusive Economic Zone. Yet hopes for a revival of the inshore fleet were short-lived. British fishermen now face a different enemy in the EU Common Fisheries Policy, according to which freedom to fish in UK waters for the fleets of Europe is mediated through the manipulations of bureaucrats who want both to maximize efficiency and conserve stocks. This is a recipe for redundancy and revolt.

## Relative Stability

The CFP's credo of equal access for member states — "One Fleet, One Pond" — has dictated its course and its approach to both the conservation and the allocation of fish stocks. Since all waters (beyond six miles from any coast)<sup>3</sup> are theoretically open to fishing boats of any size or type from any EU member state, any proposed regulation will have different repercussions on a variety of fleets and evoke different degrees of support or opposition from member states.

Almost every measure that the CFP has ever proposed has therefore been subject to prolonged horse-trading as the fisheries ministers of individual member states fight for the interests of their fishing industries (or, more accurately, those sectors of their industries with the greatest political influence). In 1994, Spain fought tooth-and-nail to gain access for its large trawler industry to the waters west of Britain known as the "Irish Box" — while UK fishermen, with much smaller boats, felt that their

been put forward by the Scottish Fishermen's Federation.<sup>5</sup> Both organizations complain that the EU has ignored their suggestions.

For EU administrators, the problem with limiting "fishing input" through measures such as these is that they affect different countries' fishing industries unequally. Changes in mesh size<sup>6</sup>, in minimum landing size or in maximum engine capacity, will favour one regional or national fleet over another. The interminable disputes over such matters cannot be resolved by trade-offs between nations because there is no known way of calculating the effects of changes in fishing input, or of expressing them in a readily tradeable unit.

Instead, relative stability is achieved by regulating "output" — by allocating a total quota to each member state based upon Total Allowable Catch (TAC) and calibrated, species for species, through a unit known as "cod equivalent". Member states who lose out from reduced quotas in one threatened fishery are compensated by a corresponding additional amount of quota in another. As the former head of the fisheries Conservation Unit for the European Commission, Mike Holden, observes:

"Relative stability committed the Community to a system of conservation based upon TACs because these are the only practical means by which the principle can be implemented."<sup>7</sup>

Michael Marchant/The Environmental Picture Library



A trawler beached at Hastings in Sussex, "tied up" under the UK government's "Days at Sea" legislation, which limited the number of days a fishing vessel could work. Protests took many forms.

government had sacrificed their interests.

In order to reach a workable agreement between the warring factions of the so-called "Community", the CFP has evolved a mechanism known as "relative stability". This means that any measure which disadvantages the fishing industry of a member nation must be balanced by another measure which provides for a reasonable degree of stability in that country's total catch.

Attempts to apply technical measures to conserve fish stocks have led to insurmountable difficulties because of "relative stability" — even though such measures are favoured by many fishermen, particularly in the UK. The British National Federation of Fishermen's Organizations (NFFO), for example, has outlined a series of technical conservation measures which could be taken in various fisheries — minimum mesh sizes and landing sizes, more selective trawl nets, limits on engine size or on the number of crab pots, bans on the landing of ungutted fish and on the use of certain types of gear, and closure of certain areas, either seasonally or permanently.<sup>4</sup> Similar proposals have

one recent example, in November 1994, scientists warned that "the state of the North sea cod stock is so serious that if it could be caught in isolation from other species, they would recommend closure of the fishery."<sup>8</sup> Yet four months later, the EC announced an increase in the North Sea cod quota of nearly 20 per cent.<sup>9</sup>

- The quota system does little, if anything, to reduce the amount of discarded fish and, in many cases, increases it. In order to keep within quota regulations, fishermen have to discard by-catch (fish of one valued species that they catch whilst targeting another) and undersized fish, and are encouraged by the regulations to "high-grade" — that is, to throw overboard low-quality fish in the hope of catching fish of higher commercial value. According to Scottish Fisheries Secretary Alastair Findlay, "more fish are discarded overboard by Scottish fishermen than they actually land."<sup>10</sup>

- The system of quotas requires expensive, bureaucratic monitoring procedures, universally detested by fishermen as an unnecessary “paper trail”. “The business of fishing bureaucracy is now greater than the business of fishing itself” says Jim Slater, chair of the Scottish Pelagic Fishermen’s Association.<sup>11</sup> Resentment of the rules and of the bureaucratic requirements results in widespread non-compliance and dishonest reporting. One skipper, who was convicted of falsifying his log-sheet, wrote an open letter to Britain’s Ministry of Agriculture, Fisheries and Food (MAFF) explaining why he was leaving the industry: “I refuse to catch fish and throw them back dead; I refuse to keep them on board and make a dishonest entry in the log book. Are you aware that most of the information entered in the EU log-books is false? Do you realize that any decisions taken based on this information are bound to be erroneous? Would you agree with me that the system itself is the biggest cause of the industry’s problems?”<sup>12</sup>
- Quotas require a centralized system of administration by an unwieldy bureaucracy that is insensitive to local differences. Inshore fishermen are adamant that they could do a better job of maintaining their stocks than the EU “fishcrats”, and many would agree with Plymouth fisherman and Save Britain’s Fish supporter Armand Thomas that “fisheries should be community-managed because it is the local fishing community that has the greatest stake in preserving fish stocks.”<sup>13</sup>

men’s organizations, the British government suspended this proposal; and, in January 1995, announced that it had allocated an extra £28 million for decommissioning — paying fishermen to scrap their boats and surrender their licence.

This met a lukewarm reception from most fishermen, who at best found it preferable to the “days-at-sea” proposal. The majority of fishermen do not oppose decommissioning *per se*; when a boat-owner decides to stop fishing, it makes clear sense, given the threatened state of many fish stocks in British waters, for the government to buy back the boat and the licence, rather than for it to be sold to another fisherman. But they are concerned that there will be little protection for crewmen who do not own boats; that British boats will be decommissioned to make way for Spanish or other foreign boats registered in the UK; and that even the extra £28 million is not sufficient — retiring fishermen can often get more money for selling their licences to others than they can for decommissioning their boats.



*Two decommissioned, Grimsby-based fishing vessels are burned at the Humber Workboats yard in South Humberside.*

Quentin Bates/Fishing News

## Decommissioning

In addition to administering quotas, the CFP aims to reduce the capacity of the EU fleet. It is agreed by almost everyone that the EU fleet is too large and overcapitalized, not least because EU subsidies have encouraged the acquisition of medium-to-large-sized fishing boats.<sup>14</sup> To reduce capacity, the European Commission aims to cut the fleet’s capacity by at least 40 per cent. By 1996, member states are required to reduce their existing capacity by one fifth.

There is little prospect of Britain’s meeting that requirement. Initially, the government tried to implement a “tie-up law”, restricting boats to a limited numbers of “days at sea” — as little as 80 days for many boats. This met unified opposition from the fishing industry, which recognized that the burden of paying fixed costs and interest payments on tied-up boats would bankrupt many fishermen; it predicted that many of them would sell their licenses to fish threatened stock to foreign fishermen.

In December 1993, following a legal challenge by fisher-

## The Roots of the Split

If there is so much apparent agreement among British fishermen concerning the inadequacy of the CFP and alternative ways of managing the fisheries, why then is there such a rift between those who hope to reform the CFP and the supporters of Save Britain’s Fish who wish Britain to leave it? And what are the specific areas of disagreement? The answer to the first question lies in the legacy of the post-war fishing industry. The Scottish pelagic fleet, which fishes herring for human consumption, has inherited a reasonably large EU herring quota, partly because the Danish fleet, which helped caused the collapse of herring stocks in the late 1960s, is no longer allowed to catch herring for fishmeal under an EU agreement. But the regionally-based whitefish fleet, which emerged out of the demise in the 1970s of the Hull long-distance trawler industry, has to battle for quota with a number of well-established European fleets — particularly the Spanish — which have a history of fishing in the waters that now constitute the “European pond”.



A large pelagic purse-seiner (above) based in north-east Scotland starts to haul in a catch of herring from the North Sea. A typical small Cornish trawler (right) has been pair trawling with another Cornish boat in the waters off Britain's south-west coast.



Phil Lockley/Fishing News

Moreover, these two sectors of the UK fishing industry are now in a diametrically-opposed market situation. Britain has become highly-dependent upon cheap cod imports from Norway, Russia and Iceland — whilst the herring and mackerel caught by the pelagic fleet are exported to Russia, Northern Europe and continental EU countries, in particular Spain.<sup>15</sup> The Scottish pelagic boats can, without difficulty, sell much of their catch to "Klondykers" — Eastern European factory ships; the whitefish fleet, on the other hand, lives under the threat of seeing prices lowered by imports of cheap cod into Britain since "a flood of cheap cod is and always has been the best way for the Russians, etc. to pay for herring and mackerel."<sup>16</sup> The Scottish fleet is also happier to accommodate Spain since it sells fish to Spain, but is not (as yet) threatened by Spanish access to waters around Scotland.

The Scottish pelagic fishery has, in fact, done very well under the CFP, so it is not at all surprising that it should be opposed to withdrawal. The fleet now includes large boats, up to 100 metres long, operated by an elite known as "the Scottish Princes". "Fishing in Scotland is hierarchical," says fisherman-turned-journalist Rodi Wout. "It is the top men with the big investments who set the pace and it is their example and thinking that is traditionally followed."<sup>17</sup> The princes and their associates in the industry have acquired a proprietary stake, which they are

unwilling to jeopardize, in the smooth operation of the CFP. As Wout writes:

"The 'Right to Fish' guaranteed by quotas, licences, vessel capacity units has now become a negotiable asset every bit as valuable as property and land. It secures and underwrites the bank loans and financing of many a fishing operation. Loss of that now would bankrupt great numbers of Scottish skippers who rely on this system, however detestable."<sup>18</sup>

### Emerging Monopolies

The prospects for the whitefish fleet and much of the rest of the UK fishing industry are by no means so rosy. The whitefish fleet is variegated, decentralized and tends to consist of much smaller boats, ranging from less than 10 metres up to about 40 metres. Most, though not all, of these smaller boats are based in England — thus there are more fishermen in England and Wales than in Scotland, even though the Scottish catch is twice as big as the English and Welsh combined. The quotas which have become an asset to the "big boys" in Scotland have proved to be elusive for many smaller fishermen. In Essex, for example, Joss Wiggins of the Kent and Essex Sea Fisheries Committee reports that:

# Computers, Condoms and "The Spy in the Sky"

Many inshore fishermen have protested angrily that they are being squeezed out of the industry through the extra expense of complying bureaucratic regulations. Although the EU Common Fisheries Policy has been slow to agree upon elementary conservation measures, such as mesh-net sizes, it has spawned a plethora of new standards relating to safety and monitoring technologies. For example:

- The Marine Safety Agency is drawing up a new Code of Practice for vessels under 12 metres, which proposes to ban single-handed fishing as "dangerous", oblige small-craft owners to obtain a qualification and impose regular and expensive surveys upon vessels. Many small-boat skippers, all of whom have successfully avoided drowning themselves, are incensed at having their competence questioned and their vessels vetted at their expense, by an official who has probably never even seen it before. Some skippers feel safer when fishing on their own, and point out that having to pay for a deckhand will mean that they will have to increase fishing effort.
- Draft legislation known as the "M Notice", which derives from an EU directive, obliges fishing vessels to carry "a large quantity



Peter Fryer/Panos Pictures

- of drugs, such as addictive Valium and controlled morphine; antibiotics and drugs to control cardiovascular conditions; headlice shampoo; and condoms . . . and surgical equipment including scalpels and dissecting forceps." The cost, says Sherrill Murray of Cornwall, "will mount to thousands of pounds . . . One wonders whether the underlying reason for this type of legislation, once again, is a way of reducing our fleet to [EU] requirements at no additional cost to the Treasury."
- The 1994 Brussels agreement on Spanish access into the waters off Britain known as the "Irish Box", carries with it stringent measures for monitoring access. It also requires satellite equipment to be installed at the cost of about £10,000 per vessel, of which the Commission will pay only half.
  - The worldwide implementation of the Global Marine and Distress Satellite System (GMDSS) scheduled for February 1999 is also worrying fishermen, since it will be accompanied by the phase-out of

aural seawatch on radio Channel 16, which provides a safety service for fisherman. Tony Rae of the National Federation of Fishermen's Organizations comments: "The loss of Channel 16 will leave us in a silent zone . . . The cost and design of existing equipment, which is far too bulky for small craft, will impose an impossible financial burden on hard-pressed fleets . . . The safety of very many fishermen may be jeopardized, particularly those in smaller vessels."

Regulations imposing additional capitalization on an industry that is already overcapitalized are viewed by some fishermen as an ill-concealed way of driving them off the seas. The Secretary of the East Devon Fisherman's Association summed up many small-scale fishermen's attitudes when commenting on the proposal to ban single-handed fishing:

"All countries have traditional fishing methods. We have traditional methods of fishing in this country, which are not very efficient, but provide a way of life for thousands of people. . . Why are we being handicapped by the very communities that are paid for by our taxes? Any interference in this industry will be vigorously opposed."

## Track Record

It is fishermen such as Pessel that provide the articulate grass-roots support for Save Britain's Fish. Many of them find that they are being squeezed out of the quota market by both foreign and British fishermen and sense that they are being pressured into decommissioning.

Quotas are allocated on the basis of "track record" — a history of fishing over a number of previous years. Recent legislation has linked track record with licences to catch specific species and these licences are, in turn, attached to boats. However, licences and track record can be "aggregated": additional quota and licences can be acquired by buying a boat for its quota and then selling the boat on. In this way, companies and CFP-instituted "Producers' Organizations" are buying up licences and quota from smaller fishermen whose track record has not

"The traditional sole fishery, supporting the majority of vessels within this district, has suffered severe restrictions. This has been as a result of loss of quota allocations, which have been diverted to large new vessels entering the fishery outside this district."<sup>19</sup>

In Plymouth, Dave Pessel, chair of the Plymouth Trawler Owners Association, says that local fishermen who are short of quota "have become masters at eking out a living and getting by on minimal catches."<sup>20</sup> As they get by, they watch Danish trawlers, officially catching fishmeal species such as pilchard and scad, dumping by-catch mackerel into the sea. The industrial boats are allowed to take 10 per cent of their "accidental" catch as mackerel — an enormous amount of fish by the standards of the local fleet — back to Denmark to be turned into fishmeal. Anything above that they are supposed to dump overboard, though they do not always do so.

given them enough quota to survive. According to an industry source, "the pace at which all this is happening is phenomenal", while a government representative remarked that "he could see the number of licences in Scotland... being reduced from about 1,500 now to 1,000 in two years."<sup>21</sup> There is nothing to stop these licenses being bought up by companies from other EU countries or abroad. There are already many Spanish- and Dutch-owned vessels registered in Britain, and fishing companies joint-owned by different nations.

Many of the aggrieved fishermen are those in the "non-sector", that is they do not belong to a Producers' Organization (PO). These regional associations of fishermen — which have been able to acquire increasing amounts of quota to distribute among their members — have been viewed by some as a way of introducing more regional control into fisheries management. But many of the fishermen who are not members of POs see them as "closed shops" and are angry at the way that the groups have managed to "ring-fence" the quota. Out of a total 1994 allocation of 43,730 tonnes of North Sea cod, the non-sector netted only 2,718 tonnes, and so had to fall back on their catches of non-quota species such as bass, skate, lemon sole, squid and some shellfish. Non-sector fishermen also find that they have to trade fish with the POs from an unfavourable bargaining position. According to journalist Henning Koch:

"The near monopoly of the POs is recognized and encouraged by the EC Directorate. Indeed, if non-sector fishermen were to form organizations to try and influence the allocation of quotas, these would probably be challenged under [European] law as restrictive practices."<sup>22</sup>

One of the most vocal groups opposing this emerging monopoly is the Plymouth Trawler Owners Association, as its Chair, Dave Pessel, explains:

*Net makers on the West coast of Britain in the 1930s. In fishing societies where the men are absent for particularly long periods, there is often a pronounced tendency towards matriarchy in local social organization.*



Hulton Deutsch

"From the outset, we opposed the introduction of sectoral quotas simply because, with the exception of national allocations, we have never believed that individual or groups of fishermen have a right to *the* fish — only *to* fish. It remains a mystery to us how the government, which continues to emphasize the importance of conservation, openly advocates a system which rewards the people who catch the most fish with even more fish, while those who catch the least run the risk of losing virtually all their quota. Such a greed-induced system must strike at the heart of an industry in desperate need of strong conservation measures. The track-record system encourages avarice, cheating, misreporting, under-reporting, over-reporting and creative reporting — in fact everything except the damn truth... What reliance can scientists place on this enormous statistical falsehood furnished by the industry for the assessment of stocks?"<sup>23</sup>

Some fishermen regard the trade in track record as effectively leading to a system of Individual Transferable Quotas (ITQs) — property rights over stocks of fish (see pp.97-104) — as quotas become monopolized by POs and bigger companies. Tom Brown of the Kent boat *Shalandra* claims that "When the government offered the industry individual transferable quotas in 1990, the POs were vehemently against it": but now "many POs operate on an individual quota scheme and can purchase track records."<sup>24</sup> As former Member of the European Parliament Henry McGubbin comments:

"The British government would be delighted to introduce ITQs... The attraction to government would be off-loading the problem onto the industry and merely refereeing the ensuing competition until the fleet is small enough to be ignored."<sup>25</sup>

*The French Naval Service videoed a Spanish pole-and-line tuna boat ramming a French driftnetter in the Bay of Biscay during the "tuna wars" of the summer of 1994. Cornish and Irish netters who fished in this non-quota fishery, which takes place from June to September in international waters, were also attacked. The labour-intensive pole-and-line fishers support a 1992 EU ban on driftnets over 2.5 kilometres long and accuse French and Cornish boats, such as those attacked, of breaking the ban.*



Fishing News

## Crocodile Tears

The support for Save Britain's Fish (SBF) comes in particular from those fishermen who believe that, unlike the Scottish pelagic fleet, they have got nothing to lose by withdrawing from the CFP — that their livelihoods and way of life are scheduled to be terminated by a relentless programme of monopolization and modernization. The fact that this anger has been galvanized by the SBF campaign has heightened the volume of the debate, but it has also narrowed its focus.

SBF has been accused by its principal opponents, including the Scottish Fishermen's Federation, of being a single-issue movement, concerned only with securing rights to the British EEZ; and its main spokesperson, John Ashworth, has been charged with giving no clear indication "as to what specific policies he would pursue for the benefit of British fishermen and the future management of our fishery resources, if in the event, his campaign [to withdraw from the CFP] was successful."<sup>26</sup>

Ashworth's reply is that:

"Unless SBF becomes an elected organization representing fishermen, it has no rights to tell fishermen how their industry should be run in the future. SBF has always stated that this is up to the fishermen, and that when the campaign has been won, SBF ceases to exist."<sup>27</sup>

In some ways, Ashworth is justified. The National Federation of Fishermen's Organizations, the Scottish Fishermen's Federation and other fishermen's organizations have already published alternative proposals. However, the concentration on the single issue of European (and especially Spanish) access to UK waters has diverted attention from some of the structural problems within the UK industry; and it has attracted support from a number of narrowly nationalist groups whose main interest in the campaign is in "gunning for Britain" rather than supporting fishermen and protecting fish stocks.

Nonetheless, the SBF's single-issue campaign is proving

more effective than any previous attempt to budge the bureaucratic might of Brussels. Corrupt regimes are rarely reformed by calls for reform — it is the threat of collapse or revolt that spurs them to change. It is also reasonable to question whether those who refuse to back SBF — pleading instead for reform of the CFP from within — are, in fact, as opposed to the CFP's present policies as they make themselves out to be. It would not be the first time in history that those who consider themselves to be safe have wept crocodile tears.

## Radical Change or No Change?

It is not the pleading of the reformists, but the militancy of the SBF and fishermen's groups in other countries (such as the Spanish pole-and-line fishermen who have been agitating against the use of driftnets in the Bay of Biscay), that appears to be pushing CFP policymakers to consider radical reforms. In May 1995, Cornwall MP David Harris was informed by senior EU officials that the EU was:

"having to carry out a 'radical rethink' on the CFP because of growing opposition to it, particularly in Britain. And the Commission will not press the 'equal access' principle which underpins the CFP... The Commission wanted much more local and regional management of stocks, with a greater say being given to fishermen on management and conservation"<sup>28</sup>

As Harris admits, not too much should be read into this statement, since large bureaucracies are slow to change, and little is likely to happen before the scheduled renegotiation of the CFP in the year 2002. Nonetheless, the supporters of SBF should consider the full implications of an abandonment of the principle of equal access. The UK fishing industry might get a bigger slice of the EU cake; but the pressure to "rationalize" the fisheries and deny small "inefficient" producers a slice of the cake might well continue unabated. The inshore family-owned

fleet could find that its main enemy becomes a UK bureaucracy headed by the Ministry of Agriculture, Fisheries and Food — and even that a new package of EU measures protecting local and regional fishermen (analogous to those that exist to support hill-farmers) might offer some defence against a national government hell-bent upon economic “efficiency”.

*Fishing News* makes a similar point in a different way:

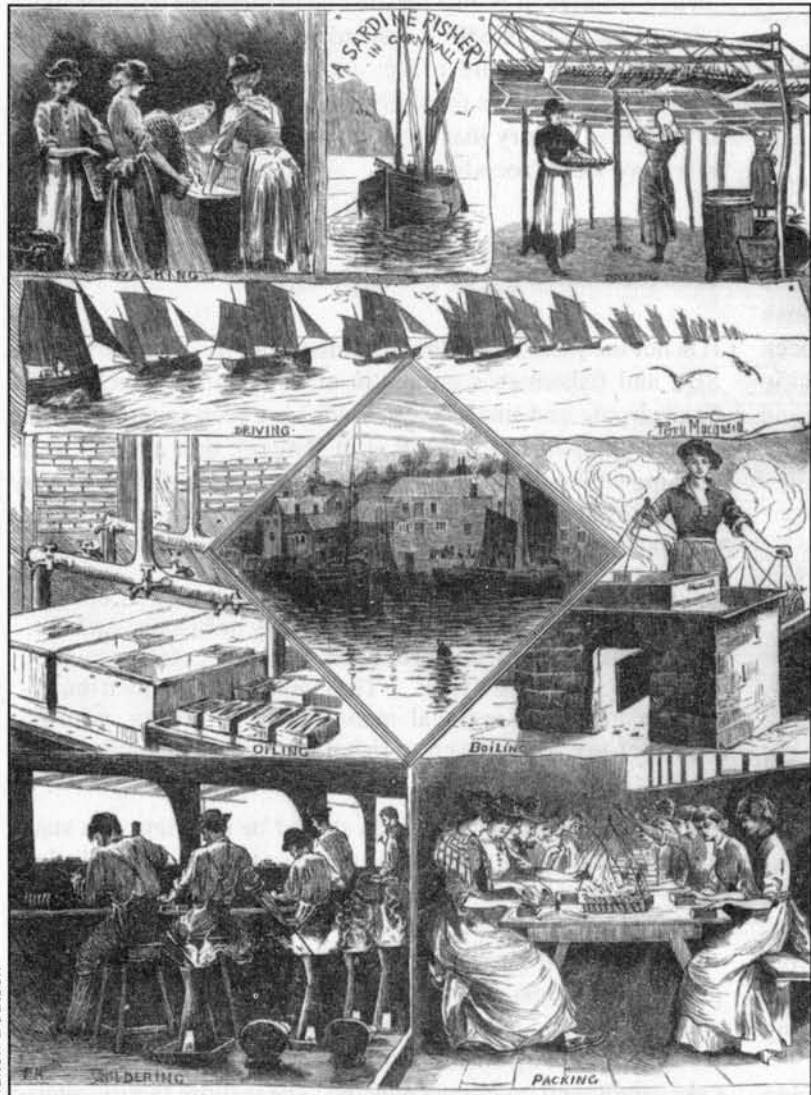
“Perhaps, in the end, nothing much will change. Between now and 2002, the ITQ system now developing rapidly informally will almost certainly become formalized. So many fishermen will then have a vested interest in the *status quo* that the head of steam for radical change will evaporate.”<sup>29</sup>

The issue was captured most graphically by Rodi Wout, writing about a television programme in which a Lowestoft beam-trawler skipper expressed regret for the local small-boat crab fishermen whose livelihoods were at risk:

“The connection between the beamer and its massive capacity and the paucity of the small boatmen’s living was left strangely unmentioned. And there we have it. In all this argument, as an industry, we still have not decided what we are and what we should be.

“That the fish stocks can’t keep us all as ‘fish yuppies’ with an abundance of fridges, central heating and fitted carpets is more than apparent to all. This is a choice we must make.

*The sardine fishery in Cornwall last century*



If we want to stay as fish yuppies, then many must leave the industry. Alternatively, if we seek to keep our numbers and our traditional way of life, we must accept that ours is to be an artisanal, pastoral way of life where poor rewards are compensated by other things not measurable in money terms but which many city dwellers would envy nonetheless. This is the reality behind all the bitter debates and one so divisive that it is hardly surprising that various pressure groups and organizations have failed to address it.”<sup>30</sup>

## Notes and References

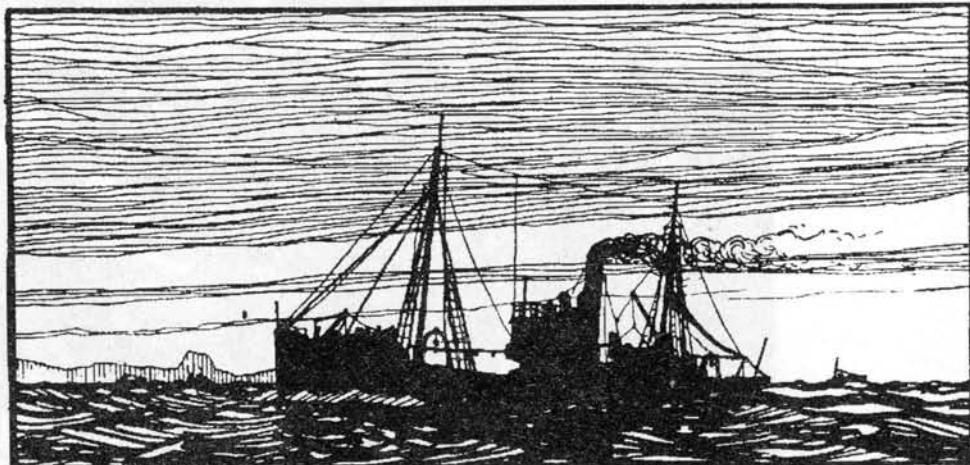
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# Joint Action Against Joint Ventures

## Resistance to Multinationals in Indian Waters

John Kurien

*The sale of licences to fish in Indian waters to multinational consortia has angered almost all sectors of the Indian fishing industry. Fishermen argue that the grounds will be overfished and that less fish will be available for Indian consumers. After a successful national strike, the government has begun to back down, but it seems unlikely to pull out of issuing licences since such actions will be perceived as retrograde in the current climate of market liberalization.*



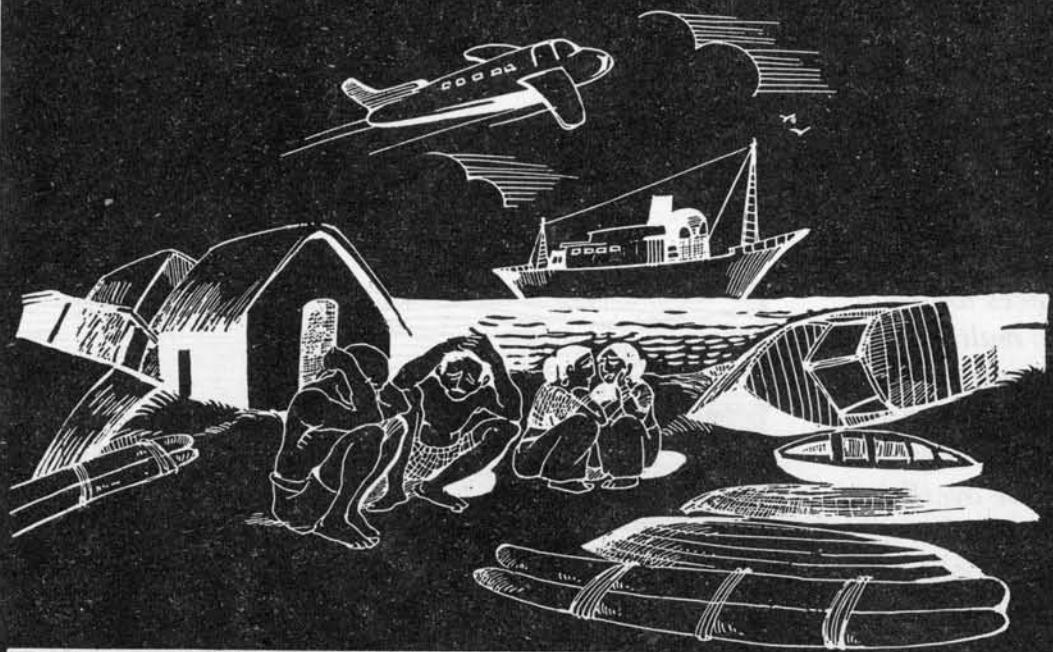
Peter F Anson

On 23 and 24 November 1994, the marine fishing industry of India came to a virtual standstill. About one million fishworkers — those working at sea, in markets and in processing plants — from nine maritime states, covering a coastline of over 7,500 kilometres, went on strike. On the same two days, a significant section of the country's 300 million fish eaters consciously chose a fish-free diet. All were protesting against Indian government policies giving international joint ventures free access to fish in the country's Exclusive Economic Zone (EEZ).

The action brought together some strange bedfellows. It was organized by an *ad hoc* alliance called the National Fisheries Action Committee Against Joint Ventures (NFACAJV) which was spearheaded by the National Fishworkers' Forum (NFF), a federation of small-scale fishworkers' unions from various maritime states. But it also mustered support from the NFF's traditional enemies, the owners of small, mechanized trawlers and the operators of export-processing plants. All these conflicting interests sank their differences in a combined effort to repel a common threat: a new wave of larger, foreign-owned fishing vessels which, as a result of a government deep-sea fishing policy introduced in March 1991, have been given a "blank cheque" to the fishery resources of India. So far, it is believed that some 170 licences have been awarded to Indian and foreign companies to operate 300 vessels which plan to fish almost entirely for the export market. However, as of March 1995, only 20 joint venture vessels and 11 chartered foreign vessels were operating in India's EEZ.

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# WHY DO WE STRIKE?



**FAST DEPLETION OF FISH RESOURCES  
DISPLACEMENT OF INDIAN FISHWORKERS  
LESS FISH FOR INDIAN CONSUMERS  
EXISTING INDIAN DEEP SEA FISHING VESSELS  
HEAVILY INDEBTED  
THREAT TO NATIONAL SECURITY**

**NATIONAL FISHERIES  
ACTION COMMITTEE AGAINST JOINT VENTURES**

## Non-Integrated Development

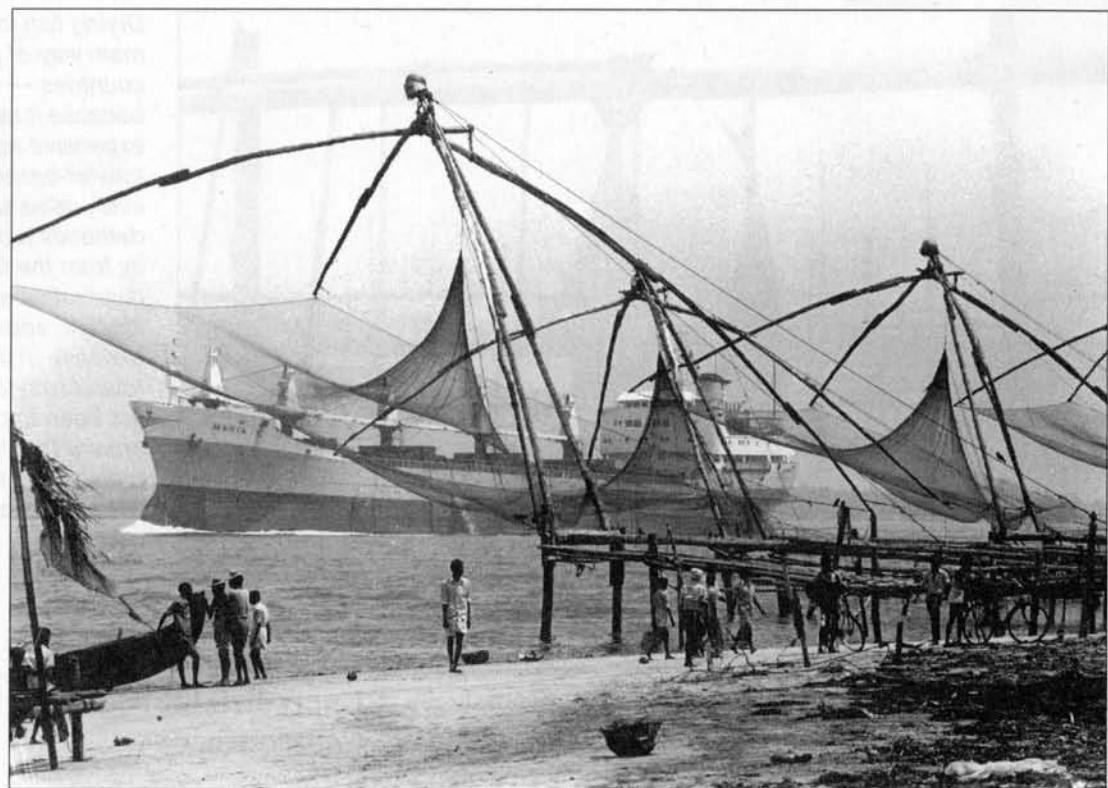
Conflicts between different elements of the Indian fishing industry date back over 40 years. Before Independence from Britain in 1947, fishing was a semi-subsistence, caste-specific occupation, practised by men, while processing and sale of the catch were the domain of women. Labour-intensive methods appropriate to specific marine conditions and the varying behaviour patterns of fish, together with a low use of energy, precluded overfishing and kept costs down; an ample amount of cheap fish was available to poor consumers in rural areas adjacent to the coast who were served by a network of small distributors. Despite increasing competition since Independence, this traditional sector has maintained a strong presence through its knowledge of the sea and, in many areas, its ability to organize to protect its interests.

The main threat to the traditional sector has come from a new fishery, introduced by post-Independence development planners, and backed by non-fishing finance capitalists. Modern fishing was pioneered in the southern state of Kerala, India's

foremost fishing state, by a UN-assisted, Indo-Norwegian "integrated fisheries development" project started in 1951 — the first ever bilateral development project in the Third World. The Norwegians rejected the potential of an intermediate form of technology to improve the performance of traditional canoes or *catamaran* through mechanization and instead introduced new Pablo mechanized boats for operating gillnets and freezer technologies for processing. This decision set the course for a form of development which, rather than gradually extending local fishing power into deeper waters and local distribution networks further inland, superimposed a completely new fishery on the existing one — the opposite of "integrated development" and a recipe for conflict and disaster.

The high levels of capital needed for the new boats meant that a new class of entrepreneurs with no caste connections or long-standing commitment to the fisheries invested their money in the new fishery and then had to find ways of recuperating their investment. This necessitated the introduction of new methods of fishing such as trawling (scraping the sea bed with a bell-shaped net for bottom-dwelling fish) and purse-seining

*Chinese-style lift-nets in Cochin, Kerala. The fishers wait to see what each tide will bring in from further offshore. But the abundance of their fish supply is threatened by powerful interests in the waters beyond their reach.*



Sean Sprague/Panos Pictures

(encircling whole shoals of surface-dwelling fish), the establishment of new, wealthier markets, and the growth of new, more commercially-orientated distribution networks.

After trawlers were introduced, shrimp trawling for the urban and export markets, particularly Japan and the US, became an increasingly important fishery. Once a commodity which provided manure for coconut palms, shrimps became the "pink gold" of marine exports from India. In 1961-2, the beach price of shrimps was only 240 rupees per tonne; ten years later, it had risen to 1,810 rupees.

Control over processing, markets and prices gradually shifted to more cosmopolitan operators; as a result prices for some fish soared out of the reach of rural people whose diet was traditionally fish-based and who had less opportunity to switch to other sources of protein. Between 1971 and 1981, the price of sardines and mackerel in Kerala increased ten-fold, while the annual *per capita* consumption of fish decreased over the same period from 19 kilogrammes to nine.

From the early 1970s onwards, the landings of nearly all the major bottom-dwelling fish began to decline sharply, largely because of excessive fishing (in the case of purse-seining) and destructive fishing (in the case of trawling which degraded the sea bed). Catches of sardines and mackerel, once the mainstay of the fisheries, plummeted from 250,000 tonnes in 1968 to 87,000 tonnes in 1990.<sup>1</sup>

The traditional sector, however, kept a footing in the fishery in two ways. Firstly, it invested in outboard motors and more up-to-date gear such as the ring-seine net (a smaller version of the purse-seine net). These caused considerable overfishing and indebtedness and generated conflicts within the inshore fishery between the users of traditional boats and gear and the innovators. But fishworkers' organizations have generally supported the introduction of outboards because they give small-scale fishermen the opportunity to fish much further out to sea and also to chase and apprehend trawlers and other large vessels that encroach upon local waters.

Secondly, during the 1980s, in Kerala in particular but also in other states such as Goa, Tamil Nadu and West Bengal, small-scale fishworkers' organizations set up independent trade unions and organized powerful protests and direct action against the dominance of the trawler industry. The involvement of women and children from the fishing communities in these militant yet disciplined fasts, as well as road blockades, railway pickets, and massive processions in key administrative cities and towns, helped to gain public support for the fishworkers. Their actions in Kerala resulted in government-enforced bans upon trawling during the monsoon period of June to August which have gone some way towards mitigating the power of the trawlers.<sup>2</sup>

## An Invitation to Global Predators

Ironically, the modernized Indian fishing fleet is now threatened by the same process of enclosure that it has been meting out over the past four decades to the traditional sector. The prospect of highly-mechanized, partly foreign-owned, factory fleets trawling the off-shore waters and capturing markets has caused both the modernized sector and the traditional fishworkers to forget their differences and cooperate in a campaign to repel this threat.

There had already been signs of the potential for such an alliance in the 1970s when multinationals such as Union Carbide and Unilever made an abortive attempt to move into the Indian fishing industry (largely in order to meet export targets imposed by the Indian government in return for import licences granted under the terms of the 1975-76 Import Trade Control Policy). But labyrinthine industrial licensing policies and resistance from smaller national investors managed to curb this trend.

An Indian-owned, deep-sea fleet, fishing shrimp for export in the Bay of Bengal, grew from 68 vessels in 1984 to 180 in 1991. But it soon started to experience heavy losses; a 1992 report by an FAO consultant, commissioned by the Indian government at



*Drying fish in the wind and sun — the main way of preserving fish in hot countries — is a cheap process because it uses no fossil fuel energy or expensive equipment. The growing trawler-based export industry, however, relies upon refrigeration, which demands a continual supply of electricity from the factory ship, through the distribution system, to the consumer's kitchen, adding considerably to the expense of the product. The distinctive role of refrigeration in world history has not been to preserve food better, but to ensure that food finds its way to the tables of distant wealthy consumers who can afford the inflated energy costs.*

the request of the industry, advised that the boats and the crews should be redeployed.<sup>3</sup> The report concluded, somewhat contradictorily, that the crisis did "not reside in the technologies applied, which are appropriate", but in a multiplicity of factors, including the competition the deep-sea fishing fleet faced from small-scale fishing boats which harvested the resource more efficiently.

However, the government has not redeployed the Indian fleet, but opted for joint ventures. Enthusiasm for multinational investment in India has blossomed in the climate of economic liberalization, resulting from the structural adjustment conditions imposed upon the Indian government by the International Monetary Fund (IMF) and the World Bank in return for loans to bail out the ailing economy.<sup>4</sup> An important element of this structural adjustment is export promotion, and the granting of deep sea fishing licences is an easy way by which the India government can meet export targets.

The offer of licences has come just at the right time for international fishing interests. The collapse of the North-West Atlantic fishery in 1992 and the generally overfished state of the world's oceans means there is a large redundant fishing capacity worldwide. Large factory trawlers are being sold at giveaway prices (See p.57). In only two of the world's 15 major marine fishing regions are catches still increasing — the Western Indian Ocean and the Eastern Indian Ocean. It is little wonder that the owners or buyers of these redundant vessels are making a bee-line for the waters around India, even if most of the gear used by these vessels is designed for fishing in Northern waters and is ecologically inappropriate for fishing in tropical waters. The race is not to catch any particular variety of commercially-valuable fish, but to catch any fish which can be harvested quickly enough to make a profit.

For its part, the Indian government has done everything in its power to ensure that the foreign investors make a profit. Subsidized fuel is available at a price far below that paid by traditional fishermen; one hundred per cent of the fish caught can be exported directly from the fishing boat, which means that there will be few checks on the amount or the kind of fish being caught; and there is no obligation for the boats to dock in Indian ports, a concession which not only reduces still further the benefits to Indian coastal economies, but also carries implications for national security.

## Unpredictable Stocks — Predictable Consequences

If all firms which have been given licences start fishing in India's deep waters, the consequences are predictable.

### • Overfishing and Stock Depletion

The quick profits sought by these predatory vessels, attracted to Indian waters because they have exhausted other regions, will be obtained at the expense of the sustainability of the fish stocks. Even if the joint venture vessels stay within deep-sea areas and do not venture inshore, they will affect the inshore fishery. Many of the species they will catch are "straddling stocks" which move back and forth between deep and coastal waters. Scientific knowledge about how the large number of species in Indian waters move and interact is very limited. Given the failure of marine scientists to predict the behaviour of the relatively small number of species in Northern waters, there is little prospect of accurate prediction in the more complexly populated waters of the Indian Ocean.

The Indian government bases its belief that huge amounts of fish remain to be harvested on a single calculation in 1977 which estimated the Maximum Sustainable Yield of India's EEZ to be 4.47 million tonnes, 2.2 million tonnes of which was in offshore and deep-sea waters — out of reach of traditional fishers.<sup>5</sup> Later studies have suggested that it is probably considerably less,<sup>6</sup> while fishworkers' unions claim that the government has overestimated the amount of fish in India's deep waters<sup>7</sup> — a claim that is ominously reminiscent of similar allegations made by the Newfoundland inshore fishermen against the Canadian government's faulty predictions for the North Atlantic (See pp.86-96).

### • Social Conflict

The majority of licences have been awarded for operations along the west coast of India, between Kerala and Karnataka in the south and Maharashtra and Gujarat in the north, the most productive of the Indian EEZ regions, and the ones which support the most inshore fishermen per square mile. These fishermen are acknowledged to be the most skilful in India, often fishing in waters far beyond the 50-metre depth line in very small boats. They are also the most militant and well-organized and have provided the main impetus for opposition to

foreign joint ventures. The potential for conflict between local fishermen and the joint venture vessels is therefore high. The day before the national fish strike, the government of India announced that coast guards would enforce a "corridor at sea" separating the deep sea vessels from the inshore fishery. This proposal — which would have been unenforceable but could still easily have exacerbated conflict had it been implemented — reveals a total lack of understanding among policymaker of the sociological and ecological realities.

#### • Less Fish for Local People

During the week of the national strike, one joint-venture vessel, originally a Soviet boat, called at the port of Cochin in Kerala. Its hold contained 2,000 tonnes of perch and snapper, two table-fish favoured by local consumers — a catch equivalent to the amount caught in one year by 1,000 hook-and-line fishermen in the region. If joint ventures for export become established, less such fish will arrive in the local markets and prices will rise still further. Middle-class urban consumers in Bombay or Delhi, however, are unlikely to suffer. An advertisement in a national newspaper at about the same time as the strike announced that "Norwegian fish will be flying in to India" to compensate for the loss of perch and snapper to the export market. The trans-oceanic exchange of exotic middle-class delicacies, typical of the present global policy of trade liberalization, undoubtedly bumps up figures for export earnings, but it pushes the price of fish beyond the reach of those who need it most.

#### • Exploitation of Workers

Joint venture vessels are unlikely to employ many Indian fishworkers: they are more likely to take on Filipinos, Thais, Mauritians and Taiwanese — the "traditional" nationalities which serve as crew on deep-sea vessels. The methods of recruitment, employment terms, working conditions (including violence at sea), and low wages of these deck-hands leaves much to be desired. Deep-sea vessel owners claim that International Labour Organization and other international agreements about working practices do not apply to them.

#### • Stifling National Enterprise

An open-door policy for joint ventures will clearly be at the expense of India's fishing industry. The evidence available suggests that very few of the Indian investors in the joint ventures have demonstrated any previous involvement in the fishing industry, and few of them belong to the Association of Indian Fishing Industries. India's highly-skilled and enterprising fishing community is well-equipped to take on the challenge of fishing in deeper waters — though such projects should only be attempted with a highly precautionary approach to the ecological uncertainties involved; and under the aegis of a body that represents all elements of the existing fishing industry including the inshore sector, the processing workers and consumers.

### A Government Rethink?

The success of the November national fish strike is indicated from the fact that all the coastal Members of Parliament, irrespective of their political affiliations, took the issue of joint-venture deep-sea fishing licences up with the government. In January, food-processing minister Tarun Gogoi assured them that no more new licences would be issued without a full review of the open sea policy. The review was entrusted in February

1995 to a newly-established committee of bureaucrats and scientists and was due to report in May 1995.

It is unlikely that the government will totally withdraw all licences and risk being branded in international circles as going back on liberalization. At best, it may stop issuing any more licences and impose additional strictures on present licensees, claiming to have put a "human face" on its *mare liberum* policy.

How the balance will tilt in future will rest largely on the kinds of pressure which fishworkers and their supporters can mobilize in the months to come.

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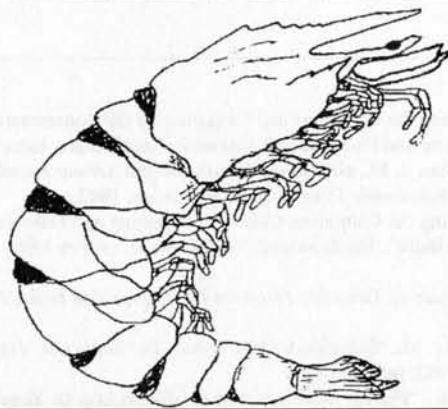
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# Prawns, Profit and Protein

## Aquaculture and Food Production

Alex Wilks



Many of the prawns that arrive on tables in Northern countries come from prawn farms in Asia or Latin America. These farms are the most conspicuous element of a recent surge in aquaculture production worldwide. Aquaculture is seen by many as a major source of food for the future, particularly since supplies of marine fish have started to decline. But whereas traditional fish farming has supplemented the diet of farmers and coastal communities for centuries, the new wave of aquaculture is increasingly commercial, producing luxury products for export at the expense of local people. Prawn farming is of particular concern because of the extensive environmental and social problems it is causing in some Southern countries.

*"On the land we have learned to produce food by cultivation. But in the sea we still act as hunters and gatherers. The next great leap in producing food will come from 'domesticated' and genetically-improved varieties of fish and other seafood."*

Ismail Serageldin  
Chair of CGIAR

*"Commercial aquaculture favours the rearing of high value carnivorous species . . . Unfortunately, this is not the most effective way of producing seafood for domestic consumers in developing countries."*

Michael New and Ulf Wijkstrom  
World Aquaculture

Leading international development agencies and governments are promoting aquaculture as a way of maintaining or increasing food supplies while relieving pressure on the overfished oceans. According to the Consultative Group on International Agricultural Research (CGIAR), aquaculture could provide nearly 40 per cent of all fish for human consumption within 15 years;<sup>1</sup> at present, it provides 23 per cent. CGIAR and the UN Food and Agriculture Organization (FAO) argue that applying scientific management techniques to fish raising is necessary if fish yields are to be increased. Without such an increase in yields, they maintain, the *per capita* availability of fish will be reduced still further, with grave consequences for the millions of people who currently rely on fish for their major source of protein.

However, higher yields do not necessarily translate into an increased availability of fish for the majority of people. Who gets to eat will depend in large part on what sort of fish are raised and by what methods. Unfortunately, as Michael New, former Senior Aquaculturist with the UNDP/FAO Aquaculture Development Programme notes, the current expansion of aquaculture is being fuelled by "profit and export earnings, not hunger".<sup>2</sup> Booms in raising salmon and yellowtail (a fish favoured in Japan) have been followed by what FAO describes as "an inexorable global expansion" in prawn cultivation as investors capitalize on the most lucrative markets and seek to capture new government export subsidies.<sup>3</sup> In turn, the prawn boom is predicted to give way to intensive cultivation of sea bass, grouper and other species with a high "farm-gate" value.<sup>4</sup>

Alex Wilks compiles and writes the Campaigns section of *The Ecologist*. He is preparing a dossier on prawn farming.

Far from increasing access to fish for many people, much of the current expansion of aquaculture is creating an expensive product which only richer people and nations can afford. In the pursuit of quick profits and export earnings, moreover, this type of aquaculture is damaging fish habitats, polluting land and water and, by using fishmeal as one of its inputs, consuming fish that otherwise could be eaten by people. By expropriating land and water for ponds, it also exacerbates social and economic inequalities that deny people access to food.

## An Age-Old Practice

Aquaculture involves the rearing in water of fish, crustaceans or molluscs in a process in which at least one phase of growth is controlled or enhanced by human action. Such activity has been undertaken for hundreds of years in almost all regions of the world in ponds, fields, lakes and coastal waters. In England, for example, farmers in chalk stream valleys used sluice gates to flood meadows in the winter to encourage the growth of crayfish. Coastal farmers in southern India and other parts of Asia raise prawns in their paddy fields after harvesting their rice. In the southern Mexican region of Chiapas, farmers have for centuries built small barriers of bamboo and palm leaves across narrow parts of lagoons to trap prawns until they grow to a harvestable size. In many countries, particularly in Asia, farmers have developed systems in which farm wastes — duck, chicken and pig manure and plant wastes — are thrown in fishponds to encourage the growth of organisms which fish feed upon; fish wastes are then returned to the fields as fertilizer.<sup>5</sup> These systems of aquaculture require little capital; do not displace other forms of food production — indeed, they often enhance it; do not require external inputs; and are integrated into the agricultural cycle.

## Capital-Intensive Systems

Although these methods of aquaculture provide affordable food or additional income for those who practise them at little financial, social or environmental cost, they are regarded as inefficient and unprofitable by many development agencies and companies now seeking to expand aquaculture. Rather than integrate fish-raising with agriculture, the intensive fish farms which such organizations are promoting raise fish species in isolated monoculture systems which require frequent inputs of specialized feeds and chemicals. The “products” of these farms are usually species such as prawns and salmon which fetch a high price in industrialized countries.

Aquaculture is becoming synonymous with the culture of these species. Prawn farming is the fastest-growing form of aquaculture, with a market — primarily in Japan, US and the

European Union — now worth US\$6.6 billion.<sup>6</sup> Intensive prawn farms have been set up since the 1980s across the coasts of Asia and some areas of the Americas and Africa. The prawns are raised, usually from fry taken from a hatchery, in large, densely-stocked ponds which have to be dug in stable soils which will not acidify. The prawns are generally fed five times a day with processed feeds which, because prawns are carnivores, are largely composed of fishmeal — feed made from by-catch fish or fish of low economic value. Chemicals are applied to kill any competitors and to prevent disease; some intensive prawn farms use up to 35 chemical and biological products as disinfectants, soil and water conditioners, pesticides, fertilizers and feed additives.<sup>7</sup> The ponds require mechanical aeration and frequent intakes of clean brackish water to flush out surplus inputs and prawn faecal matter and to maintain the required level of salinity.



Fishing for supper in a paddy field in Bangladesh.

Paul Harrison/Still Pictures

## Encroaching on Fisheries

Aquaculture for export increasingly dominates the cultivation of fish in many countries, displacing, in some cases, local fisheries in the process. To encourage salmon farmers to export, the Chilean government restricted the sale of salmon on the Chilean market and banned artisanal fishing in rivers and lakes which contained salmon cages.<sup>8</sup> In the Philippines, fisher unions such as CALARIZ have protested that bays where they fish have been obstructed by fish pens.<sup>9</sup> Ponds in Taiwan and Indonesia in which milkfish, a locally-favoured herbivorous species, were raised have been converted to cultivating prawns for the export market.<sup>10</sup> In Latin America and the Caribbean, the World Bank describes aquaculture as focusing “on high-value species . . . such as shrimp, fresh water prawns, scallops [and] salmon” for export markets while aquaculture for domestic consumption has been “negligible”.<sup>11</sup>

In addition, because the rearing of carnivorous species such as prawns relies on fishmeal, it does not “create” protein but merely turns protein with a low commercial value into protein which can be sold as a luxury commodity, primarily in export markets.<sup>12</sup> In 1995, carnivorous aquaculture — which



*Catching crabs in mangrove swamps in Zanzibar. Large tracts of estuarine and coastal areas of mangrove forest — the breeding grounds of numerous species of fish and shellfish — have been cleared for commercial, export-oriented prawn farming. Ecuador, Malaysia, the Philippines, Taiwan and Thailand are among the countries most affected.*

comprises about a quarter of all aquaculture<sup>13</sup> — is expected to consume about 15 per cent of world fish meal supply.<sup>14</sup> The FAO itself admits that less fish are available to “low-income consumers in Asia . . . as a result of competition from aquaculture feed demands.”<sup>15</sup> In Indonesia, demand for prawn feed is making unaffordable “inexpensive locally available products such as sardines previously used for human consumption”, while in Malaysia the demand for fish by prawn farms has caused a shortage of fish for the salted fish industry.<sup>16</sup>

Inshore fish catches have also been affected by aquaculture as fish fry have been netted for stock ponds and coastal habitats destroyed to make way for fish farms. The most important of these habitats are mangrove forests, which many fish species rely on at some point in their life cycles.<sup>17</sup> There are strong correlations between total mangrove area and inshore fish and prawn catches.<sup>18</sup>

Mangrove forests grow at the edges of seas and estuaries. As prawn farms need brackish water — a mixture of freshwater and seawater — the land which mangroves grow on is ideal for the large ponds as both kinds of water are easily accessible. Half of the world’s mangrove forests have now been cut down and in many cases, aquaculture is the lead cause. In Ecuador, over 120,000 hectares of mangroves had been cut down to make way for prawn ponds by 1987.<sup>19</sup> A fisherman living near the country’s second biggest prawn farm warned:

“we have not benefited from it. Ours is a fishing zone, but in five to six years, with the mangrove destruction, we’ll end up with nothing.”<sup>20</sup>

In Thailand some 100,000 hectares of mangrove forests have been turned into prawn farms.<sup>21</sup> Research suggests that between 1985 and 1990, Thailand lost a potential fish harvest of 800,000 tonnes while gaining only 120,000 tonnes of prawns.<sup>22</sup> The loss of mangrove forests has also deprived coastal people of building poles, thatching material and medical products as well as flood protection for houses and fields.<sup>23</sup>

## Encroaching on Agriculture

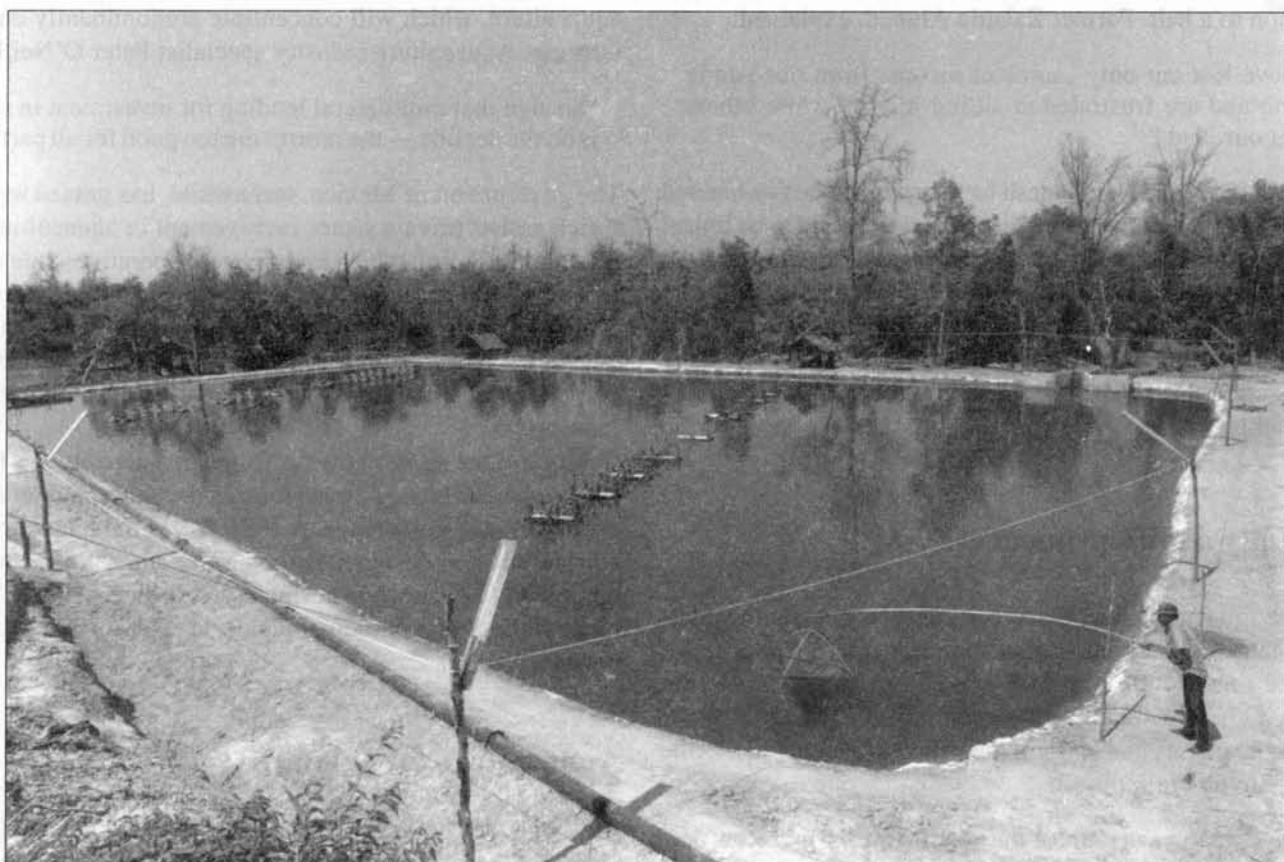
Intensive aquaculture can affect land-based food production as well because some fish farms take over agricultural land. Intensive aquaculture also requires large quantities of freshwater, reducing the amount available for irrigation. In the Philippines, overextraction of groundwater for prawn farms in Negros Occidental has been cited as causing shallow wells, orchards and ricefields to dry up,<sup>24</sup> land to subside and saltwater to intrude from the sea.<sup>25</sup> Chemicals used in prawn ponds also cause problems: in South Thailand’s “rice-bowl” between the provinces of Nakhon Si Thammarat and Songkhla, yields crashed as chemical effluents from 15,000 acres of prawn farms polluted irrigation canals used to irrigate paddy. The canals also provided water for local ricefield aquaculture and drinking and washing water.<sup>26</sup>

In Khulna, South-Western Bangladesh, where 25,000 hectares have been rented for prawn cultivation from small farmers who were growing rice and some jute, “the increase in salinity required for prawn cultivation has reduced rice yields from one and three quarter tons to around half a ton per acre . . . it will take many years to restore the land’s fertility.”<sup>27</sup> Some farmers can grow one crop when the water drains away at the end of the seven month prawn harvesting season, but Dr Atiur Rahman of the Bangladesh Institute of Development Studies says paddy yields in the Khulna area have fallen by 30 per cent since the prawn farming began; the number of cattle has also dropped by 47 per cent as grazing lands have been taken over.

## Dispossession

The ability of people in the locality of fish farms to produce food for themselves is further undermined as commercial fish farmers expropriate communal land and water rights.<sup>28</sup> In Bangladesh, for example, journalist Inam Ahmed comments:

## Boom and Bust Prawn Farming



Mark Edwards/Still Pictures

A pond in an export-oriented prawn farm in the south of Thailand. Electricity is needed for lighting and to power the rotators in the water which circulate oxygen. The "filling and flushing" of brackish and waste water through pipes or canals around the edge of pond pollutes adjacent land and water supplies.

Whilst intensive aquaculture techniques have increased yields, the increases often prove short-lived as pollution and diseases cause yields to crash. Intensive prawn ponds produce huge quantities of faecal matter and unconsumed feed as well as pesticides and other chemicals which reduce water quality in the ponds, especially its oxygen content. The quality of water in the pond may lower the resistance of the fish being farmed so that they are killed by common opportunist pathogens.

In Taiwan, where many intensive prawn farming methods were first developed, yields rose to 95,000 tonnes in 1987 before collapsing to

20,000 tonnes in 1989 due to virus outbreaks. Prawn farming has not recovered. The other main prawn-producing countries — China, Thailand and Ecuador — have suffered similar infestations. In 1993, Thailand had an devastating outbreak of yellowhead disease, whilst farmed prawn production in China declined by two-thirds, or about 125,000 tonnes, because of algal blooms or "red tides". In the same year, Ecuadorian prawn production fell to 40 per cent of its peak because of similar factors. *Monodon baculovirus*, which affects the most commonly-farmed species of prawn, has become endemic in almost all coastal areas in Indonesia.

Aquaculturists have sought to prevent

disease in their intensive production units by using large quantities of antibiotics. In South-East Asia, however, the overuse of anti-biotics has resulted in the development of resistant strains of viruses, making certain infections almost untreatable.

Many prawn farms have been abandoned after about five years because of disease or pollution. In some areas, farmers are experimenting with water filtration and settling tanks for water outflows; but in others, where land is cheap and investors do not have a stake in it, they move elsewhere as soon as yields decline, taking their profit but leaving a wasteland.

"the government has recently changed its common land policy, allowing shrimp farmers priority in leasing land. This has deprived local people of their rights to common land and public water bodies. In one case, Jewel Fisheries in Khulna took over a wide canal on its shrimp farm. Villagers who had fished there since childhood suddenly found they were being treated like intruders."<sup>29</sup>

Entrepreneurs have used their control of water to intimidate Bangladeshi farmers to sell or lease their land for fish farms.<sup>30</sup> A Bangladeshi farmer explained how he was affected:

"The big farmers around my plot had already leased out their land to the shrimp farm owner. Saline water began to

creep into my rice field. It was no longer possible to protect my land by building mud walls."

He was then forced to agree to rent his land to shrimp farmers, but complained "the rent the shrimp farmer pays me is hardly enough to meet the costs of supporting my family for half a year. Now I have to buy everything, from rice to vegetables."<sup>31</sup>

Other farmers have been displaced by force or have been priced out as rents have risen with escalating land prices. In Thailand, the Thai Farmers Bank reported that "the price of land suitable for shrimp culture in coastal provinces... increased 10-fold since shrimp-farming became popular and began to attract investors."<sup>32</sup>

Such dispossession has not gone uncontested. In early 1994 protesting farmers who had lost land to a US\$ 24 million Saudi Arabian-backed fish farm in Kedah State, Malaysia, brought production to a halt. Farmer Zakaria Ahmad, explained:

"we have lost our only source of income from rice paddy farming and are frustrated at sitting idly by while others exploit our land."<sup>33</sup>

Protests in India and Bangladesh have provoked heavy-handed responses. In September 1994, hired thugs believed to be linked with prawn farms burned 30 houses in the village of Moovakarai, Tamil Nadu state, while in January 1995 in Orissa, two villagers were shot dead by police in Adhuan village, after a peaceful march protesting that prawn farms on the coast had left them with reduced fish catches and no access to the seashore to collect salt to sell.<sup>34</sup>

## Inequality and Dependency

Intensive aquaculture has exacerbated existing social inequalities. Because of its high capital requirement — the costs of preparing one hectare of prawn pond have been estimated at \$13,700-\$27,300 with a similar amount needed in addition for operating expenses<sup>35</sup> — it is an opportunity open mainly to the wealthy. In the Philippines:

"big businessmen in joint ventures with foreign investors or with their own collateral have a monopoly of the industry, and the credit offered by banks and financial institutions. [Small entrepreneurs] are effectively shut off from high-density prawn farming."<sup>36</sup>

Moreover, the economic benefits of commercial fish farming have largely remained with farm owners; fish traders and coastal communities have not gained from the trickle-down of money or food.<sup>37</sup> Farms tend to employ only a few, mainly skilled workers; a five-hectare intensive prawn farm, for instance, needs about three workers.<sup>38</sup>

Some of those who cannot afford the high start-up and operating costs farm prawns on their own land under contract to agribusiness companies. While the contracts vary, most stipulate that farmers buy their feed from the company and sell the prawns to them. The farmer becomes dependent on the company while bearing all the risks, both financial and environmental. Thai farmers under contract to a leading Thai feed and prawn company, Charoen Pokphand (CP), agree to buy all their feed — which accounts for about half the expense of raising prawns — from the company.<sup>39</sup> In the Philippines, the San Miguel Corporation restricted sales of its prawn feed to farmers who signed a contract to buy prawn fry from the company's hatchery and sell them the final product.

## Aiding Intensification

Despite the effects of intensive commercial aquaculture on many people's livelihoods, aid agencies and governments continue to support it. Multilateral aid agencies have long encouraged this kind of aquaculture with large loans — from 1988-93, aid to aquaculture represented a third of the total monies committed to fisheries.<sup>40</sup> In 1991, World Bank loans for

aquaculture included \$420 million to India, \$385 million to China, and \$267 million to Argentina.<sup>41</sup> The World Bank is currently considering a \$150 million loan for Mexican aquaculture, which will concentrate predominantly on prawn-farming. Aquaculture industry specialist Peter O'Neill sees:

"no sign that multilateral lending for investment in shrimp is on the decline — the returns are too good for all parties."<sup>42</sup>

The government of Mexico, meanwhile, has passed legislation which assists private sector involvement in aquaculture, overturning legislation which had given cooperatives sole rights to exploit eight fish and shellfish species, including prawns. Incentives for investors include allowing 100 per cent foreign ownership of farms and repatriation of all profits, halving the corporate tax, and designating three million hectares for prawn farming.<sup>43</sup>

Much of the money now flowing into aquaculture is for high-tech projects which generate foreign exchange and ignore local conditions and knowledge. A 1991 World Bank loan for Indian aquaculture was designed to modernize aquaculture into "technologically-advanced semi-intensive shrimp culture," including building or upgrading ponds at a cost of \$11,000 per hectare.<sup>44</sup>

## Aquaculture for Whom?

Although development agencies claim that yields from increased aquaculture will be in addition to those from ocean fisheries,<sup>45</sup> some in the burgeoning industry admit that intensive aquaculture, particularly the culture of commercially-favoured carnivorous species which consume fishmeal, is actually in direct competition with ocean fishing and even depleting ocean fish stocks.<sup>46</sup>

FAO has therefore endorsed calls for the promotion of aquaculture which does not need fishmeal:

"if aquaculture is to be sustainable in the long term and play a significant role in food security it is imperative that donors, development agencies and governments, wherever possible and economically feasible, promote the culture of species with herbivorous and/or omnivorous feeding habits, which are not dependent upon the use of high-quality protein-rich feed inputs, and which are able to make maximum benefit from natural food organisms and farm-made supplementary inputs."<sup>47</sup>

There is indeed some potential for increased culture of herbivorous species such as tilapia and carp to complement other food production in a socially and environmentally-sustainable manner. China, for example, which has a long aquaculture tradition produces nearly five million tonnes of herbivorous carp each year, much of it in polyculture systems which require little water exchange.<sup>48</sup>

However, FAO and others support culture of herbivorous species only on condition that it is "economically feasible", that is, it should provide a high economic rate of return. Yet "economically feasible" aquaculture is unlikely to have as its priority making more food available to those who need it most. In the open market, post-GATT regime, the financial interests of aquaculture investors will be even more at odds with the nutritional and livelihood interests of coastal and other communities.

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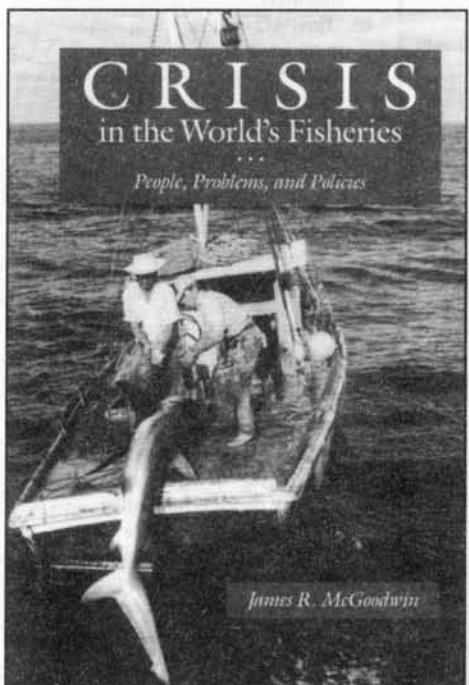
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## Books

Fishers and fishworkers rarely write books; mostly academics write them. It can therefore be hard to find out what fishers think and feel about their situation. Only a few books have managed vividly to convey their voice: Jeremy Tunstall's *The Fishermen* (MacGibbon and Kee 1962) provides poignant testimony from Hull trawlemen at home, while William W. Warner's *Distant Water* (Little Brown and Co., 1977) vividly portrays life at sea in the same doomed industry; David Ralph Matthews has documented the opinions of fishermen from five Newfoundland communities (*Controlling Common Property: Regulating Canada's Inshore Fishery*, University of Toronto, 1994) while Alan Christopher Finlayson has provided astonishingly intimate testimony, not from fishermen, but from Canadian fishery scientists (*Fishing for Truth*, ISER, Memorial University of Newfoundland, 1994).

The books listed below are all useful, and many of them inspired contributions



to the debate about marine resources. But anyone who wishes to discover the viewpoint of fishing communities — the people who through their daily haul are in a better position than anyone to observe what is going on "beneath the windows of the sea" — should read their local or national fishing newspaper, or better still, pay a visit to their nearest harbour.

**CRISIS IN THE WORLD'S FISHERIES: People, Problems and Politics**, by James R. McGoodwin, Stanford University Press, Stanford, California (UK distributor Cambridge University Press), 1990, £30/\$39.50 (hb) ISBN 08047-1790-7, £10.95/\$13.95 (pb) ISBN 08047-2371-0, 235pp.

This book has established itself as the classic overview of the global fisheries crisis. The author, an anthropologist, covers most aspects of the subject from prehistoric cultures to sports fishing and the "Tragedy of the Commons", and also provides an excellent bibliography. Though it has been criticized as alarmist and inaccurate by a fisheries expert from Britain's Ministry of Agriculture, Fisheries and Food (MAFF), most of McGoodwin's conclusions are now accepted by the mainstream.

**ABANDONED SEAS: Reversing the Decline of the Oceans**, by Peter Weber, Worldwatch Paper 116, November 1993, (pb) 66pp, ISBN 1-878071-16-5; **NET LOSS: Fish, Jobs and the Marine Environment**, by Peter Weber, Worldwatch Paper 120, July 1994, (pb) 76pp, ISBN 1-878071-21-1, Worldwatch Institute, 1776 Massachusetts Ave. NW, Washington DC, 20036-1904, \$5/£3 each (outside US WEC Books)

*Abandoned Seas* outlines some of the threats to the marine environment from overfishing, coastal development and pollution, and calls for concerted action from organizations stretching from "grassroots groups" to the World Bank, without coming to grips with the politics of neo-colonialism and consumer capitalism that underlie the crisis. *Net Loss* makes a more determined attempt to confront these realities, highlighting the drain of protein from South to North, and questioning the cliche of "too many fishermen chasing too few fish". There is much useful information, and some good points are made but are not followed through.

**COASTAL ECONOMIES, CULTURAL ACCOUNTS**, by Gísli Pálsson, Manchester University Press, Manchester, 1993, £45/\$65 (hb) 202pp. ISBN 0-7190-3543-0.

Non-anthropologists who find the theoretical focus of the first three chapters of this book mystifying should skip to the final four chapters in which Pálsson compares the changing attitudes of Icelandic fisherfolk to nature and to work by focusing on the concept of *fiskni* — "fishiness" — the ability to provide fish. As the Icelandic fishery has moved from a household activity, where "the subsistence value of a boat was considered to be equivalent to that of a cow", through a period of competitive capitalist expansion, into an industry dominated by "quota kings", so "fishiness" has shifted from Nature, to highlining skippers, and finally to the "spekingar or wise men" in the Marine Research Institute who "announce their precise measurements of the stocks, to the ton." Pálsson concludes with the pointed reminder that "scientific understanding of the environment is a social construction".

**THE COMMON FISHERIES POLICY**, by Mike Holden, Blackwell Science, Oxford, £49.50/\$76 (hb) 288pp, ISBN 0-85238-205-7.

For those who want to understand the intricacies of the EU Common Fisheries Policy (CFP) — and can read between the lines when necessary — this is probably the best book. Mike Holden, Head of the Fisheries Conservation Unit for the EC Commission in the early 1980s, puts up a spirited, but critical, defence of the CFP, on the lines of "given the impossible objectives, it has not done badly". There is a great deal of information in the book, though unfortunately, it is not easily accessible because its structural arrangement is obscure, and the index (which has eight listings for Skaggerak, but none for Spain) is inadequate.

**FREEDOM FOR THE SEAS IN THE 21st CENTURY: Ocean Governance and Environmental Harmony**, edited by Jon M. Van Dyke, Durwood Zaelke and Grant Hewison, Earthscan, London, 1994, £24.50/\$27.50 (pb) 504 pp, ISBN 1-55963-242-9.

This is a compendium of papers covering many of the questions arising from the

UN Convention on the Law of the Sea project to impose governance upon what were previously "Global Commons". There are many excellent contributions, ranging from R P Anand's brief history of the concept of "The Freedom of the Seas" to Claudia Carr's analysis of the role of aid agencies in the exploitation of the oceans and Andrew Mack's analysis of the arms race as a "Tragedy of the Commons". But the subject matter is dry and the reader may occasionally yearn for something a little more evocative of salt-spray, seaweed and the smell of fish.

**DANGLING LINES: The Fisheries Crisis and the Future of Coastal Communities: The Norwegian Experience**, by Svein Jentoft, Institute of Social and Economic Research Books, Memorial University of Newfoundland, St John's, Newfoundland, CANADA A1C 5S7, 1993, Can\$24.95 (pb), 164 pp. ISBN 0-919666-85-X.

In the aftermath of the 1990 collapse of the Norwegian cod fishery, sociologist Svein Jentoft analyses the implications for the future of the fishing and processing industry, and the endangered coastal communities of northern Norway. After a very sharp analysis of the pitfalls of the "Tragedy of the Commons" approach, he details a number of practical approaches that the industry could take, involving greater emphasis on flexibility, decentralization and cooperation, more support for occupational pluralism, better valuation of the role of women, more self-regulation for fishermen, and a move away from a policy based on "efficiency at all costs".

**TO WORK AND TO WEEP: Women in Fishing Economies**, edited by Jane Nadel-Klein and Donna Lee Davis, Social and Economic Papers No.18, Institute of Social and Economic Research Books, Memorial University of Newfoundland, St John's, Newfoundland, CANADA A1C 5S7, Can\$20 (pb), 320pp. ISBN 0-919666-60-4.

An excellent and direly-needed corrective to the view that fishing communities are "working men's clubs", where, in the words of Charles Kingsley's poem, "men must work and women must weep... and the harbour bar keeps moaning". Whilst it is generally only men who go to sea for long periods to catch fish, women:

"actively participate in various aspects of the fishery almost everywhere... [as] commercial fishers, fish plant labourers and proletarian processors, subsistence or artisanal fishers, processors and marketers, political agents, financial managers, dependent housewives and complementary work partners."

Indeed, in many instances, it is the work undertaken by women that "underwrites or provides the risk fund necessary to sustain fishing activities."

This book charts how culturally-gendered activities have changed as fishing communities have been drawn into the wage-economy and how women have responded to such changes. A particularly fascinating chapter explores the key role that "fishermen's wives" played in defending the North Atlantic fishing grounds off Georges Bank, Massachusetts, against the threat of offshore oil and gas development. Understanding the dynamics of fishing communities — and particularly the operation of fishing commons — is nigh-on impossible without understanding the role played by women in the community. A key text.

**FISHING FOR DEVELOPMENT: Small-scale Fisheries in Africa**, edited by Inge Tvedten and Bjørn Hersoug, The Scandinavian Institute of African Studies, PO Box 1703, S-75147 Uppsala, SWEDEN, 1992, £12.95 (pb), 257pp. ISBN 0-917106-327-7.

This collection of papers on African artisanal fisherfolk is written by Norwegian professionals in the field of fisheries development. What emerges from the complex African situation is that some (mainly West African) cultures, such as those of the Fante, Nyominka and Wolof peoples, have adapted modern techniques to traditional methods extremely effectively without much help from developers, while others, such as the Bijago of Guinea Bissau, have defied developers' attempts to integrate them into a market-based fishery. Meanwhile trawler graveyards — testimonies to the failure of "development on the Western model" — are as common on the coast as tractor graveyards are inland, partly because of the inability of national trawler fleets to compete "with the highly efficient technique of canoe fishing". It is the absence of indigenous trawler fleets that makes African waters an attraction for European trawler companies, but the potential in

this kind of development for overfishing and for the sort of conflict that has already occurred in India and South-East Asia is not covered in this fascinating but somewhat blinkered book.

**Maritime Anthropological Studies (MAST)**, bi-annual, Het Spinhus, Oudezijds Achterburgwal 185, 1012 DK Amsterdam, THE NETHERLANDS. (fax: +31-20-535 3010) Complete set of 12 back issues (including postage) \$36.

**MAST** is an academic journal for those interested in the relationship between humans and fish. It has published many groundbreaking studies on subjects ranging from fishing commons and chaos-based fisheries management to the nomenclature of vessels and the importance of alcohol consumption for some fishermen.

**SAMUDRA**, International Collective in Support of Fishworkers (ICSF), 27 College Road, Madras, 600 006, INDIA, (Also Rue Gretry 65, B-1000 Brussels, BELGIUM) 3-4 times per year, free.

**SAMUDRA** is the magazine of the International Collective in Support of Fishworkers (ICSF), an umbrella group that represents fishworkers' groups from over 30 nations; it provides probably the only international voice for small-scale fishing communities worldwide. In its December 1994 issue, it hosted an important and constructive debate between ICSF and Greenpeace which made significant steps towards establishing common ground: that industrialization of the fisheries threatens both fishing communities and fish.

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24-25 June 1995: 11th NATIONAL CONFERENCE ON LOW-LEVEL RADIATION AND HEALTH at the County Hotel, Carlisle. For more information, contact CORE, 98 Church Street, Barrow-in-Furness, Cumbria, LA14 2HT. Tel: 01229 833851; Fax: 01229 812239.

30 June 1995: THE EVOLUTION OF THE ENVIRONMENTAL PROFESSION IN EUROPE: NEEDS, COMPETENCES AND FUTURE TRENDS, University of Geneva, Switzerland. For further information, contact Karim Zein, EEMA Secretariat. Tel: +41 21 617 73 82; Fax +41 21 617 90 15.

18 July 1995: The Geological Society, INFANT MORTALITY AND GEOLOGY: IS THERE A CONNECTION? at The Geological Society, Burlington House, Piccadilly, London W1V 0JU. For more information, Tel: 0171-434 9944; Fax: 0171-439 8975.

17-21 September 1995: International Conference on HABITAT FRAGMENTATION, INFRASTRUCTURE AND THE ROLE OF ECOLOGICAL ENGINEERING. The Netherlands Congress Centre, The Hague. For more information, contact: Congress Office ASD, PO Box 40, 2600 AA Delft, THE NETHERLANDS. Tel: +31 15 120234; Fax: +31 15 120250.

4-8 December 1995: CHINA RESOURCES RECYCLING '95 — gathering the world's latest recycling, reuse and recovery technologies and equipment at the Beijing Exhibition Centre, Hong Kong. For further information, contact Ms Iris Tse, Business & Industrial Trade Fairs Ltd, 18/F First Pacific Bank Centre, 56 Gloucester Road, Wan Chai, Hong Kong. Tel: +852 2865 2633; Fax: +852 2866 1770

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