

CONFERENCE KEYNOTE SPEECH

Quotas And Beyond

The Continuing Evolution of Fishing Rights

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Introduction

It is a singular honour to have been invited to speak at this conference, especially here in New Zealand, on the subject of fishing rights. The character of rights to fish has been a subject of interest, indeed the central subject of interest, of economists since they seriously turned their attention to the fisheries half a century ago. And it has certainly been the focus of my interest in fisheries over most of that period.

By about a quarter of a century ago, those of us thinking and writing on this subject thought we had worked out what was wrong with the traditional organization of fisheries. We also thought we knew what could be done about it, but we anguished over the seemingly insurmountable obstacles of tradition, vested interests, misunderstanding and government inertia. But suddenly, in the late 1970s and early 1980s, a few countries introduced a bold new approach to fisheries management based on a new kind of rights to fish. New Zealand was in the vanguard of these innovators, and has since provided an exciting case study in fisheries management.

Having had an opportunity to participate briefly in New Zealand's experiment, it is a great pleasure to come back to Wellington to see how these ambitious fisheries reforms have developed, and I want to express my appreciation to the International Institute of Fisheries Economics and Trade for this opportunity to share impressions and ideas with others interested in this subject.

My purpose in this presentation is to introduce our discussion of fishing rights. I intend to direct my remarks to the continuing evolution of fishing rights, and in particular the directions in which individual fishermen's quotas are developing or seem likely to develop. This gives me an opportunity to share my own ideas about what governments can do to promote improvements in fisheries management.

Fishing Rights: The Traditional Model

Fishing rights have been changing rapidly over the last few years. To put present developments into perspective, it is helpful to begin with a little historical perspective.

Many centuries ago it was well established that fish in the sea belonged to no one. Roman law held that fish could not be owned because they are not capable of being "possessed", at least not until they are caught – a theory still deeply entrenched in the law of western countries. A complementary rule, more important for my discussion here, is that everyone had a right to catch them. This common right to fish was bolstered when King John of England signed away the Crown's authority to grant private fishing rights in the Magna Carta in the thirteenth century. And four centuries later it was endorsed by Hugo Grotius in his famous doctrine on the freedom of the seas. For centuries, the rights of fishermen were no different from the rights of anyone else; everyone had an equal right to fish, free from the encumbrances of property and regulation. This remained the general rule until recently.

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Writers on the economics of property say that this open-access regime was natural and entirely appropriate as long as the supply of fish exceeded the demands on them, which was historically the case. There is no need to go to the trouble and expense of organizing and allocating rights among fishermen unless their demands exceed the supply, making it necessary to ration the supply among them.

Over the years, as fishing industries expanded and the technology of fishing advanced, pressures on the richest fisheries grew. In the nineteenth century the most vulnerable stocks, notably some of the whales and other mammals, shellfish and salmon were overfished. By the middle of the last century it was apparent that most of the world's valuable stocks were fully exploited and many were overfished. Sometimes governments intervened to protect the stocks by restricting gear and fishing seasons. But the rights of fishers did not change fundamentally.

About fifty years ago, economists began to elucidate a fundamental flaw in the organization of fishing industries. As long as access to the stocks was uncontrolled, profitable fisheries would attract more fishers and more catching power, even if fleets were already greater than needed to harvest the available catch, and fleets would expand, redundantly, until all profits were dissipated in higher costs. Thus fishing industries were condemned to a kind of dismal Malthusian equilibrium, evidenced around the world in over-expanded fleets, over-exploited stocks and almost universally low incomes among fishers.

All this was due to the unlimited access to limited resources.

So it was explained that when demands on resources exceed the available supply, open access gives rise to two problems. One is the *conservation problem*. It was clear, after centuries of denial, that fish stocks were exhaustible, and uncontrolled expansion of fishing pressure leads to overfishing. The other is the *economic problem*; over-expansion of labour and capital in fishing dissipates the potential profit, or more correctly the resource rent, the stocks are capable of producing, ensuring that even the richest fisheries will, over time, yield low returns. These two tendencies – overfishing and dissipation of economic returns – became worldwide phenomena in the latter half of the twentieth century.

Governments tried to prevent overfishing by controlling fishing effort through restrictions on fishing gear, the capacity of vessels and fishing time, but their interventions were typically slow, belated and faltering. They tried to alleviate the poor economic performance through subsidies and various forms of assistance, but in the long run this only aggravated the problem.

Recent Development of Fishing Rights

A major innovation in fishing rights took place in the late 1960s. In Canada, over-expansion of the fishing fleet in the Pacific salmon fishery had progressed to such an extreme it was becoming unmanageable, and to prevent further deterioration the government licensed all existing vessels and declared that no more licences would be issued. This limited access policy was picked up and spread remarkably quickly; within a few years it applied to all the major fisheries in Canada and many of those in other fishing nations.

In terms of the rights of those who fish, licence limitation implied a fundamental change. Previously, all citizens had an equal right to fish, so in a legal sense the right to fish lacked an essential characteristic of property: the right to exclude others. Licence limitation changed this. Fisheries remained common property, in the sense that all those with licences shared the right to fish, but others were now excluded. Thus governments introduced, unintentionally through the regulatory process, the first crucial characteristic of property (Scott).

Today, limiting the number of vessels in an overcrowded fishery seems an obvious thing to do, but at the time it met with strong opposition. The tradition of open access was difficult to overcome in the fishing community, and the need for this new restriction was not widely appreciated. Many believed that the government's role was to conserve the stocks, and let anyone fish who wanted to; if too many entered, some would go broke, but there was no need to interfere. The connections between uncontrolled access, overcapacity, overexploitation, poor earnings and the public interest were too subtle, or insufficiently important, to justify restrictions on the traditional free and open access to fisheries.

In any event, licence limitation was not as effective as many had hoped. All licensed vesselowners still had strong incentives to increase their fishing power to compete in the zero-sum game of striving for larger

individual shares of the catch. They replaced their boats with bigger, more powerful boats, and equipped them with more advanced equipment for finding, catching and handling fish. In attempts to forestall this wasteful expansion of fishing power, governments added more restrictions on vessels and gear, but it is practically impossible to restrict all dimensions of fishing power and fishing effort, and as a result, fishing capacity and the cost of fishing continued to rise, but catches typically did not. So the treadmill of overexpansion, overexploitation, poor economic performance and regulatory intensification continued.

Then, around the late 1970s the notion of “stinting” the fisheries was broached; that is, dividing up the total allowable catch among the holders of fishing licenses. The idea was that if each licence holder had the right to take a specified quantity of fish, and the sum of these quantities was the total allowable catch, they would no longer have to engage in a competitive race for their shares of the catch. Moreover, if their quotas were transferable, they could buy and sell them to adjust the scale of their operations for maximum efficiency, thereby rationalizing the fleet. Within a remarkably short time, quota licences – variously known as IQs, ITQs, IVQs, enterprise allocations and catch quotas were introduced in Canada, Iceland, New Zealand, Australia, Europe and elsewhere.

Individual quotas were an extension of commercial fishing licensing arrangements. But they added a new dimension to the rights of fishers by defining quantitatively their shares of the total harvest. This allocation of the catch eliminated, for the first time, the competitive race for fish and with it the perverse incentives for overexpansion of fishing capacity and effort which were at the root of both the poor economic performance of fishing industries and the depletion of stocks.

The Experience with Individual Quotas

Over the last two decades, individual quota systems have proliferated, and are now the basis for managing a couple of hundred ocean fisheries around the world. Five important fishing countries –Australia, New Zealand, the Netherlands, Greenland and Iceland – have adopted individual quotas as the main instrument for organizing their fisheries. A number of others, including Canada, Norway, Denmark and Chili employ quotas in major fisheries. These cover a wide variety of fisheries – shellfish, demersal species and pelagic species – ranging from very small to very big fisheries. Some have been in place for two decades.

As a result, we now have a good deal of practical experience with this approach, and a substantial body of empirical evidence of its advantages and disadvantages as a fisheries management system. This documentation, in government reports, conference proceedings, research papers and books contains valuable lessons about how the practical problems of quota systems can be dealt with – how to define the quotas, how to determine the initial allocations, how to monitor catches and enforce the system, and how to embed it in suitable law and institutions.

This documented experience is far too extensive to attempt even a summary here, but at the risk of oversimplification, I will venture a couple of general observations (I emphasize the risk in generalization, because fisheries differ so widely, in so many respects, that few conclusions apply to all).

The documented experience with individual quotas leads convincingly to the conclusion that this method of managing commercial fisheries has been remarkably successful in advancing the two primary objectives noted earlier, namely to protect the stocks from overfishing, and to improve the economic performance of commercial fishing industries.

Improvement in economic performance has been particularly apparent. Ragnar Arnason, of the University of Iceland, recently calculated the productivity of labour and capital in fishing in four fishing countries that have based their fisheries management mainly on individual quotas for some years – Iceland, Greenland, Holland and New Zealand. He compared this with the corresponding productivity of labour and capital in five fishing countries that rely, for the most part at least, on other management methods such as fishing effort controls and licence limitation, namely the United States, Faroe Islands, Canada, Norway and the United Kingdom. The average catch per gross registered ton of fishing fleet in the quota management countries was double that in the other category. The average catch per fisherman employed was even more striking: in the quota countries it was more than three times that in the others.

Most of the many reports on individual quota systems introduced in particular countries and fisheries are consistent with these findings. Notwithstanding a variety of difficulties encountered in implementing

quotas, and plenty of critics of the system, the results are generally favourable, especially in respect to the improvements in economic performance resulting from elimination of excess fishing capacity, increased productivity of labour and capital and higher value of catches. In some cases the improvements have been dramatic in both management of the fish stocks and economy performance. Arnason concluded that the quota system has been more successful in achieving these policy objectives than any other fisheries management system currently employed around the world. The continuing spread of quota systems among fishing nations is evidence that his assessment is widely shared.

When individual quotas were first mooted two decades ago, much of the discussion and writing was about the potential difficulties and obstacles to implementing the system. I refer to the problems of initial allocations – undoubtedly the most contentious issue among the fishers – and displacement of employment and communities – the greatest concern among others – as well as the practical problems of monitoring catches, data corruption, enforcement, discarding, high-grading and concentration of fishing rights. Undoubtedly, these problems have been experienced, and might explain why individual quotas have not been adopted in some cases. They should not be underestimated, but sometimes they have been exaggerated, especially about concentration of fishing rights, displacement of labour and enforcement.

In any event, each fishery is different, and as governments have introduced quota management in specific fisheries, each with its particular character and problems, these challenges have been found to be manageable, and practical solutions found.

The system has produced some benefits that were not anticipated. One is increased value of the catch. Until fairly recently, the economic gain from individual quotas was expected to arise entirely from elimination of the costs of excessive inputs of labour and capital as fishing fleets and fishing effort were rationalized. Experience has shown that substantial gains can be realized also through increased value of the catch. In Canada's Pacific halibut fishery, under the former policy of controlling fishing effort, the government had reduced the fishing season to six days per year. The individual quota system allowed fishing all year round, and as a result fishers could fish when markets were most opportune, take time to clean and handle fish for maximum value, and take advantage of higher prices for fresh fish, increasing the value of the catch by more than 50 percent. Similar gains have been experienced in Alaska's halibut fishery and Australia's southern bluefin tuna fishery, among others.

Another effect that was not expected, or at least was underestimated, results from the incentives to act collectively. When quota holders in a fishery find themselves with new and substantial assets in fishing rights, they look for ways to protect them from encroachment and to enhance their value through better management of the fish stocks, efficiencies in fishing and improvements in the fishing rights themselves. These measures call for collective action, which I will return to in a moment.

Future Directions

There can be no doubt that the individual quota system of organizing fisheries is more than a passing fad. Its well-documented success, the already deeply vested interests in the system, and its continuing expansion suggest that it is here to stay, and may well become the normal method of managing commercial fisheries, in economically advanced fishing countries at least. It certainly constitutes a major innovation in the evolution of fishing rights and fisheries management.

Now that the initial experiments with individual quotas are behind us, and we have the benefit of a good deal of experience with them, we should direct our attention to the next steps. I think we should try to build on the progress we have already made with individual quotas by exploring new possibilities in two general directions. One of these involves refining quota management systems to respond to demands and pressures from outside individual fisheries. I refer to the rapidly growing requirements in most fishing nations for attention to the interactions among species and stocks of fish, habitat protection and the management of whole ecosystems, which call for compromises in allowable catches, fishing methods and other matters in the interest of wider concerns. Other external considerations are social, such as the competing demands of commercial, recreational and aboriginal groups of fishers and advocates of protecting stocks from exploitation. These issues reflect new objectives in fisheries management, or at least new objectives for the design of quota management systems.

The other opportunity for development is to improve individual quotas as instruments for achieving the traditional objectives of fisheries management – conservation of the stocks and economic efficiency in fishing. These have been the usual objectives hitherto, but there are ways of improving the characteristics of quotas, and their administrative and institutional frameworks, to make them more effective in terms of both of these goals.

I intend to direct my remaining remarks to the second of these; that is, how individual quota systems can be developed to further strengthen their contribution to effective management of fish resources and efficient organization of fishing industries.

Strengthening Property Rights

The success we have already witnessed with individual quota systems is due, fundamentally, to the way they realign fishers' incentives to complement these objectives. Individual quotas eliminate the incentive to wastefully expand fishing power and effort that motivates those who fish in non-quota fisheries, and generate, instead, incentives to minimize fishing costs, efficiently adjust fishing capacity and the scale of operations, and maximize the value of the catch.

I want to draw special attention to the way the improved performance results from the change in fishing rights. The change from simply a right to catch fish to a right to take a specific quantity of fish represents a significant addition to the bundle of sticks in the lawyers' metaphor for property, and a strengthening of fishers' property interests in the fishery, which drives them to organize fishing more efficiently. So to improve performance further, we should look for ways to further strengthen fishers' property interests.

The main characteristics of property which govern its effectiveness in guiding economic behaviour are fourfold: its *exclusivity*, or the extent to which it gives the holder an exclusive right to use an asset without interference from others, its *duration*, or the period over which the rights prevail; its *security* against intrusions or claims of others and its *transferability* or capacity to be bought and sold, divided and leased or otherwise conveyed to others.

There is considerable scope for improvement in these qualities of fishers' property rights in most individual quota systems. The quotas in New Zealand, Australia, Iceland and the Netherlands are relatively strong rights insofar as they are long-term or perpetual in duration, legally secure and freely transferable. In Canada, in contrast, they are conspicuously feeble, being administrative supplements to fishing licences with weak legal status. Quotas are issued with terms of only one season. Fishers have no protection against government manipulation of their quotas to accommodate new entrants or other political pressures, or even against cancellation of them; they can transfer their quotas only with governmental approval; and financial institutions won't accept them as collateral. All this uncertainty and insecurity leaves very little confidence in the system, which undermines its power to guide economic behaviour in constructive directions. Most individual quota systems suffer from at least some of these deficiencies, presenting opportunities for improving the property rights held by the fishers, and hence also their long-term proprietary interest in the fisheries.

However, proposals to strengthen property rights face resistance in many countries. In contrast to the normal resistance to introduction of a quota system in the first place, the resistance to strengthening the property rights embodied in individual quotas usually comes not from the fishers but from governments. In many cases this seems to be due simply to a lack of appreciation, within government, of the subtle implications of security and transferability of rights to resources for entrepreneurial incentives and investment decisions, especially among fisheries agencies that have historically seen their responsibility as one of constraining and restricting fishers from pursuing their self-interests in catching fish. More often, I believe, is the lack of clear policy direction. The countries that have developed the most advanced forms of individual quotas in terms of their property characteristics, such as New Zealand, Australia and Iceland, are those in which the government has explicitly adopted individual quotas as their preferred approach to fisheries management, thus giving their public administrators clear direction through policy statements, legislation and institutional innovations. Where governments have been equivocal, as in Canada, and in the United States where the federal government has hesitated (and for a time even invoked a congressional moratorium on individual quotas) administrators are left with two, conflicting, systems to administer – a regulatory system aimed at constraining market incentives and a quota system that depends on them. Almost inevitably the quality of the rights of quota-holders remains weak. Clear governmental direction is obviously needed to enable development of these new policy instruments.

At the political level, some governments have hesitated to strengthen the property interests of fishermen because of public anxiety about “privatizing” public resources. This is partly a misconception, insofar as the introduction of individual quotas does not change the ownership of fish, but only the nature of the right to fish, as we have noted, typically from a right to catch fish to a right to catch a specific quantity. But opposition to “privatization” is often strong. In the United States and other countries legal actions have been brought against governments for privatizing fisheries through individual quotas. Alaska’s halibut quotas are explicitly not private property. In Australia and elsewhere public spokespeople have often felt it necessary to deny that they were creating property in the form of fishing rights.

(Professor Scott has noted that fishing rights were first created through the administrative process of fisheries regulation with no intention of conveying any rights of ownership, unlike more traditional types of property in land which evolved through the common law process. Public opposition to quotas is undoubtedly aggravated by the habit among lawyers and academics of referring to such rights as property, which they undeniably are, *de facto* if not *de jura*, but so are limited access licences and other forms of rights. Some also refer to individual quota regimes as “rights-based” fisheries, with the misleading implication that those who fish under other arrangements have no rights.)

A related public concern is about the windfall gains or profits that may accrue to quota-holders, often considered unfair to those excluded from the fishery. This may also involve misunderstandings. Instead of being recognised as the emergence of economic rent and evidence of economic improvement in a fishery, these net gains are often seen as artificial enrichment of a few at the expense of the public owners and excluded fishers.

Toward Self-Regulation

There is now plenty of evidence of the proprietary interest fishers develop in fisheries managed under individual quotas. Once they find themselves members of a group that collectively holds exclusive rights to fish, and each of them has a specified share of the harvest, the stage is set for cooperation.

Thus, we find many examples of quota-holders cooperating in conservation measures such as larger mesh-sizes, surveillance and enforcement, data collection and research and in contributing to the costs of these.

Moreover, if the individual quotas are secure, long-term and transferable they become valuable assets, and their holders develop a keen interest in protecting them against interlopers, poachers or governments that might in some way threaten them or diminish their value. They also look for ways of enhancing their assets, such as by increasing the yield of the fishery or improving the security and integrity of their fishing rights. To advance their interests in these ways they must act collectively. These are the ingredients of self-regulation.

Individual quota systems, when first introduced, almost inevitably require a good deal of governmental management and administration because only governments have the capabilities needed. But experience has shown that quota-holders soon respond to their incentives to develop collective arrangements with the capacity to take over fisheries management responsibilities. The benefit of this participation and cooperation is in the lower costs and improved economic performance of the fisheries that can be expected to follow. This is not to say that the cost of regulating the fishery will necessarily be lower, but rather that the value generated by the fishery, relative to all the costs of fishing, regulation and compliance, both government and private, will be greater when those with a direct interest in this outcome have responsibility for management.

Governments can promote the development of self-management in at least three ways. One is by strengthening the quality of individual quota rights where they are weak. As I have already suggested, this means giving them solid legal standing, long or perpetual terms and easy divisibility and transferability to provide their holders with the security and incentive they need to manage both fish stocks and their own investments for the long term.

Rights can be strengthened by reducing their political as well as their legal vulnerability. I have already noted the importance of a clear governmental policy commitment to support the quota system. Half-hearted, tentative and partial measures, such as those in Canada, cannot be expected to generate the confidence necessary to yield the potential results.

Another means is by adopting a policy of cost recovery for public fisheries management and administration, as Australia and New Zealand have done. This has the effect of internalizing both the costs and benefits of services, closing the circle between those who pay and those who gain, and focusing attention on the scope for improved efficiency.

The third means of facilitating the shift to self-regulation is by providing an institutional framework that enables quota-holders to manage their affairs. To be able to cooperate effectively, fishers need a management organization on the same scale as the fish stock. It must represent all those having rights to fish, have a clear mandate and authority to make rules and powers to enforce them including, most importantly, the power to exclude outsiders and free-riders.

New Zealand's experience provides vivid evidence of the efficacy of these policy measures in combination. Here, where the government originally took responsibility for all administration of the quota management system, much has now been transferred to the fishing industry, and there has been a marked change in the respective roles of government and industry. Quota-holders, who initially complained about inadequate governmental services, gradually turned their concern to bureaucratic waste and inefficiency, and began to demand cost reductions and control over expenditures. They have organized themselves into management companies, and in some cases these companies finance research, enhancement and other activities, determine allowable catches, make fishing rules and impose sanctions. They also endeavour to strengthen their fishing rights and expand their management role. Industry associations now operate to government standards the quota and vessel registries, the programs for reporting catches, and the day-to-day administration of the quota management system. Consideration is now being given to contracting out parts of the compliance enforcement function, hitherto considered a core governmental responsibility.

Australia is developing a model that depends on more governmental structures, notably a statutory authority (the Australian Fisheries Management Authority) to manage all Commonwealth fisheries. This authority maintains a Management Advisory Committee for each major fishery. These committees, dominated by those who hold fishing rights, provide a mechanism for self-regulation and have been given increasing responsibilities.

In my view, self-regulation is the most exciting opportunity for future development of fisheries management and fishing rights. It has already proceeded further than anyone expected a decade ago. In some fisheries quota holders have begun to act as joint owners and to organize their activities as cooperatives, and in the end they may evolve into shareholders of enterprises that not only organize fishing but manage the fish stock and its yield as well. Tradeable shareholdings might even provide the machinery to manage some of the external pressures on individual fisheries, such as the allocation of catches among competing sectors of commercial, recreational and aboriginal fishers within a given fishery. Extending the transferability of quotas among fishers within a sector to transferability across sectors would shift the often intractable problem of allocating catches among competing groups from governmental discretion to the market, just as land is allocated among users.

Moreover, individual quotas might be held by anyone – fishers, communities, companies, cooperatives or even environmental organizations that simply want to reduce fishing, again leaving the market, instead of administrators and ministers, to decide who can make the best use of the resource as circumstances change over time. Trading in quotas between fisheries might allow holders of rights to interdependent species to find the most appropriate balance between the stocks.

Fishing rights might develop in other directions as well. Most importantly, some fisheries lend themselves to a system of rights based on areas of the sea, similar to rights to land. Oysters and other shellfish are usually produced by owners or lessees of defined areas of the sea or seabed. Aquaculture is typically conducted under such rights as well. Such territorial fishing rights, or TURFs, are common in less developed countries and aboriginal cultures, but elements of this approach are found as well in the fishing cooperatives of Japan, the long-established fraternal fishing organizations in Mediterranean France and Spain, and the salmon fisheries in Alaska. There are probably many more fisheries that could be most effectively managed under area-based rights, and they deserve careful investigation because exclusive rights to areas of productive sea, as on land, provide strong incentives to use and manage resources effectively.

Some sociologists and others advocate area-based rights over individual quotas on grounds that they preserve local access to fish and local management of fisheries. But this reflects a misunderstanding: any

form of rights can be tied to or assigned to local communities, and the choice among alternatives should be made on other grounds.

Area-based rights probably offer the most promise in the less developed world, which present the world's most intractable fisheries management problems and where the conditions needed for managing under individual quotas are absent. In many developing countries, particularly in the tropics, scientific information to assess stocks and sustainable yields is lacking; large numbers of small fishing enterprises selling mixed catches in many locations and outlets makes monitoring landings difficult; and the technology and wherewithal for tracking and policing catches is not available, leaving individual quotas and other administratively demanding management systems unworkable.

In these circumstances, exclusive fishing rights granted to communities or fishing cooperatives are likely to be more practicable and effective. But again, it will be critical that the government give the organization the right to organize and to require everyone with rights to fish to become members in order to protect against free-riders, the authority to levy fees to enable it to carry out its work effectively, and the power to make rules and to enforce them to enable collective action. This authority to protect itself from non-members is essential to cope with the most common threat to traditional area-based management systems, namely the intrusion of outside, often industrial, fishing activity. Beyond this, much work needs to be done on the requirements to enable these organizations to function effectively.

The development of area-based rights might lead to more comprehensive rights to all the resources or ecosystems in defined areas.

Ultimately, the role of government might be in maintaining the legal and institutional framework needed to enable those with rights to fish to govern themselves. This is likely to become the most essential task of government, at least.

Concluding Comment

By way of concluding my remarks I want to refer again to the economic theory of property, and how property develops in response to growing demands on resources in limited supply. Until the twentieth century, fish in the sea were not perceived to be scarce, and no property rights were needed to ration them. But that century saw pressures on the world's commercial stocks grow to the point that most were overexploited and depressed. In response, property rights in ocean fisheries began to emerge, and in the last three decades they have, in historical perspective, been evolving with astonishing speed.

Over that brief period, in the developed world at least, the long tradition of open access to fisheries has ended. Most fish resources have been appropriated by coastal states. Governments of those states have reserved access to the stocks for a relatively few, who consequently hold strongly vested interests. Increasingly, their rights to fish are specified quantitatively. In some cases these rights have well-developed characteristics of property, and their holders have begun to act like cooperative owners. The trend is clearly toward more well-defined, tangible and exclusive rights to fish. And those who hold them have begun to take an interest not only in catching fish but also in managing them.

Fishing rights have begun to take on the characteristics of property common in other natural resources. The implications for the management of ocean resources are not unlike those of the enclosure movement for the agriculture communities of eighteenth century Europe, and the social and economic impacts might well be as profound.

Where is all this leading? The search for policy direction has to take account of the urgency of improved fisheries management which, over the last century, has been undeniably dismal. With few exceptions, both the natural resources and the industries that depend on them have languished, and it will take herculean measures to restore their health, and to respond to the growing demand for sustainable development.

In this context, the development of property rights in fisheries over the last few years is promising, and the adoption of individual quotas is particularly auspicious. Governments should give high priority to what it takes to make the most of this system. With virtually no prospect of turning back; the challenge is to find the best way forward.

Our historical experience with agriculture, as well as our experiments with quotas, suggest we can build on the successes already achieved by strengthening the property rights embodied in quotas, thus ensuring that those who fish take a long-term interest in the health of the resources and in their efficient use. To take full advantage of this, governments can also provide the legal and institutional framework to enable them to manage their fisheries. This prospect of the holders of fishing rights doing more than simply harvesting fish, by taking responsibility for managing and developing them as well, presents an exciting new frontier of opportunities for ocean fisheries.