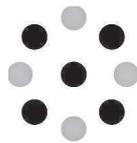


# Advances In Rights Based Fishing

Extending the Role of Property  
in Fisheries Management



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# Advances In Rights Based Fishing

Extending the Role of Property  
in Fisheries Management

Edited by  
Ragnar Arnason and  
Birgir Th. Runolfsson



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# Preface

The papers published in this volume were initially presented at the *Workshop on Advances in Property Rights Based Fisheries Management* held in Reykjavik, Iceland, August 27-29, 2006. The workshop was organized by RSE – Centre for Social and Economic Research, an Icelandic think-tank. As the title of the workshop suggests, the papers in this volume consider the issue of fisheries management from a property rights perspective. More precisely, they constitute attempts to identify ways by which existing or improved property rights regimes can increase the social benefits flowing from fisheries.

The topic of property rights in fisheries is a broad one. Reflecting this, the papers approach the subject from quite different angles: Some deal with aspects of ITQs; the limitations of ITQs as property rights, ITQs as a basis for fisheries self management and the political and allocative aspects of ITQs. Others examine community property rights as an alternative to ITQs, problem of fisheries property rights outside exclusive economic zones, and finally the international aspects of fisheries property rights.

The papers have been subject to modest editing, although we have chosen to interfere as little as possible with the textual and presentation preferences of the authors. Thus the papers may

## PREFACE

still retain some attributes of conference proceedings rather than a fully edited and refereed text. We would like to thank Jinny Gupta for her help with textual editing.

Finally we would like to extend our thanks to the organizers of this workshop for their initiative, the speakers, and to the many firms and organizations for their generous support for the workshop and this publication.

*Ragnar Arnason*  
*Birgir Th. Runolfsson*

# Introduction

RAGNAR ARNASON AND  
BIRGIR TH. RUNOLFSSON

The modern theory of fisheries economics was formally launched by Scott Gordon's 1954 article in the *Journal of Political Economy* (Gordon 1954). Gordon's paper, however, was not the first analysis of the problem. The Danish economist, Jens Warming, had published two articles in a Danish economics journal in 1911 and 1931, which forwarded there essentially the same analysis (Warming 1911, 1931; Andersen 1983).<sup>1</sup> No doubt other precursors can be found in the history of economic thought.

Less than a year after Gordon's seminal paper, Anthony Scott attempted to bring the role of property rights to the forefront (Scott 1955). Unfortunately, Scott's analysis was restricted to the case of a sole owner fishery. While, on this basis, he essentially proved that property rights were somehow central to the fisheries problem; this crucial point escaped the attention of most other researchers for at least a quarter of a century. An important

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<sup>1</sup> Interestingly it seems that it was a professor of economics at the University of Iceland, Olafur Björnsson, who pointed Warming's work out to a newly formed community of fisheries economists in 1956. FAO initiated and sponsored a Round Table on the economics of fisheries, held in Rome in September and the papers and proceedings were published later that same year (Turvey and Wiseman, 1956, the reference to J. Warming is on page 132). Among the participants were A. Scott, H. S. Gordon, J. A. Crutchfield, O. Björnsson, and, of course, R. Turvey and J. Wiseman.

reason for this obtuseness may have been that most economists of this period had been trained in a somewhat limited variant of neo-classical economics which focussed on markets and market prices while largely ignoring the fundamental social institutions which made markets possible. Thanks to institutional economics and other insights, it is now understood that property rights are necessary for the establishment of markets (North 1981; North 1990; North 2005). Without property rights there can be no markets and, therefore, no market guidance or “invisible hand” as it this phenomenon is sometimes referred to.

A clear appreciation of the crucial economic role of property rights is particularly vital in fisheries as well as several other natural resource-based economic activities. Many natural resources are not subject to well-defined property rights. As a result, markets for their services and for the resource base itself do not arise. Market guidance is therefore absent and the resources tend to be severely overexploited. This is sometimes referred to as the common property problem (Hardin 1968).

The common property problem applies to ocean fisheries with particular vengeance. In most ocean fisheries property rights are either extremely weak or totally absent. Therefore, in these fisheries, the fishing activity cannot operate in an economically efficient way unless minutely controlled by an overarching entity such as the state. Unfortunately, it turns out, both as a matter of experience and theory, that government-induced economic efficiency, so stridently pushed by economists with a penchant for centralization, is little more than wishful thinking. Anywhere, in any field of human activity, attempts to run economic activity by commands and controls have failed, often quite dramatically. In addition, the controlling activity itself is extremely expensive. Therefore, if economic efficiency is wanted, there is no viable alternative to property rights and, consequently, the decentralized rule of market forces.

Many kinds of property rights are conceivable in fisheries. The socially most relevant, however, are (i) sole ownership

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(Scott's initial idea), (ii) territorial user rights in fisheries (TURFs), (iii) individual harvesting quotas and (iv) community property rights. Of these, individual quotas (IQs) and individual transferable quotas (ITQs) are most common and widely applied with generally good economic results.

The idea that individual quotas could be used to solve the fisheries problems seems to have become current in the 1970s. The earliest scientific paper explicitly suggesting IQs to solve the fisheries problem that we have been able to find is a limited circulation discussion paper by Christy in 1973. However, similar thoughts seem to have been in the minds of Quirk and Smith in their paper in 1970, but not finding clear expression. Arnason's paper in 1977 explicitly discusses tradable IQs and proposes them as superior to taxation for generating efficiency in fisheries. Finally, a clear fairly systematic statement of the use of IQs to solve the fisheries problem was presented in English in a paper by Moloney and Pearse (1979).

Nevertheless, in spite of these early publications, it seems fair to say that developments in property rights-based fisheries management were initially led more by events in the field than theoretical analysis (Arnason 1996, Arnason and Gissurason 1999, Arnason 2002). Already in the 1960s and 70s, small scale territorial use rights in fisheries (TURFs) were popping up in various sedentary mollusc fisheries here and there. More importantly, in the second part of the 1970s and early 1980s a few important fishing nations designed and introduced IQs and individual transferable quotas (ITQs) in their fisheries, ignoring the fact that a theoretical basis for such systems was largely non-existent. Thus, Holland and Iceland introduced IQs in some of their important fisheries as early as 1976. Iceland instituted a fully fledged ITQ system in her herring fisheries in 1979. New Zealand introduced ITQs in her deep-sea fisheries in 1983, as did Iceland in 1984 in her all-important demersal fisheries. In 1986, New Zealand adopted a uniform ITQ system in all her fisheries — the first such comprehensive ITQ system in the world.

In stark contrast to these real-life developments, it wasn't until the late 1980s that the theory of property rights based fisheries management caught up. An important landmark in this respect was the conference on rights based fishing held in Reykjavik in 1988 (Neher, Arnason, and Mollett 1989). At that conference, the theory and practical aspects of the ITQ fisheries management, as well as that of other property rights arrangements, such as TURFs and community fishing rights, were first systematically and clearly expounded.

Since the initial steps toward individual property rights in fisheries in the 1970s, the use of property rights-based instruments in the world's fisheries has expanded greatly. The most important property rights based systems are TURFs, ITQs, and community fishing rights. TURFS have been found to be very effective, but they can only be applied to species that are relatively sedentary, such as certain types of shellfish. ITQs have broad applicability and generally are very effective in generating economic efficiency in fisheries. As a result, they have been widely applied over the world and their use is steadily expanding. At least eleven major fishing nations; New-Zealand, Iceland, the Netherlands, Russia, Australia, Canada, Chile, Greenland, Denmark, Morocco and Namibia employ ITQs as a major component of their fisheries management system. Several other important fishing nations such as the USA, Mexico, Norway and South Africa employ individual quotas (IQs) with varying degrees of transferability in a substantial segment of their fisheries. The most recent examples of major fishing nations turning to ITQs as their main tool for fisheries management are Chile which went on ITQs in 2002 and Denmark which did the same in 2007. Taken together, it now appears that well over 15% of the global catch is currently taken under ITQs or ITQ-like fisheries management systems.

Various forms of community fishing rights and co-management schemes exist around the world. They are particularly suitable where it is difficult to introduce individual

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fishing rights because of enforcement problems or for socio-political reasons. The economic efficiency generated by community fishing rights appears to depend on two main factors; the quality of the community fishing rights and how the community decision process is set up. If community fishing rights are high quality, the potential for efficiency is believed to exist (Ostrom 1990, McCay 2000). Unfortunately, there is not much hard evidence on the actual efficiency of community-managed fisheries. What there is, however, suggests that their efficiency varies a great deal from community to community (Ostrom 1990, Scott 2007).

The ten papers published in this volume all approach the issue of fisheries management from a property rights perspective and constitute attempts to identify ways to enhance the contribution of property rights to socially beneficial fisheries. The topic of property rights in fisheries is wide, however. Reflecting this, the papers approach the subject from quite different angles. Six of them deal with aspects of ITQs; the limitations of ITQs as property rights, ITQs as a basis for fisheries self management and political and allocation aspects of ITQs. One paper examines community property rights as an alternative to ITQs. Two papers consider the problem of fisheries property rights outside exclusive economic zones. Finally, one paper discusses the international institutional aspects of fisheries property rights.

### LIMITATIONS OF ITQs

The first two papers in this volume, those by Christopher Costello and Robert Deacon titled “The Efficiency Gains from Fully Delineating Rights in an ITQ Fishery,” and Rognvaldur Hannesson titled “Taxes, ITQs, Investments, and Revenue Sharing,” deal with the limitations of ITQs to solve the fisheries problem.

The paper by Costello and Deacon makes the fundamental

point that the aggregative, discrete ITQ system—the kind of ITQ system which is almost exclusively employed in the world’s fisheries—will, in general, not be fully efficient. An aggregative ITQ-system issues one TAC for the aggregate stock and, thus, does not distinguish between substocks by genetic make-up, growth potential, year class, location, catchability, market value, and so on. Obviously, to the extent that this heterogeneity applies, which would be the rule rather than the exception, the shadow value of the respective substocks will be different. Consequently, an aggregative ITQ system cannot be efficient.

A similar, but not quite identical, problem arises with discrete ITQ-systems. A discrete ITQ-system is one which issues a TAC over a finite length of time. All of the world’s ITQ fisheries do this, most commonly for a year at a time. If fishing conditions vary over the period, for instance because of developments in the stock size, seasonal catchability, and so on, the shadow value of the biomass will fluctuate accordingly. Thus, the optimal TAC should also do so. It follows that an ITQ-system based on this kind of discrete TAC issues cannot be fully efficient. In addition, variability in individual profit functions over time, combined with discrete TACs, may give rise to new external effects, such as crowding when profitability is high, or an inefficient harvesting profile over time.

Costello and Deacon explore these issues and how they relate to the limited property rights contained in ITQs. Their fundamental conclusion is that disaggregated ITQs; i.e., ITQs by each economically distinct substock, would solve the problem stemming from aggregative ITQs and generate efficient utilization at each point of time. This, of course, is not surprising. A fundamental result in market economics is that heterogeneous goods should have different prices. Otherwise the problem of missing markets arises. The same applies to ITQ systems. ITQs based on undifferentiated TACs with respect to substocks only confer property rights in the aggregate stock. Hence, there cannot be separate ITQ prices for substocks. This results in

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missing markets and economic inefficiency. Basically the same thing applies to the time dimension. Shorter-period ITQ systems would reduce the inefficiency of ITQ use over time. Continuous time ITQ systems would, of course, eliminate it altogether. Costello and Deacon refer to adequately disaggregated and continuous time ITQ systems as fully delineated rights.

Thus, Costello and Deacon not only identify some important limitations in the property rights quality of most existing ITQ systems, but they also point to the way of improving these property rights and, thus, making them more capable of generating economic efficiency.

The paper by Rognvaldur Hannesson considers another kind of limitation on the efficiency of ITQ systems. Hannesson points out that the common presumption that ITQs lead to optimal investment in fishing capital will be unwarranted if there are other sources of distortion in the system. The specific situation explored by Hannesson, the almost universal one in fisheries, is where fisheries labour is remunerated on the basis of a share in the gross output. This situation, of course, is essentially the familiar case of sharecropping, which is known to be economically inefficient (Marshall 1920), unless compensated by actual labour exertions. In his paper, Hannesson ignores this last possibility and shows that that when labour remuneration in an ITQ fishery consists of a share in the gross output, investment decisions will not be socially optimal. Under these conditions, the ITQ system alone is not sufficient to generate full efficiency in the fishery. The source of the problem, however, is not the ITQ system as such, but the distortion created by the share remuneration system. Indeed, a corresponding distortion would also apply in a sole-owner fishery, which was otherwise optimal, if it were working under the same regime of labour remuneration. So, Hannesson's basic point is that the ITQ-system will not correct for distortions which have nothing to do with property rights in the extraction process.

Having established this fundamental result, Hannesson goes

on to explore ways to correct for this particular distortion. He shows that that the correct tax on the value of fish landings will do the trick. On the other hand, according to Hannesson, no tax on quota holding can do so. It seems likely, although Hannesson does not explore this, that if sharecropping in an ITQ-managed fishery is truly inefficient, there will be a tendency to adopt a more efficient labour contract in the long run. Another interesting issue, not explored by Hannesson, is whether there are more incentives to adopt sharecropping labour contracts in common pool fisheries than there would be in an ITQ-based fishery in the long run.

#### FISHERIES MANAGEMENT BY ITQ-HOLDERS

The two papers by Ragnar Arnason and Tom McClurg deal with what has been called fisheries self-management on the basis of ITQs. The basic idea is that under the ITQ system, ITQ-holders have a vested interest in getting together to set the parameters of the system such as the TAC, to impose collective rules to protect and enhance the fish stocks and their ocean habitat, and to enforce the system's restrictions.

Arnason, in his paper titled "Fisheries Self-management under ITQs", considers the economic aspects of having ITQ holders take care of the management of their fishery. Fisheries management comprises: (i) the selection and modification of fisheries management rules, (ii) the setting of specific fisheries management measures including the TAC, (iii) the enforcement of the fisheries management system, and (iv) the biological and economic research necessary for adequately discharging these functions.

This analysis is motivated by a number of empirical observations. First, fisheries management is generally a costly activity, representing, in most cases, a substantial fraction of the gross landed value of the fishery. Second, due to problems

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of inadequate information, inappropriate incentives, and misalignment of costs and benefits, the government is generally an inefficient provider of fisheries management services. Third, under a properly designed ITQ system, the need for government management is greatly reduced compared to what it would be under traditional fisheries management. This is because such an ITQ system defines reasonably high-quality property rights in harvest volume and, thus, eliminates many of the most detrimental externalities associated with common property resources.

Under ITQs, the interests of the various ITQ holders regarding the underlying marine resources tend to be aligned. Essentially, all of them want to maximize the value of their ITQs. Thus, they will find it in their individual interest to promote, participate in, and undertake collective measures to protect and enhance all the marine resources on which the fishery depends. Moreover, as a collective, the ITQ holders are in a position to negotiate the withdrawal of ITQs or reduction of the TAC with other users of ocean resources, such as the tourist industry and conservationists. Given well-defined property rights, this kind of negotiation may well lead to an efficient overall resource utilization according to principles first explained by Ronald Coase (1960). Thus, on *a priori* grounds, there appears to be strong reasons to expect that fisheries self-management by ITQ holders would be: (i) reasonably economically efficient and (ii) much superior to centralized management by the government.

Arnason goes on to make these arguments more rigorous, recognizing that collective decision-making within the group of ITQ-holders is basically the outcome of a bargaining game. He shows that when the ITQ holders can employ the same technology (a condition not far from the reality in most fisheries), this bargaining game basically collapses to the efficient solution — the only moves that make sense to individual ITQ holders are those that maximize of the overall value of the fishery. Moreover, even when fishers are heterogeneous with respect to

their technology, they would, under quite plausible conditions, still agree on the value maximizing policy. Finally, irrespective of any diversity of ITQ holders, if the group as a management unit is coherent enough (or transaction costs are low enough) to make side payments possible, the overall benefit maximizing solution is almost bound to occur.

On this basis, Arnason concludes that entrusting the management of an ITQ fishery to the ITQ holders may very well be the socially optimal way to proceed.

In contrast with Arnason's paper, Tom McClurg's paper is an empirical one. He takes the economic advantages of fisheries self-management for granted and, in that light, reviews the history of the ITQ system in New Zealand. This review suggests that while development toward fisheries self-management may be economically ideal and technically straight-forward, political and bureaucratic opposition may easily frustrate the process.

McClurg observes is that, in spite of New Zealand having been a pioneer in the use of ITQs in fisheries and having one of the strongest ITQ-rights in the world, the development toward fishing industry self-management has been slow. The reason, according to McClurg, is not some perceived weakness in that the self-management arrangement. The success of the only significant example of fisheries self-management organization, the Challenger Scallops Enhancement Company established in 1994, has quelled any lingering doubts of that nature. Nor is it lack of interest by the fishing industry. There have been many initiatives and proposals by the industry for self-management powers similar to those which the Challenger Scallops Enhancement Company enjoys. No, the reason, according to McClurg, is that the New Zealand government does not really want to give up its fisheries management powers and has actively opposed their devolution to fishing industry consortiums and organizations.

McClurg does not really forward explanations as to why the government would take this stand. Standard theories of

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government, however, immediately suggest why (Mueller 2003; Mueller 1997). The politicians and bureaucrats running the government, exactly as any other social agents, seek power and income. A larger government can only help in this. Under ITQs, fisheries no longer pose a problem but are the source of success and, possibly more importantly, government revenue. Thus, as shown in McClurg's Table 1, from 1995 to 2006, the Ministry of Fisheries' budget increased almost threefold and the number of full time staff increased by over 40%. During the same period, there was no increase in the New-Zealand fish catch.

Under these political circumstances, any initiative for increased fisheries self-management in New Zealand is bound to run into difficulties. These are recounted by McClurg at some length. Indeed, his frustration with the process is well described by likening the most recent industry self-management initiatives in the deep sea crab and surf clam fisheries to 'candles in the wind'.

### THE POLITICS AND ASSIGNMENT OF PROPERTY RIGHTS

The next two papers by Gary Libecap and Hannes H. Gissurarson consider the politics and initial assignment of ITQs and other individual property rights to previously common pool resources. The approach in these papers is both analytical and empirical and shows that fisheries management may be looked at as a political problem as well as a biological or an economic problem.

In his paper entitled "Assigning Property Rights in the Common Pool: Implications of the Prevalence of First-Possession Rules for ITQs in Fisheries," Gary Libecap considers the initial assignment of individual property rights to previously common pool resources. Libecap's approach is both analytical and empirical. More precisely, he uses theory to

derive hypotheses about actual assignments of property rights and then compares them with empirical observations.

Libecap begins by noting that the social institution of private property rights generally reduces the economic waste associated with the common pool/common property arrangement. Moreover, as a rule, the higher the quality of the property rights, the more efficient the resulting resource use. Other approaches to avoid the common property waste, notably government regulations of various types, have generally been found to be ineffective. Thus, if economic efficiency is the aim, as social welfare dictates, private property rights constitute the most promising way of attaining it.

The introduction of private property rights into a situation of common property logically requires the assignment of the property rights to economic agents. In general, this assignment cannot be carried out independent of other economic and social variables. The way in which the assignment of property rights is done may have significant economic as well as socio-political implications. In his paper, Libecap explores these implications.

From a static perspective and in the absence of significant transaction costs, the assignment of property rights is not a major economic issue. As long as the property rights are freely transferable, they will end up with those that can make the greatest use of them. In a more realistic setting, however, transactions costs of various types are often substantial and this result does not hold. Over time, even with no transaction costs, the rule for assigning property rights may have major economic consequences. The reason is that each method of assigning property rights affects the incentives for: (i) discovering new resources (or new uses for old ones) and (ii) developing new property rights technologies (including technologies for the enforcement of property rights). Since, as demonstrated by history, both activities are crucial for economic growth, the same applies to the incentives for undertaking them. Thus, in a dynamic setting, the rule for assigning property rights becomes crucial.

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The purely technical task of selecting the most efficient rule for assigning property rights is further confounded by the almost inevitable social struggle for who gets these rights. As a general rule, the more potentially valuable the resource in question and the less well socially established the assignment rule, the more intensive is this fight. Social fights are costly, sometimes extremely so. This must be taken into account in suggesting modifications to existing assignment rules.

Libecap studies three ways of assigning private property rights: (i) first possession assignment, (ii) lottery or uniform allocation, and (iii) auctions. He convincingly argues that none of these assignment rules is uniformly most preferable or “best.” The nature of the resource including its value; the presence of existing incumbents or resource holders; and a range of transaction costs regarding the establishment, protection, enforcement, and exchange of property rights all affect the best allocation rule in any given case. Digging deeper, Libecap argues that with a resource already under exploitation; i.e., with current incumbents, or a new resource requiring costly search and discovery, a first possession rule would be most efficient. For a new resource (i.e. one currently unexploited and, consequently, with no incumbents) which is highly valuable and subject to high subsequent transfer costs, an auction might be most efficient. Finally, for a new resource with low transfer costs that is subject to strong equity sentiments, a lottery or uniform allocation might be optimal.

On this basis — and apparently the axiom that efficient procedures tend to be adopted by society — Libecap forwards the following empirical hypotheses concerning the assignment of property rights:

- (1) Resources already under exploitation: Assignment of rights to current users.
- (2) New, naturally provided resources (with strong equity sentiments) and low transaction costs: Assignment by lottery or uniform distribution.

(3) New resources (not naturally provided and with comparatively weak equity sentiments) with high potential rents and transaction costs: Assignment by auction.

(4) The adoption of property rights based institutions (and assignment of property rights) comes relatively late when the cost of open — access and/or centralized regulation becomes too great.

(5) The most complete property rights are assigned to highly valuable, low mobility, and easily measured resources.

Libecap goes on to compare these predictions with the experience from five empirical cases in North America: (i) oil and gas reservoirs, (ii) surface water resources, (iii) radio spectrum, (4) air pollution permits, and (5) fisheries. He finds that by and large his hypotheses are confirmed by these examples. It remains to be seen to what extent they are confirmed by a wider set of examples for more disparaged parts of the world.

In his paper, ‘The Politics of Property Rights’, Hannes H. Gissurarson takes a somewhat different track. Echoing a similar comment made by Karl Marx more than 150 years earlier, Gissurarson makes the point that it is not sufficient to show that certain fishing rights, such as ITQs or TURFs, can generate economic efficiency in fisheries. For such conceptual systems to have a social impact it is necessary to create the political support necessary to have them implemented. Thus, according to Gissurarson, fisheries management is as much a political problem as it is a biological or an economic problem.

Gissurarson proceeds to explain how, in his opinion, the necessary political support can be generated. As he sees it, the party who loses the most from poor fisheries management is the same as the party who gains the most from good management, namely the owners of fishing capital. This group has the greatest incentive to ensure good fisheries management. Already for that reason, this group should receive all fishing rights defined in the system. Moreover, since this group has the most to gain, they

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are most likely to forge the necessary political consensus for the establishment of rights-based systems.

Gissurarson uses the example of the ITQ system in Iceland to illustrate this theory. In Iceland, ITQ-rights were initially given to vessel owners. In fact, the case can be convincingly made that any other allocation of ITQ-rights would not have been politically feasible. Thus, the introduction of ITQs in the Icelandic fisheries, a step which has clearly led to greatly increased economic efficiency as well as some restoration of fish stocks, was made possible by initially allocating ITQ-rights to vessel owners. Subsequently, according to Gissurarson, the fact that vessel owners held the ITQs led both to various improvements in the initial ITQ system towards increased efficiency and to strong resistance to attempts by government authorities to dilute the property rights value embedded in the ITQs and, thus, reducing the efficiency of the system.

In the light of Gissurarson's theory, it is interesting to note that almost everywhere where ITQs or similar property rights based systems have been introduced in already existing fisheries, the property rights have been given to the fishers operating in the fishery, i.e. Gissurarson's vessel owners. This observation constitutes strong evidence that the allocation of rights to the existing operators is necessary for the adoption of new rights-based systems. Whether it is also sufficient is more doubtful. Many groups of fishermen remain suspicious of new rights-based systems such as ITQs, although they would be the likely recipients of rights were they to be introduced.

### COMMUNITY MANAGEMENT AS AN ALTERNATIVE TO ITQs

In their paper "Turfs and ITQs: Collective vs. Individual Decision Making," José Cancino, Hirotsugu Uchida, and James Wilen consider space-based collective management alternatives to decentralized species-specific ITQs. They point out that while

most of the fisheries management literature has been devoted to ITQs, other rights-based alternatives exist. More importantly, these alternatives may be more appropriate than ITQs in certain fisheries and social situations. One obvious, and probably empirically highly relevant, case is where the enforcement of ITQs is prohibitively costly. This would, for instance, often be the case in small scale, low technology fisheries with a large numbers of fishermen, many landing places, and short post-harvest processing and distribution lines.

Cancino, Uchida, and Wilen specifically study two prominent cases of community-based management, the ones in the inshore fisheries of Chile and Japan. Their approach is primarily descriptive. However, by reviewing the experience, they manage to detect certain patterns of possibly general validity.

In spite of a great geographical and social distance between these two situations and entirely different histories, there are many similarities between these community-based arrangements that have been adopted. In both situations, the community rights are based on collective TURFs. In the Chilean case, the TURFs are supplemented with collective harvesting quotas. In both cases, there is a hierarchy of management from the basic units — Fishery Management Organizations (FMOs) in the case of Japan and Management Exploitation Areas (MEAs) in the case of Chile — to regional and national organizations. This hierarchy is more developed in the case of Japan than Chile. In both systems, the fishers belonging to the basic units have a high degree of collective autonomy over how to manage their biologically determined allocations. Considerable collective effort is devoted to the management of effort over space and time in order to reduce spatial overharvesting and maximize revenues, often with revenue pooling. But in both cases the actual determination of TURF-level allocations is guided and ultimately determined by the government fisheries authorities at high levels. Thus, in both cases, the system is properly described as one of co-management with higher authorities.

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The history and state of evolution of the two systems are very different. The Japanese TURF-based community management system originated under the feudal system centuries ago. Since then, the system has evolved and taken forms according to the wishes of its members. Thus, the Japanese system is quite mature and settled with deep social and historical roots. Most of the rent generation appears to have been driven by devolution of community-level TURF management into multiple, smaller, species-specific FMOs that manage their own fisheries intensively. By contrast, the Chilean community management system was formally instituted by the Chilean government in the 1990s in response to failures of previous attempts to properly manage shellfish fisheries. Being recent, the system is still subject to quite rapid evolution and change. At the present, Chilean collective TURFs retain control and manage at the local ecosystem level, including spatial and temporal management of individual species, but also managing intra-species interactions. There are also differences in the species coverage of the two systems. The Japanese system comprises basically all inshore fisheries. The Chilean system has devoted most management effort to relatively sedentary benthic species, especially molluscs and seaweed.

One of the frequently mentioned conditions for a successful community management is a relatively small membership. It is interesting to note that this condition seems to be met in both systems. In Japan, the average FMO membership is reported to be 53, while in Chile the average MEA membership is 62. Another condition for successful community management is restriction of entry. Formally, in both systems, entry is open to new members who satisfy certain fairly unrestrictive conditions. In practice, however, both systems have set up informal barriers to entry that seem to be sufficient to keep new membership at bay. It is not clear, however, to what extent these barriers would hold, if the benefits of entry would substantially increase.

According to Cancino, Uchida, and Wilen, these two community management systems have been successful in generating and sustaining economic rents. This success has not been uniform, however, and some communities have apparently done much better than others. Differences in success appear to be determined by the fundamental potential for rent generation (biological productivity, species mix, market access) in each TURF and the ability of local decision-making bodies to overcome the transactions costs of collective management. How that differential success in overcoming transactions costs relates to the characteristics of the communities, leadership, group size, and other local characteristics is clearly material for further research. It is notable that a substantial part of the added net benefits stem from output and marketing improvements, not from input savings. This is in accordance with the experience from ITQ fisheries.

#### HIGH-SEAS FISHERIES AND PROPERTY RIGHTS

The next two papers by Professor Gordon Munro entitled “Internationally Shared Fish Stocks, the High Seas and Property Rights in Fisheries,” and by Ross Shotton entitled “Managing the World’s High-Seas Fisheries; A Proposal for a High-Seas Fisheries Trust,” deal with the management or lack thereof, in high-seas fisheries.

Munro in his paper approaches these issues on several levels. On one level, his paper may be read as an extremely clear, illuminating account of the expansion of national rights to marine resources in the post-World War II era. On another level, the paper considers the games fishing nations inevitably find themselves playing as they seek to maximize their benefits from marine resources they share with other nations. The probable outcomes of these games are discussed and illustrated with empirical examples. On the third level, Munro relates the

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types of games being played and, consequently, their probable outcomes to the quality of the property rights held by the various players. His fundamental conclusion is that the higher the quality of national property rights, the more likely it is that the equilibrium outcome of the game will be economically efficient.

Munro first explains how, during the post World War II period, the “Freedom of the Seas” doctrine, as formulated, among others, by the Dutch legal and political philosopher Hugo Grotius, was gradually eroded by the combined forces of rapidly advancing marine exploitation technology and increased national ability to assert sovereignty across open seas. Faced with this process, United Nations conferences may be seen as attempts to adjust international law to economic and political reality.

The first UN conference on the law of the sea, UNCLOS I, was held in Geneva in 1956 and resulted in important international law treaties in 1958. This, however, proved far from adequate and the second conference, UNCLOS II, was convened in 1960. This one, however, conducted at the height of the cold war, was largely unsuccessful and did not conclude any treaties. The third United Nations conference on the law of the sea, UNCLOS III, was convened in 1973 and lasted 10 years. In 1982, it resulted in a major revision of the international law of the sea, referred to as UN Convention on the Law of the Sea. These three UN conferences on the law of the sea did not deal exclusively or even primarily with fisheries. Nevertheless, fisheries and national fishing rights were among the many aspects of marine resources they were concerned with. Arguably, the greatest accomplishment of UNCLOS III was precisely in relation to international fisheries law. Thus, as pointed out by Munro, on the basis of UNCLOS III, and the UN Convention of the Law of the Sea, the 200-mile exclusive economic zone (EEZ) became acknowledged international law. Also, and no less importantly, Munro points out that further international agreements and treaties to deal with other unresolved fisheries

issues have been completed on the foundation laid by these fundamental agreements. Among those is the UN Fish Stocks Agreement adopted in 1995, which deals explicitly with rights to the utilization of straddling and highly migratory fish stocks.

The second level of Munro's paper is to explore the games that inevitably arise between nations when their property rights to fisheries are limited or insufficiently clear. With regard to the types of games being played, Munro makes a clear distinction between transboundary fisheries resources and straddling fish stocks. The former are shared between two or more coastal nations. The latter are at least partially outside national EEZs and are thus subject to exploitation by distant water fishing fleets. In his analysis, Munro explicitly ignores the so-called high-seas discrete fish resources, which, for the most part, are fish stocks located in certain areas on the high seas often around sea mounts.

The first situation, transboundary fish stocks, constitutes a relatively tractable bargaining game situation with a fixed number of players. In this kind of a game, the economically efficient solution is often attainable and even stable. In other words, the core of the game is often nonempty (Shapley and Shubik 1969). However, it may take many moves and considerable time to reach the core. Indeed, there is no guarantee that it will ever be reached. An important result is that if so-called side payments are possible — total game payoff can be transferred in any proportion between the players — the core is guaranteed to be non-empty and the likelihood of reaching it quickly is greatly increased. Munro points out that when the transboundary stock is allocated as ITQs to individual fishers of the nations involved, the playing of this kind of a game becomes much simpler and the attainment of the core much more likely. Interestingly, it appears that an ITQ system with quotas transferable between fisheries of different nationalities is theoretically equivalent to unrestricted side payments. In transboundary fisheries games, the way the game is played is highly dependent on

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the respective quality and clarity of the property rights of the nations involved. It is precisely in this field where the various international agreements have contributed substantially. Munro finds that the experience of outcomes in transboundary fisheries games where respective property rights have been well defined has been mildly encouraging.

According to Munro, there is less reason for this kind of guarded optimism with regard to straddling fish stocks. The main problem here is that of new entrants. According to current international law, any distant water nation can request and should be awarded access to straddling marine resources provided it is willing to abide by the general exploitation rules laid down by the Regional Fisheries Management Organization (RFMO). This means, as Munro carefully explains, that the regional coastal states have a greatly reduced incentive to make the effort to agree on an efficient utilization of the resource. For, were they to accomplish this, and the resource is moderately valuable, the odds are that new entrants would appear to request their “rightful” share in the proceeds. Thus, the benefits of cooperation are reduced, often greatly reduced, and the likelihood of an efficient utilization correspondingly diminished.

The third level of Munro’s paper is to relate the types of international fisheries games that are played to the property rights held by the nations involved. According to Munro, the stronger the national property rights the simpler the game and the more likely it is that an economically efficient outcome will be attained. Munro sees the evolution of international law of the sea post-World War II as essentially an expansion in national property rights at the expense of international commons. It is interesting that this author, probably the world’s most outstanding scholar in empirics and theory of international fisheries games, concludes on the basis of his analysis and experience that “the only real solution is to finish the job” by eliminating the Freedom of the Seas by establishing *de facto*,

if not *de jure*, state (or possibly joint) property rights to the marine resources currently under the auspices of RFMOs. By implication, the same should apply to the discrete high-seas fish resources which are otherwise not explicitly discussed in Munro's paper.

Ross Shotton in his paper also focuses on the high-seas fisheries and their governance. His paper starts off with a brief review of the historical experience and current approaches to high-seas fisheries management and the lessons to be learned. For governance of high-seas fisheries to be effective an appropriate management body is required, claims Shotton, so that accurate fish stock assessment can be undertaken, conservation regulations imposed and compliance ensured. According to him, the experience in national waters shows that this can best be achieved when the management authority has sovereign rights or control of the resources manifested in the ability to assign individual property rights to the resources being harvested.

Shotton proposes, and this is the main point of his paper, that this could be achieved through the creation of a global fisheries trust in which ownership of high-seas fishery resources is invested. According to Shotton, such a proposal would have elements common to the concept of a "common heritage of mankind," a concept the he discusses at some length in the paper. Shotton's proposed High Seas Fisheries Trust would have the power to assign entitlements to harvest high-seas fishery stocks to countries or companies. These would have appropriate property rights features, such as those of transferability and duration. The implementation of such a governing body would require the support of high-seas fishing states as well as the support of non-fishing states. Shotton sees the creation of the High Seas Fisheries Trust facing several challenges. Two of the most difficult could be termed the Catch Entitlement Issue, which ensures existing harvesting rights of current operators, and the Rent Distribution Issue, which gives

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the trust the power to charge for the harvesting rights. Shotton claims that the support of high-seas fishing states for the High Seas Fisheries Trust could likely be obtained in exchange for secure fishing rights that are free from the threat of new entrants. The establishment of the trust, however, would also require the support from non-fishing states. This, Shotton suggests, could be obtained through payment of some form of resource rent that could be returned to the international community, in addition to paying the management costs needed to ensure conservation of the fisheries resources by the fishing operators. Ross Shotton therefore agrees with Gordon Munro that property rights are the solution to the high-seas fisheries problem but suggests that the creation of a new “sovereign“ in the form of a global trust that can more than supplement and complement the current RFMOs.

### THE INTERNATIONAL INSTITUTIONAL (FAO) PERSPECTIVE

In his paper titled ‘Fishing rights: A global perspective with a focus on FAO activities’, Grimur Valdimarsson describes the evolution and current depressed status of the world’s fisheries. For several decades, following World War II, capture fisheries around the globe expanded rapidly fuelled by increasing demand and greatly improved fishing technology. This expansion slowed in the 1980s and came to a halt in the 1990. Since then, the global capture fishery catch has fluctuated between 80 and 85 million tonnes annually with no discernable increasing trend in spite of greatly increased fishing effort. This suggests that the maximum sustainable yield of the global fishery has already been reached if not exceeded. Indeed, according to FAO’s estimates, over 50% of the world’s marine commercial fish stocks are currently biologically fully exploited while 25% have clearly fallen below their maximum sustainable yield level.

Valdimarsson claims that there is now general agreement

that aquatic ecosystems are in a decline. The causes are well known, he says, overfishing and habitat degradation especially in coastal areas. Obviously, to reverse or just halt this trend requires greatly improved fisheries management. The fisheries management problem is never easy. As seen by the FAO, it is made even more difficult by fishing fleet overcapacity, substantial by-catch, discards and IUU (illegal, unreported and unregulated) fishing on a large scale.

Traditional fisheries management methods, such as mesh size regulations and time-area closures, limitations on fisheries access and fishing fleet restrictions so long recommended by the FAO, have proved powerless to halt the decline. According to Valdimarsson, the FAO now acknowledges that these methods are inadequate and that right-based fisheries management is the vehicle for ensuring sustainable fisheries. Valdimarsson, presumably speaking for the FAO, puts it quite bluntly; 'Clearly defined fishing rights must be established to foster conservation and a sense of stewardship of the resource among the sector's participants and communities'.

Having said this, Valdimarsson is at pains to emphasize that due to the complexity and variety of global fisheries, no single system of rights fits all fisheries. Rights-based systems must be tailored for each particular situation, he says. While this is undoubtedly formally correct, it should not be forgotten that there are many kinds of individual rights in fisheries. Access rights, for instance, are clearly such rights. They are, however, totally incapable of leading to resource conservation and economic efficiency in fisheries. What counts is not fishing rights as such but the property rights quality of those rights with respect to the underlying marine resource. Therefore, a wholesale acknowledgement of all sorts of fishing rights without any reference to their quality can serve as an excuse for those fisheries authorities and governments who for some reason of their own would like to avoid installing an effective fisheries management in the fisheries. Indeed, there are already signs, for instance from within the EU, that nations with extremely poor

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fisheries management records are preparing to claim that their fisheries management is indeed rights-based.

### THE WAY FORWARD

Overall, the papers in this book provide strong arguments and suggest ways for enhancing the contribution of property in the management of fisheries. Property rights in fisheries, like property rights in general, have proven to be extremely effective, flexible tools for generating economic efficiency, provided they are of sufficient quality (Scott 1989, 1996, 1999, 2007). The world's fishing nations are still in the initial stages of adapting this tool and honing it for the needs of the various fisheries. There is no doubt that there is still a long way to go before the full potential of property rights in fisheries is realized. It is our hope that the papers here will assist in that realization.

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