

The death rattle of open access and the advent of property rights regimes in fisheries

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I would like to dedicate this paper to the memory of Don Bevan, who died last May. As Jimmy Crutchfield said "we remember Don for many things, not the least of which was his very early recognition of the key role in fishery management to be played by social scientists. He combined the rigorous thinking of a scientist with a remarkable ability to participate in the political process" (J. Crutchfield, electronic communication, 14 May 1996) In addition, I would add that Don brought to the field a marvelous trenchant, yet gentle, wit.

Introduction

In considering fisheries regulation in the next decade, I make a concluding point that may become a major theme. This is that individual permanent catch quotas of a regulator-determined TAC are only a stage in the development of management from licensing to private rights (Scott 1989).

The condition of open access in fisheries is widely accepted as the cause of over-investment in the harvest of fisheries. Less appreciated is the fact that open access is also the source of massive over-investments in fisheries administration and research. Redundancy in fisheries capital and labor is matched by redundancy in fisheries scientists, social scientists and managers.

The waste in fisheries research and administration is associated with the two kinds of paradigms generally accepted by analysts and administrators. The first paradigm is that of models based on the continuation of open access, and the second is that of models based on the assumption of the need for government to resolve the problems of open access. I suggest that these paradigms are of decreasing relevance and that reliance on them is misleading many of us involved in fisheries research. We are giving excessive attention to the wrong set of issues and ignoring the matters that should be addressed. Paradigms lost must be replaced by paradigms gained.

To characterize the old paradigms, I borrow an analogy developed thirty years ago by the late Don Bevan. Don translated fisheries regulations into regulations for lumbering with superb ridicule. Some of the items were: "Logging will be permitted on Tuesdays and Fridays, subject to extension or restriction by field announcement. It shall be unlawful for any person, firm, or corporation to use, employ, or operate a power-driven saw for the purpose of removing timber. No logging truck shall be longer than 30 feet overall except trucks that logged prior to

January, 1, 1960. Trees with cones can be taken only prior to July 31." (Bevan 1965)

I would like to do an imitation of Don's analogy by translating the Code of Conduct for Responsible Fisheries, promulgated by the United Nations Food and Agriculture Organization (FAO 1995), into a Code of Conduct for Responsible Agriculture. I do so, by substituting agricultural terms for fisheries terms.

Article 7.2.1: Recognizing that long-term sustainable use of fisheries [land] resources is the overriding objective of conservation and management, States should adopt appropriate measures, based on the best scientific evidence available, which are designed to maintain or restore stocks [land resources] at levels capable of producing maximum sustainable yield, as qualified by relevant environmental and economic factors.

Article 7.6.1: States should establish effective mechanisms for fisheries [agriculture] monitoring, surveillance, control and enforcement to ensure compliance with their conservation and management measures.

Article 7.6.2: States should adopt measures to ensure that no vessel [tractor] be allowed to fish [farm] unless so authorized.

Article 7.6.7: in the evaluation of alternative conservation and management measures, their cost-effectiveness and social impact should be considered.

Article 8.1.8: State, should, as appropriate, maintain records of fishers [farmers] which should, wherever possible, contain information on their service and qualifications, including certificates of competency, in accordance with national law.

Admittedly, there are certain characteristics to fishery resources, which dictate different approaches to management than are appropriate for agriculture. But, in general, the kinds of principles advanced by the Code of Conduct fail to recognize that fishing is an economic activity, which should be, and will be, governed by property rights regimes. I suggest that such property regimes will provide the paradigms for the future, and that these will significantly change the role of both government and researchers, making archaic, and possibly damaging, the kind of principles advanced by the Code of Conduct for Responsible Fisheries. I believe that the proper role of government in the management of fisheries is to get government out of the role of managing the fisheries.

The transition to property rights regimes in fisheries is occurring with a speed which, I think, is not fully appreciated. The process is inexorable. It is also associated with a high degree of real pain for the participants. The danger is that attempts to alleviate the pain may, unless carefully taken, result in long-term imperfections in the ultimate outcome. The challenge we all face is to facilitate the transition in such a way that the imperfections are minimized.

This paper is an attempt to collate mention of the new paradigm by Anthony Scott and several others (Hannesson in press; Townsend 1995; Arnason 1993; Wilen 1989; Troadec 1995) and to move one small step further in what Anthony Scott suggests "may become a major theme." The paper begins with a discussion of the present paradigms and the costs associated with maintaining them. It then postulates the future paradigms as a basis for setting the goals towards which we

should be striving and for identifying the most significant obstacles in the path. The forces at work, which are leading to the new paradigms, are discussed. The paper concludes with an identification of some of the challenges for administration and research.

Paradigms Lost

The present paradigms for fisheries management are based on the prevailing condition of open access to the resources and the presumption that governments will have a persistent and major role in the conduct of the fishing industry. Thus, the general prescriptions for dealing with the problems are to acquire more information on the resources and the fisheries, and to leave in the hands of governments the consideration and adoption of measures for closing access. These elements shape the patterns of research and debate, as well as the approaches to fisheries management.

Characteristics of the Present Paradigm

The characteristics of the present paradigms can be described in terms of the interests and activities of the different participants in the management of fisheries. This includes those involved in research and those involved in harvesting, related industries, and administration.

Researchers. There is a generalized acceptance of the present paradigms by those who conduct research on the biological, sociological and economic aspects of fisheries. This limits the perspectives and range of research and tends to be self-reinforcing. The following discussion of the role and interests of the participants in fisheries management is deliberately provocative. It makes use of unseemly generalizations as a means for goading oxen and sacred cows in the hope that some of the oxen and cows will be stimulated to adopt the new paradigm.

(a) Biological and ecological research. Marine biologists have long had their innings as the presumed progenitors of fisheries management. They have, however, two sets of failings: (i) their belief that what's good for the fish is good for mankind; and (ii) their presumption that, given the right information, governments will make the right decisions. 1[1]

The concept, that a certain level of biological yield is of value to society, persists in the minds of the biologists and has led to the adoption of management measures, designed to reach these yields. The principle of Maximum Sustainable Yield (MSY), whose death has been pronounced many times, continues its influence, as noted above in the Code of Conduct (Article 7-2.1). Its presumed replacement, Optimum Sustainable Yield (OSY), has totally failed to be a useful guide for decisions, as is to be expected since we all have different optimums.

Having persuaded fishery administrators of the importance of preserving the fish through the establishment of fixed levels of yield, these types of biologists have induced the administrators to adopt such damaging controls as a total allowable

catch, ignoring the costs associated with the measures, and supporting the misguided concept that management can be achieved without the redistribution of wealth.

Considerable public investments have been made in biological research, with few practical results. For example, the International Council for the Exploration of the Seas has been studying the fish stocks of the Northeast Atlantic for a century and has produced abundant information on the status of the stocks. Yet, the benefits to society from these stocks can be found only in the employment of redundant labor and capital.

Although there are clearly other impediments to the making of decisions than the lack of adequate biological information, many biologists do not appear to be concerned.

They continue to undertake stock assessments and plea for the primacy of achieving a sustainable yield. There is a certain irony to their plea for more support for the production of more information. Under the present paradigms, only governments are willing to pay for assessment of stocks and information on their location and movements. Since governments may be becoming aware of the dubious value of the information, the funds are likely to diminish.^{2[2]} Under paradigms of property rights, however, holders of the rights will have an interest in acquiring the information and will be willing to bear the costs (or at least some of them). "As a case in point, the northern Australian prawn fishers, following their adoption of a limited entry scheme, found it in their interests to finance routine stock assessments to allow them to take the largest and highest priced prawns. The critical importance of this point can be indicated by the fact that research budgets of the private forestry industry are many times greater than those of the private fishing industry. For example, a single forest company in the United States (Weyerhaeuser) spends about \$70 million per year on research and development" (Troadek and Christy 1990).

Arnason argues that "in most ocean fisheries, the data requirements for the calculation of optimal tax rates, catch quotas, etc. greatly exceed the capacity of any resource manager. It follows that management systems based on such approaches are of little practical use. On the other hand, there appear to exist institutional arrangements that allow the resource manager to take advantage of the market mechanism in order to solve the management problem. The fundamental proposition is that within the framework of the share quota system...and given certain additional assumptions, the quota authority can attain economic efficiency in the fishery by simply maximizing the market value of total outstanding quotas at each point of time" (Arnason 1989). "Once the fishermen acquire control over the means of production, they will have the incentive to invest in and heed scientific advice" (Christy 1986).

(b) Sociological and anthropological research. Sociologists and anthropologists are relative newcomers to the field of fisheries management. They entered the fray when they discovered that traditional systems of fisheries management by fishermen communities were being destroyed by the intrusion of large scale operations into their grounds; an intrusion which was aided by the support of

development agencies and the lack of awareness of the value of the traditional approaches. Fisheries sociologists and anthropologists have also gained strength from the growth in interest in community management of common property resources (National Research Council 1986). Some economists, the author included, have also pursued the concept of community-based fisheries management (see Christy 1993, 1982).

The concern of the sociologists and anthropologists is, as it should be, with the issues of wealth distribution and concepts of equity. Unfortunately, they carry in their concern a large burden of myth. Several myths can be mentioned. One myth is that there is a difference between developed and developing states in the setting of objectives for fisheries management and in the choice of management regime. Though I am not a sociologist, I have adopted this myth. I once stated that developing countries were special because of the lack of alternative employment opportunities (Christy 1986a). But it should have been stated in the obverse: i.e., that where there are no alternative employment opportunities (in developed as well as developing countries), a case might be made for special, transitional management regimes. Stating this way helps to avoid the trap of adopting protective approaches, which serve to perpetuate poverty rather than progressive ones which allow for development [3], it is not in the interests of countries to exclude small-scale fishermen from opportunities for economic growth.

Another myth associated with the paradigm of open access is that access to fisheries is not, in fact, open, but rather subject to "common property rights" and a "law of the commons." The initial definition of common property in fisheries comes from Ciriacy-Wantrup and Bishop. "The concept implies that potential resource users who are not members of a group of co-equal owners are excluded" (Ciriacy-Wantrup and Bishop 1975). The presumption that common property in fisheries is pervasive is made by McCay: "For North America, where common property is the preeminent law of the sea and inland waters, we may posit the existence of a culture of the commoners" (McCay 1988).

There are two fundamental difficulties with this view: it assumes a stasis in fisheries employment: and it assumes that no one can become a fisher unless he or she is already a member of a group of fishers. The question is begged as to how one becomes a member of the group. But the question can, and should, be raised because of the likelihood that there has been a high degree of mobility into fisheries.

Unfortunately, little attention has been paid by researchers to the critical issue of labor mobility into, and out of, open access fisheries: or how one becomes a member of a commons. One of the few studies that I know of states that "both the extreme positions of perfect mobility assumed by the open access theory and of total immobility advanced by small-scale fisheries studies, are rejected in favor of imperfect but substantial mobility constrained by location, occupation, and household specific factors" (Panayotou and Panayotou 1986). In the case of the US, it can be noted that estimates of the number of fishermen show an increase of 3% per year in the decade following the extension of jurisdiction. The question can be raised as to whether this growth came entirely from within the membership in the "commons" or whether it included entry by people outside the "commons".

The second difficulty with this view is that it leads to the belief that the commoners, having control of the resources, are able to make the management decisions. Many examples of effective management by commoners are cited in the literature. In most of these cases, the user group or community has a form of territorial use right (TURF) which excludes outsiders, either formally or by tradition. Where TURFs exist, access is controlled and the members of the user group have the opportunity to fulfill the functions of management. However, the evidence of depleted fisheries indicates that either TURFs do not exist in the majority of fisheries, or that they have been massively ineffective in preventing waste.

There is no question that there are severe distributional issues associated with the closure of access to fisheries. Unfortunately, the development of property rights in any resource has always led to a redistribution of wealth, which cannot be avoided. It should also be pointed out that continuation of the open access regime is always associated with a dissipation of wealth. In both cases, there are losers.

(c) *Economic research.* An examination of economic research under the paradigm of open access can best be summarized by remarks by Anthony Scott, who is in the forefront in the study of property rights in fisheries. He stated that his paper in 1955 (one of the seminal papers in the literature) "did deal with the possibilities of sole ownership, comparing that regime with common property in various aspects, including incentives to invest in the stock and to optimize over time. However, the idea of property was soon forgotten, as most economists turned their attention to improving the biological production function and to studying regulation. Subsequent 1960s work took open access as inevitable. Turvey introduced Pigovian externality analysis and much else in 1957. Thereafter, analytical energy was expended on alternative regulatory regimes, ranging from control over seasonal openings to mesh sizes... Licences, employed simply as administrative elements in these control schemes, were not analyzed as rights" (Scott 1989)1[4].

To this can be added the point that much of the economic literature has been more concerned with theoretical models than with problems of applying the models to real situations. This should not be particularly surprising since academic economists are rewarded more by work on the refinement of models than by participating in the dirty tasks of making real decisions.

Although recent papers by some economists adumbrate the new paradigm (see Scott 1989; Hannesson in press; Arnason 1993; Townsend 1995), I am not aware of any that attempt to characterize how the new paradigm will shape fisheries management and the economy of the industry, and yet both will be significantly different.

Stakeholders. The present paradigm can also be characterized by the stakeholders in fisheries management, administrators, politicians, fishermen, and those in affiliated sectors. The interests of these groups in the condition of open access have been described elsewhere and need be only briefly summarized here (see Christy, in press; Hannesson in press; Scott 1988). There are those who want to preserve the paradigm of open access and are offering it intensive care. In some cases, they do so for very good reasons of self-interest, recognizing that they will be among the losers. I have no quarrel with them, except when they pretend that their self-interest is in the general interest of society. In other cases, intensive care is given to the dying paradigm by those who focus on the pain of change but fail to appreciate the greater, though less apparent, pain of preserving open access.

(a) *Administrators.* "Having no direct interest in institutional change, public organizations often react to avoid failures in prospect, rather than act to reap new opportunities. They may see negatively the distributional effects on the small scale sector of the adoption of market mechanisms, the change in scope of their interventions in management (from the provision of support to the industry to resource stewardship, from a command to an economic mode of allocation), or the political risk attached to the promotion of institutional change" (Trodec 1995).

Except for a few countries (e.g. New Zealand and Iceland), fishery administrators focus their major efforts on dealing with the problems of open access. They do so because of ignorance, choice, or the absence of appropriate authority. Where ignorance is an impediment, it is due to the prevailing, long persistent emphasis that has been given to stock assessment and the health of the fish stocks rather than to societal benefits. Many fishery administrators have emerged from backgrounds in biology, with an absence of training in the social sciences. For them, "fish come first". 4[5]

In other cases, they restrict their views to the open access condition because of choice. The creation of property rights regimes requires the devolution of management authority to private groups, which means a loss of power for them. "If the characteristics of individual and collective rights can be substituted for bureaucratic decision-making and enforcement, the demand for specialized administrators should decline" (Scott 1988).

I suspect, however, that the fundamental reason for their restricted view is that the move to property rights regimes cannot be made without making decisions, on the distribution of wealth, and administrators do not generally have the mandate to make such decisions that must be made in the political arena. I am sure that many, if not most, fishery administrators are aware of the need for closing access, but are unable to do so without political support. The problems in the Northeast Atlantic provide ample evidence of the dilemma. Administrators are pushing for reduction in fishing capacity while, at the same time, politicians are giving out grants for vessel improvements.

(b) Politicians. Politicians do not benefit from the condition of open access in

fisheries, but they are likely to incur severe costs from closing access. They will only willingly make decisions to redistribute wealth when the costs of not doing so outweigh the benefits. In this calculation, the potential economic rents that can accrue to national economies by closing access, although they may be extraordinarily large invisible. Theoretical considerations have seldom been a significant influence on political decisions (Marx and company excepted). In the U.S., for example, it appears anomalous that the Republican majority in Congress in 1994-96 does not accept the idea that property rights in fisheries are as important to the free market system as property rights in other natural resource industries.5[6]

More important in the politicians' calculations are the noises made by their constituents. Decisions will be made when conflict creates sufficient noise as in the case of the U.S. halibut fishery. The theoretical arguments in favor of closed access in the halibut fishery had been thoroughly and competently made as far back as 1961 (Cruichfield and Zeilner 1961). But it was not until 1994, thirty years later, when the season dropped to less than one day in length, that the Individual Transferable Quota system was adopted.

The ability to make the necessary decisions on wealth distribution is inversely proportional to the degree of vested interests in the fishery. It is not surprising that the countries with the most advanced management regimes (New Zealand and Australia) are those which have had the shortest history in fishing, or that the areas where the problems are most difficult (the Northeast Atlantic) are where there has been the longest history and where employment in fisheries is well entrenched.

(c) Fishermen and affiliated industries. The difficulty with attempts to characterize the views of fishermen with regard to open access is the disparity of situations, experience, and opinions. Differences include: high-liners against average fishermen; newcomers against old hands (or traditional fishermen); part-time

vs. full-time fishermen; captains vs. crew members; large-scale vs. small-scale; users of fixed gear vs. users of mobile gear; and others.

In the light of this amalgam of interests and perceptions, generalizations about fishermen represent an area where angels fear to tread. Although this has not prevented such fools as myself from rushing in (Christy, in press), I will exercise somewhat more timidity on this occasion.

Somewhat easier to characterize are the interests of those linked lore and aft to fishing. It probably can be said with some degree of assurance that boat builders and gear makers look with horror on the idea that access to fisheries should be closed. The very concept that boats should not only be removed from the industry but also destroyed must turn their stomachs (unless they can prevail on the powers-that-be that vessel replacement and improvement should be subsidized).

At the aft end, there may also be some apprehensions about the closure of access. With open access, the derby that results means that fishermen have virtually no opportunity to influence the price they receive. With a one-day season, a hold filled with perishable goods, and a limited number of buyers, the fishermen will take whatever price they can get. "Owners of processing plants, vessel repair facilities, and associated businesses locate themselves close to fishing grounds when fishing seasons are short and furious. Land rents at these locations can clearly fall precipitously when the rights based fishery makes it unnecessary to unload fish rapidly and frequently at remote sites. For example, land owners and businessmen in the thriving fishing town of Kodiak, Alaska, may correctly perceive that their advantages, in the crab, halibut, salmon, and ground-fish fisheries depend partly on the open access competition in the fishery" (Huppert 1989).^{6[7]} A contrary view may be held by processors who are closer to markets than to the producers since, under a rationalized fishery, they are more likely to have access to the catch of the fishermen.

Significance of the Present Paradigm

The significance of the characteristics of the present paradigm lies in the ways in which they interfere with the forces for institutional change. Three kinds of impediments can be mentioned.

One impediment results from the long history of biological approaches to management. The entrenched position of biologists in the management process tends to narrow the field of choice among alternative measures to those that achieve "sustainability" of stocks, (whatever that is). Although economic aspects are currently included in many fishery management plans, they tend to be subordinate to the concept that the stocks must be conserved. The predominance of biologists also leads to the allocation of scarce public funds to research on biological aspects, with little left over for economic or social research. Economic data is almost nonexistent in most countries and there is sparse information on costs and revenues.

The second impediment to change is the persistent and prevailing reliance on governments to fulfill the functions of management. This leads to a focus of debate and analysis on present approaches to management, (i) conservation measures, (ii) license limits, or (iii) ITQs. Considerable attention is devoted to ways in which governments can control by-catch, reduce over-capacity, prevent seepage in license limit schemes, achieve sustainable yields, and more important, make allocation decisions among competing uses and users. With regard to the last function, governments are asked to achieve balance among multiple and diverse interests: maintaining employment opportunities for small-scale fishermen, preserving life styles, preventing the domination of big business, preventing mammal mortality, and

enhancing opportunities for recreational fishermen, as well as ensuring that fishermen have adequate incomes.

The importance of these allocation decisions raises the third and perhaps most important impediment to change. By definition, the creation of exclusive use rights (whether a license limit, ITQ, or TURF) means that some gain and some lose. Wealth distribution cannot be avoided and, thus, issues of equity cannot be avoided. "Since private versus public ownership of resource, and means of production has been at the core of ideological disputes for more than a century, it is natural to expect ITQs to be controversial" (Hannesson, . in press).

The difficulty of making such decisions will delay the evolution to property rights regimes. What is worse is that in attempts to placate the losers, imperfections may be built into the systems which will preclude, or impede, optimum solutions. For example, attempts to protect the presumably desirable "life styles" of fishermen, which might be considered as attempts to achieve maximum sustainable anachronisms, could lead to both technological and economic inefficiencies, as well as perpetual poverty. The prohibition against the use of motors on oyster dredging vessels in the Maryland waters, of the Chesapeake Bay may have preserved the last remaining commercial sailing fled in the U.S. but it has also preserved a life style which is marked by "low returns from arduous labor".

PARADIGMS GAINED

To examine the future paradigm for fisheries management, the fantasy of a completely unfettered market, with permanent use rights and no restrictions on transfer of rights, provides a useful rhetorical device. It can be used to examine the goals toward which we should be striving, provide some basis for evaluation of progress, and help in the identification of the most significant obstacles.

Model Modus Operandi

Under this paradigm gained, property rights will exist for all fisheries (capture and cultured, fresh and marine), both within and outside of national jurisdiction. The rights will be either territorial use rights in fisheries (TURFs) or stock use rights in fisheries (SURFs). Satisfactory control within a TURF is a matter of the habits of the stocks, whether sedentary (e.g. oysters) or migratory (e.g. tunas). In the latter case, it is not necessary that the control cover all areas within which the stock moves: simply that there be sufficient control to allow the production of economic rents. Thus, the use of fixed gear such as fish aggregation devices and stake nets, may also serve us the basis for a TURF. In the Philippines, for example, tuna fishing companies control access to the areas around the fish aggregation devices, which they have planted.

However, since there are numerous stocks which would be difficult to cover within a "territory", the alternative would be the establishment of exclusive use rights to the stock (or related stocks) under the concept of a SURF (see. Townsend 1995a).

Under these hypothetical arrangements, the holders of the TURF or SURF rights could be individuals, communities, cooperatives, or corporations. They would have the incentives to take over most of the four basic functions of management from governments, *i.e.* (i) determining their objectives, (ii) acquiring information, (iii) allocating capital and labor, and (iv) ensuring compliance with their regulations.

With regard to determining objectives, it is likely that the general aim would be to maximize net economic revenues over the long run. However, for cooperative-held or community-held rights, the objectives might be modified to include employment or other goals. There would be an incentive for them to acquire information of various kinds including the status and yield of the stocks, the determination of total

allowable catches (TACs), stock interrelationships, stock movements and location, price and markets etc.7[8]. As owners, they would automatically have the interest in allocating capital and labor at the optimum rate with regard to their objectives and also the interest in investing in technological innovations in both cost reductions and revenue increases. As to enforcement, they would engage in monitoring catches and the surveillance of their areas of rights. The enforcement functions of arrest, trial, and punishment would most likely lie with government ¹, although, in the case of co-operative or community rights, peer pressure would be effective in ensuring compliance.

This ultimate devolution of management authority and responsibility to individuals and groups would mean significant changes in the role of governments. The role would presumably be akin to that of public agriculture or forestry departments, largely facilitating the private entrepreneurs in their activities, such as: (i) conducting research where the scale is beyond the means of private investors or where the product of the research would be available and beneficial to all; (ii) monitoring use to ensure that resources are not over-used; (iii) setting means for dealing with externalities visited on the fisheries or created by them; and (iv) ensuring that the exclusive use rights are exclusive. "The state would become redundant as a management authority and its only role would be the ultimate upholding of the rule of law and the honoring of contracts" (Hannesson, in press). One of the major benefits of the new paradigm would be the reduction of public costs for Fisheries management.

Possible Imperfections

This fantasy will certainly be anathema to some people and groups such as Greenpeace. "Individual Transferable Quotas are about deciding who has the right to fish based on a market approach. It is clear that ITQ systems have the potential to radically alter the nature of participatory rights in fisheries. The question, which has yet to be answered, is whether ITQs will serve the best interests of fishers, fisheries conservation, the environment, and the public at large" (Greer 1995). Greenpeace's answer to the question is a resounding "no". A more balanced answer might be "Yes, in general."

Just as the agriculture, grazing, and forest, industries abound with imperfections, so will fisheries under a properly rights regimes bin perhaps a little more so because of the mobility of the resources. Several possible sources of imperfections can be mentioned. Some are inherent to the regime. Others, discussed later, will be the consequence of constraints imposed in the process of establishing the regime.

Big business. The major objection expressed by Greenpeace, and held by other groups as well, is the fear that there will be a "Big Business Takeover of Fisheries" and the corollary that the small fishers, will lose out. "Thus with ITQs, access to the right to fish becomes a property right that is most easily controlled by large corporations" (Greer 1995). The same view was expressed over a hundred years ago in the conflict between those using fixed gear (pounds, weirs. and traps) and those using hook and line. The fixed gear, based on a form of TURF, attracted big business; whereas, the mobile gear, based on open access, was the province of the small scale fisherman. The opposition to big business can be illustrated by a statement, whose echoes reverberate today.

Even supposing, for the sake of argument, that these wholesale methods of taking fish do not, on the whole, injure the fisheries, by what right does any man, or set of men take all the fishes of the sea which they can catch as his or theirs? Has the public no rights? Has not every individual some rights which these monopolists are bound to respect? I wonder that the people have so long consented to be robbed, and for no better reason than that large moneys are invested in the business. See the hundreds of thousands of barrels of fish...which they have taken in their traps...the profits of which they have pocketed, and to which they had no legal or moral right if their modes of fishing deprive the poorer

fishermen of what was legally and morally theirs (Palmer 1873).

This same apprehension accompanied the enclosure of the western grazing lands in the U.S. "It is feared by some that under any system of control the large owners and corporations would secure a monopoly in the use of pasture land, and the young men starting in the business of stock raising would have no opportunity to build up under a lease system" (Hibbard 1939).

These concerns, but not the conclusions, are entirely justifiable. By definition, the closing of access excludes some users, potential if not present. By definition, the need to reduce over-capacity will lead to a concentration of rights in the hands of fewer fishermen than exist at present. With full transferability of rights, there will be an opportunity for monopoly control and it is possible that such control could fall into the hands of big business (however that is defined).^{8[9]}

Whether control does actually fall into the hands of big business depends, at least in part, as to how one defines big business: ranging from a fisherman-owned corporation with two vessels to a Microsoft. It also depends on whether the big business has an interest in participating in the harvest sector.

Aside from the issue of "equity" which is addressed below, the problem is whether the control of a TURF or SURF gives monopoly power to the owner sufficient to dictate price. If it does, then the question is whether the monopoly rents that may be gained are more damaging to society than the rents lost under open access. Furthermore, controls against monopolistic practices are common in most countries although they appear to flow and ebb in response to current fads.

Mining stocks. Another possible imperfection is that owners of the rights will mine the stocks; "over-fishing" them in the interests of short-term gains. Those who adopt the precept that "fish come first" or consider "sustainability" to be sacred, view this possibility with alarm. But there are other views. One question is whether the tenure provided with ownership will create sufficient incentive to ensure that the stock produces a long-term yield. In general, it is likely that it would. There may be situations where stock mining would be in the owner's interest. Here the question is whether this is necessarily a bad thing. Certainly, if it leads to species extinction there may be a significant loss to society. But aside from that, the damage would depend upon the speed of recovery of the stocks and the appropriate discount rate. For stocks which are subject to wide natural fluctuations, the best approach may be to fish them out when they are abundant and move to another stock when they are not. This form of "pulse fishing" might allow a more efficient use of capital and labor than attempting to maintain a certain yield in the interests of sustainability, which after all, is more of a biological concept than an economic one.

Problems of high grading and by-catch. In ITQ systems, problems of multi-species and multi-sized fisheries are particularly difficult to resolve and generally require a high degree of enforcement. The latter problem of high-grading would not necessarily be significant under TURF/SURF systems since the owner(s) would have a strong incentive to avoid taking sizes of individual fish which have lower prices.

For interrelated stocks, however, there may be difficulties where the stocks are subject to different SURFs. If the owner of one SURF takes, as by-catch, a stock subject to another SURF, there is no innate incentive for him to avoid doing so. This however, might be resolved by establishing a cross-market between the two owners under which the by-catch is taken only at a certain price paid as recompense to

the owner of the other stock. There may be, nevertheless, difficulties in dealing with this problem.

Information problems. Fishery resources have several attributes that make them more difficult to deal with than land based resources, including: (i) the mobility of the stocks; (ii) their interrelationships as predator/prey species or competitive species; (iii) the obscurity of the environment in which they reside; and (iv) their susceptibility to environmental influences.

Uncertainty with regard to yields is a hallmark of fisheries and will remain as a problem for management. The most that can be said is that, with ownership of the resources, some of the risks associated with uncertainty can be alleviated by the development of a futures market.

The Evolution of the New Paradigm

I stated in the introduction that the move to systems of property rights is inexorable. This assumption is based on the belief that fishermen, given the right conditions, will find it in their own self-interest to acquire exclusive use rights and take on the responsibilities of management: and that those conditions are now emerging.

The common property resource literature is replete with examples of communities which have acquired exclusive use rights (see for example: National Research Council 1986; Cordell 1989; FAO 1993; and Ruddle 1994). Although some of this literature relates to the holding of rights by individuals and corporations, the distinction between community and corporate rights is not generally made. "In as much as corporate governance is most often associated with private property...it is somewhat natural that corporate governance structures would not be considered for self-governance of common property resources" (Townsend 1995).

In making a similar point, Hannesson (in press) notes that "scholars of the common property tradition do, in my view, overemphasize the distinction between individual and communal property rights. Both types of rights would appear to have a common origin in human greed; both are an application of the rule 'this is mine and not yours', or in the common property case 'ours' and not 'yours'. Why use rights have taken the form of common rights and not individual rights often appears to depend on technical circumstances such as economies of scale...The use rights (in commons) do in some cases, however, come fairly close to being individual rights.9[10]

In a review of some of these systems, I identified three different motivations for the acquisition of exclusive use rights (Christy 1993). These were enhancement, efficiency, and equity. Of these, the first two apply equally well to the development of both corporate and community rights. Examples of enhancement motivations occur where aquaculture is feasible (using the term enhancement, in a broad sense), e.a. oyster and other mollusc culture, shrimp ponds, and cape culture. They also occur where it is possible to increase the concentration of fishery resources through such means as artificial reefs and fish aggregation devices, as in the case of the Philippine tuna fishermen cited above. In most situations, investment in enhancement does not take place unless the investor can receive a satisfactory return on his investment; and this generally requires that the investor have exclusive rights to the fruits of his investment.

Efficiency motivations are important when the community or entrepreneur can increase net economic returns by asserting exclusive use rights and the costs of doing so are less than the benefits. The

community TURFs, common in Japanese coastal waters originated with the efforts of the feudal lords to extract rents from the coastal communities by the UKS of taxes. "In order to secure peace in fishing communities and stable tax collection, the then Japanese feudal government introduced a standard regulation in 1743 called *Urahoau* to govern fishing villages and manage fisheries" (Hirasawa 1993). Under this regulation "each local lord (*han-shu*) owned adjacent coastal waters and controlled the fisheries therein" (Matsuda 1991).

Opportunities to control markets may be one of the most important incentives for the adoption of closed access systems. One example occurred in the Yokohama City Fisheries Cooperative in Japan. "Triggered by a sudden decrease in the value of mantis shrimp following a bumper catch during the latter half of the 1970s, this cooperative started to limit the total catch by allocating individual quotas to each boat in 1977 in order to restrict the supply to the market" (Hasegawa 1993).10[11]

Similar developments occurred in the U.S. in the past. For many years during the 1930s and 1940s, the menhaden fisheries of the Atlantic were under the control of a monopsonit , the Smith Company, which effectively limited entry. Another example has been described by McCay, with regard to a fishermen's group in New Jersey. "As the seining fleet increased in size, the captains developed an overall fleet quota on how much menhaden and porgies could be caught. The size of the quota was determined through the cooperative's manager by what the market would bear without depressing prices. In addition, they developed a boat quota program" (McCay 1989). Libecap (1989) has pointed out "that fishermen unions and trade associations historically provided structured arrangements for restricting access by nonmembers and for policing member compliance to harvest restrictions. In the 1930s, unions emerged along the U.S. coasts to limit entry and negotiate price agreements with wholesalers and canners. Their policies appear to have increased member incomes, but the unions were dismantled in the 1950s by the federal government for alleged violations of the Sherman (Anti-Trust) Act." Similar approaches based on market controls have been adopted in several Japanese fisheries, the Mar del Plata fishery in Argentina and among the prud'homme fishermen in the Mediterranean (Christy 1993).11[12]

An example of an efficiency and enhancement TURF resulting in a form of sole ownership is that of the scallop fishery in Nemuro Bay, Japan (Nekaikyo No. 29 Committee. 1993). Prior to 1975, there were about 153 boats with a total catch averaging 2,000 tons of scallops per year. When the catch declined, the five cooperative joined together to plant scallops. After recovery, the cooperatives chartered vessels to harvest the scallops. In 1985, the sixteen-chartered boats produced over 6,600 tons of scallops and annual profits were US \$11 million, which was distributed among the cooperatives and then divided up among the individual members.

The Japanese examples indicate the ability of groups of fishermen to adopt management measures given the right conditions, in these cases, a form of TURF provided the basis. In most cases, however, TURFs or SURFs do not exist and it is necessary to create conditions which will facilitate the establishment of exclusive use rights. Wilen suggests a process by which this might occur under license limit schemes: the reduction in the number of players in the game through "limited entry licensing/area licensing" (Wilen 1989). "The extent to which this process can be pushed depends upon the fishery but the potential is very high for geographically spread out periodic spawning and schooling fish such as herring and salmon. It is conceivable, in fact, to move these fisheries almost to the point of "privatization," where a small group of fishermen effectively owns rights to certain spawning stocks and very controlled fisheries take place only at river mouths (for returning salmon) or specific spawning beds (for returning herring,)" (Wilen 1989). Indeed, privatization of salmon runs is common in Iceland, the UK, and other countries, and existed in

Alaska until 1959. 12[13]

Scott suggests that ITQs may provide an appropriate impetus. "Individual permanent catch quotas of a regulator-determined TAG are only a stage in the development of management from licensing to private rights. This evolution can be expected to continue until the owner has a share in management decisions regarding the catch: and further still, until he has an owner's share in management of the biomass and its environment. The expected evolution would begin with joint harvesting. Their ownership of individual catch quotas gives fishermen independent position from which they can form owners' alliances or committees. As users, they can organize to coordinate searching activity and reduce wasteful racing. I would also expect them to negotiate jointly with regulators over TACs. By catches, openings, quota markets, enforcement records and other day-to-day issues. And I expect that they will, as owners, mobilize self-enforcement to reduce poaching" (Scott 1989. see also Scott 1986).

For this evolutionary process to take place, it is essential that rights be credibly permanent. Writing a decade ago Scott (1996) asked the question. "When is a right not a right"? when it is an instrument of administration. It is worth going into the difference. The individual fisheries rights advocated in most of the literature are regarded by fishermen and politicians as theoretical and experimental. They are part of a scheme that can be extended, or withdrawn, as its features and defects become evident. They are the creation of theorists and the plaything of bureaucrats and they need not be taken too seriously, for whatever the government imposes, it can by lobbying and collective action be induced to modify or withdraw. Perhaps for this reason, most academic fisheries literature describes relying on rights over water, the environment, and fisheries in tentative fashion is just one of several techniques of economic regulation of common-property problems."

At the time of writing the above, the experience in ITQs was relatively limited. The ITQ systems in New Zealand did not begin until 1982. Experience since then has tended to BELIE Scott's, apprehensions, as he himself has noted. The appearance of sizeable economic rent, in the form of the sale price of the quotas. In many of the managed fisheries, indicates that fishermen perceive their rights to be more permanent than not. The point is well taken because it emphasizes the critical deficiencies in maintaining the present paradigm: that as long as ITQs are viewed as "an instrument of administration" rather than as a basis for property rights, both management decisions and research will be misdirected. "These opportunities (for property rights systems) are available already, but the fisheries rights literature has failed to see individual rights as the nuclei of larger sole-ownership corporation or collectives. Thus, it has not benefited from studies of common-pool management of other resources. The advantages and difficulties of modern collective oil-pool, pollution emissions, pasture and irrigation water management are rarely referred to: perhaps most of these are based on individual rights" (Scott 1989.).

Summary and Conclusions

"The crucial point, however, is that economic rationalization of ocean fisheries is probably inevitable. A property-rights-based system, such as the ITQ system, appears to be the most effective way of accomplishing this. Therefore, it is advisable to begin preparations for the eventual implementation of such a system in an orderly fashion. The alternative is to risk being rushed, at a late stage, into a fisheries management system trial may not be suitable" (Arnason 1993).

The question is one of determining the preparations that need to be undertaken. There are many possible elements, one of which would be the studies that might be undertaken by economists. Some tentative and preliminary suggestions for research can be made.

- *Estimates of the economic rents.* Estimates of rents that are potentially available in fisheries (which may be extraordinarily large) may be helpful in inducing politicians to give greater consideration to properly rights systems. It is surprising that so few such studies have been done.
- *Studies of common-pool management of other resources, as suggested by Scott.* The lessons learned from such studies should be of value, in the development of policies for fisheries property rights systems. The abundant literature on traditional common property management systems is seriously deficient in the provision of information on the development of the systems and on the conditions of membership in the commons.
- *Identification of the conditions and incentives that will facilitate the establishment of property rights systems.* For example, the use of fixed gear encourages the users to acquire exclusive rights, and opportunities for such gear need to be identified. The ability to influence market prices appears to be a strong motivation for collective action and control of access. There should be studies on the ways this can be encouraged, legally and without serious monopolistic consequences.
- *Analyses of present closed access systems.* Many such studies exist and are helpful in evaluating alternative approaches and measures. *But they* tend to evaluate the systems in terms of the old paradigm, instead of the new one. There is a need to examine the systems to determine the aspects which may impede or facilitate the evolution to a properly rights regime.
- *Compensatory mechanisms.* The possibilities for using compensatory mechanisms to alleviate the hardships of those who lose in the evolution of property rights regimes should be explored.
- *Conflict resolution.* Conflicts are likely to occur not only between and among the owners of TURFs and SURFs, but also between them and other users of the aquatic environments.
- *Tax systems.* Only a few studies have been undertaken on taxing mechanisms (see (Johnson 1995). There is a need to examine the possible use of forms of property taxes, user fees, royalties, and auctions as means for extracting an appropriate share of the rents (as well as a need for determining what is appropriate) (see Hannesson, in press). Information on the use of such mechanisms in other common-pool resources would be valuable.
- *Studies of the concept of SURFs.* Stock use rights systems have been mentioned peripherally in the literature, but with a few exceptions (Townsend 1995a), it has not been subjected to critical analysis.
- *Labor mobility.* There is a critical dearth of information on the mobility of labor into and out of fisheries.

A general principle for future economic work would be to focus on those studies that will facilitate the evolution to property rights regimes. This would include the identification of the hazards along the evolutionary path and the development of measures to overcome those hazards. The great danger is that the very real hardship, that are associated with the evolution may lead to the imposition of constraints that will impede eventual rationalization.

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13[1] There are, of course, exceptions, of which Don Bevan was one of the most notable.

14[2] Fishery management alternatives that made sense in an era of massive annual data collection and analysis are being challenged as funds for research, management, and enforcement agencies are cut year after year. Rights based fishery management, if it can be designed to reduce public expenditures, is likely to attract a great deal of interest from financially strapped government agencies" Rettig 1989).

15[3] " In a discussion of "social legislation in oystering" under which technologically and economically efficient gear was prohibited in favor of the individual tongs, McCay stated that "it may have the intent and effect of maintaining equity in opportunities in harvest oysters, because it is difficult for any person or group to monopolize the resource with tongs alone. Moreover, entry is limited to those willing and able to accept low returns from arduous labor" (McCay 1988).

16[4] In 1983, E.A. Keen, a geographer, made a strong argument for sole ownership in fisheries. He stated that "sole ownership as a right system for marine resources has received almost no attention in the literature of fisheries management. It warrants far more consideration in view of its demonstrated efficacy with other resources. Reasons for its neglect appear in rest more in personal values and ideology than in an objective analysis of its potential" (Keen 1983).

17[5] On two separate occasions administrators have told me that the halibut fisheries of the northeast Pacific were in fine shape—and this was when the season for halibut was less than one day long. One of them said it was a model for management.

18[6] In the recent revision of the Magnuson Act, Senator Stevens of Alaska inserted a ban on the use of Individual Transferable Quotas in order to protect his constituent fish processors. He did this on the pretense that this management system needs more Study.

19[7] In a poignant message to the Fishfolk list on the Internet, Cindy Amberfield, the owner of Beryl's Sweetshop in Kodiak, provided strong evidence of Huppert's point, in terms of the significant decline in patronage in the 1995-96 season. She blamed the economic losses on the establishment of ITQs for halibut and the "loss of business in the processing sector due to "vertical integration" of the fishery (fishers owning the fish before they are caught, and thus having the right and the resource to market them as they will)" which resulted in only three of the eleven canneries in Kodiak operating during the peak of the season.

20[8] "If fishing rights are permanent, the resource will in effect become a shared property of those who hold rights. Under this arrangement it is indeed likely that the holders of the use rights would assume the full responsibility for managing the resource, from stock assessment through the setting of total allowable catch and monitoring of individual quotas or licenses" (Hannesson, in press).

21[9] A hundred years ago, the big businesses were identified as the "Wm. L. Bradle Manufacturing Company at Weymouth, the Pacific Guano Company at Wood's Hole, and the Cape Cod Railroad Company" (Palmer 1873). Today, it is Tyson foods. Inc.. ConAgra ("the country's second largest diversified food company"), and KPMG Peat Marwick (Greer 1995).

22^[10] Although the motivation for the claims of individual and communal rights may be the same, the consequences may be quite different, as discussed by Townsend (1995).

23^[11] It is noteworthy that some of the deficiencies of ITQ systems persist in this fishery." A major continuing problem of the mantis shrimp fishery is that of high grading" (Shiba Branch 1993)

24^[12] Scott (1993) believes that fishermen groups, which have adopted self-regulation measures, have failed to control catch or effort. In referring to a study by Schlager (1990), he states "thus I believe that her painstaking documentation may have confirmed an important general rule: that existing self-governed fisheries worldwide tend to confine their rule making and enforcement to the simple problems of the manner of fishing, not to the total amount of catch ". It is noteworthy, however, that where the objective of the fishermen's group is to control prices, it must also control catch and that there are several examples, in addition to the ones cited here, of self regulation of total catch or effort.

25^[13] An excellent history of the Alaska salmon fishery can be found in Crutchfield and Pontecorvo, 1969. This includes a thorough description of the dynamics by which salmon traps under private ownership rose and fell.
