FENCING THE OCEANS

A RIGHTS-BASED APPROACH TO PRIVATIZING FISHERIES

by Birgir Runolfsson

OVER THE PAST SEVERAL DECADES, countries have shifted the management of ocean fisheries within 200 miles of their coastline from open access to intensive regulation. Governments attempt to restrict the total harvest of fish in order to stabilize or increase fish stocks. Yet regulatory regimes largely have failed to stem the decline of fisheries because they do not alter the fundamental incentives that lead to overfishing.

Change is inevitable in the fisheries. Retaining the status quo is not an option. Managing a fishery through regulation does not solve the basic incentive problems caused by the lack of property rights to the fish stock. Excessive fishing still exists because of the absence of property rights.

Recently, several countries have replaced fisheries managed by government with systems based on property rights. Rights-based fishing is increasingly recognized as a practical alternative to the inefficiencies of direct controls and regulation. On land, the conversion from medieval common ownership to the private property system is responsible for increases in economic productivity. The expansion of property rights as a method of economic organization should extend to individual transferable quotas in fisheries. As with property rights on land, the use of individual transferable quotas for fish will yield substantial economic benefits.

THE FISHERIES PROBLEM

Only a generation ago, the supply of fish available from the world's oceans seemed plentiful. However, advances in fishermen's ability to catch, preserve, transport, and sell fish quickly exceeded the ability of fish stocks to reproduce. Catches increased more than fourfold from 1950 to 1990, from twenty million metric tons to almost one hundred million metric tons. The United Nations Food and Agriculture Organization (FAO) maintained in 1993 that thirteen of seventeen major global fisheries were depleted or in serious decline. FAO also estimated that the world's fishing fleet catch was worth $72 billion but cost $92 billion to catch.

By the early 1980s, commercial fishing fleets had become so large and efficient that fish abundance and average catch per day of major stocks declining to a level that threatened stock reproduction. Many fisheries were unprofitable without subsidies. Although overall catch has remained constant in recent years, the increased catch of low-value species used for fishmeal has masked the decline of more commercially valuable species. Fish firms have responded to the decline of valuable species with the use of more capital and technology to increase the intensity of their fishing effort, exacerbating the decline of fish stocks.

Governments have responded to the decline in fish stocks with command-and-control regulation. Those regulatory regimes attempt to reduce overfishing through three types of restrictions: limits on the amount of time during which fishing can occur, limits on the types of capital and labor used to fish, and limits on the amount of fish caught. The length of fishing season, the size of the allowable catch, fishing areas, number of fishermen, vessel size, and equipment, have all been regulated at various times.

While such regulations drive up costs and discourage some fishing effort, they do not alter the fact that fish are valuable but no one owns them. Those who catch fish earn money. That fundamental fact, as well as the existence of government subsidies in many countries—including the United States—for the acquisition of boats and gear, encourage fishermen to explore further means for finding fish. For example, limits on vessel size encourage investment in more boats and in more sophisticated equipment; specifying which days of the week, month, or year one can fish encourages more intensive effort on those days. Restrictions on fishing efforts make fishing less efficient than it could be. Seasonal closures coupled with improved fishing technology most often results in overcapitalization and wasteful racing for fish.

CREATING PROPERTY RIGHTS

Overfishing and other inefficient fishing practices have nothing to do with the nature of the resource, the characteristics of fishermen, or the localities in which fish are found. Rather, inefficiencies are the direct result of the definition and enforcement of property rights in fisheries. Fisheries are troubled by overfishing because they are not privately owned. Fishermen own only what they catch. The government, which is to say, everyone and therefore no one, owns the stock of fish from which the catch is taken.

If fish stocks were privately owned, incentives would exist to conserve them because the gains from their preservation as well as the costs of their exploitation would accrue to their owners. Private owners will neither race to take fish nor deplete stocks that would enhance future catch because if an owner does either, he bears the cost.

Birgir Runolfsson is an associate professor of economics and director of the Center for Rights-Based Fishing at the University of Iceland.

The establishment of private ownership in coastal fisheries, where fish stay put, is conceptually simple and very analogous to private property on land. A coastline could be carved up and private owners would be allowed to take exclusive possession of the fish in their area. Those rights, are called exclusive user rights (EURs) or territorial user rights in fisheries (TURFs). A single firm or fisher with EURs is assigned the right to a fishery within a country's jurisdiction. TURFs split the fishery within a country's jurisdiction into several geographic territories. Each territory is assigned to a single firm or a small group of fishers.

EURs are appropriate for coastal fisheries in which the catch is small and involves only a single species. In Iceland, for example, the quahog fishery is organized with an exclusive user right. The fishery is small and a single vessel has a license for the fishery.

TURFs are appropriate for fisheries that are large and can be divided into geographic territories. A single individual or a small group can be assigned exclusive rights to a slice of an area where a species is located. The slice, or TURF, would usually be a rather small area close to shore. An example may be seen in the informal structure of the Maine lobster fishery.

Exclusive ownership of coastal fisheries would eliminate the need to regulate the fishery. The private owners of the fishery would have incentive to look after the maintenance of the coastal fish population. They would have the authority to prevent overfishing in their area.

The difficulty of defining boundaries and monitoring trespass in a liquid without obvious property lines emerges further away from the coast, where commercially valuable species of fish are found. The difficulty is as much a matter of incentives as technology. To be sure, new technological developments, such as remote observation by satellite, have enhanced the feasibility of assigning area rights to fishing grounds further offshore. But many other technologies no doubt already exist and are not recognized because incentives are lacking for their use.

INDIVIDUAL TRANSFERABLE QUOTAS

The solution to overfishing of migrating species is not as simple as the coastal situation solution. Most governments currently limit the Total Allowable Catch (TAC) in fisheries within their two hundred mile limits, though sometimes those limits are not strictly enforced. The problem with such limits is that if the fishery is simply closed once the TAC is reached, fishermen race against each other to get as large a share of the TAC as possible.

A system of Individual Transferable Quotas (ITQs) would modify simple TAC regulations to prevent that race. Such a system was instituted in Iceland in 1984 for all the major fisheries. Under an ITQ system, the TAC is allocated as individual quotas to fishermen, fishing firms, or fishing vessels. After the initial quotas are set, fishermen are free to adjust their share by buying, selling, or leasing a quota. That approach allows fishermen to better respond to market conditions by adjusting the nature, timing, and scale of operations to produce a more profitable harvest.

The quotas in an ITQ system should be proportional (the right to a percentage of the TAC) and permanent property rights. Absolute changes in the TAC will then translate into proportionate changes in each individual's quota holdings without any adjustment in the ITQ. The ITQ also should be allocated in perpetuity. Fisherman with a permanent interest in the harvest would manage their behavior more efficiently.

An ITQ system giving operators a right to a share of the harvest is not as good as a right to all fish in a defined territory. ITQs are not ideal because the gains from behavior that negatively affects the stock of fish, like cheating on one's quota, accrue to only one person while the losses are dissipated among all other owners of the quota. But because ITQs provide security over one's share of the harvest, fishermen will not dissipate the wealth in a fishery by competing among themselves for a greater share of the total catch. Even though ITQs are not ideal property rights, they provide a practical and politically achievable reform for existing ineffective systems of government fisheries administration.

CONCERNS ABOUT AN ITQ SYSTEM

Critics of an ITQ system make four claims. First, the understanding of fish stocks is insufficient to determine the correct TAC. Second, ITQ systems are more expensive to manage than traditional fish management systems. Third, ITQ systems exclude poor fisherman from their livelihood. And fourth, the government will regard quotas as simple property and thus, subject to a range of civil procedures such as seizure for bad debts or sale to settle a divorce. Such cavalier treatment of quotas is not compatible with sound management of a fishery.

The critics are correct that fisheries management is as much

art as it is science. But the scientific limits of our knowledge of fishery dynamics affect the status quo and an ITQ system equally. That is because the TAC concept is a central feature of both. Even if TAC is not an explicit part of current politically managed systems, the implicit purpose of the restrictions and regulations in the status quo is to limit the catch to a level that a fishery can tolerate. And the explicit TAC in an ITQ system is preferable to the indirect ineffective methods of limiting the catch found in the status quo.

The benefits of an ITQ system exist even in the presence of scientific uncertainty about the long-run sustainability of any particular TAC. Continuous adjustment of TAC will be necessary because of the inherent biological variability in fisheries and their ecological interrelationships. Our understanding of those issues, and hence our ability to set TAC at a sustainable level, should improve over time. Whether the TAC is set too high or too low will not affect the assertion that ITQs will maximize income from the TAC. For most fisheries, only a TAC that is set too high year after year will create difficulties.

To be effective, any fisheries management scheme has to be monitored and enforced. One criticism of ITQs is that such schemes are more expensive to administer and enforce than traditional types of schemes. All fisheries management schemes have costs. The advantage of ITQs is that they focus attention on the explicit costs of management versus the economic benefits. Improvements to management are more likely to be initiated if the costs of management are transparent.

Monitoring and enforcement need not be a government responsibility. Indeed, there is considerable scope for self-policing in a fishery. Large numbers of fishers spend time on the water harvesting their catch. They can and will be enlisted in policing the resource. The incentive for self-policing follows directly from the ownership of quota. Although individuals profit if they exceed their quota (steal fish), it costs them if other quota owners do likewise. If everyone exceeds their quota, the fishery will be overfished, fishers income will fall, and the price of quota will fall. Fishermen themselves will, in time, protect their property rights just like landowners protect theirs.

The perception that closing the commons excludes some from access to fishing is true but the concern is overstated. The fishing of ocean resources is currently excessive, so by definition, some who are currently fishing will not be fishing in the future. But that fact is unaffected by the management system in place. The ITQ system, in fact, is superior to the traditional system because as long as people can trade the quota rights, nobody is automatically excluded. And once you obtain an ITQ right, the fish will actually exist for you to catch. Under a traditional system, everyone is free to fish, but the race to harvest often implies that no one is entitled to a fish.

The history of the Icelandic firm Samherji Ltd. suggests that entry under an ITQ system is relatively easy. One year before ITQs were introduced, that firm's only asset was an old, rusty, deep-sea trawler. As of January 1997, Samherji Ltd. is the largest holder within the Icelandic system of both groundfish and total quotas, and has invested in other firms, domestic and foreign. Today, Samherji Ltd. and its subsidiaries operate twenty vessels from five countries as well as fish processing plants and a marketing firm in England. Samherji Ltd. went public in April 1997 and about 6,700 parties out of a total Icelandic population of only 270,000 bought stock. The current value of its stock makes it the largest corporation in Iceland today in value terms, and second in total stockholder terms.

In some cases, the argument that ITQs allow the use of fisheries by some people to the exclusion of others is nothing more than an argument against the institution of private property. The long and bitter experience with public ownership of resources in Eastern Europe suggests that the argument should be put the other way; lack of private ownership allows the exploitation of resources by some to the detriment of others.

In contrast, a legitimate concern in the creation of an ITQ system is the mechanism used to distribute the initial quota rights. An auction favors those who have access to capital. A lottery favors those who are lucky. Allocation to existing fisherman favors history.

Two important economic truths should govern any discussion of the initial distribution of quota rights. First, the initial distribution of quota does not affect efficiency; as long as quotas are easily traded, those who can use them most efficiently will purchase them. Second, the concerns of those who worry about the exclusion of some from the new system can be ameliorated in the design of the initial quota distribution system. For example, if "little" fishermen are a source of concern, give "little" fishermen more initial quotas then they would receive if quotas were initially distributed according to historical catch data. Hence they can either sell fish or sell the quotas to larger firms and invest the proceeds of the sale to raise their incomes.

The final concern of the critics is also true but irrelevant. Some worry that because ITQs will be considered the property of fishers, the government or courts will seize ITQs to satisfy debts, lawsuits, or other judgments against a quota holder. As

with other classes of assets, quotas would be split in divorce settlements and inherited as a quota owner passes away.

That charge is true but not an argument against private ownership of fisheries. If a quota owner runs up debts, he may be obliged to sell his quota. But the new owner also will have the same incentive to manage his asset competently. Improved management of the fishery requires exclusive rights, and exclusive rights require that someone be responsible. Responsibility implies the possibility of asset loss.

ENCLOSURE AND PRIVATIZATION OF OCEAN RESOURCES COULD BE COMPARABLE TO THE LAND ENCLOSURE MOVEMENT IN BRITISH HISTORY OR THE FENCING OF WESTERN RANGE LAND IN AMERICAN HISTORY.

EXAMPLES OF RIGHTS-BASED FISHERIES

Although no country has yet completely privatized their fisheries, many countries have experimented with property-rights-based management including Australia, Canada, the Netherlands, Norway, Portugal, the United Kingdom, South Africa, and the United States. But New Zealand and Icelandic fisheries offer the best examples since both have used property rights management more extensively than other countries.

New Zealand has developed the most extensive property-rights-based fisheries in the world. The Ministry of Fisheries, after consulting with scientists and industry representatives, sets TACs for the commercial species in each fishing area within the New Zealand jurisdiction. The quotas are permanent, perfectly divisible, and transferable, but no owner may own more than 35 percent of total deep-sea quota and 20 percent of total inshore quota.

The most important innovation of the New Zealand experience is the quota management company. It was formed by the quota owners in the same manner condominium owners in a large building form a management company to oversee their collective interests. The company can potentially solve, through contract negotiation, any discrepancies between the interests of individual quota owners and the interests of the fishery as a whole. The New Zealand ITQ system was initially set up without any means for enabling quota owners to act collectively. In spite of the fact that they still lack the legal right to manage or enhance their fisheries, quota owners have organized themselves into management companies.

For example, in the deep-water orange roughy fishery, quota owners have formed a joint management company, the Exploratory Fishing Company, to undertake exploratory research into orange roughy fish stocks and facilitate other management strategies. The Challenger Scallop Enhancement Company conducts research in the scallop fishery, implements its own compliance regime, and develops its own management plans in conjunction with other users. The improvement to the fishery is exceeding expectations.

The ITQ system experience is favorable. The exclusive right to harvest the resource guaranteed by the ITQ system has impelled New Zealand fishermen to treat fisheries as an asset. Overall the change has been from a system of short-term to a system of long-term fisheries management. Aggregate catches have increased and most resource stocks seem to be stable. In 1996 the TACs for twenty-nine of thirty-two ITQ species exceeded their 1986 TACs. Harvest quality has improved and there is evidence of reduced fishing effort. The size of the fishing fleet has declined slightly since 1990 and catch per unit effort has been stable or slightly increasing. Profitability in the industry has been good and improving. Both industry and government are generally satisfied with the system.

Second to New Zealand, Iceland has developed property-rights-based fisheries most extensively. Icelanders introduced individual vessel quotas (IQs) in 1975 in the herring fishery. Those quotas applied to catches by individual vessels. They were similar to ITQs except they were not transferable. In 1979, the IQ regime was transformed into an ITQ system for that fishery. In 1990, all fisheries became subject to a comprehensive ITQ system, with only minor exemptions. The ITQ system is a proportional or share quota system. The number of species under the ITQ system has increased to thirteen, from five in 1984.

The Ministry of Fisheries, on the recommendation from Iceland's Marine Research Institute (MRI), an independent government institute that conducts oceanographic and fisheries research, recommends TACs for all commercial species. The basic property right in the system is a share of the TAC for every species for which there is a TAC. The quotas are permanent, perfectly divisible, and transferable. There are no rules of maximum quota holding.

The costs of administering and monitoring the ITQ system in Iceland, in contrast to New Zealand, have not been greater than expected. The 1990 Fisheries Management Act provides for cost recovery of fishery management costs. Both the Icelandic and New Zealand governments operate independent government institutes that conduct fisheries research. The operating cost for the institutes is paid out of the government budget. Both countries have legislation concerning the recovery of those and other costs regarding the fisheries. In addition, private parties in both countries pay for fisheries research. There is more government involvement in the Icelandic fisheries than the New Zealand fisheries and hence a larger subsidy.

The Icelandic ITQ system was created because of sharply declining stocks of herring and cod. The experience with the ITQ system is generally favorable. Catches of herring have increased. And more importantly, catch per unit effort has increased significantly, for example, by more than tenfold in the Icelandic Herring fishery. In fact the condition of the herring stock is better than at any time since the 1950s. The number of vessels in the fishery has declined from more than two hundred in 1980 to less than thirty in 1995, although the average vessel size has increased substantially.

The groundfish fisheries, for example cod fisheries, have not improved as much because the TACs have been set too high. Politicians have chosen the gradual approach to cutting the cod catch, despite recommendations by the Marine Research Institute. Only recently has the TAC been set in accordance with MRI recommendations. That was done at the insistence of the Association of Vessel Owners who want to preserve the value of their ITQ assets. Stocks seem to be rebounding as a result; the current TAC in the cod fishery is 20 percent higher than last year. The fact that the government had to respond to pressure from quota owners to protect the value of their property demonstrates the dynamics set up by the ITQ system.

Since 1990, when the comprehensive ITQ system went into effect, there have been substantial improvements in cod fishery economics. Fishing effort is now more than 30 percent lower than it was in 1983. Fishing capital, which had increased by more than 400 percent in 1960-1990, has actually declined since 1990, and the number of vessels has also declined. Harvest quality and profits have improved significantly and fishing effort has been reduced.

TOWARDS PRIVATE PROPERTY FISHERIES

ITQ systems could prove to be one of the great institutional changes in recent history. Enclosure and privatization of ocean resources could be comparable to the land enclosure movement in British history or the fencing of western range land in American history. As with the enclosure of common land resources, the establishment of property rights in fisheries conserves the resource. Both land enclosures and ITQs remove the threat of overexploitation of resources that results from open access.

Under an ITQ fisheries scheme, quota owners form, in effect, a club with the exclusive right to harvest fish species commercially. Their property right in the fishery, in the form of their ITQ, will reflect the overall value of the fishery. The situation is exactly analogous to property rights on land. If a property owner does not maintain and improve his or her property, then its value will fall. If the property is well maintained, its value will rise. Club members' wealth increases if they encourage fisheries management strategies that improve the health of the fishery.

AS WITH THE ENCLOSURE OF COMMON LAND RESOURCES, THE ESTABLISHMENT OF PROPERTY RIGHTS IN FISHERIES CONSERVES THE RESOURCE.

The New Zealand experience teaches the importance of contestable management of fisheries through management companies formed by quota owners. The quota owners, rather than taxpayers, pay the costs of management. Under a company structure, quota owners elect a management board, who in turn appoints a manager to run the fishery. The fishery manager is accountable to the board, who is in turn accountable to the quota owners. Explicit lines of responsibility and accountability support the incentives for improved fisheries management.

Although ITQs eliminate the need for restrictive governmental licensing, since quotas are required for entry, quota management companies can take the system a step further. Those organizations could be responsible for the complete management of the resource if empowered with the right to restrict access to their fisheries. Quota management companies are, in a sense, analogous to unitization contracts in the oil industry. Those contracts are used to solve the commons problem in oil reservoirs when ownership is divided.

CONCLUSION

The creation of Individual Transferable Quotas is an improvement over standard approaches to fishing regulation, but prospects for more complete privatization should not be ignored. Since ITQ rights are determined in the harvest and not in the stock of fish or in the fishing grounds, they may not replicate the incentives of sole ownership. In the case of stationary fish stocks, private rights (EURs or TURFs) to beds of fish are superior to ITQs, if the costs of monitoring and enforcing those rights are lower. Allowing private fishing organizations to restrict entry also may provide better results than ITQs. Quota management companies are a step in that direction, but the development of explicit private entry restriction rights may require additional legislative consideration.

The evolution of technology to facilitate the transition to complete property rights, rather than just property rights in the harvest, will be closely related to the incentives faced by the potential resource owners. Consider the evolution of exclusion technology on land. Anyone who could effectively exclude others from the range could capture the rents from private ownership. The expense of wood and stone fences created a ready market for an economical alternative. Barbed wire filled

the niche. If a regulatory agency had been charged with controlling grazing to solve the commons problem, little incentive would have existed to invent barbed wire since private exclusion would not have been allowed. Given that regulatory agencies control access to most fisheries and leave little room for the evolution of private property rights, there is little incentive for entrepreneurs to develop an equivalent property boundary for the oceans.

Just as barbed wire revolutionized private ownership on the American frontier, new technology may help "fence" fish. Satellites are already capable of monitoring fishing vessel locations. Such monitoring could help enforce against trespass if fishing grounds were privatized.

Future advances in property rights technology and a more complete property rights regime in fisheries may be confidently predicted. Hopefully, bureaucracy will not impede the evolution.

SELECTED READINGS

Peter Ackroyd and Roger Beattie. "ITQs—Fishing with a Future: A strategy for action." Report on establishing ITQs in the California Sea Urchin Fishery, 1996.

Terry Anderson and Donald Leal. *Free Market Environmentalism*. San Francisco: Pacific Research Institute, 1991.

Terry Anderson and Randy Simmons, eds. *The Political Economy of Customs and Culture*: *Informal Solutions to the Commons Problem*. Lanham: Rowman & Littlefield Publishers, 1993.

Ragnar Arnason. *The Icelandic Fisheries: Evolution and Management of a Fishing Industry*. Oxford: Fishing News Books, 1995.

Brian Lee Crowley, ed. *Taking Ownership; Property Rights and Fishery Management on the Atlantic Coast*. Halifax: Atlantic Institute for Market Studies, 1996.

Laura Jones and Michael Walker, eds. *Fish or Cut Bait! The Case for Individual Transferable Quotas in the Salmon Fishery of British Columbia*. Vancouver: Fraser Institute, 1997.

Gary D. Libecap. *Contracting for Property Rights*. Cambridge: Cambridge University Press, 1989.

Roger Meiners and Bruce Yandle, eds. T*aking the Environment Seriously*. Lanham, MD: Rowman & Littlefield, 1993.

P. Neher, R. Arnason and N. Mollet. *Rights-based Fishing*. Boston: Kluwer Academic Press, 1989.

Elinor Ostrom. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge:Cambridge University Press, 1990.