

Chapter 13

Sustainable Development and Marine Fisheries

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World fishery production today is more than six times what it was half a century ago. Since 1960, the quantity of fish destined for direct human consumption has more than tripled and now stands at around 90 million tons per year.¹ Estimates put total world capture fisheries and aquaculture production (which includes all marine fish harvests) at 125 million tons for 1999, up from 113 million tons in 1995.² But this apparently rosy picture belies some worrying facts: The recent increase in production has come primarily from aquaculture; after decades of steady increases, capture fishery numbers now fluctuate around 90 million tons per year. More disturbingly, stocks of some important commercial fish are severely depleted and many of those are *not* recovering.

If one considered only the plight of the Atlantic cod, it would be tempting to agree with WWF's 1996 claim that "Without a doubt we have exceeded the limits of the seas".³ Cod is one of the most fecund fish (an average female produces one million eggs) and has been a staple of many diets for centuries. Once one of the world's richest fishing grounds, cod are so scarce today in New England and Atlantic Canada that they are close to commercial extinction.⁴ However, many other fisheries are healthy, and recent evidence indicates that even those that have been depleted may be remarkably resilient.⁵

This chapter considers why some fish stocks have been depleted while others have not. It assesses the various attempts that have been made to improve fisheries management and provides insights into which kinds of institutions lead to sustainable management of stocks.

Sustainable Fishing

The notion of sustainability flows directly from the biological sciences, especially the study of natural populations of animals such as fish and wildlife. For most of the twentieth century, fisheries science focused on determining the 'maximum sustainable yield' (MSY); that is, the largest harvest that could be taken year on year from a specific population of fish. This calculation involved not only estimates of growth and fecundity but also of the size of base population needed to maintain stocks.

Unfortunately, due both to the great uncertainties involved in estimating fish populations and – perhaps more importantly – to political gamesmanship,⁶ fish populations have been decimated in the name of MSY. As a result, the concept has fallen out of favor. But while the 'maximum' part

¹ FAO (2000).

² FAO (2000).

³ Associated Press (1996).

⁴ Commercial extinction occurs when it is no longer economically viable to catch the remaining fish.

⁵ Myers, et al (1995).

⁶ See, for example, Brubaker magazine piece (REF!)

has been maligned, ‘sustainability’ remains the holy grail of fisheries management for everyone from biologists to conservationists to some environmentalists.

Of course, without appropriate definition, sustainability is ambiguous and can be used – as was MSY – to justify good, bad and even ugly policies. For the purposes of this chapter, sustainability is taken to mean *an activity or a population of a species that is resilient over time*. It is important to consider sustainability of both populations *and* activities for two reasons. First, especially in the developing world, wildlife and fisheries will not be conserved unless the people who depend on them for food and sustenance also prosper. (Anyone worried about where their next meal will come from will hardly be too concerned about the effects of their catches on the long-term health of a particular fish population.) Second, the concern of this book is with sustainable *development*, so activities that benefit people must be given due consideration.

Conservation and development are often presumed to be diametrically opposed to one another. Having made this presumption, some argue that the environment must be sacrificed for development. Others argue that development must be foregone in order to preserve the environment. But these prescriptions are misguided because the underlying presumption is incorrect. While there are certainly many examples of environmental degradation resulting from development, there are also many examples of environmental improvement and economic development being mutually supportive. Indeed, development and the wealth that it creates are in many respects the environment’s best friend.⁷

It is also important to distinguish environmental change from environmental degradation – modern environmentalists tend often to confuse the two, seeing all change as bad.⁸ In reality, of course, change is the norm and must be embraced as an inevitable part of the sustainability of a system. So, although we may be concerned about the resiliency of an individual fish species, this must be balanced against the resiliency of the marine ecosystem as a whole, as well as the resiliency of the human activities that depend upon the ecosystem and relevant parts of it.

Decentralising Control over Resources

There is no single answer as to how best to conserve the ocean’s resources. However, experience shows that when people are given the opportunity to conserve marine resources, they generally do so.⁹ To give people that opportunity, however, there must be a dramatic shift in the way fisheries are managed, away from many current regimes that all too often encourage depletion of resources and the wastes of time, effort and capital. Resource conservation is not happenstance; it is a rational response to a given situation.

In most countries, the political solution to over-harvesting of resources has been the imposition of regulatory controls on fishermen and other resource users. As the above discussion suggests, these controls have largely failed to stem the over-harvesting of important oceanic and terrestrial species. The problem with such regulations is their failure sufficiently to constrain the incentives traditional resource users have to harvest resources. Thus, limiting the number of days a fisherman may put to sea induces him to invest in more equipment, so that on those few days he is at sea he is able to pull in just as many fish as he did before. Meanwhile, creating ‘national parks’ from which poor local peasant farmers are excluded, and nationalizing the remaining

⁷ See Goklany (2000) and Goklany (this volume).

⁸ See e.g. Botkin (2001).

⁹ See, for example, Demsetz (1967), L. De Alessi (1980), Johannes (1981) and Ostrom (1990).

wildlife actually encourages peasants to poach animals – especially if the animals threaten to trample on their crops.

Some nations have, however, demonstrated the promise of an approach, which, at its core, recognizes the role of economic incentives in conservation and sustainable development. These nations, notably those in the South Pacific for marine resources¹⁰ and southern Africa for wildlife,¹¹ have decentralized control over resources – effectively making the users the owners of the resources. Resource users now have a proprietary interest in the resources they rely upon for their livelihood, so they have incentives to ensure that their resource increases in value over time, whilst bringing in a steady annual return. We now consider how this system works in more detail.

Property Rights

Property rights essentially define who has the right to do what with a resource. Economists studying natural resources have demonstrated the fundamental importance of property rights institutions to conservation and sustainable use. The allocation of property rights sets the rules of the game. There are, broadly, three types of allocation rules for resources:

- Open access (no-one has any property rights);
- Government ownership;
- Private ownership (property rights are held by individuals or groups).

Any attempt to exert control over resources is an attempt to define property rights. When property rights are not well-defined, or cannot be readily enforced, a situation approximating that of open access pertains. Under open access, scarce natural resources tend to suffer from what Garret Hardin termed ‘the tragedy of the commons.’¹² When it is impossible legally to exclude others from utilising a resource, users will tend to behave as though the resource is non-renewable, taking as much as possible as soon as possible, regardless of the impact on the stock. This does not cause problems when the resource is plentiful and harvests are small,¹³ but as the pressure grows, so does the potential for depletion. In a system of open access to a valuable resource with low harvesting costs, there are no rewards for restraint, and then, as Hardin described, “ruin is the destination toward which all men rush.”

Property rights encourage particular users to consider the harms and benefits they cause because they determine whether the future effects of their current behavior (either positive or negative) will be borne by the owner. As economist Harold Demsetz put it, “A primary function of property rights is that of guiding incentives to achieve a greater internalization of externalities.”¹⁴

¹⁰ See Johannes (1981).

¹¹ See Sugg and Kreuter (1994).

¹² Hardin (1968) drew on the earlier work of economists such as Gordon (1954) and Scott (1955), and, unfortunately, did not initially recognize the exclusivity of some communal institutions, so his use of the word ‘commons’ has been the source of some confusion. Ostrom (1990), for example, documents numerous examples of successful common property management. The real problem seems to be not with commons *per se* but with resources that are not privately owned – that is *either* ‘open access’ or controlled by the state.

¹³ Even under open access, harvests may be small either because costs of extraction are high (e.g. if the only technology available is sail boats and rod and line fishing tackle), or because demand for the resource is low.

¹⁴ Demsetz (1967), p. 348.

Thus, as property rights become better defined, resource stewardship becomes more attractive and, equally, owners bear more of the costs of rapacious behavior.

Clearly defined and readily enforceable private property rights to marine resources are rare. However, those few examples that do exist strongly support the arguments of theorists who have promoted private property rights in the oceans as a means to improve resource management.¹⁵

If a resource is held privately, then the owners have incentives to protect, conserve and husband resources. Formally, a resource is deemed to be privately owned when property rights over the resource are well defined and readily enforceable by an identifiable set of residual claimants. The crucial determinant for whether or not a resource is really privately owned, however, is whether the welfare of those making decisions about its use is tied to the economic consequences of their decisions.¹⁶

It is the lack of private property rights, not economic development or ‘greed’, that leads to environmental degradation. The reason that development and environment have often been viewed as diametrically opposed to one another is that private property rights – which would have been a bulwark against environmental degradation – have so often been trampled by the state in the name of economic development.

The Creation and Evolution of Property Rights

Whether private rights develop depends not only on the value of resources and the costs of monitoring them but also on the political costs of creating those rights.¹⁷ The process can be mutually reinforcing; as resources become more valuable, owners invest more in creating, monitoring and enforcing private ownership rights, which in turn make resources more valuable, and so on.

An early example of the development of private property rights concerned the trade in beaver pelts and the Montagne Indians in North America.¹⁸ Prior to the arrival of the settlers, beavers were plentiful and not highly valued by the Montagne, so they did not bother to impose any restrictions on harvesting them. But with the rise of the fur trade, the value of beaver pelts increased rapidly and suddenly the beavers became susceptible to depletion. The Montagne responded by rapidly developing a system for allocating certain areas to specific families who could then benefit from conserving the beaver. As beaver were the only resource valuable enough to warrant this kind of protection there were no other harvest restrictions imposed on these territories. Other people were free to roam across them and were even free to kill and eat the beaver as long as they left the pelt behind. Thus, the trade in beaver pelts was ‘sustainably developed’.

Another exemplary case study is the American West at the end of the nineteenth century. Much like the oceans not so long ago, few could imagine depleting its vast resources. But as the West was settled, its water and grassy lands became progressively more scarce and more valuable. Research by economists Terry Anderson and P.J. Hill showed that, as the rights to these resources became more valuable, more effort went into enforcing private property rights, and

¹⁵ See, for example, Keen (1983); Scott (1988); Edwards (1994).

¹⁶ Louis De Alessi, 1980.

¹⁷ Libecap (1990)

¹⁸ Demsetz (1967).

therefore into innovation and resource conservation.¹⁹

Defining private property by physical barriers was desirable, but there were too few raw materials, so livestock intermingled and monitoring was difficult. However, frontier entrepreneurs soon developed branding systems to identify individual animals, and cattlemen's associations were formed to standardize and register these brands, allowing cattlemen to define and enforce ownership over a valuable, roaming resource. Then, in the 1870s another innovation came along that radically altered the frontier landscape: barbed wire. Barbed wire was an inexpensive and effective means of marking territory, excluding interlopers, and keeping in livestock. It made it easier to enclose property and exert private ownership, and illustrates how private property rights encourage innovation.

Responses to Depletion

Unfortunately, the most common response to open access and depletion has been government intervention, which has meant that ingenuity and innovation have focused on circumventing restrictions, rather than on conserving or even enhancing resources. For the fisheries, these restrictions are, typically, limits on fishing gear, effort and seasons. Yet, so many variables influence harvest that regulators cannot hope to keep up. As seasons are shortened, fishers might respond with larger nets. As larger nets are restricted, more horsepower may take up the slack, and so on. One of the more extreme examples was the Alaskan halibut fishery, where the primary limitation was the length of the fishing season. As the season shortened, larger boats, larger nets, and technologies such as fish-finding sonar began to appear. Before long, a season that was once months long was down to two days, *with no discernible reduction in the total harvests*.

The halibut story is an extreme one, but the plot is common around the world. Political battles are inevitably fought over pieces of a pie that never gets bigger. Instead of investing in efforts to enlarge the pie, resources are devoted to attempts to grab a bigger share at some else's expense. Moving resource allocations out of the political arena, however, turns a zero-sum game into a positive one.

While government control may define who has the right to fish, it fails to internalize the effects that harvesters have on the resource, and so it has generally failed to conserve marine resources, let alone help to provide a leg up to those in developing countries who depend on the marine environment for sustenance. Fortunately, however, many subsistence fishing communities are already familiar with one form of private property – common property.

Common Property Rights

Private individual property rights offer the greatest rewards for conservation to their owners, but are also the most costly to define and enforce. Thus, in some instances, private communal property may be optimal, depending on the resource and the costs of monitoring and enforcing rules and excluding outsiders. Private communal property rights may range from nearly open access to a strict system of controls and rules, but essentially they define the rights shared by the members of a group with exclusive access to a resource.²⁰

Margaret McKean and Elinor Ostrom provide an explanation for the existence of private

¹⁹ Anderson and Hill (1975).

²⁰ Ostrom (1990).

communal rights: “Common property regimes are a way of privatizing the rights to something without dividing it into pieces ... Historically, common property regimes have evolved in places where the demand on a resource is too great to tolerate open access, so property rights in resources have to be created, but some other factor makes it impossible or undesirable to parcel the resource itself”.²¹ An example cited by McKean and Ostrom is a very large, forested area where edible flora and fauna are patchily distributed.

Private communal rights may not be easily transferable, but the welfare of either the individual or group is tied directly to the health of the resource, thereby generating incentives for conservation and sustainable use.²² However, limits on transferability of communal property may lead to problems of transition, as transferability bolsters resiliency in the face of pressure from outsiders. If out-transfers are not possible, pressure from outsiders for access often leads to expropriation, either of the resource itself or of the right of access to it.

In many cases common property regimes are not legally recognized, but as long as they are enforceable they can be workable. In the Maine lobster fishery, for example, lobstermen formed ‘harbor gangs’ to mark territories and turn away outsiders.²³ As a result, lobstermen in these gangs have higher catches, larger lobsters, and larger incomes than lobstermen who fish outside controlled areas. Some of these common access rights have even now been legally recognized by the state of Maine.

Unfortunately, in most places around the world, not only does the legal system not recognize common property rights, it is often biased against them. In fact, many legal systems favor individual property at the expense of common property. Ostrom notes finally that “When resources that were previously controlled by local participants have been nationalized, state control has usually proved to be less effective and efficient than control by those directly affected, if not disastrous in its consequences.”²⁴

Common property rights arise when parcelling is difficult and/or the return from doing so is low. Otherwise, as resources grow in value and/or monitoring becomes cheaper, private property rights become increasingly attractive.²⁵ Common property rights are emphasized in this paper because of their prevalence in developing countries, and because in many places where individual rights to resources are too expensive to enforce, they may afford an opportunity for private property rights to gain a foothold, to the benefit of both people and wildlife.

Examples

Coral Reefs

Coral reefs in the South Pacific suffer widely from destructive fishing practices such as fishing

²¹ McKean and Ostrom (1995).

²² Unfortunately, anthropologists, economists and policy makers often promote either individual or group ownership at the expense of the other, even though the distinction is frequently muddled. Adding to the confusion are the varying definitions that different (and even often the same) schools of thought apply to terms like “the commons”, “common property” and “private property”. For example, biologist Garret Hardin used the word “commons” to mean open access, anthropologists often use it to mean a strictly monitored form of group ownership, and economists frequently dismiss the concept entirely under the assumption that only individual ownership institutions are private.

²³ Acheson (1987).

²⁴ Ostrom (1997).

²⁵ Demsetz (1967).

with dynamite or cyanide.²⁶ However, such practices are often proscribed in places where fishing rights are securely owned, most often by a village, clan or community. Biologist Robert Johannes has studied coral reef conservation throughout the Pacific and found village control over local marine resources to be the surest indicator of reef health.²⁷

Reef tenure typically extends from the beach to the outer edge of the reef, sometimes even miles out to sea.²⁸ These reefs are valuable assets to the community and so are fiercely protected. In Fiji some communities employ fish wardens to watch over the reefs. In Johannes' study of Palauan fishers, he found community-managed fisheries employing closed seasons and areas, abiding by size limits and even imposing quotas to ensure conservation.²⁹

The experience in much of the Philippines offers a dramatic contrast. Most of the common property regimes there were destroyed by the Spanish Conquest. Today fishing over the reefs is nearly open access and many reefs are dead or deteriorating. The WWF's Hong Kong office looked into the problem of cyanide fishing and found that reef fisheries in Southeast Asia 'work in a sustainable way only in those few places where the rights to fish a particular reef are clearly established'.³⁰

In many of these island communities, secure tenure has also led to initiatives such as giant clam farming, redress for coastal pollution and the development of eco-tourism ventures, none of which would have been possible without a healthy environment and the income derived from well-defined property rights. And because of those secure property rights, development centers on a healthy environment.

Japanese cooperatives

Another formal communal arrangement exists in Japan, where in many places Fishery Cooperative Associations (FCAs) hold the rights to coastal marine resources and impose strict conservation measures on their members. As a result, coastal marine resources in Japan are generally healthy. Cooperative ownership in Japan is so strong that FCAs have even been able to block polluting coastal developments by asserting the primacy of their fishing rights. As Kenneth Ruddle and Tomoya Akimichi note, "Because fisheries rights have a legal status equal to land ownership under Japanese law, ... a private developer must ... either purchase all of the fisheries rights ... or compensate for any reduction in the quality of the rights".³¹

These cooperatives are, however, not purely private endeavours, since they receive significant government subsidies (as do most Japanese farmers). But they do demonstrate the emphatic link between exclusive control and the stewardship of marine resources.

Oysters in Maryland and Washington state

Much like the Atlantic cod of New England, the oyster fishery in Chesapeake, Maryland, was once a great industry and oysters were a staple of the local diet. Sadly, despite more than a century of warnings, oyster stocks in the Chesapeake have declined precipitously. In 1891, William Brooks, a scientist and Maryland Oyster Commissioner, declared that "all who are

²⁶ Barber and Pratt (1997).

²⁷ Johannes and Ripen (1996).

²⁸ M. De Alessi (1997).

²⁹ Johannes (1981).

³⁰ *The Economist* (11 May 1996), p. 35.

³¹ Ruddle and Akimichi (1989).

familiar with the subject have long been aware that our present system [of open access] can have only one result – extermination.”³² Brooks recommended the creation of privately owned oyster beds, in order to encourage oyster cultivation and stewardship. But regulation was chosen instead. As stocks continued to decline over time, the Maryland government continued to increase its involvement in the fishery, presenting us with a dramatic case of regulatory failure. It has been said that Maryland has passed more legislation dealing with oysters than any other issue. Restrictions on technology were (and still are) so severe that the skipjacks plying certain Maryland oyster beds are the only commercial fishers in the United States still powered by sail. In recent years disease has also played a part in the continued decline of the Chesapeake oyster, but even before this new threat, oyster harvests were well below one percent of what they once were.

In marked contrast to public oyster beds in Maryland, oyster beds in Washington state may be owned ‘fee simple’³³ – completely privately, and with a title to prove it, just like a house. As a result, harvests of oysters in Washington state look very different from those in Maryland. Additionally, the oysters are harvested by relatively modern means and the beds are often seeded from high-tech hatcheries financed by the oyster growers. Private rights not only allowed oyster growers to protect their beds from over-harvesting, they allowed their industry to develop; to invest in enhancement projects, to invest in biological research, and even to stop pollution.³⁴

Individual Transferable Quotas

Although the benefits and feasibility of private ownership are most readily apparent for sedentary species like oysters, they may also be perfectly applicable to more far-ranging species. Many countries are attempting to improve fisheries management by introducing some limited forms of private ownership into the fisheries, frequently by creating a quasi-property right called an Individual Transferable Quota (ITQ).

ITQs grant a right to harvest a certain percentage of a Total Allowable Catch (TAC) of fish in a given year and can be bought or sold. Over time, ITQs may also offer a real opportunity to move towards the private ownership of marine resources. Within the past two decades they have been introduced in New Zealand, Iceland, Australia, the United States and Canada. Some developing countries, most notably Namibia, are also beginning to experiment with such systems.³⁵

Although they are not really private rights, ITQs can be a tremendous step in the right direction. In contrast to regulation-based controls, they provide positive conservation incentives for those harvesting resources, because the health of the fishery is capitalized into the value of the quota. In other words, the brighter the prospects for future harvests, the higher the value of ITQs, allowing ITQ owners to gain now from steps they take to ensure the long-term health of the fishery. Some banks are even beginning to accept ITQs as collateral, improving access to the fishery by making loans easier to secure for new entrants.

ITQs in New Zealand

Until the introduction of ITQs, fisheries management in New Zealand followed a familiar pattern. Since 1960 the government had condoned free entry into the fisheries and subsidized

³² Brooks (1996), p. 71.

³³ Also known as ‘freehold’, this is the tenancy of *fee simple absolute in possession*.

³⁴ De Alessi (1996).

³⁵ See Iyambo (2000).

development, with predictable results; depletion of fish stocks and over-investment in boats, nets and other technologies. The deplorable state of many inshore fisheries, combined with the importance of fish to the New Zealand economy, forced a rethink of past policies. The result was the Fisheries Act of 1983, which consolidated previous legislation and set out both to improve resource conservation and to increase economic returns from the fisheries. This led to the creation of tradable quotas for some of the deep-water fisheries and, in 1986, the introduction of ITQs for all significant commercial finfish species with the creation of the Quota Management System (QMS).

Today, following numerous improvements, the program appears to have been tremendously successful. Fish stocks are generally healthy, the fisheries receive no subsidies, capacity in the fishing industry has been reduced voluntarily (more efficient quota owners bought out less efficient ones and retired redundant equipment – especially in the deep-water fisheries), and there has been an increase in investment in scientific research into the fisheries.³⁶ The New Zealand Ministry of Agriculture's Philip Major described a remarkable transformation in attitudes after the creation of the ITQ system: "It's the first group of fishers I've ever encountered who turned down the chance to take more fish".³⁷

It has been suggested that ITQs will result in the consolidation of the industry and the elimination of the small-scale fisher. While there has been some consolidation in New Zealand, especially in capital-intensive deep-water fisheries, the total numbers of vessels, full-time employees, and quota owners all increased from 1986 to 1996.³⁸ Of course, one reason for this is that limits have been placed on the percentage of the overall quota any one fisher may own, ranging from a limit of 45 percent in a given area for species such as hoki and orange roughy to 10 percent for rock lobster. While such limits may be economically inefficient – and for that reason it would be desirable to remove them in the longer term – in the short-term they serve to quell objections from those who fear excessive concentration and make it politically easier to shift from open access to a system of privately owned ITQs.

The New Zealand quota system seems to be moving closer and closer to a real system of privately owned fisheries. In the orange roughy fishery, for example, quota owners in 1991 formed the Exploratory Fishing Company (ORH 3B) Ltd., in large part to fund management science and research.³⁹ Similarly, the owners of scallop ITQs formed the Challenger Scallop Enhancement Company Ltd, which manages the fishery. Through contracts, the company levies money for research, enhancement (a vigorous reseeding program), monitoring, and enforcement both of ITQ allocations and daily catch limits.⁴⁰ They have even contracted with other fleets and owners to ameliorate multi-species effects of other fisheries (in particular, the dredge oyster fishery and the inshore finfish fishery) on habitat and productivity.⁴¹

Once again, when property rights in marine resources are clearly defined and readily enforceable, development proceeds along a path that is truly sustainable.

³⁶ See McClurg (1997); Sharp (1997).

³⁷ quoted in *The Economist* (1994), p. 24, describing a 1993 decision by the hoki fleet to not fish an extra 50,000 tons of fish allocated to them by the government.

³⁸ McClurg, (1997).

³⁹ Orange roughy has received a lot of attention in recent years due to new findings about their age and stock sizes, and the industry now fishes them much more conservatively.

⁴⁰ Arbuckle (2000).

⁴¹ Arbuckle (2000).

Overcoming the political nature of ITQs

This evolution from political allocation to private ownership is a very important aspect of some ITQ systems. The New Zealand system is the most notable in this respect and has gone the furthest, but the Icelandic system has also gradually moved in the same direction. In many other places, however, ITQs have been explicitly set up in a manner that prevents them from evolving into stronger rights. For example, the IFQ program in Alaska (which successfully ameliorated the 48-hour halibut derby mentioned earlier) specifically states that IFQs are not private property rights and that they can be taken away without compensation at any time. Such threats of expropriation undermine the credibility of the IFQs as secure, long-term investments, and strike at the very reason why ITQs have had some measure of success in the first place.

As long as an ITQ system remains politically managed, it will be susceptible to many of the pitfalls discussed earlier, limiting the impetus for innovation and sound resource enhancement. It also discourages the exploration of alternative systems for managing resources – such as setting up a scheme under which rights are created in a particular area, rather than a particular species.

These potential pitfalls highlight the importance of giving careful consideration to the structure of the rights being created before an ITQ system is implemented. The central lesson from New Zealand's experience should always be borne in mind: the more an ITQ resembles a private right, the greater is the likelihood that the system itself will adapt and evolve into a system of real private rights, which commensurately have the strongest possible incentives for conservation and sustainable development.

The creation of such secure, private-like rights can even help overcome political opposition from powerful groups with emotive and, in many cases, morally and legally justified claims. In New Zealand, the Maoris claimed a significant portion of the fisheries under the Treaty of Waitangi. This claim was settled amicably and the Maoris now own the largest fishing company in New Zealand.

Aquaculture

While the world fish catch has remained relatively stable in recent years, aquaculture production has grown dramatically. In fact, it is primarily responsible for the 20-million ton growth in world fish production over the last decade.⁴² In 1991, world aquaculture production was approximately 13 million metric tons, double what it was seven years before.⁴³ By 1999, that number had jumped to almost 33 million metric tons.⁴⁴

The reason for these increases is that aquaculture facilities have allowed entrepreneurs to set up private enclosures that “fence” parts of the sea (or even transport it onto land). A fish not harvested today will be there tomorrow, normal rates of mortality notwithstanding. Private ownership has invigorated entrepreneurs to tinker, experiment, and innovate, and, even more importantly, has encouraged others to innovate as well. In this, the experience of aquaculture mirrors that of the cattle ranches in the American West: it was not landowners in the West who invented barbed wire, but entrepreneurs who sought to develop new markets and products.

Of course, aquaculture is not without its problems. Most aquaculture (approximately two-thirds) occurs near the coast or in shallow estuaries, where pollution from outside sources can cripple

⁴² FAO (2000).

⁴³ FAO (1993).

⁴⁴ FAO (2000).

the operation. In addition, intensive aquaculture in these areas can produce significant amounts of organic pollution, which can reduce levels of oxygen in the water and increase quick-growing algae harmful to marine life. There is also growing concern over the use of antibiotics in some aquaculture.

It is worth noting, however, that pollution and environmental degradation generally occur where property rights have not been appropriately defined and/or are not readily enforceable. Government subsidies and incentives to expropriate coastal areas for aquaculture often further undermine nearshore conservation efforts. In Thailand, for example, aquaculture is heavily subsidized and in many cases farms are built in areas that were previously managed much more sustainably by a system of customary tenure.⁴⁵ In Malaysia, the Land Acquisition Act was amended in 1991 to allow the state to appropriate land for any reason deemed beneficial to economic development, including the construction of fish ponds. In Ecuador, bribes, corrupt government partnerships and land expropriation are common because “by law, coastal beaches, salt water marshes, and everything else below the high tide line is a national patrimony.”⁴⁶ Not only shrimp farms but city slums regularly invade these areas, even in national ecological preserves.⁴⁷ Alfredo Quarto, a director of the Mangrove Action Project, has pointed out that the main reason why shrimp farmers choose to clear mangrove forests is that they are usually government owned.⁴⁸ In other words, government sanctioned open access and expropriation of common property rights are really to blame for coastal habitat destruction in places like Thailand and Ecuador.

Barriers to Sustainable Development of Marine Fisheries

Legal recognition

One major reason that Japanese cooperatives have been so successful is that they have been recognized by law, which allows them both to defend their rights in court and develop ways of accommodating out-transfers. Unfortunately, in most places around the world, not only does the legal system not recognize private communal rights, it is often biased against them. McKean and Ostrom note that “Some [common property regimes] may have disappeared naturally as communities opted for other arrangements, particularly in the face of technological and economic change, but in most instances common property regimes seem to have been legislated out of existence”.⁴⁹

This was certainly the case in the Pacific Northwest, where Native Americans had developed complicated arrangements, both within and between tribes, to manage their salmon fisheries.⁵⁰ They relied heavily on fixed nets and weirs along the riverbank, but were careful to allow plenty of fish to pass in order to maintain the spawning runs and ensure a future supply. According to Robert Higgs, “Indian regulation of the fishery, though varying from tribe to tribe, rested on the enforcement of clearly understood property rights. In some cases these rights rested in the tribe as a whole; in other cases in families or individuals.”⁵¹ But as the numbers and power of settlers

⁴⁵ Bailey (1988).

⁴⁶ Southgate (1992).

⁴⁷ Southgate (1992).

⁴⁸ Weber (1996).

⁴⁹ McKean and Ostrom (1995), p. 3.

⁵⁰ Higgs (1982).

⁵¹ Higgs (1982), p. 59.

increased, these property rights were quickly expropriated by force.

Legal recognition of communal rights would go a long way towards resolving this problem, but unfortunately, especially in developing countries, expropriation is the norm. This may explain much of the current emphasis that many policy makers place on maintaining small fishing communities and their “cherished way of life”. Barring legal recognition, sentiment seems to be the next best alternative. Unfortunately, this may do more harm than good, as it tends to work toward entrenching the status quo. Property rights institutions, including communal ones, are constantly evolving, and while some communities may choose to maintain a certain way of life, others may not. Empowering people with the property rights to protect their environment is a powerful tool for sustainable development. On the other hand, legislating stasis is bad policy.

Opposition to private rights is often justified by arguing that fisheries are a ‘public’ resource and that any move in the direction of privatizing them will prevent ‘the public’ from benefiting from the resource. But such arguments are based on prejudice – not reason. If it is agreed that the greatest public benefit likely to result from maintaining both a healthy resource and a healthy and prosperous populace, the available evidence suggests that, generally speaking, private ownership is superior to open access. Maintaining open access may appeal to egalitarian values but is likely to lead to a depleted ‘wasteland’. By contrast, a shift to private ownership is more likely to ensure access to a valuable, plentiful resource. It may reasonably be concluded, therefore, that in the interests of ‘the public’, marine resources should be privatized.

Conclusions

A shift towards private solutions to marine conservation problems would almost certainly lead to better stewardship of marine resources and, as such, must be considered a necessary part of ‘sustainable development’. With marine resources privatized, innovation would no longer be about finding ways to fish more quickly; it would be about protecting those resources.

There is, of course, no single answer as to what sort of private ownership schemes might develop – if given the chance. In fisheries where there is great uncertainty and large catch fluctuations, there would no doubt be more risk sharing and group ownership schemes – from village common property regimes (as occur in the South Pacific) to fishing companies made up of ITQ owners (as in New Zealand). In other places, advanced technologies, many of which already exist, might be used to define and protect private property in the oceans, just as branding and barbed wire did in the frontier American West.⁵²

While new technologies can help define and enforce property rights, their availability must not blind one to the overarching importance of institutions. As the discussion of common property regimes above has demonstrated, in many places appropriate institutions already exist, though we may not understand them as such. It is worth remembering the words of the anthropologist John Cordell:

“It is one thing to contemplate the inshore sea from land's end as a stranger, to observe an apparently empty, featureless, open accessed expanse of water. The image in a fisherman's mind is something very different. Seascapes are blanketed with history and imbued with names, myths, and legends, and elaborate territories that sometimes become exclusive provinces partitioned with traditional rights and owners much like property on

⁵² See De Alessi (1998) for a discussion of how advanced technologies may be used to enforce private rights to marine resources.

land.”⁵³

People the world over will continue to try to improve their lot, whether or not the environment suffers. Fortunately, the success of attempts to marry conservation with development in countries from Palau to New Zealand points to the only workable solution. By recognizing and encouraging more private property rights and by allowing conservation and commerce peacefully to co-exist, both people *and* the environment will be better off – now that’s what I call sustainable development.

⁵³ Cordell (1989), pg. 1.

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