

PRESCRIPTIONS FOR THE COMMONS: ENVIRONMENTAL SCHOLARSHIP AND THE FISHING QUOTAS DEBATE[†]

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I. INTRODUCTION

Many natural resources important historically to the settlement and prosperity of the United States currently exhibit a now-familiar set of problems including overuse, waste, and adverse effects on non-commercial components of the surrounding ecosystem. The oceans adjacent to the U.S. coastline and the fish and wildlife species they support are no exception.¹ Sadly, it has taken the collapse of many commercially significant U.S. fish stocks and the attendant economic problems in fishing communities to capture the interest of legal scholars.²

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1. For a discussion of the role of cod in the settlement of North America, see MARK KURLANSKY, *COD: A BIOGRAPHY OF THE FISH THAT CHANGED THE WORLD* 78 (1997) ("By the eighteenth century, cod had lifted New England from a distant colony of starving settlers to an international commercial power."). The importance of whaling to New England is familiar to all readers of Herman Melville's *Moby Dick*. The current plight of the cod and great whales in New England waters surfaces in frequent newspaper accounts of depletion and impending extinction.

2. Legal commentary on federal fisheries management appeared only sporadically from 1976 until 1994, when the introduction of ITQs led to litigation, and the harvest of several commercial fisheries was severely reduced. See, e.g., Catherine E. Decker, *Issues in the Reauthorization of the Magnuson Fisheries Conservation and Management Act*, 1 OCEAN & COASTAL L.J. 323 (1995); Eldon V.C. Greenberg & Michael E. Shapiro, *Federalism in the Fishery Conservation Zone: A New Role for the States in an Era of Federal Regulatory Reform*, 55 S. CAL. L. REV. 641 (1982); Warren Magnuson, *The Fishery Conservation and Management Act of 1976: First Step Toward Improved Management of Marine Fisheries*, 52 WASH. L. REV. 427 (1977); Landgon S. Warner et al., *Practical Application of the Conservation Aspects of the Fishery Conservation and Management Act*, 5 HARV. ENVTL. L. REV. 30 (1981); Teresa M. Cloutier, Comment, *Conflict of Interest on Regional Fishery Management Councils: Corruption or Cooperative Management?*, 2 OCEAN & COASTAL L.J. 101 (1996); William Rogalski, *The Unique Federalism of the Regional Fishery Management Councils under the Fishery Conservation and Manage-*

Environmental problems such as air and water pollution, though similar in their underlying causes, have not suffered from the same neglect. Legal scholarship is replete with commentary on the shortcomings of environmental laws enacted in the 1970s and proposals for their reform.³ The principal legislation under which marine fisheries are managed in the United States was also enacted in this period, and its implementation has been influenced by some of the same trends in policy making.⁴ The modern era of U.S. fisheries regulation, however, began at a starting point quite different from that of pollution control. To be sure, command-and-control regulations designed to limit the amount of fish taken dominated the approach of federal fisheries managers. However fisheries policy making has been decentralized from the beginning: these regulations were committed to a form of face-to-face negotiations among competing stakeholders that has only recently begun to be used to shape pollution control regulations and to influence the consumptive uses of other natural resources.⁵

Fisheries policy making has in a sense already entered the phase of "alternative problem-solving strategies" that is now of such interest to analysts of western water policy, endangered species conservation, and

ment Act of 1976, 9 B.C. ENVTL. AFF. L. REV. 163 (1980). The introduction of ITQs has generated more interest in fisheries law in law reviews and journals. See, e.g., Franz Thomas Litz, *Harnessing Market Forces in Natural Resources Management: Lessons from the Surf Clam Fishery*, 21 B.C. ENVTL. AFF. L. REV. 335 (1994); William J. Milliken, Comment, *Individual Transferable Fishing Quotas and Antitrust Law*, 1 OCEAN & COASTAL L.J. 35 (1994); Symposium, *The Magnuson Fishery Conservation and Management Act: Retrospect and Prospect*, 9 TUL. ENVTL. L.J. 211 (1996); Neal D. Black, Note, *Balancing the Advantages of Individual Transferable Quotas Against Their Redistributive Effects: The Case of Alliance Against IFQs v. Brown*, 9 GEO. INT'L. ENVTL. L. REV. 727 (1998); Katherine A. Marvin, Note, *Protecting Common Property Resources Through the Marketplace: Individual Transferable Quotas for Surf Clams and Ocean Quahogs*, 16 VT. L. REV. 1127 (1994). The challenge of managing fisheries on an ecosystem basis and the role of ITQs in this quest was considered in three articles in 1997. See David A. Dana, *Overcoming the Political Tragedy of the Commons: Lessons Learned from the Reauthorization of the Magnuson Act*, 24 ECOLOGY L.Q. 833 (1997); Shi-Ling Hsu & James E. Wilen, *Ecosystem Management and the 1996 Sustainable Fisheries Act*, 24 ECOLOGY L.Q. 799 (1997); Alison Rieser, *Property Rights and Ecosystem Management in U.S. Fisheries: Contracting for the Commons?*, 24 ECOLOGY L.Q. 813 (1997).

3. See, e.g., Eric W. Orts, *Reflexive Environmental Law*, 89 NW. U.L. REV. 1227 (1995) (describing the limitations of centralized, command-and-control approaches and urging the adoption of more flexible, decentralized regulatory approaches); Richard B. Stewart, *United States Environmental Regulation: A Failing Paradigm*, 15 J.L. & COM. 585 (1996) (citing the failure of centralized regulation to set priorities among a series of fragmented and conflicting commands).

4. The Fishery Conservation and Management Act of 1976, 16 U.S.C. §§ 1801-1882 (Supp. II 1996), was aimed largely at controlling foreign fishing fleets in U.S. coastal waters with the assertion of a 200-mile fishery conservation zone. It did, however, also introduce for the first time a comprehensive program for the management of the domestic fishing industry. See generally Hsu & Wilen, *supra* note 2, at 799, 800-04.

5. See, e.g., DOUGLAS S. KENNEY & WILLIAM B. LORD, ANALYSIS OF INSTITUTIONAL INNOVATION IN THE NATURAL RESOURCES AND ENVIRONMENTAL REALM: THE EMERGENCE OF ALTERNATIVE PROBLEM-SOLVING STRATEGIES IN THE AMERICAN WEST (Univ. Colo. Sch. of Law Nat. Resources Law Ctr. Research Report RR-21, 1999).

forest management.⁶ Moreover, U.S. fisheries management has embarked on several long-term experiments with exclusive property rights, in which fisheries are managed as closed systems through the creation of perpetual harvesting rights known as individual transferable quotas ("ITQs").⁷

Because ocean fisheries are "one of the most important remaining commons in the American economy,"⁸ these experiments may help legal scholars and policy makers to devise more effective approaches to the problems that plague many other natural resources. It may be difficult for policy makers to heed these lessons, however, unless they are encouraged to adopt a more sophisticated and complex conception of human institutions and rules for natural resource use. Environmental law scholarship can help bring about this understanding. It can do so, however, only by analyzing these experiments in environmental law and policy in light of the theories and observations of a broader range of disciplines than those traditionally relied upon, applying the learning of those scholars who have sought a deeper understanding of humankind's relationship to the environment than that conveyed by simple stories like the tragedy of the commons.⁹

This Article traces the influence of different bodies of scholarship on one field of environmental policy—fisheries management. The influence of the "tragedy of the commons" story, and the prescription for individual property rights that relies on the commons tragedy for its justification, is contrasted with the more complex social and institutional analysis arising from the theory of common pool resource dilemmas and from thoughts about private property rights triggered by recent takings litigation. All are considered in light of recent calls for "ecosystem approaches" to natural resource management problems. The difficulties encountered in the attempt to introduce private property rights into the fisheries com-

6. *Id.* at 26–40 (describing the rise of alternative problem-solving strategies aimed at devising institutional solutions to natural resource and environmental problems and addressing the limitations of command-and-control programs).

7. When these permits are tradable or transferable, they are ITQs. If the program significantly limits or prohibits exclusive trades or sales, they are called individual fishing quotas ("IFQs.") The Magnuson-Stevens Act uses the term "IFQ." See 16 USC § 1802(21) (Supp. II 1996) (definition of IFQ). An ITQ is the most common type of IFQ and the literature uses the term "ITQ." For additional discussion of this concept, see *infra* note 67.

8. Dana; *supra* note 2, at 846.

9. Some legal scholars have begun this project. See, e.g., ROBERT C. ELLICKSON, *ORDER WITHOUT LAW: HOW NEIGHBORS SETTLE DISPUTES* (1991) (explaining how neighboring ranchers in Shasta County, California, use informal norms to prevent conflicts). The commons literature has been carefully considered in the work of Carol M. Rose. See, e.g., Carol M. Rose, *The Comedy of the Commons: Custom, Commerce, and Inherently Public Property*, 53 U. CHI. L. REV. 711 (1986); Carol M. Rose, *Rethinking Environmental Controls: Management Strategies for Common Resources*, 1991 DUKE L.J. 1; see also Fred P. Bosselman, *Replaying the Tragedy of the Commons*, 13 YALE J. ON REG. 391, 399–402 (1996) (book review).

mons suggest the need for a better integration of economics, political theory, and property law in environmental law and policy.

II. SCHOLARSHIP'S INFLUENCE ON THE PROBLEM OF THE FISHERIES COMMONS

Although legal writers have only recently discovered fish, scholars in other disciplines, primarily economics, have thought about "the fisherman's problem"¹⁰ for at least a half century.¹¹ In fact, economic theory long ago set the terms of the environmental policy debate with such accounts as the theory of property rights and the problem of social cost.¹² In the field of fisheries management, economists have had as much influence as biologists in the evolution of government responses to the problems of overfishing.¹³ Recently, legal scholars have begun to pay attention, seeing the fisheries crisis as the latest illustration of how poorly open access resources fare in the hands of individual actors and government agencies and suggesting that new institutional arrangements are in order.¹⁴

The collapse of many U.S. fisheries has coincided with an overall disenchantment and reexamination of environmental policies in the United

10. ARTHUR F. McEVoy, *THE FISHERMAN'S PROBLEM: ECOLOGY AND LAW IN THE CALIFORNIA FISHERIES, 1850-1980* (1986). Summarized, the fisherman's problem describes the situation when a fisherman exercises restraint by not capturing a fish, but has no way to prevent others from catching it, and therefore loses out to those fishermen not exercising restraint. McEvoy explains that there is no market mechanism available to reward individual behavior that serves to conserve a shared resource. See *id.* at 10. The fisherman's problem is also an example of what has been called the n-person prisoners' dilemma, where the behavior strategy that is rational for the individual is irrational for the collective. It is the same dilemma faced by the individual cattle grazer Garrett Hardin described in his essay, *The Tragedy of the Commons*, 162 *Sci.* 1243 (1968).

11. H. Scott Gordon, *The Economic Theory of a Common-Property Resource: The Fishery*, 62 *J. POL. ECON.* 124 (1954).

12. See generally Ronald H. Coase, *The Problem of Social Cost*, 3 *J.L. & ECON.* 1 (1960); Steven N.S. Cheung, *The Structure of a Contract and the Theory of a Non-Exclusive Resource*, 13 *J.L. & ECON.* 49 (1970); Harold Demsetz, *Toward a Theory of Property Rights*, 57 *AM. ECON. REV.* 347 (1967); Ronald N. Johnson & Gary W. Libecap, *Contracting Problems and Regulation: The Case of the Fishery*, 72 *AM. ECON. REV.* 1005 (1982).

13. See generally FRANCIS T. CHRISTY, JR. & ANTHONY SCOTT, *THE COMMON WEALTH IN OCEAN FISHERIES: SOME PROBLEMS OF GROWTH AND ECONOMIC ALLOCATION* (1965) (providing an overview of fishing as a common pool problem). For an historian's account of the interaction of ecology, economics, and legal processes in public policies concerning fisheries, see McEVoy, *supra* note 10, and Harry N. Scheiber, *From Science to Law to Politics: An Historic View of the Ecosystem Idea and its Effect on Resource Management*, 24 *ECOLOGICAL Q.* 631 (1997). For an account of the challenge economists posed in the 1950s to the dominant paradigm of fisheries management (maximum sustainable yield), see Harry N. Scheiber & Chris Carr, *The Limited Entry Concept and the Pre-history of the ITQ Movement in Fisheries Management*, in *SOCIAL IMPLICATIONS OF QUOTAS SYSTEMS IN FISHERIES* 235-60 (Gísli Pálsson & Guðrún Pétursdóttir, eds., 1997).

14. For scholarly attention to this problem, see articles cited *supra* note 2.

States. The reexamination has focused on alternatives to government-centered decision-making, relying either on markets to determine the optimum levels of resource use or on voluntary, collaborative decision-making within some defined community closely connected to the resource in question. The prescriptions emerging from this reexamination range from calls for privatization of a broad spectrum of environmental resources to devolution of management decisions to stakeholders' committees representing interests that encompass the entirety of ecosystem services and boundaries.

The greatest influence on fisheries policy arguably has come from the proponents of property rights and market forces to avert the tragedy of the commons. Since the early 1990s, most of the calls for reform have focused on ITQs as the best solution to the problems that plague U.S. fisheries. But there have been other voices that speak of the informal rules and institutions that some communities have developed to control the use of natural resources upon which they depend. Communities like those are cited as examples of "fisheries that work."¹⁵ Further, new insights into the complex dynamics of ecosystems coming from the biological and ecological sciences have given rise to the development of ecosystem management approaches more suitable than the traditional single-species or commodity approaches of the past.

A. Origins of the Pure Property Rights Prescription

In the early 1990s, one of the most controversial approaches to environmental law was that associated with "free-market environmentalism."¹⁶ This approach is part of a broader trend among legal scholars to advocate the use of market mechanisms to deal with problems previously considered to be in the realm of pure law or morality.¹⁷ In this literature, the adoption of ITQs as an alternative to command-and-control regulation is frequently cited to illustrate the benefits of leaving difficult resource allocation decisions to market forces.¹⁸ In a sense, the ITQ has become a "poster child" for free market environmentalism.

15. See, e.g., EVELYN PINKERTON & MARTIN WEINSTEIN, *FISHERIES THAT WORK: SUSTAINABILITY THROUGH COMMUNITY-BASED MANAGEMENT*, A REPORT TO THE DAVID SUZUKI FOUNDATION (1995).

16. See TERRY L. ANDERSON & DONALD R. LEAL, *FREE MARKET ENVIRONMENTALISM* (1991) [hereinafter *FREE MARKET ENVIRONMENTALISM*]. For background, see the Symposium, 15 HARV. J.L. & PUB. POL'Y 297 (1992).

17. See Norman W. Spaulding III, *Commodification and Its Discontents: Environmentalism and the Promise of Market Incentives*, 16 STAN. ENVTL. L.J. 293 (1997).

18. See, e.g., *FREE MARKET ENVIRONMENTALISM*, *supra* note 16, at 121-34; see also Terry L. Anderson & Donald R. Leal, *Fishing for Property Rights to Fish*, in *TAKING THE ENVIRONMENT SERIOUSLY* 161-83 (Roger E. Meiners & Bruce Yandle eds., 1993).

ITQs may be of both practical and symbolic importance to proponents of market mechanisms. This literature clearly values and searches for examples of successful policy decisions made by resorting to market forces. But the significance of the ITQ goes further. The open access fishery classically illustrates (and may have been the original inspiration for) the "tragedy of the commons." Garrett Hardin's famous essay of that name has long served as a description of individual behavioral and social factors responsible for resource depletion.¹⁹ Hardin drew upon the work of H. Scott Gordon, an economist whose explanation of the phenomenon preceded Hardin's own seminal article by more than a decade.²⁰

Gordon used the fishery to illustrate the fate of commonly used resources when unrestrained exploitation leads to the dissipation of all economic rent (income over costs). He showed that whenever a fishery market has few barriers to entry, new vessels or increased fishing power will exploit such opportunities. Yield from the fish stock will go up until it reaches its maximum level and then start to decline. In response to the decline, instead of reducing effort, fishermen will invest in more effective gear or technology, temporarily increasing their yields, but also their costs. The associated decline in profits attracts additional fishing effort to recoup these losses. As new effort continues increasing, total costs will eventually equal total income and the average return from fishing reaches zero. Gordon's prescription is to vest property rights in the fishermen or allow the government to control access to the fishery through limiting fishing vessel licenses.²¹

Hardin expressed skepticism about the efficacy of property rights in some circumstances and emphasized instead the need for a democratic choice of "mutual coercion" through regulation.²² But the powerful imagery of his metaphor has been linked to the absence of ownership and connected to the classical economic theory that institutions naturally evolve toward a state of private ownership.²³

The "free market environmentalism" literature often cites the emergence of ITQs as a step toward recognition of the superiority of property rights in ensuring efficiency and efficacy in resource management.²⁴ The

19. See Hardin, *supra* note 10.

20. See Gordon, *supra* note 11.

21. See *id.* at 132-33; see also McEvoy, *supra* note 10, at 11-12 (suggesting that Hardin's essay fits Gordon's analysis of marine fisheries to a wider range of issues). Cf. James E. Krier, *The Tragedy of the Commons, Part Two*, 15 HARV. J.L. & PUB. POL'Y 325, 335-38 (1992) (describing how Hardin's central insight was prefigured by the economist Harold Demsetz, whose 1967 article emphasized the problem of coordination and transaction-cost in common ownership, but that Hardin as a biologist was likely unaware of Demsetz' article and the contradictions it contained). See generally Scheiber & Carr, *supra* note 13.

22. See Hardin, *supra* note 10, at 1247.

23. See CAROL M. ROSE, PROPERTY AND PERSUASION: ESSAYS ON THE HISTORY, THEORY, AND RHETORIC OF OWNERSHIP 105-06 (1992).

24. See, e.g., Terry L. Anderson, Chapter 9, *Homesteading the Oceans*, in FREE

ITQ is presented as an alternative to the relentless and futile cycle in fisheries regulation. In this old model, government managers adopt command-and-control regulation to try to introduce inefficiency into the fishing fleet in response to its success in catching too many fish. The industry responds with a further investment in fishing power to get around the regulations. This increased power increases the catch rates even more, leading to a further decline in the fish stocks and calls for further government restrictions. The result is overcapitalization of the fishing fleet. This overcapitalization causes resource rents from the fishery to be dissipated, wasted in the endless struggle to evade regulation and to catch fish before the fishery is closed.²⁵

Assigning fishermen individual quotas, the free market environmentalism literature argues, allows fishermen to break out of the race for the fish, and to invest the money they would otherwise waste on unnecessary fishing power in the race against their competitors and the regulations, in improving the condition of the resource, better safety practices, and other socially desirable pursuits. This picture of the fisherman's problem and the contribution of regulations to the tragedy of the fisheries commons assumes that as long as the rule of capture prevails, fishermen cannot break out of the cycle unless they have a private right to harvest an amount of fish which they can use or sell.

B. The Theory of Common Pool Resources

Hardin's tragedy of the commons has been widely cited as a support for private ownership of certain natural resources.²⁶ It has also attracted numerous critics who question both the basic premises and the offered solutions.²⁷ These critics point out that Hardin was analyzing the tragedy of open access, non-property resource management regimes, not common property regimes.²⁸ Not all common property resources inevitably meet a tragic fate.²⁹ Economist Daniel Bromley, for example, argues that Har-

MARKET ENVIRONMENTALISM, *supra* note 16; Anderson & Leal, *supra* note 18.

25. See Anderson & Leal, *supra* note 18 at 161-62.

26. See, e.g., FREE MARKET ENVIRONMENTALISM, *supra* note 16, at 122 ("Ocean fisheries provide the classic case of the tragedy of the commons . . ."); see also Litz, *supra* note 2, at 336.

27. See Elinor Ostrom, *Governing The Commons*, in AN ENVIRONMENTAL LAW ANTHOLOGY 286-87 (Robert L. Fischman et al. eds., 1996) [hereinafter Ostrom, *Governing the Commons*].

28. See DANIEL W. BROMLEY, ENVIRONMENT AND ECONOMY: PROPERTY RIGHTS AND PUBLIC POLICY 22, 30 (1991).

29. See *id.* at 104 ("[T]he real tragedy of the commons is the process whereby indigenous property rights structures have been undermined and delegitimized."); Bosselman, *supra* note 9, at 391 nn.9-10. Bosselman also points out that the common pasture lands Hardin described never actually existed. The common law limited grazing rights to those persons holding specific grants or prescriptive servitudes and to villagers who had

Hardin's "tragedy of the commons" allegory has confused rather than enlightened scholars, stifling progress in understanding natural resource management regimes that actually work.³⁰

Political scientist Elinor Ostrom's criticism acknowledges the explanatory power of the "tragedy" but cautions scholars from drawing policy prescriptions from this metaphor and from assuming that the solutions to the problem it describes can only come from external sources, either government or the private market.³¹ Research by Ostrom and several others describes communities that have managed to avoid successfully the "perverse logic" and "shackles" of their "commons dilemma."³² Her goal is to develop and refine a theory of human organization based on these empirical studies that can explain why particular local regimes succeed, and identify the appropriate strategies to help those communities that do not succeed.³³

The Institutional Analysis and Development ("IAD") framework developed by the Workshop in Political Theory and Policy Analysis at Indiana University describes how rules operating at different levels of social organization affect the outcomes achieved by individuals using common natural resources.³⁴ Combining ideas from classical and neo-classical economics, public choice theory, transaction-cost economics, and non-cooperative game theory,³⁵ the IAD framework seeks to explain the types of rules and rule configurations humans develop that affect their interactions with the natural world.

The IAD framework is based on a conception of "common-pool resources" ("CPR"). The term "common-pool" is distinct from common property because it describes the nature and condition of the resource, not the management regime, that is, whether it is owned privately, by the state, or by a group.³⁶ The physical nature of common-pool resources tends to encourage their overconsumption.³⁷

customarily grazed their animals there. *See id.* at 396.

30. *See* BROMLEY, *supra* note 28, at 22. In Bromley's words, the Hardin metaphor "is not only socially and culturally simplistic, it is historically false," and deflects analysis away from the elements that allow common property regimes to prevent resource degradation. *Id.*

31. Ostrom, *Governing the Commons*, *supra* note 27, at 287. Ostrom notes that these policy prescriptions are themselves metaphors, oversimplified and perhaps even utopian. *See id.* at 293.

32. *Id.* at 292.

33. *See id.*

34. *See* ELINOR OSTROM ET AL., RULES, GAMES, AND COMMON-POOL RESOURCES 23-50 (1994) (providing a brief summary of the IAD framework and its history); Elinor Ostrom & Vincent Ostrom, *A Theory for Institutional Analysis of Common Pool Problems*, in *MANAGING THE COMMONS* 157-72 (Garrett Hardin & John Baden eds., 1977).

35. *See* OSTROM ET AL., *supra* note 34, at 25.

36. The term "pool" is used instead of "property" to avoid introducing property assumptions into the definition of the resource. *See* Bosselman, *supra* note 9, at 393.

37. *See id.*

The features of CPR that encourage overuse include the *excludability problem*, which is the difficulty of excluding other potential users because of physical characteristics. For a fish stock, these characteristics could include seasonal migration and distance from land. The excludability problem may be compounded by customs and laws that protect public use rights by prohibiting exclusion or the use of informal actions to control access.³⁸ Another problem is *subtractability* or *rivalry in consumption*, whereby extraction by one user reduces the amount available to other potential users or to the growth and replenishment of the stock. In the case of fish, the common law rule of capture precludes any ownership until capture but, once taken by a fisherman, fish are no longer available to other fishers, predators, or to the stock itself for reproduction.³⁹

Fish populations are the most obvious CPRs in the ocean. It is difficult to exclude others from access to and use of a fish stock. Less obvious, which contributes to the problem, is the biological diversity CPR. This CPR is the enormous variety of species that populate the ocean waters and seabeds and which compete with fishermen for habitat, prey, and protection.⁴⁰

Marine biodiversity, as global commons, benefits the entire biosphere through the varieties of genotypes, species, and ecosystems that it encompasses. But no one can be excluded from these benefits, and, once diversity is reduced by activities such as overfishing, or through widespread habitat destruction, the value to all current or future beneficiaries is diminished.⁴¹

According to the CPR literature, human societies create institutions to deal with these features of common-pool resources. The traditional account from the economic theory of property rights is that while the resource is still relatively abundant and therefore cheap, or the costs of management high, societies employ an open access regime. As the resource becomes scarce and more valuable, or as technology and other social changes occur that facilitate new institutions, societies adopt other institutions, like private property and market transactions, that will ensure that resources are allocated to their highest value uses.⁴²

38. See Johnson & Libecap, *supra* note 12, at 1006; GARY D. LIBECAP, CONTRACTING FOR PROPERTY RIGHTS 75-76 (1989) (explaining that the common law prohibition of exclusive property rights in uncaptured fish and vigorous enforcement under the Sherman Act have prevented actors from excluding rivals).

39. See NATIONAL RESEARCH COUNCIL, SHARING THE FISH: TOWARD A NATIONAL POLICY ON INDIVIDUAL FISHING QUOTAS 42 (1999) (citing Ostrom & Ostrom, *supra* note 34).

40. See ELLIOTT A. NORSE, GLOBAL MARINE BIOLOGICAL DIVERSITY: A STRATEGY FOR BUILDING CONSERVATION INTO DECISION MAKING 9-36 (1993) (describing marine biological diversity and explaining its importance).

41. See generally Alison Rieser, *International Fisheries Law, Overfishing and Marine Biodiversity*, 9 GEO. INT'L ENVTL. L. REV. 251 (1997).

42. See Demsetz, *supra* note 12.

Ostrom and others have shown that private property and markets are not the inevitable institutional response to growing scarcity. Individuals jointly using a common resource with subtractability and excludability features can communicate and agree to rules of use that can improve their joint outcomes.⁴³ By studying the sets of rules adopted in long-surviving common-pool resource regimes around the world, these researchers have identified common variables most often found in sustainable regimes and a set of design principles for institutional change.

Recent studies of multiple-use commons present a refinement on the IAD framework particularly relevant to ocean fisheries.⁴⁴ This approach considers resources in the context of their "resource domain." A resource domain is a set of fixed spatial dimensions within which one or more resources is located. Sometimes a resource and the domain it occupies are coterminous; other times they are not. For example ocean space is both the resource and the resource domain when used for navigation. The fish stocks are the resource and the ocean the resource domain when the same ocean space is used for fishing.⁴⁵

An example of a multiple-use commons is a fresh water body, the resources of which may be used for irrigation, municipal drinking water, recreation, waste disposal, and maintenance of ecological functions.⁴⁶ Access to the commons may be controlled by property rights recognized in the various users. The uses themselves differ in their degree of excludability and subtractability and conflicts among users are likely to arise. In the oceans, the multiple human uses include fishing, transportation, scientific research, mineral extraction, aquaculture, and recreation. Management institutions for these activities rely to some degree on a system of licenses or usufructs, but these are the exceptions; open access remains the norm.

Applying the CPR theory to a study of rules that coastal fishermen have developed on their own around the world, Edella Schlager found

43. See OSTROM ET AL., *supra* note 34, at 5. The IAD framework relies on a typology to classify the types of problems faced by joint users of a CPR. The problems that most people would consider "overuse" fall into two broad categories: appropriation and provision. *Appropriation problems* involve how to determine the sustainable level of use of a subtractable resource and how to exclude other potential users in order to stay within that level. *Provision problems* relate to creating a resource, maintaining it, and preventing its destruction. See OSTROM ET AL., *supra* note 34, at 9. See generally KENNEY & LORD, *supra* note 5.

44. See Victoria Edwards & Nathalie Steins, Developing an Analytical Framework for Multiple-Use Commons, Paper Presented at a Conference of the International Association for the Study of Common Property, Berkeley, Cal., June 5-8, 1996, cited in SUSAN J. BUCK, THE GLOBAL COMMONS: AN INTRODUCTION 33 (1998).

45. See BUCK, *supra* note 44, at 3.

46. See Ruth Meinzen-Dick & Lee Ann Jackson, Multiple Uses, Multiple Users of Water Resources, Paper Presented at a Conference of the International Association for the Study of Common Property, Berkeley, CA, June 5-8, 1996, cited in BUCK, *supra* note 44, at 34.

that fishermen experience three kinds of resource dilemmas.⁴⁷ First, *appropriations externalities* arise when each fisherman subtracts fish from the common stock without taking into account the effect on other fishermen's catches. This action increases the costs of fishing for all fishermen because the fish are now scarcer and more costly to find and catch.⁴⁸ Second, *technological externalities* arise when vessels and different gear types interfere physically with one another on the fishing grounds, both directly, through gear conflicts, and indirectly, through congestion. Third, *assignment problems* arise because fishermen do not necessarily coordinate their choice of fishing grounds: because fish are not evenly distributed across fishing areas, and fishermen cannot accurately determine the fish distribution, the fishermen do not efficiently allocate themselves across the grounds.

Schlager found that fishermen tend to organize themselves and to develop rules to address the technological externalities and assignment problems, but not the appropriation externalities. Coastal fishermen may set gear-use rules and establish territorial boundaries. They do not, however, regulate the quantity of fish caught each season based on some estimate of the sustainable yield and assigning a quota to each individual fisherman.⁴⁹ Fishermen may set quotas to try to influence the market price, but they do not on their own create, for example, tradable individual fishing quotas or tradable units of limited fishing time. Contrary to familiar assertions that fisheries exemplify the quintessential commons tragedy, these findings suggest that fishermen acting collectively can address at least some of their common-pool dilemmas without the intervention of government or the introduction of individual property rights.⁵⁰ The question for policy makers should then be what intervention strategies might help fishermen to address *all* of the externalities, including those affecting the broader marine ecosystem and biodiversity.

C. The Challenge of Ecosystem Management

While environmental law reformers were grappling with the challenges to centralized, standard-setting approaches brought by the property-rights proponents, rapid increases in ecological knowledge led to the creation of new sets of imperatives. These gains in understanding high-

47. See Edella Schlager, *Fishers' Institutional Responses to Common-Pool Resource Dilemmas*, in OSTROM ET AL., *supra* note 34, at 247-65 (1994).

48. See *id.* at 250. This dilemma arises when a fisherman asks himself what actions will give him the greatest level of yield, rather than what amount of total fishing effort will yield the largest aggregate production. See Schlager, *supra* note 47, at 250 n.2 (citing H. Scott Gordon, *An Economic Approach to the Optimum Utilization of Fishery Resources*, 10 J. FISHERIES RES. BOARD CAN. 442, 451 (1953)).

49. See Schlager, *supra* note 47, at 264-65.

50. See FREE MARKET ENVIRONMENTALISM, *supra* note 16, at 121-32.

lighted the inadequacies of the existing institutions of state ownership or centralized regulation designed to ensure the sustainable provision of natural resources and the protection of ecosystem functions.⁵¹ This recognition in turn has created a tension between the need for better international coordination of natural resource exploitation and the need for "highly diverse and localized solutions closely tied to the biological and cultural peculiarities of different places."⁵²

The hallmarks of "ecosystem management" include the twin goals of sustaining the integrity of an entire ecosystem over the long term and the adaptive and precautionary use of science to achieve that reality.⁵³ The approach includes recognition of the complexity of ecosystems and their resilient, dynamic, and self-organizing features that can be supported to achieve sustainability. Humans are an integral part of ecosystems, but the management of ecosystems requires transcending political boundaries in order to take account of the complex spatial and temporal scales at which ecosystem processes occur.⁵⁴

These goals and considerations do not demand a particular regime of resource management or form of decision making. The politics of environmental protection, however, and the quest for alternatives to centralized regulation, have led to a proliferation of voluntary, consensus-based arrangements aimed at involving directly various ecosystem stakeholders in choosing the rules.⁵⁵

The trend toward ecosystem-based management reflects recognition of two ideas crucial to the debate over ITQs. The first is that good fishing returns require management that ensures the health of the larger ecosystem of which the fish stock is a part. Even if humans only value the fish actually taken from the environment, humans still need to attend to the ecosystem effects of fishing to guarantee sustainable yields. Effective management of a marine ecosystem requires scientific data beyond the population dynamics of the commercially harvested fish stock and how much "surplus" fish those populations can produce.⁵⁶ The second idea is that ecosystems have valuable components beyond the fish caught, marketed, and consumed. The other valuable CPRs of the ocean include the diversity of species and habitats. Fishing can harm other species and

51. See Lee P. Breckenridge, *Reweaving the Landscape: The Institutional Challenges of Ecosystem Management for Lands in Private Ownership*, 19 VT. L. REV. 363, 368 (1995).

52. *Id.*

53. See *id.* at 371-76; see also Cymie Payne, *The Ecosystem Approach: New Departures for Land and Water*, Foreword, 24 ECOLOGY L.Q. 619 (1997) (noting that ecosystem management begins with the idea that the ecosystem is the unit to be managed and regulated).

54. See Breckenridge, *supra* note 51, at 374; see also R.E. Grumbine, *What Is Ecosystem Management?*, 8 CONSERVATION BIOLOGY 27 (1994).

55. See KENNEY & LORD, *supra* note 5, at 26-40.

56. See generally NATIONAL RESEARCH COUNCIL, *SUSTAINING MARINE FISHERIES* (forthcoming 1999).

habitats and alter marine ecosystems in ways not fully understood.⁵⁷ To protect the health and productivity of a marine ecosystem, restraints are needed to supplement total catch limits, including fish size limits, measures to prevent or minimize bycatch, restrictions on damaging fishing gears, and finally, closed areas to protect vital habitats.

Catching a species of fish for sale realizes one value of a rich and diverse marine ecosystem. If the right to engage in this activity is held exclusively by a group of individuals in the form of an ITQ, and these are traded actively in a market, there is a serious risk that all other valuable components of the ecosystem, which have no direct market value and whose contribution to the ecosystem's productivity is not understood, will be ignored. The value of the ecosystem itself is likely to be discounted by managers when setting regulations such as the total catch limit from which the annual, individual harvesting rights will be calculated.

Protecting the broader ecosystem does not necessarily require the adoption of one particular institutional arrangement must be adopted. As between the two regimes upon which environmental scholarship has focused the most attention—centralized regulation and property-rights approaches—neither one seems to have any particular advantage, although each has its proponents and detractors as a basis for ecosystem management. Carol M. Rose has observed that environmentalists use the image of a particular resource as part of a larger ecosystem to argue against rights-based regulatory tools like ITQs.⁵⁸ The effect of such measures, environmentalists fear, will be to elevate the significance of the property-tized component and, in effect, over-value them. This overvaluation may lead people to ignore that their entitlements overlap the entitlements of others interested in the same resource or ecosystem. It may even cause the disintegration of the "larger and intricately interrelated ecosystem," as holders of one entitlement overstate what they "own" and block other management actions aimed at protecting other components of the same ecosystem.⁵⁹

However, the need for management sensitive to the broader ecosystem may suggest, that, if property rights approaches are to be used to prevent resource depletion and spillover effects, these rights should take a particular form. These approaches should emphasize less the individual nature of the property right and more the community nature of the right. In fisheries management, for example, property rights could be allocated to a community, rather than an individual. Communities are more likely to embody a broader range of values and will therefore balance harvest-

57. See *id.* at 62-63.

58. See Carol M. Rose, *The Several Futures of Property: Of Cyberspace and Folk Tales, Emission Trades and Ecosystems*, 83 MINN. L. REV. 129, 174-77 (1998).

59. *Id.* at 173. This result may be aided by the introduction of a rhetoric and mentality of entitlement when property-like policy instruments are used.

ing decisions against broader spatial and temporal views of the ecosystem. Communities can also enforce limits on individual appropriators through informal norms and sanctions. The work of Elinor Ostrom and others using the IAD framework could offer guidance on the design characteristics of such regimes.⁶⁰ As discussed below, however, the current debate over property-based tools in fisheries management still focuses on the private individual ownership model, despite changes in the law reflecting the new awareness of a need for ecosystem-based management.

III. THE DEBATE OVER ITQS

A. *The Institutional Setting*

In 1976, when Congress enacted the Fishery Conservation and Management Act, now known as the Magnuson-Stevens Act, the principal policy goal was to assert U.S. authority over foreign fisheries within a zone 200 nautical miles from the U.S. coastline.⁶¹ In a sense, Congress heeded the argument that coastal fish stocks would suffer from the tragedy of the commons unless the tragedy was averted through the declaration of national sovereignty, an assertion of exclusive property rights at the national level.

The Act also put in place a comprehensive system for federal regulation of the domestic fishing industry.⁶² This system was based upon a promising but untested approach to public resource management, the development of regional conservation and management plans and regulations by federal-state cooperative bodies with significant participation by the principal resource users, the commercial fishing industry. Eight regional fishery management councils were given responsibility for the development of fishery management plans ("FMPs") for fish stocks of significance to commercial and recreational fisheries in the region.⁶³ These plans sought to promote "optimum yield" from each fishery; as that term would be defined by the regional councils. The benchmark for approval and implementation of these plans by the Secretary of Commerce was a set of seven national standards, the most significant of which was

60. See *supra* text accompanying notes 34-50; see also Rose, *supra* note 58, at 180-82.

61. 16 U.S.C. §§ 1801-1882 (Supp. II 1996). The Magnuson-Stevens Act creates the management framework for the commercial and recreational fisheries of the U.S. Exclusive Economic Zone, which extends from the seaward limit of state jurisdiction (usually 3 nautical miles) out to 200 miles from the U.S. coastline.

62. Some commentators suggest that fishermen agreed to the domestic regulatory program on the promise that the federal government would provide financial subsidies to assist in expanding the fishing fleet to replace the foreign fisheries. See Hsu & Wilen, *supra* note 2, at 801.

63. See 16 U.S.C. § 1852(a),(h) (Supp. II 1996).

the requirement that the plans prevent overfishing and achieve "optimum yield."⁶⁴

The Magnuson-Stevens Act authorizes a variety of tools to control fishing pressure and protect fish stocks and their environments.⁶⁵ These tools include restricting access by strictly controlling the number of fishing vessels licensed to participate in a particular fishery. Under such schemes, a vessel or fisherman who does not have a catch history in a fishery by a certain date is ineligible for a license or permit.⁶⁶ The goal is to prevent overcapitalization of the fishing vessel fleet that would produce more vessels and catching power than the resource can support.

The ITQ is by far the most controversial tool for restricting access. With an ITQ, an individual fisherman is allocated a fixed percentage of a fish stock's yearly quota in the form of an exclusive "harvesting privilege" and may sell or lease that privilege.⁶⁷ The basic objective of an ITQ is to avert the "tragedy of the commons" by guaranteeing fishermen who hold quota shares that their portion of the harvest quota will be available to them when they are ready to go fishing. They need not invest in excessive fishing power or deploy an excess of fishing gear in order to win the "race to the fish." The advantage of the ITQ over the limited license form of restricted access is that fishermen have no incentive to increase the power of their vessels in order to be able to capture their fixed share of the quota. (Under the traditional limited license schemes, fishermen still race to catch the seasonal quota.)⁶⁸

64. *Id.* § 1851(a). The national standards require that conservation and management measures adopted by the regional councils or the Secretary prevent overfishing while achieving optimum yield, that they be based upon the best scientific information available, that they consider efficiency in fisheries utilization, and that they manage individual fish stocks as units throughout their range and interrelated stocks as a unit or in close coordination. The standards prohibit measures from discriminating between residents of different states. They also require any assignment of fishing privileges among fishermen to be fair and equitable and to be reasonably calculated to promote conservation. Finally, measures may not forbid an individual entity from acquiring an excessive share. The 1996 Sustainable Fisheries Act amendments added standards requiring conservation measures to take account of the importance of fisheries to communities, minimize bycatch, and promote the safety of human life at sea. *See id.*

65. *See* § 1853(b).

66. Under the Act, in developing and approving limited access systems, the Secretary of Commerce and the regional councils must take into account present participation in the fishery, historical fishing practices in, and dependence on, the fishery, the economics of the fishery, the capability of fishing vessels used in the fishery to engage in other fisheries, the cultural and social framework relevant to the fishery and any affected fishing communities, and any other relevant considerations. *See id.*

67: Individual Fishing Quotas are defined under the Act as "a Federal permit under a limited access system to harvest a quantity of fish, expressed by a unit or units representing a percentage of the total allowable catch of a fishery that may be received or held for exclusive use by a person." *Id.* § 1802(21). IFQs are often referred to as ITQs because their trade or sale is authorized by the implementing regulations. But the IFQ concept does not necessarily include transferability.

68. Limited licenses are input controls, measures that often lead to "capital stuffing," i.e., the investment in fishery capital not controlled by the regulations.

In most ITQ programs, a government agency initially distributes the quota shares to current participants in the fishery, usually fishing vessel owners who can demonstrate a record of landings in the fishery. Ownership of a vessel with a landings record is assumed to be a good indication of entitlement to a share in the exclusive access to a fishery resource should it become necessary to create an exclusive class of participants.⁶⁹

Reflecting an international trend in fisheries management and responding to economic arguments, fisheries managers adopted individual quota programs in four federally managed fisheries during the 1990-1996 period: the Atlantic surf clam-ocean quahog, the South Atlantic wreckfish, and the Alaska halibut and sablefish fixed gear fisheries. The largest, most complex, and most controversial is the combined halibut and sablefish IFQ program, which took effect in 1996.

The discussion of property-rights approaches to managing U.S. fisheries has thus centered largely on the perceived advantages and disadvantages of the ITQ or IFQ. Other potential property-based approaches, including territorial use rights ("TURFs")⁷⁰ and community quotas,⁷¹ have been sidelined.

By 1994, however, implementation of the Magnuson-Stevens Act had reached a critical stage. The majority of U.S. fish stocks were overfished and several of the country's signature species were seriously depleted.⁷² With foreign competition in check, the catching segment of the U.S. fishing industry had grown to unprecedented levels. The rapid

69. See *Alliance Against IFQs v. Brown*, 84 F.3d 343 (9th Cir. 1996).

70. See Svein Jentoft, *Fisheries Co-management: Delegating Government Responsibility to Fishermen's Organizations*, 13 MARINE POL'Y 137, 138 (1989).

71. See, e.g., Rieser, *supra* note 2, at 830. A community quota is created when the government management agency allocates exclusive fishing rights to members of a community, usually defined geographically. An example of one form of community quota is the community development quota ("CDQ") program created under the Magnuson-Stevens Act in 1995. See David Fluharty, *Magnuson Fishery Management and Conservation Act Reauthorization and Fishery Management Needs in the North Pacific Region*, 9 TUL. ENVTL. L.J. 301, 310-11 (1996). The CDQ program's goal is to allow native communities of western Alaska to use revenues from certain Bering Sea fisheries for community economic development. See *id.* The program allocates a fixed percentage of the total annual catch of certain North Pacific fisheries to eligible communities. See 50 C.F.R. § 679.30-32 (1998) (Western Alaska Community Development Quota Program). Communities must be certified under the Alaska Native Claims Settlement Act, 43 U.S.C. § 1601 (Supp. II 1996). In 1996, Congress amended the Magnuson-Stevens Act to specify the conditions under which the Secretary of Commerce could establish and amend CDQ programs for western Alaska and western Pacific fisheries. Congress also imposed a moratorium on the creation of new CDQ programs pending preparation of a comprehensive report on their performance and effectiveness. See 16 U.S.C. § 1855(i) (Supp. II 1996). Congress requested the National Academy of Sciences to submit a report to Congress and the Secretary of Commerce on the performance and effectiveness of existing CDQ programs for Pacific fisheries. See 16 U.S.C. § 1855 note (Supp. II 1996). See generally NATIONAL RESEARCH COUNCIL, *THE COMMUNITY DEVELOPMENT QUOTA PROGRAM IN ALASKA AND LESSONS FOR THE WESTERN PACIFIC* (forthcoming 1999).

72. See NATIONAL MARINE FISHERIES SERVICE, *REPORT TO CONGRESS: STATUS OF FISHERIES OF THE UNITED STATES 3-5* (1997) (on file with author).

growth in these fisheries had led to most of the problems often associated with open-access fisheries, including overcapacity, reduced profits, short and dangerous fishing seasons, and continuous political pressure on the management system to relax conservation and management measures.⁷³

Through the concerted and well-coordinated efforts of environmental organizations and recreational fishing groups, the 1996 Sustainable Fisheries Act restored to prominence the goal of conservation of fish stocks. The 1996 amendments make the duty to prevent overfishing an enforceable obligation on the part of the regional management councils;⁷⁴ the amendments also require attention to non-commercial marine resources and the habitat impacts of fishing gear and activities.⁷⁵ These conservation objectives include the need to avoid or minimize the biological waste associated with certain fisheries in terms of bycatch, discarding, and adverse impacts on fish habitat.

On the economic side, the Act requires consideration of economic efficiency in light of the overcapacity in many of the newly Americanized fisheries.⁷⁶ On the social side, the amended Act contains a new national standard requiring consideration of the importance of fishing to certain "fishing communities" and greater attention to the distribution of economic benefits from U.S. fisheries.⁷⁷ With these goals seemingly in tension, the relative importance of efficiency versus distributional considerations in U.S. fisheries policy remains to be determined on a fishery-by-fishery basis.

73. See Daniel D. Huppert, *Managing the Groundfish Fisheries of Alaska: History and Prospects*, 4 REV. AQUATIC SCI. 339, 342 (1991).

74. Before the amendments, the regional councils were not required to stop overfishing. The Act now requires the Secretary of Commerce to step in and amend an FMP to institute a rebuilding plan if the council fails to do so within one year from the date on which the fishery is determined to be overfished. See 16 U.S.C. § 1854(e) (Supp. II 1996).

75. See *id.* § 1853(a)(7). The Act now requires the regional councils to describe and identify essential fish habitat for each fishery, to minimize to the extent practicable adverse effects on such habitat caused by fishing, and to identify other actions to encourage the conservation and enhancement of such habitat. Essential fish habitat is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity." *Id.* § 1802(10).

76. See 16 U.S.C. § 1851(a)(5) (Supp. II 1996).

77. The new national standard requires conservation and management measures to take into account the importance of fisheries to communities. See *id.* § 1851(a)(8). The Act defines a fishing community as "a community which is substantially dependent upon or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community." *Id.* § 1802(16).

B. The ITQ Moratorium

The debate over efficiency versus distribution was not ignored in the Act's reauthorization. In fact, the reauthorization was stalled for many months while the tension between the two played out in the political battle over ITQs. On the surface, the fight appeared to be about the merits of ITQs, but it was really a battle over which sectors of the Washington and Alaska commercial fishing and processing industries would gain permanent rights to the lucrative groundfish fisheries of the North Pacific.⁷⁸

The ITQ is in many ways similar to the emission reduction credits created under the 1990 Clean Air Act amendments, or the transferable development rights used in some states to conserve agricultural or ecologically sensitive land. However, Congress took a different approach to tradable fishing rights in 1996 than it did to tradable emission credits in the 1990 Clean Air Act. After the Commerce Department had approved and implemented only four regional ITQ and IFQ programs,⁷⁹ Congress placed a moratorium on the submission and approval of any new ITQ program until October 1, 2000.⁸⁰

The moratorium represented a compromise between factions in the fishing lobby during the reauthorization. Opponents of ITQs favored a permanent ban, while proponents struggled to keep ITQs available as a policy option. During the moratorium, the Act called upon the National Academy of Sciences ("NAS") to prepare a comprehensive report to Congress on ITQs after holding hearings in every fishing region of the country and evaluating the existing U.S. and foreign experience with ITQs and their alternatives. Congress in essence asked the NAS Committee to weigh both the theoretical claims and the empirical evidence of the advantages and disadvantages of tradable fishing quotas.⁸¹

78. See Hsu & Wilen, *supra* note 2, at 801-11.

79. The Secretary of Commerce approved ITQ programs for the Mid-Atlantic surf clam and ocean quahog fishery, the South Atlantic wreckfish, the Alaska halibut and sablefish fishery, and the Gulf of Mexico commercial red snapper fishery. See 55 Fed. Reg. 24,184 (1990) (to be codified at 50 C.F.R. pt. 652) (final rules to implement Amendment 8 to the Mid-Atlantic surf clam and ocean quahog plan creating transferable quota program); 57 Fed. Reg. 7,886 (1992) (to be codified at 50 C.F.R. pt. 646) (final rules to implement South Atlantic wreckfish ITQ program); 58 Fed. Reg. 59,375 (1993) (to be codified at 50 C.F.R. pts. 204, 672, 675-76) (final rules to implement North Pacific halibut and sablefish IFQ program); 60 Fed. Reg. 61,200 (1995) (to be codified at 15 C.F.R. pt. 902 and 50 C.F.R. pt. 641) (final rules to implement Amendment 8 to the Gulf of Mexico Snapper-Grouper FMP creating a commercial red snapper transferable quota program).

80. See 16 U.S.C. § 1853(d)(1) (Supp. II 1996). The moratorium required the Secretary of Commerce to repeal approval of the red snapper IFQ program. See 16 U.S.C. § 1853(d)(1)(B) (Supp. II 1996) (repealing the approval of any plan or amendment creating a new IFQ program that occurred either on or after January 4, 1995). The Gulf of Mexico red snapper IFQ program was approved on Oct. 13, 1995. See 60 Fed. Reg. 61,200 (1995) (to be codified at 15 C.F.R. pt. 902 and 50 C.F.R. pt. 641).

81. See NATIONAL RESEARCH COUNCIL, *supra* note 39.

The remaining issues surrounding IFQ programs were left to the NAS study committee to sort out. These issues included: when a fishery should be turned into an IFQ fishery; who should be eligible to hold quota shares; whether the quotas should be tradable; whether IFQ programs should have a fixed duration and "sunset" after some number of years; whether crew members or processing companies should be awarded initial allocations of quota shares; etc.⁸² Congress asked for the report to consider questions that go to the heart of the standard rationales for adopting ITQs: that tradable quotas promote economic efficiency, improve stewardship and conservation, and increase safety for fishermen and vessels.

The moratorium compromise recognized the ITQ as a potential tool for limiting access to a fishery under the Act⁸³ but froze ITQ development during the period of the moratorium and put certain conditions on any future ITQ programs.⁸⁴ By defining an ITQ as a revocable permit, the Act distinguishes the creation of ITQs from the establishment of a legal interest in property or a property right. The intent behind this language is

82. Congress asked the NAS committee to analyze and make recommendations on: threshold criteria for determining whether a fishery should be considered for ITQ management; mechanisms to ensure that past and present vessel owners, crews, and processors are treated fairly and equitably in initial allocations; the effects of limiting or eliminating the transferability of IFQs; the impact of limiting the duration of IFQ programs; mechanisms to minimize adverse social and economic impacts of ITQs and IFQs on fishing communities; measures to require ITQ and IFQ holders to be on board when their vessels are fishing for such quotas; measures to facilitate the entry of new participants under ITQ and IFQ programs; and the potential return to the public of some of the windfall profits from ITQs and IFQs realized through annual fees, transfer fees, auctions, or other measures. See 16 U.S.C. § 1853 note (Supp. II 1996).

83. It was no doubt a relief to the National Marine Fisheries Service to have a clear statutory basis for the existing programs even though courts had previously approved ITQ programs. See *Sea Watch Int'l v. Mosbacher*, 762 F. Supp. 370 (D.D.C. 1991).

The Act now defines an IFQ as "a Federal permit under a limited access system to harvest a quantity of fish, expressed by a unit or units representing a percentage of the total allowable catch of a fishery that may be received or held for exclusive use by a person." 16 U.S.C. § 1802(21) (Supp. II 1996).

The IFQ is defined as a permit for purposes of the Act's provisions on prohibited acts, civil penalties, permit sanctions, and criminal offenses. That permit may be revoked or limited at any time in accordance with these provisions, and if it is so revoked or limited, the holder is not entitled to any compensation from the government. The Act also states that the IFQ shall not create, or be construed to create, any right, title, or interest in or to any fish before the fish is harvested. See *id.* § 1853(d)(3).

84. These conditions include the creation of a loan fund for entry-level fishermen to purchase IFQs funded in part by a levy of up to three percent of the ex vessel value of the landings in an ITQ fishery and a central registry for the registration of title to ITQ permits and liens (this provision was requested by the financial community). After the expiration of the moratorium in 2000, the Act requires any council submitting an IFQ program for the Secretary's approval to consider the report of the NAS Committee and to ensure that the program includes a process for review and evaluation. The IFQ program must also provide for effective enforcement and management, and utilize a fair and equitable initial allocation. The initial allocation should include provisions to prevent concentrations of IFQ holding and to facilitate new entry, especially by those not benefiting from the initial distribution of quota shares. See *id.* § 1853(d)(5).

clearly to prevent ITQ holders from developing "investment-backed expectations" that could require the government to compensate them should such rights be eliminated in a revision of that fishery's management plan.⁸⁵

In one sense, the ITQ moratorium reflects the chronic impact of special interest politics on the development of national fisheries policy.⁸⁶ But in a more positive sense, the ITQ moratorium can be viewed as an opportunity for a full public debate beyond the Academy on the adoption of legislatively created property rights for common-pool environmental resources. The misgivings many people express about introducing private property rights in the form of tradable fishing quotas, and the possible answers to some of these misgivings, can shed light on the role of tradable rights generally in environmental protection.⁸⁷

C: A Tale of Two Fisheries

Before the government's adoption of IFQs in 1996, the Alaska halibut fishery fit the classic pattern of an open access fishery. Its value had grown so much that thousands of vessels were licensed to harvest halibut.⁸⁸ Given the competition, skippers and crews had devised highly efficient methods of catching fish, leading government managers to restrict fishing seasons to two twenty-four-hour "derbies" (one each in the spring and fall), when the entire annual quota was taken.⁸⁹

During these derbies, a huge amount of fishing gear was deployed, the fishing grounds became congested, and much fishing gear was entan-

85. When a government regulatory action is challenged as a taking, the Supreme Court has held that the regulation's economic impact and the extent to which it interferes with reasonable investment-backed expectations are relevant to the inquiry. See *Pa. Cent. Transport Co. v. City of New York*, 438 U.S. 104, 124 (1978). When Congress created the acid rain trading program in the 1990 Clean Air Act amendments, a similar disclaimer was made. See Clean Air Act, 42 U.S.C. § 7651(b)(f) (1994) (providing that tradable allowance to emit sulfur dioxide "does not constitute a property right").

86. See Dana, *supra* note 2, at 835-37; Hsu & Wilen, *supra* note 2, at 810.

87. The failings of the Magnuson-Stevens Act should also be studied for what they may teach us about environmental law because the Act has in essence experimented with many ideas that are the basis of reform proposals in environmental law. For instance, the Act embodies a decentralized form of decision-making which attempts to define management boundaries more in consonance with biological boundaries than with political jurisdictions. It delegates decisions to the resource users themselves, and relies to a degree on self-regulation and restraint by the federal agency in deference to the stakeholders' potentially superior knowledge of the practicable measures. Finally, the Act allows the adoption of market-based, property-like measures as an alternative to relying strictly on command-and-control regulations.

88. See *Development of the Individual Fishing Quota Program for Sablefish and Halibut Longline Fisheries Off Alaska: Before the National Research Council Committee to Review Individual Fishing Quotas* 10 (Sept. 4, 1997) (statement of Clarence G. Pautzke, Executive Director, North Pacific Fishery Management Council) (on file with author).

89. See *id.* at 11.

gled and lost. Estimates of the value of lost gear were between \$2.2 to 3.4 million each year, and the value of the target species caught by this "ghost" fishing gear around \$3.4 million.⁹⁰ A high rate of "incidental catch" of other non-target species, which were discarded at sea, also concerned managers. Work in the fishery was rated by the United States Coast Guard and the Labor Department as the second most dangerous *occupation* in the United States, with an average of three fatalities per year.⁹¹ In 1992, six people died and twenty-three search and rescue operations were launched during the twenty-four-hour derbies.⁹² Captains and crews took substantial risks with the weather and sea conditions to catch as much as they could before the season's quota was taken and the fishery closed.

At the same time, the derbies created many jobs for deck hands. Unfortunately, the deck hands received a low wage for their work; the frenzied fishing season glutted the market with quantities of lower-quality fish that were not handled well enough at sea to preserve their value for the fresh fish market. In the United States, fresh fish from this fishery was available and plentiful right after the two derbies. After that time, restaurants imported their product from Canada, while the fish caught by U.S. fishermen was sold for frozen storage.⁹³

After the introduction of IFQs, the fishery had only 2700 licensed fishing vessels operating during the eight-month season.⁹⁴ Consumers of halibut enjoy the availability of fresh, high-quality fillets at a reasonable price throughout this eight-month season. There are few if any gear conflicts because the vessel captains have time to decide where and when to set their gear to avoid other fishing vessels and their fixed gear. The captains also have time to communicate about the location of concentrations of juvenile fish which they want to avoid catching.

The fishing grounds are never saturated with gear. There are low rates of lost fishing gear so "ghost" fishing gear does not catch and waste target species. There is also a low incidental catch rate of non-target species of fish or marine wildlife. The fishing vessels obtain good prices for

90. See *id.* at 10-11.

91. The danger of the halibut derby fishing seasons was exceeded only by the Bering Sea crab fisheries. See *Report: Before the National Research Council Committee to Review Individual Fishing Quotas*, 20-21 (Nov. 13, 1997) (statement of Robert D. Alverson, Manager, Fishing Vessel Owners' Assoc.) (on file with author).

92. See *id.* at 20 (citing Letter from B.I. Merchant, Captain, Commander of U.S. Coast Guard, Seventeenth Dist., to Philip J. Smith, Chief, Restricted Access Management Div., Alaska Region, Nat'l Marine Fisheries Serv. 3 (Sept. 6, 1996)). Coast Guard search and rescue missions in the halibut fishery dropped from 33 in 1994 to seven in 1996. See *Commercial Fishing Fatalities in Alaska, 1991-1996: Before the National Research Council Committee to Review Individual Fishing Quotas* 3 (Sept. 5, 1997) (statement of George A. Conway, and Jennifer M. Lincoln, Ctrs. for Disease Control and Prevention, Nat'l Inst. for Occupational Safety and Health, Div. of Safety Research) (on file with author).

93. See *Report*, *supra* note 91, at 17-20.

94. See *id.* at 14 (reporting the number for 1996).

their catch and can "shop around" among dealers and processors to get the best terms. The ability to bargain for higher prices and the increased time to take care of the catch generates higher prices.

Only seven search and rescue operations were mounted in a recent eight-month season and only three fatalities have occurred in the past four years of this fishery.⁹⁵ One skipper recently participated at his own expense in an experiment to modify his fishing gear and deployment methods to reduce seabird mortality. He made and reproduced multiple copies of a demonstration video of his bycatch avoidance techniques.⁹⁶

To many observers, the changes in the halibut fishery confirm the theory behind individual quotas in fishing: that by assigning each participant a pre-determined amount of fish, each participant has an incentive to fish carefully and protect the continued availability of the resource. Quota trading allows the less efficient operators to sell out and transfer their shares to their more efficient colleagues. Assuming that the annual quota, the total allowable catch ("TAC") (which is used as the basis for assigning the quota shares), is based on sound scientific information, the halibut IFQ experience suggests that IFQs could be a recipe for sustainable fisheries.

D. Objections to IFQs

Both the halibut program and the earlier sea clam IFQ programs were challenged in federal court. The cases raised a number of issues reflecting a broad range of criticisms of property rights approaches to fisheries. Challengers to the surf clam and ocean quahog program claimed it amounted to an unauthorized privatization of a public resource.⁹⁷ They also raised the possibility that by awarding individual quotas based on past catch records, the program rewarded those fishermen whose excessive investment and harvesting caused overcapitalization and overfishing.⁹⁸ These challenges echo criticisms raised in

95. See *The Coast Guard's Role in the IFQ Fishery: Before the National Research Council Committee to Review Individual Fishing Quotas 1* (Sept. 4, 1997) (statement of Captain Vince O'Shea, U.S. Coast Guard) (on file with author). Greenpeace cites an opposite result in the surf clam/ocean quahog fishery, finding that fatalities have increased since the introduction of ITQs (apparently due to smaller crew sizes and crew fatigue), along with high-grading (selective discarding of smaller or lower value fish from the harvest so they do not count against the vessel's ITQ), and over-exploitation of higher yield fishing grounds. See Jed Greer, *The Big Business Takeover of U.S. Fisheries: Privatizing the Oceans Through Individual Transferable Quotas (ITQs)* 12-13 (Greenpeace Report, Apr. 1995).

96. See *Report on Seabird Deterrents: Before the National Research Council Committee to Review Individual Fishing Quotas 1* (Nov. 13, 1997) (statement of Mark S. Lundsten, Operator, F/V Masonic) (on file with author).

97. See *Sea Watch International v. Mosbacher*, 762 F. Supp. 370 (D.D.C. 1991).

98. See *id.* at 377.

earlier debates over emissions trading, one of the earliest proposals for a rights-based, market approach to environmental protection.⁹⁹ The *Sea Watch International* Court, reviewing the surf clam/ocean quahog ITQ program, was not inclined to entertain such fundamental challenges.¹⁰⁰ In *Alliance Against IFQs v. Brown*, however, the Ninth Circuit was more sympathetic to the claims of unfairness by the crew members who, because the decision was made to award quota shares only to vessel owners, were not included in the initial TAC distribution.¹⁰¹

Opponents of ITQs certainly include those who stand to gain little in the initial distribution of shares because they have no record of significant landings. They also include many who argue that ITQs create incentives that do not lead to better conservation or reduce investment in fishing power. ITQ owners can still benefit from exceeding their quota shares if they can escape detection by enforcement officials ("quota-busting"), and they may still have economic incentives to fish indiscriminately and then discard the less valuable fish from the catch ("high-grading"). Opponents also raise the potentially serious social dislocations associated with ITQs. They foresee fishermen becoming share-croppers for the owners of the quota shares who stay on shore and abuse their economic advantage by offering a reduced share of the vessel's profits.¹⁰²

Clearly, many fishermen have adapted to the "race for fish" under open access or limited access regimes, and those that remain in the race are good at it.¹⁰³ These fishermen have a rational fear that they will not do as well under an ITQ regime that creates a more efficient and business-like fishery. They fear efficiency, believing that more efficient operators will be able to buy up quota shares and bid up the prices, hire fewer crew members, and destroy family-based fishing operations.¹⁰⁴

99. See Robert W. Hahn & Robert N. Stavins, *Incentive-Based Environmental Regulation: A New Era From an Old Idea?*, 18 *ECOLOGICAL L.Q.* 1, 20 n.122 (1991).

100. See *Sea Watch*, 762 F. Supp. at 375-81.

101. 84 F.3d 343 (9th Cir. 1996). The court found that the Secretary of Commerce's decision to allocate only to vessel owners had a rational foundation, although alternative allocation schemes were easy to envision. In denying the plaintiff's relief, the court was clearly frustrated by the limited review afforded under the arbitrary and capricious standard. See *id.* at 352.

102. Environmental NGOs in the United States have also divided on the issue of ITQs. Greenpeace has waged a grassroots campaign to rally opposition among fishing communities to the concept of ITQs. See Greer, *supra* note 95. The Environmental Defense Fund, on the other hand, has taken a position of qualified support of the ITQ as a vehicle for sustainable fisheries, consistent with its policy of supporting market-based instruments for environmental protection. See *Comments of the Environmental Defense Fund: Before the National Research Council Committee to Review Individual Fishing Quotas 1-3* (May 7, 1998) (statement of D. Douglas Hopkins, Senior Attorney, Envtl. Defense Fund) (on file with author); see also Lee G. Anderson, *A Commentary on the Views of Environmental Groups on Access Control in Fisheries*, 28 *OCEAN & COASTAL MGT.* 165 (1995).

103. See Dana, *supra* note 2, at 838-40.

104. See Greer, *supra* note 95, at 12-14.

The privatization claim raises critical issues about the nature of the ITQ. If it does in fact convey a property interest in the right to harvest, it is in the nature of a usufructuary right, where the right held is the right to enjoy the fruits of someone else's property. The critics who cite the problems of quota-busting and high-grading may be suggesting that this limited right is not enough to change the incentives of a Hardinian herder, contemplating adding one more head of cattle to the common pasture, into those of an individual owner, developing the long-term value of the harvesting right.

ITQ owners may not believe they stand to gain future benefits from staying within the TAC. They know that they can pressure their regional management bodies to set the total quota from which the individual annual shares are calculated on the high side. ITQ holders are still likely to engage in this form of rent-seeking and to fight with managers and each other over catch limits and other restrictions.¹⁰⁵ The amended Magnuson-Stevens Act may in fact encourage this rent-seeking behavior by defining ITQs as mere harvesting privileges that can be changed or eliminated by later decision.¹⁰⁶

Awarding fishermen usufructuary rights is not enough to guarantee they will become good stewards. Once ITQ programs are in place, they will be extremely costly to change, as the New Zealand experience has shown.¹⁰⁷ Moreover, ITQs are a form of individualized property that would tend to prevent fishermen from forming alternative production arrangements in which they could collect and share information¹⁰⁸ and adopt their own rules to address the appropriation and technological externalities described by Elinor Ostrom and Edella Schlager.¹⁰⁹ ITQs do

105. See Elizabeth Brubaker, *The Ecological Implications of Establishing Property Rights in Atlantic Fisheries*, in *TAKING OWNERSHIP: PROPERTY RIGHTS AND FISHERY MANAGEMENT ON THE ATLANTIC COAST* 221, 244 (Brian Lee Crowley ed., 1996) ("The spectre of too many fishermen chasing too few fish has been removed by the [ITQ] system only to be replaced by special interest groups fishing politically on land for a share of the resource." (quoting Rodney P. Hide & Peter Ackroyd, *Depoliticising Fisheries Management: Chatham Islands' Paua (Abalone) as a Case Study* (1990) (unpublished report for R.D. Beattie Ltd. Centre for Resource Management, Lincoln University)); Steven F. Edwards, *Ownership of Renewable Ocean Resources*, 9 *MARINE RESOURCE ECON.* 253, 258 (1994).

106. See 16 U.S.C. § 1853(d)(3) (Supp. II 1996). See also Sea Watch International v. Mosbacher, 762 F. Supp. 370 (D.D.C. 1991) (noting the sea clam ITQ regulations do not create permanent property rights but only revocable harvesting privileges).

107. See Christopher Dewees, *Fishing for Profits: New Zealand Fishing Industry Changes for "Pakeha" and Maori With Individual Transferable Quotas*, in *SOCIAL IMPLICATIONS OF QUOTA SYSTEMS IN FISHERIES*, supra note 13, at 91; Basil M.H. Sharp, *From Regulated Access to Transferable Harvesting Rights: Policy Insights From New Zealand*, 21 *MARINE POL'Y* 501 (1997).

108. See Anthony D. Scott, *The ITQ as a Property Right: Where it Came From, How It Works, and Where It Is Going*, in *TAKING OWNERSHIP*, supra note 105, at 79-80.

109. See supra text accompanying notes 34-49.

not give fishermen a vehicle for collectively advancing their common concern for the future value of their property.¹¹⁰

Perhaps the most important shortcoming of ITQs arises with ecosystem management. ITQs alone do not create an institutional framework within which fishermen must work with other groups and individuals who depend upon and are concerned with a healthy, functioning marine ecosystem. In this way ITQs may run counter to the trend in environmental policy generally and, in particular, the new mandates of the Sustainable Fisheries Act that require fisheries management to take account of the inter-relatedness of species and their habitats, as well as the ecological ramifications of heavy fishing pressure on increasingly lower trophic levels.¹¹¹ These changes in the law, which reflect the growing global concern for preserving biological and ecological diversity,¹¹² may mean the ITQ with its emphasis on achieving efficiency is already an obsolete policy instrument.

IV. LESSONS FOR SCHOLARSHIP FROM THE ITQ DEBATE

The ITQ debate suggests that property instruments do have a role to play in the new era of ecosystem management, but it also shows that scholarship must avoid focusing too narrowly on one conception of property rights, on the *individual* rights that might be enlisted in the cause of conservation and efficiency.¹¹³ The debate points out that efficiency, the major goal of market-based approaches, is not necessarily the most important objective of resource management. To many, fairness in the distribution of benefits from a public resource is equally or more important.¹¹⁴ As soon as one group of users within a multiple-use resource domain that has previously operated as a commons acquires property rights, other claimants will surely come forward and seek similar recognition of their stake in the ecosystem. This phenomenon has been demonstrated in the experience of the New Zealand ITQ program and its costly adjust-

110. See Scott, *supra* note 108, at 85.

111. See John Beddington, *Fisheries: The Primary Requirements*, 374 NATURE 213, 214 (1995); Carl Safina, *The World's Imperiled Fish*, 9 SCI. AM. PRESENTS 58, 60 (1998); Dick Russell, *Fishing Down the Food Chain*, AMICUS J. Fall, 1995 at 16. The Magnuson-Stevens Act requires fishery management regulations to minimize bycatch and mortality of fish caught incidentally, to include measures to protect habitat essential to exploited fish species, and to achieve the level of fishing that is consistent with the protection of marine ecosystems. See 16 U.S.C. §§ 1802(28), 1851(a)(1), 1851(a)(9) (1994 & Supp. II 1996).

112. See, e.g., Rieser, *supra* note 41, at 254-55.

113. See *id.*; see also William J. Ballantine, *Networks of "No-Take" Marine Reserves Are Practical and Necessary*, in NANCY L. SHACKELL & J.H. MARTIN WILLISON, MARINE PROTECTED AREAS AND SUSTAINABLE FISHERIES (1995) (noting governments tend only to recognize private rights when property rights are created in the oceans).

114. See *Alliance Against IFQs v. Brown*, 84 F.3d 343 (9th Cir. 1996); Black, *supra* note 2.

ment to recognize Maori native fishing rights claims.¹¹⁵ The experience under the Magnuson-Stevens Act also provides substantiating evidence of this phenomenon. For example, CDQs have been created to allocate a portion of Bering Sea fisheries to native Alaskan villages¹¹⁶ and fishing quotas have been reduced to address the claims of the endangered Steller sea lion.¹¹⁷

Fisheries management, like virtually all areas of environmental policy, has undergone a major transformation. With the increase in scientific understanding of ecological phenomena, and the change in conditions from one of surplus to one of scarcity,¹¹⁸ the recognition is spreading that new management institutions are needed to provide the incentives appropriate to a time of scarcity.¹¹⁹ As economist Susan Hanna points out, while it may have taken much longer for humans to reach the end of the ocean-resource based frontier than that of the land, that point has now arrived. The institutions of the frontier, including open access, creation of ownership at the point of capture, and reliance on the resource user to make decisions about resource use in competition with others (a scramble competition strategy), are no longer appropriate.¹²⁰

The end of the ocean resource frontier is signaled by the increasing number of spillover effects between users, including fisheries bycatch levels, habitat destruction, and changes in biological relations among trophic levels (such as predator-prey relations) that now threaten the integrity of whole marine ecosystem.¹²¹ Having reached the end of the frontier, environmental law scholars and policymakers must recognize that property rights accorded any one individual cannot adequately take account of the entire ecosystem. Nor can one individual acting alone, even when given incentives through a permanent property right, take sufficient actions to ensure that all of the interconnecting components of a functioning ecosystem remain intact.¹²² Even a large number of individuals with the same new incentives, acting independently, cannot collectively address and account for all of these interacting components. Therefore, the individual property right seems more consistent with the previous era of resource use, a time when the policy goal was to design

115. See Dewees, *supra* note 107, at 91; Sharp, *supra* note 107, at 516-17.

116. See 16 U.S.C. § 1855(i) (Supp. II 1996); Jay J.C. Ginter, *The Alaska Community Development Quota Fisheries Management Plan*, 28 OCEAN & COASTAL MGT. 147 (1995).

117. See *Greenpeace Action v. Franklin*, 982 F.2d 1342 (9th Cir. 1992); see also McEvoy, *supra* note 10, at 235-36 (describing how California anchovy management had to leave a portion of the quota available for the brown pelican population).

118. See Susan Hanna, *The New Frontier of American Fisheries Governance*, 20 ECOLOGICAL ECON. 221 (1997).

119. See *id.* at 222.

120. See *id.* at 223.

121. See *id.*

122. See *id.* at 228-31.

incentives to capture the flow of benefits from fish populations without an excess investment in physical capital.¹²³

The collapse of fish stocks and the subsequent cascading effects that have been felt throughout the marine environment have made it apparent that fisheries must also be managed on the basis of the entire ecosystem. The institutions of management must abandon the frontier mentality and emphasize common resource approaches. The original Fishery Conservation and Management Act of 1976 in one sense perpetuated the frontier mindset by encouraging the Americanization of all fisheries, including those used previously only by foreign fishing fleets. The Sustainable Fisheries Act of 1996 may have begun the process of adapting existing regimes toward what land-based managers have already recognized as the ecosystem approach.¹²⁴

If new management approaches use property rights, those property rights must be created in a manner informed by a wider sense of social justice. The new property rights must acknowledge the importance of the distribution of benefits as well as endangered species, endangered cultures, and all groups dependent upon and affected by the condition of the natural environment.¹²⁵ In the modern fisheries commons, property rights should not be designed to alienate fishermen and free them from the interference of the community. Instead, a link should be established between rights and responsibilities.

The ITQ is firmly rooted in the principles of what Joseph Sax calls the "transformative economy," where nature is seen as a discrete entity waiting for the investment of time and human energy to transform it into something of value.¹²⁶ The vision of property embodied in the ITQ is the traditional notion of an individual property right, that views nature as something that can be "separated into components and dedicated to [the] production of particular commodities through monocultural practices or parcelization."¹²⁷ With the end of the fisheries frontier and the recognition of the legitimate claims of other components of marine ecosystems, new

123. Hanna describes *physical capital* as the fishing vessels and equipment which are applied to the ecosystem's *natural capital* to extract benefits in the form of landed catch. See *id.* at 222.

124. Edward Grumbine has described this approach as consisting of a number of themes, but overall requiring an approach that integrates "scientific knowledge of ecological relationships within a complex sociopolitical and values framework toward the general goal of protecting native ecosystem integrity over the long term." Grumbine, *supra* note 54, at 29. In regulations to implement the new habitat protection requirements of the Fishery Conservation and Management Act, the National Marine Fisheries Service sets out the Grumbine model as the one it seeks to achieve. See NOAA, Interim Final Rules on Essential Fish Habitat, 62 Fed. Reg. 66,531, 66,533 (Dec. 19, 1997) (to be codified at 50 C.F.R. pt. 600).

125. See McEvoy, *supra* note 10, at 256-57.

126. Joseph L. Sax, *Property Rights and the Economy of Nature: Understanding* Lucas v. South Carolina Coastal Council, 45 STAN. L. REV. 1433, 1442 (1993).

127. Breckinridge, *supra* note 51, at 385.

fisheries management should include property rights that reflect an ecological view of property, what Sax calls the "economy of nature."¹²⁸ Advances in science and the observation of the adverse effects of parcelization highlight that the marine environment is of far greater value when all its ecological components operate "as a whole, complexly-functioning entity."¹²⁹

The marine environment, with its fish stocks, physical environment, and other biological components, is not waiting for human interaction to make it productive. As Sax has described land when viewed ecologically, the marine environment is also "already at work, performing important services in its unaltered state. . . . Transformation diminishes the functioning of this economy and, in fact, is at odds with it."¹³⁰ The marine environment is, like land, part of a community which extends beyond the dominion of the owner, where use rights must be determined by physical nature, not humankind, and where public and exclusive owners have a custodial and affirmative protective role for ecological functions.¹³¹

Recognizing the economy of nature in the oceans requires active involvement of the community in determining how the marine system should be used. It cannot be left to the discretion of the individual owner of an ITQ, because a system of ITQs does not provide the capital needed to sustain systems of resource use. The institutions of a sustainable marine governance system must at the least force resource users to recognize that the fishery is an integrated system and that other stakeholders must share in the decision-making.¹³²

V. CONCLUSION

The social science literature published both before and after Garrett Hardin's essay on the tragedy of the commons has had an enormous impact on the trend toward property approaches in environmental policy. Legal scholarship that now seeks to reform environmental law should be careful to consider the full implications of the commons story in light of the need for strategies that can address the many complex and dynamic features of ecosystems. Advocates of property approaches should consider the reconception of property rights that is a part of the new ecosystems approach, a rethinking that has been shaped in part by efforts to retain a definition of property rights from an earlier time in our history, when we needed individual rights to transform the environment into goods and services.

128. Sax, *supra* note 126, at 1442.

129. *Id.* (commenting on river and forest ecosystems).

130. *Id.* (discussing land generally).

131. *See id.* at 1445-46.

132. *See* Hanna, *supra* note 118, at 231.

Marine fisheries, the last great commons in the American economy, and the traditional description of that resource, the tragedy of the commons, are in serious trouble. Property rights approaches may be the answer to this tragedy, but they must be fashioned to reflect the new conceptions of property that our time and circumstances require and build on the experience of communities that long ago learned to cooperate in managing their renewable resources.