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A PROPERTY RIGHTS CONUNDRUM
DOES COMMON + PROPERTY = NOTHING IN COMMON AND NO PROPERTY RIGHTS?

by

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and

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When models based on situations with no restrictions on entry are used to refer to situations which have restrictions on entry, serious confusion ensues. Similarly, the prescriptions for how to solve the predicted inefficiencies resulting from common property resources vary from creating clear-cut private property rights, to "intervention" by government, to governmental ownership.¹

Clearly, fisheries present a complex natural resource whose harvesting involves many problems of interdependencies, difficulties in measurement, differentials in knowledge and skills, and at times the presence of large numbers of independent actors (see Johnson and Libecap, 1982, for an excellent discussion of some of the complexities involved in production patterns in most fisheries). The diversity of property right regimes used in practice is also immense. Important commercial fisheries have been destroyed by the failure of the producers and/or of governmental agencies to devise appropriate property rights regimes that provide the incentives to lead producers to stay within sustainable yield and invest capital and labor at efficient levels. On the other hand, other commercial fisheries are effectively regulated by the fishers themselves either by property rights regimes which have evolved over time [e.g., lobster fisheries in

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Steven Cheung, describing the evolution of the concept of "externality" describes a similar process in which a theoretical term has gone "astray" in the following statement:

The process of arriving at a useful concept of analysis is not only slow and painful, but also may go astray and attain nothing useful. Someone begins with one example or observation, followed by a theory which is intuitively plausible. A theoretical term associated with a vague concept is coined. Examples of a seemingly different type emerge, which call for another theory. The process goes on. As examples and theories continue to accumulate, the different categories under the same heading of analysis serve only to confuse, and each associated theory becomes ad hoc (1970: 49).

Maine (Acheson, 1975)] or have been designed by the fishers themselves [e.g., inshore fisheries in Turkey (Berkes, 1987)].

The thesis we develop in this paper is that our theoretical and empirical knowledge of how various types of property rights regimes affect incentives, behavior, and outcomes cannot cumulate as long as we use an ambiguous term -- common property resource -- to refer to different theoretical and operational situations. We briefly review how resource economists have used the term "common property resources" to analyze the problem of fisheries. We then analyze the different bundles of rights which are included in various conceptions of property and define four types of legal positions -- owners, proprietors, claimants, and squatters -- by reference to which bundle of rights is possessed or not. Next we examine whether the set of right holders is defined or not and the individual or group status of the right holders. For rights held by collectivities, we examine whether the groups are organized or not and the type of enterprise structure involved. We then present a classification of property rights and organizational arrangements which enables us to sharpen predictions about particular property rights regimes which are likely to face problems of over-exploitation, extinction of species, and overinvestment of resources. Finally, we will illustrate how such a conceptual scheme helps bring clarity to disparate research findings related to the lobster industry in Maine.

Resource Economists on Property Rights

In 1954, H. Scott Gordon wrote what has become a classic article on the economics of an open access fishery. The article represents one of the

earliest attempts at applying standard economic theory of production to fisheries. Gordon demonstrated that in an open access fishery, fishers would withdraw fish beyond the point where rent from the fishery is maximized, and to the point where total costs equal total revenues. As Gordon concludes, "in sea fisheries, the natural resource is not private property; hence the rent it may yield is not capable of being appropriated by anyone" (Gordon, 1954: 130-131). In reaching this conclusion, Gordon fails to clarify differences among various property regimes. While he favors private property, which the above quote implies, he does not describe what rights private property in a fishery would entail. In addition, he speaks favorably of local self-control, or common use of fisheries, as in the case of Maine lobstergrounds, but he does not explicate what he means by local self-control (Gordon, 1954: 133-134). Later, Gordon equates common use with open access, which he claims leads to overexploitation. Finally, Gordon questions the efficacy of governmental regulation in relation to fisheries, particularly the regulation of the Pacific halibut fisheries, yet he finally advocates governmental control (Gordon, 1954: 131-132).

Common-property natural resources are free goods for the individual and scarce goods for society. Under unregulated private exploitation, they can yield no rent; that can be accomplished only by methods which make them private property or public (government) property, either case subject to a unified directing power (Gordon, 1954: 135; our emphasis).

In 1955, Anthony Scott expanded upon Gordon's paper. Scott avoided entangling himself in the property rights issue by focusing entirely on sole ownership of fishing grounds -- "property must be allocated on a scale sufficient to insure that one management has complete control of the asset" (Scott, 1955: 116). In addition, Scott follows Gordon's lead in equating

open access with common property, and like Gordon fails to clarify what is meant by sole ownership.²

An article by Frederick Y. Bell illustrates the influence of Gordon's and Scott's work. Bell describes his own work as "one of the first empirical verifications of the common-property theories developed by Gordon and Scott" (Bell, 1972: 149). At the time of publication, Bell served as the Chief of Economic Research for the National Marine Fisheries Service, National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce. While he denied that his view represented the official position of NOAA, one can presume that it reflected the view of many of the staff in this governmental agency.

Bell asserts (without any effort to explain why) that the inshore northern lobster fishery from Labrador to Delaware is a common-property resource even though the actual practices along this shore vary widely as we will discuss below. Bell specifically focuses on Maine. Bell finds that the total production of lobster from this fishery was at maximum sustainable yield. At the sustainable yield, the long run average cost equaled the price received for lobsters. Since long run average cost was higher than long run marginal costs, Bell argues that the rent (profit) that fishers could earn from this fishery was being dissipated by allowing too many fishers to produce. The efficient level of production would be, he concluded, where marginal costs = marginal revenue or, about one half of the amount produced. For this to be efficient, the "excess" labor must have low cost alternative employment. Bell, however, points out that "the

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In 1965, Scott co-authored a book with Francis T. Christy, Jr., in which the two authors equate open access with common property. In addition, they advocate the imposition of private property in fisheries (see Scott and Christy, 1965).

opportunity costs for labor is extremely low in rural parts of Maine" (Bell, 1972: 156). Since labor is not easily transferable, Bell warns that his "conclusion regarding uneconomic use of resources should be qualified" (Ibid.). But, nonetheless, Bell prescribes that:

The only solution to the "market failure" is government intervention. Government must find some device to control entry to the resource either by auctioning fishing rights or licenses (Ibid.: 157; our emphasis).

Why his finding that the fishers were not making as much of a profit as they could should be labeled such a serious "market failure" that the "only solution" is "governmental intervention," is left to the reader to ponder.

Bell's work remained for several years the major empirical support undergirding the continuing theoretical work on common-property fishery problems (see Plourde, 1970; Smith, 1968; Gould, 1972; Clark, 1973). In 1975, Agnello and Donnelly, drawing on Bell's work, developed a similar model for the eastern coast oyster industry. Like their intellectual predecessors, Agnello and Donnelly stress the importance of ownership rights as determinants of economic efficiency. They continue to equate open access and common property defined to mean the ability of any member of a community to harvest the fish stock (Agnello and Donnelly, 1975: 521). Private property, on the other hand, is not defined in terms of rights but in terms of effects. Private property internalizes the costs of the

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See J. L. McHugh, "Jeffersonian Democracy and the Fisheries," in Brian J. Rothschild, ed. World Fisheries Policy: Multidisciplinary Views (Seattle: University of Washington Press, 1972). McHugh takes an even more extreme view of government intervention. After reviewing oyster, crab, and menhaden fisheries in the Chesapeake Bay, he claims that "the primary lesson that they [the case studies] can teach is that strong, well-informed, and centralized control probably is the only effective mechanism for fishery management. When fishery decisions must be made in a regime based on Jeffersonian democracy, special interest groups and the uninformed majority take over and scientific management for maximum yield is impossible" (p. 152).

fisher's action, and also permits the fisher to capture the benefit of his or her harvesting efforts.

Agnello and Donnelly's use of the terms "private property" and "common property" epitomizes the general confusion in the literature about these terms. In their study of oyster fisheries, what they denote as private property is state-owned property leased to individuals or corporations. What they claim to be open access, or common property, is extensively regulated state-owned property (Agnello and Donnelly, 1975: 522). Given their unusual use of private property, it is difficult to determine what Agnello and Donnelly mean when they suggest the privatization of natural resources. Other empirical studies of inshore fisheries also refer to government-owned fisheries as open access or common property resources (Johnson and Libecap, 1982).

The preceding short review portrays the level of confusion in the literature on property rights. Many authors never clarify what they mean when they speak of private property, government-owned property, or common property. Yet these same authors proceed to advocate changes to other named but undefined property regimes, which they believe will close access into the resource. While controlled access is undoubtedly important in the management of fisheries, it can be attained and maintained under a variety of property regimes. Moving beyond the ambiguous way property rights have been defined requires a schema of rights that captures the basic property regimes developed by individuals as they confront the collective challenge of managing natural resources.

Rights, Rules, and a Property Regime Schema

A property regime is a configuration of rights and duties explicated by a set of rules. The basis for any schema must begin with an understanding of the relationships referred to as rights and duties. John R. Commons, in his book The Legal Foundations of Capitalism (1968) provides a general description of these relationships, which he calls working rules. "Working rules" order actions and transactions among individuals. The right/duty correlative relationship is the most basic of these ordered transactions. A right, according to Commons, is the capability or authority to undertake particular acts. The correlative of a right is a duty to act in accordance with the right being asserted. Commons also argues that limits exist to both rights and duties. Where an individual's rights end, their exposures begin. Exposure is the area of decision making where an individual cannot assert or enforce a right. The correlative of exposure, or the limit of a duty, is liberty. This is an area of decision making where the individual is under no duty, but is at liberty to act.

These two sets of relationships -- rights/duties and exposures/liberties -- order everyday human relations. The concepts of rights and duties are defined generally. What is contained in a particular set of rights is left open. Particular rules, such as position, boundary, authority, and scope rules, establish which persons may have particular rights, which individuals have corresponding duties, what constitutes an act of noninterference, and so on (E. Ostrom, 1986a; 1986b).

We use the term "property rights" to refer to the entire array of rights that individuals (or collectivities) may hold relating to the access, harvesting, and management of a resource, as well as the rights to

exclude others from a resource and the rights to transfer any or all of the above rights. We propose to define different types of legal positions that individuals (or collectivities) may hold depending on which bundles of rights are included in these positions. We define four positions: owner, proprietor, claimant, and squatter.

The legal position of owner of a particular resource, no matter whether an individual or a collectivity holds this position, is defined as holding a full set of property rights including:

Access: The right to enter a defined physical property and enjoy nonconsumptive aspects of that property (e.g., watch what is going on).

Withdrawal: The right to obtain the "products" of this resource (e.g., catch fish, appropriate water, etc.).

Management: The right to regulate internal use patterns, to transform the resource by making improvements or even to destroy the resource.

Exclusion: The right to determine who will have access to a resource or a share thereof.

Transfer: The right to sell, lease, or bequeath all of the above rights in whole or in part.

As shown in Figure 1, the legal position of "proprietor" of a particular resource, again no matter whether an individual or a collective, is defined as possessing four of the above rights: access, withdrawal, management, and exclusion. A proprietor can exclude these from use but cannot sell his or her property rights to that resource. This bundle of rights is what is frequently referred to as usufructory rights. The legal position of "claimant" of a particular resource is defined as possessing three of the above rights: access, withdrawal, and management, but not exclusion and transfer. Finally, some users, called squatters, of some resources have no rights. Others are owners, proprietors, or claimants. Squatters do use

natural resources such as fisheries, but they do so at their own risk since they have no enforceable rights in relation to anyone with claimant, proprietor, or ownership rights. In other words, a squatter stands entirely exposed to the actions of others as concerns the use of the resource. In the remainder of this paper, we will focus on the positions of owners, proprietors, and claimants since each of these legal positions have some property rights. Analyses of how some squatters are able to achieve some level of property rights are interesting, but we will focus our analysis on those who already have some legal rights.

Figure 1

Bundles of Rights Associated with Positions

<u>Owner</u>	<u>Proprietor</u>	<u>Claimant</u>	<u>Squatter</u>
Access	Access	Access	No Rights/ Only
Withdrawal	Withdrawal	Withdrawal	Exposures
Management	Management	Management	
Exclusion	Exclusion		
Transfer			

The breadth of rights contained in the bundle held by a particular owner, proprietor, or claimant will vary from jurisdiction to jurisdiction. Many laws affect property rights including those related to zoning, inheritance, civil rights, and taxation. Stating that a person is an owner, a proprietor, or a claimant does not tell us how broadly defined the access, withdrawal, or management rights are that each might possess. It simply tells us that any person occupying any of these three positions ~~would have the rights.~~

The positions of owner, proprietor, and claimant may be held by a single individual or a set of individuals. The literature on common property resources focuses entirely on situations in which positions are held by multiple individuals. When held by a single individual, it is assumed that a solitary economic actor will use a resource efficiently.⁴ Basically, the problem of investment in and withdrawal from the resource can be thought of as a problem of optimal control. The potential for inefficient management of a resource arises when multiple individuals possess ownership, proprietorship, or ownership rights to the same resource.

When multiple individuals possess property rights to the same resource, many factors influence whether these multiple economic actors will achieve an efficient system of investment in and withdrawal from the resource. While no single factor is the determinant of whether multiple actors achieve an efficient utilization pattern, the factor which we consider most important is whether or not the set of individuals who hold similar rights is well defined or not. In other words, is the criteria for membership in the set well specified. A well specified set -- such as all residents living in a particular jurisdiction -- may be large or small, but it is possible for any co-holder of any of the types of property rights to challenge the legal status of a user of a resource when membership is well defined. In many U.S. inshore fisheries, for example, all residents of a particular state are eligible to obtain a fishing license for particular

⁴ It is sometimes erroneously assumed that economic theory predicts that a sole owner would never exhaust a fishery. Clark's model, however, leads to a conclusion that "extermination of the entire population may appear as the most attractive policy, even to an individual resource owner" (Clark, 1973: 950).

species. Thus the set of co-claimants to an inshore fishery is restricted to those residents who apply and obtain a fishing license. Co-claimants can apply to state authorities to enforce this restriction on residents from other states (or countries) who try to fish within the territory under state jurisdiction.

On the other hand, a totally unregulated fishery, such as those occurring on the high seas, is open to use by an entirely undefined set of persons. No user, no matter what they consider their own set of property rights to be, has any grounds to exclude anyone else. Given this, the concept of either "owner" or "proprietor" in a completely open-access fishery loses meaning. In such a fishery, the only property right is that of claimant, as all who may want to use a resource can do so. The appropriate model for this type of situation is that of myopic optimization (Kaitala, 1986: 255). In such a situation, any of the following presumptions make myopic optimization the rational individual strategy:

- (1) Fishers do not (and cannot) know how many others are using the same fishery and how much is being harvested;
- (2) Fishers place an infinite (or VERY HIGH) discount rate on the future of the fishery; and
- (3) Fishers believe that individual harvest rates have no affect on the availability of future stock (Kaitala, 1986).

In such a situation, one should expect that the number of fishers continues to increase until no fisher makes any profit. Whether extinction occurs depends on the short-term marginal value of the dwindling stock.

If the set of individuals is well-defined, the next theoretically important question is whether the set is organized in some fashion. When co-owners, co-proprietors, or co-claimants try to exercise rights without some form of organization in which to determine how access, withdrawal, and

management activities (and the costs and reward related thereto) are assigned among them, they can be involved in endless disputes and may never achieve a coordinated harvesting strategy.⁵ The difference between an organized and an unorganized group of co-owners, co-proprietors, or co-claimants is substantial. Once organized, even a group of co-claimants may be able to exercise some effective control over harvesting activities so that the worst problems of over-use or over-investment are avoided. While the forms of organization that may be adopted are multitudinous, we will broadly classify the forms of organization (enterprise) into three types: private, communal, and public.

In a private organization, right holders have considerable liberty and independence regarding entry, exit, and input contributions to a joint enterprise. At the other extreme, when co-holders of a legal position are organized in the public sector, membership and contributions of inputs (taxes) may be coerced. Communal organization shares aspects of both private and public organization. One normally becomes a member of a communal organization through birth and may not be fully free to leave all responsibilities of communal life behind even upon moving to other

⁵ Co-owners and co-proprietors may develop a regular "share" arrangement where each person is allocated a defined share of rewards and specific duties. Co-owners can independently transfer these shares to others with greater or lesser individual discretion but cannot transfer the ownership of the commonly held resource in total without the agreement of the other co-owners. There are many extant property arrangements where a set of identifiable individuals each owns a well defined share of the harvest from a resource but does not effectively own the resource itself. This is particularly the case in regard to water rights. In Southern California, for example, a series of court cases have resulted in the perfection of well defined, transferable rights to a specific quantity of water to be withdrawn each year from underlying ground water basins (see Blomquist and E. Ostrom, 1985, and Blomquist, forthcoming). None of the "co-owners" of water rights, either individually or collectively, can sell the underlying ground water basins themselves even though they are able to exclude others from them and manage them in an efficient and effective manner.

locations. Those who are members of a communal organization determine whether and under what conditions those who are not borne into the organization may be considered members. The internal decision rules of a communal organization normally require a higher level of agreement -- sometimes approaching unanimity -- than the internal decision rules of either a private firm or a governmental enterprise.

We have arrayed our schema in Figure 2 so that the three legal positions are the columns and the form of organization constitutes the rows. As one moves from left to right and from top to bottom on the figure, one moves from what is clearly thought about as private property to several classes of relationships which are called common property regimes by one or another scholar. However, the differences among these regimes should now be somewhat clearer.

The concept of an "open access resource" is quite distinct from the other types of arrangements shown on the table. An open access resource involves an undefined set of individuals and, thus, all persons are potential claimants. Several economists have tried with little success to impress upon their colleagues the importance of distinguishing between problems associated with open access resources where any one can use the resource, from situations where a defined set of individuals share the same legal position (see, for example, Ciriacy-Wantrup and Bishop, 1975; Bromley, 1982; Runge, 1981).

The theoretical models of Gordon, Scott, Plourde, and Smith all assume that anyone can fish. These models are of situations which would be classified as open access resources in this schema. The theoretical predictions for the bottom row are straightforward. As long as the price that consumers are willing to pay for fish exceeds the private costs of

Figure 2

A Property Rights Schema Related to Natural Resources

<u>The Set of Persons Holding the Legal Position is:</u>	<u>Legal Position</u>		
	<u>Owner</u>	<u>Proprietor</u>	<u>Claimant</u>
Well Defined			
One Person	Sole Owner	Sole Proprietor	Sole Claimant
Multiple Persons			
Organized			
Private Sector	Private Firm Owner	Private Firm Proprietor	Private Firm Claimant
Communal Organization	Communal Owner	Communal Proprietor	Communal Claimant
Public Sector	Governmental Owner	Governmental Proprietor	Governmental Claimant
Unorganized	Unorganized Co-Owners	Unorganized Co-Proprietors	Unorganized Co-Claimants
Not Well Defined	[OPEN ACCESS RESOURCE]		

production, an increasing number of firms will exploit a fishery and overcapitalization and dissipation of rent will occur. Extinction may occur if the price is high enough to cover the increased production costs of mining the ever-dwindling stock.

Whether a similar prediction should be made for the second row from the bottom -- the unorganized right holders -- depends on the relationship between the number of individuals in these sets and the yield of the fishery. Even though the right holders may not be effectively organized to engage in the most economic forms of production, if the set of individuals who are co-owners, co-proprietors, or co-claimants is relatively small in relation to the resource in question, there may be few problems of over-exploitation. Unless over-exploitation or other technical externalities are a substantial potential problem, the cost of organizing may be greater than the benefits to be obtained.

If the group of co-holders of a position is sufficiently large, the dynamics facing rights holders in the "unorganized" row may be similar to those of the bottom row. A large group of unorganized "co-owners," who together own rights that permit them to harvest more than a fishery can produce, are in a similarly difficult position as those harvesting from an open access resource at least in the short run. The real advantage that such a set of individuals possess over those using an open-access resource is that membership is well defined. The costs of organizing a well defined group are substantially lower than the costs of trying to organize an undefined set of individuals. It may thus be possible to organize such a group. We have kept the concept of organization rather broad to include diverse forms. Most of the theoretical models of open access fisheries recommended some form of "centralized management" or "centralized

ownership" which would possess the right to exclude (for example, Smith, 1968: 426). Either organized proprietors or owners would, thus, fit this concept of "centralized ownership" even though the forms of organization may not themselves be highly centralized.

Of the three forms of organization, one could presume that private firms will be more conscious about efficiency in making investment decisions about resources than communal organizations, which, in turn, may be more efficient than governmental enterprises. Substantial literature comparing governmental enterprises and private enterprises undertaking similar tasks has consistently shown governmental enterprises to be less efficient (see De Alessi, 1980; 1982). However, relative efficiency also depends on the composition of the group of co-holders of rights and the willingness of participants to share in common duties without coercion. A communal organization relying on high levels of consensus may be the most efficient form of organization for relatively small, inshore fisheries where the species itself breeds and matures in a relatively localized area. For species which range over vast territory, no private or communal organization may be able to cope with the problems of gaining compliance from large numbers of individuals who do not know one another and share few norms of cooperation. In such cases, diverse forms of public organization may be able to reduce transaction costs sufficiently so as to be the most efficient form of organization. We would be willing to say that resources where those sharing the legal positions are organized -- whatever their form -- are far more likely than the unorganized or open access resources to be "managed" efficiently.

As we move from left to right across the columns of this schema, there are also important theoretical differences. All holders of ownership

rights have both the right to determine who will have access to the resource as well as rights to sell, lease, or transfer all or part of their rights to this resource to others. The right to exclude and the right to transfer play a very important part in the theoretical models of property rights and resource use. Without the right to exclude others from a share of a resource, it is presumed that a "rational" harvester would be motivated to withdraw as many fish as he or she could sell at a price just covering the harvester's private costs. Under many usufructory right systems, co-proprietors have very well defined rights to a share of "fruits" produced by a resource even though they do not possess rights of transfer. In many modern legal systems, proprietary rights are acquired through leasehold arrangements. Thus, we would expect that organized holders of ownership and proprietary rights would more likely make efficient investment decisions in a resource than organized holders with only claimant rights. The primary difference between having full ownership rights and having proprietary rights is that of transfer. In economic theory, it is the right of transfer that is the mechanism allowing resources to move from less efficient uses to more efficient uses.

Since the right of transfer can be exercised to a limited set of rights for a limited duration, it is also possible to have "hybrid" legal arrangements related to the same resource. Many of the empirical studies of fisheries cited above concern fisheries that have such hybrid property rights systems. Agnello and Donnelly, for example, compared two such hybrid systems: the "state owned-private firm proprietor" system used largely in Virginia to harvest oysters and the "state owned-unorganized claimant" system used largely in Maryland. In fact, all coastal fisheries in the U.S. are apt to be hybrid legal arrangements of one or another

variety since the ownership rights to the coastal waters are vested in the states and each state decides whether to assign claimant status to all residents, to all residents who obtain licenses, or to allow various forms of proprietorship to come about through self-organization or through formal lease-hold arrangements.

The possibility of "self-organization" of proprietorship rights introduces the necessity of discussing the difference between de jure rights and de facto rights. A right holder who has de jure rights can presume that, if these rights were challenged in an administrative or judicial setting, the rights would most likely be sustained. Users of a resource who have developed de facto rights act as if they have de jure rights among themselves and they may enforce these rights on one another. Many inshore fisheries around the world have been organized into de facto proprietorship arrangements by the fishers themselves who agree on their own membership, the territory they can fish, and whether or not there are limits placed on each person's harvest. The fishers themselves enforce these "rights" through a willingness to cut lines, destroy traps, or otherwise impose sanctions on those not following their local rules. Whether or not these de facto rights will be sustained in a court of law is more or less uncertain depending on the particular location. So long as no one challenges the rights exercised as a result of locally developed rules, the property rights regimes are as stable and predictable as de jure property rights regimes. Whether de facto rights will become de jure rights if challenged depends on many factors related to the legal doctrines in force and the history of resource use at the time of the challenge.

In understanding patterns of behavior and interaction in relationship to inshore fisheries in the U.S. and Canada, for example, it is important

to study both de facto and de jure relationships. In a wide variety of settings where local fishers possess de jure claimant rights, field research has found that these fishers have developed de facto proprietorship arrangements that are commonly known, understood, followed, and perceived as legitimate within the context of the local community (McKean and Cordel, 1987; Berkes, 1987; Davis, 1984; Acheson, 1975). Further, as we will discuss below, several studies have obtained empirical evidence that would support the claim that some de facto proprietorship regimes have not only been stable for long periods of time, but actually manage inshore fisheries more efficiently than similar fisheries which have not been so organized.

De facto property systems are important to study for several reasons. First, the literature examining property rights and fishery regulation is overwhelmingly pessimistic about the likelihood of fishers undertaking forms of self-regulation so as to avoid species extinction and inefficient practices. Understanding the de facto arrangements that have enabled some fishers to avoid these problems permits the development of better explanations of the conditions which deter or enhance effective collective solutions. Second, since the professional literature is so pessimistic about fishers adopting effective self-regulation, this literature is used by policy analysts to recommend sweeping reforms. These reforms may "sweep away," however, the successful human efforts to solve extremely difficult problems (see, for example, Davis, 1984). Third, since the regulation of these de facto proprietorship regimes is undertaken by local fishers who benefit from these regimes, the costs of regulation are largely borne by these same beneficiaries. Any institutional arrangement which enhances the internalization of the costs of monitoring and exclusion among the beneficiaries are important types of institutions to study.

A Second Look at the Maine Lobster Industry

As discussed in the introductory section, when Bell studied the Maine lobster industry, he simply assumed that the entire coast was an open access fishery. Instead of obtaining detailed information about the specific set of rights and duties of different regions of Maine, Bell obtained information about the quantity of lobster harvested, the average price paid for lobster, and the harvesting effort. Given the information he obtained on production costs and price, he was able to show that long run average costs of production along the entire coast were approximately the same as the average price received for lobster. Since he presumed that marginal costs were higher than average costs, Bell argued that the Maine lobstermen had dissipated the potential profits they could have made if they had agreed to curtail their number or the quantity of production. Not only did Bell not inquire about the specific types of property rights regimes that might be developed by specific lobstermen in particular harbours, he committed what Demsetz (1969) would call the "grass is greener fallacy." Bell compared average statistical results for a large number of aggregated real world transactions with a hypothetical ideal. When real world situations are compared to nirvana situations, the real world always fails.

Several scholars have studied the specific patterns of de jure and de facto property rights regimes in the Maine Lobster industry and have compared the performance of the two forms found in practice. Since the state of Maine has owned the lobstergrounds off the coast of Maine since

its inception, the state holds the rights of access, withdrawal, management, exclusion, and transfer.⁶ Maine has not, however, always exercised its rights of formal ownership leaving its grounds open for Maine residents to access and harvest. During the past several decades, the state has added licensing requirements (Acheson, 1975). Thus, instead of calling the lobster fishery an open-access fishery, we would call the dominant pattern that of government ownership with claimant status extended to all who obtained licenses.

In addition to these de jure claimant rights, lobstermen in many harbours developed de facto proprietor rights among themselves based on communal organization (Acheson, 1975; Grossinger, 1975). Prior to 1920, and thus prior to licensing, the entire coast was divided into a series of lobster "fiefs" with the men from each harbor or island fishing only the grounds associated with their own harbors. The lobstermen in each fishing village determined who could enter "their" grounds. In addition, as groups they decided how the grounds would be used -- what production techniques would be used, etc. Since the lobstermen could not sell, lease, or bequeath their rights of access, withdrawal, management, and exclusion, they would be classified as de facto proprietors using the scheme developed above.

The enforcement of these de facto proprietorship rights was borne entirely by the lobstermen of each village. The sanction that they used against anyone who violated communal rules was gear destruction. The lobstermen use large wooden traps, set on the ocean floor, to catch

⁶ Maine achieved statehood in 1820.

lobsters. These traps are attached by rope to buoys. The easiest means of destroying traps is to cut the rope by which the traps are attached to the buoys. Prior to 1920, lobstermen used this enforcement mechanism primarily to enforce their rules. It was a defensive strategy to cut any traps set in their territory by intruding lobstermen from other areas.

The period of time during which these de facto proprietor rights existed along the entire coast and remained stable is uncertain, but Acheson reports that they began to change after 1920. He attributes the change to the interaction of two factors -- new technology and the shape of the coast line (Acheson, 1975: 192). After 1920, lobstermen installed motors on their boats. The motors extended both the range and the type of weather in which the men could fish. No longer did the lobstermen have to fish only during the calm waters of summer. This technological change had its greatest impact in southern Maine where the coast is convoluted and forms deep bays (Ibid.). Men who fished in these bays prior to 1920 did so only during the summer months when lobsters were active in the warm waters of the bay.

The "inland" lobstermen had much more to gain by invading and maintaining access to open water grounds (Ibid.: 193). Being able to fish for more than three months out of the year translated into higher incomes and the ability to pay for expensive motors. The alternatives for the inland lobstermen, Acheson argues, was "to be bottled up in small traditional territories near their home harbors where they can only fish a few months a year" (Ibid.).⁷

⁷ These inlanders expanded into the open ocean territories, by setting gear in their territories, and by cutting the traps of the men who had developed de facto proprietary rights to fish in these territories.

The initial response of the open water men to these incursions was to retaliate "by cutting traps. The open water men were, however, unwilling to incur these enforcement costs permanently in order to exclude the baymen from their open ocean territories. Given the change in technological capabilities and the resulting economic incentives, stemming the incursions permanently would require the escalation of trap cutting into a full scale war. In addition, the open water lobstermen knew, and know, that while they might temporarily protect the boundaries of their grounds, future incursions would be a certainty. As a result, "men from open-ocean harbor

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gangs feel it is better to mix than fight" (Ibid.).

Property rights systems are not static, they tend to change as the environment in which they exist changes. Thus, in the southern part of Maine, boundaries of the former lobster fiefs have slowly become more permeable. Mixed fishing, i.e., groups of men from different harbors fishing the same territories, has become more common. The de facto system has slowly evolved to be much closer to the de jure system than it was previously. While the claimant rights of the lobstermen in these grounds are secure, the lobstermen have less decision-making authority over who can fish and how much in these grounds.

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These lobstermen act within the structure of two systems of use rights -- the one they have evolved for themselves, and the one recognized by the state of Maine. These men are, therefore, not limited to enforcing their rights through the sanctions they have established for themselves; they also have recourse to the state court system. The two enforcement mechanisms redress different rights. While trap cutting by the fishermen supports boundary maintenance and the de facto right of exclusion, the state court system enforces the right of access by claimants through penalizing trap cutting. Lobstermen rarely seek remedies within the state court system. First, to do so is to undermine their own de facto proprietor rights. Second, it is understood that lobstermen do not invoke external law against other lobstermen. Third, the information necessary to successfully prosecute is difficult to obtain. Someone, preferably the state fish warden, must see the cutting take place.

Lobstermen in northern Maine, however, have been more successful in maintaining their de facto priorietorship rights than in the south. The physical environment that these men face is quite different from that faced by the southern lobstermen. The coastline is generally not as convoluted as in the south. Therefore, there are fewer bays. The harbors tend to face the open seas and therefore the communally defined territories have tended for many years to include the open seas. There are also not as many islands. The islands that do exist are far enough off of the mainland that few mainland lobstermen find it worthwhile to make forays into the island lobster territories. Some of the northern fishing villages have defended their territories, when challenged, quite effectively and have further controlled "the total number of men engaged in the fishery in a particular area over a period of time" (Wilson, 1977: 101). Wilson argues that the voluntary agreements among lobstermen in these territories "confer on the group the potential benefits of ownership and control" (Ibid.).

Some of the island men have even gained legal recognition by the state of Maine of their proprietary rights. Acheson reports, for example, that the lobstermen of Monhegan Island persuaded the Maine legislature to forbid fishing in Monhegan waters from June 25 to January 1 (Acheson, 1975: 191). By taking this action, the legislature recognized the existence of a territory called "Monhegan waters." The state takes on the role of the traditional police officer patrolling these waters to enforce private property rights during six months of the year. From January 1 to June 25, the Monhegan lobstermen patrol their own territory. They choose to fish during this period because most other lobstermen do not fish during these months and the price of lobster is at its highest level for the year.

James Wilson and James Acheson have carried out empirical studies evaluating the biological and economic effects of the different institutional arrangements that existed side by side along the Maine coast. This provides a genuine comparative institutional analysis rather than the nirvana analyses of many of the other studies. The two researchers collected data from three lobstergrounds whose boundaries were well defended, and from three adjoining lobstergrounds whose boundaries were permeable. The researchers collected data on crowding effects, seasonality of catches, the age/size of the lobsters caught, stock density, and income. They found that controlled access grounds were not as crowded as uncontrolled access grounds. In particular, there were fewer boats per square mile in defended areas, and the average catch as measured by the number of lobsters per trap hauled was 60 percent greater in controlled areas (Acheson, 1975: 196; Wilson, 1977: 104).

In relation to the seasonality of the two types of fisheries, the average catch remained relatively stable throughout the year in defended grounds. In other words, lobstermen with de facto proprietor rights spread their fishing effort more evenly throughout the year. In undefended grounds, the average catch is quite high from August 1 to December 31, declining dramatically over the remaining several months (Wilson, 1977: 106). Average catches are high from August thru December because lobsters molt into legal size during this period, and there is a rush to harvest these lobsters as soon as possible. Lobstermen with de jure claimant rights expend much of their fishing effort during five months of the year.

Given the relatively uncrowded conditions and the stable fishing effort that characterizes defended grounds, one would expect that the age/size of the lobsters caught in these grounds would be greater than in

undefended areas. While on average, the weights and sizes of lobsters are only slightly larger in controlled areas, these small differences are significant in relation to reproduction. Many lobsters achieve sexual maturity between 90 and 100 cm. The average size of lobsters caught in undefended areas is 88cm, while in controlled grounds the average size is 90cm. In addition, a greater quantity of larger lobsters (ranging from 90cm to 100cm) are caught in the defended areas (Acheson, 1975: 199). This means that more lobsters in controlled areas reach reproductive maturity. Wilson estimates "that the probability of a female being mature at time of capture is 1.52 times greater in the controlled than in the uncontrolled areas" (Wilson, 1977: 105). Female lobsters that reach sexual maturity must by law be returned to the water if caught. Therefore, in the long term, there are more sexually reproductive lobsters in defended areas than in undefended grounds. This should translate into greater stock densities in controlled areas, which in fact is the case. Acheson reports that depending on the time of year, stock densities of defended grounds are from 22 percent to 50 percent greater than those of undefended grounds (1975: 202).

Finally, given the above data, it is not surprising that the incomes of lobstermen who have de facto proprietor rights are, on average, greater than the incomes of de jure claimants. As Wilson tentatively reports (N size is 27), lobstermen from controlled areas average \$22,929 per year as opposed to \$16,449 for lobstermen from uncontrolled areas.

As the empirical data collected by Acheson and Wilson reveal, de facto proprietor rights have resulted in greater benefits to the fishermen who hold such rights, as opposed to those lobstermen who are simply de jure claimants. In addition, grounds managed under rights of proprietorship

appear in better condition as revealed by less crowding and higher stock densities.

The ownership and use rights of Maine lobstergrounds compose an evolving, complex configuration of rules. Formal legal ownership of the grounds is vested in the state of Maine. The state, in turn, has vested claimant rights originally in all residents and more recently in those lobster fishermen who obtain state licenses. Prior to 1920, most of the Maine coast was organized into defined territories and the fishermen from each harbour controlled access to the fishing in each territory. Technological change challenged this system in the South where the economic incentives were substantial to move out of one's own territory and to invade territories which could be fished for longer periods of time. Under this challenge, the system has slowly evolved into a more permeable "property rights" system with local fishermen defending their core territory but boats from different harbours fishing in the outer portions. In the North, where the costs of maintaining the communal proprietary system have not been so high, some fishing villages have successfully kept their old system and control access from within the fishing village as well as from without. The different systems provide a "natural laboratory" in which to test the results of these diverse, operational systems.

Some readers may ask, is that not exactly what the theoretical models would lead one to expect? What is so different about Acheson's and Wilson's findings from those of Bell? Are not the policy conclusions similar? Does this not establish that government intervention is needed to control access? Well, the answers are yes and no. Let us return in particular to Bell's analysis. Bell presumed that the entire coast was open access. To counter this, he recommends government Intervention. The

key problem with this recommendation is what does government intervention mean in the empirical setting he was discussing. The fishery was already owned by the State of Maine. The State has from time to time intervened. But the interventions have been primarily in the opposite direction --to open access to local fishery fiefdoms rather than to help local fishery develop their de facto proprietary systems into de jure systems. One exception to this was the willingness of the state legislature to recognize the property rights of the Monhegan fishermen and to authorize the use of state funds to help police these property rights.

Governments intervene in the context of on-going property rights systems in diverse ways. The overwhelming orientation of both State governments and the Federal government in the U.S. has been to oppose informal voluntary efforts developed by local fishermen (or their unions) to control entry. The list of court cases in which the outcome was to dismantle a locally evolved, proprietary rights system is rather long (see Johnson and Libecap, 1982, for discussion and citations). Simply to call for governmental intervention in an empirical setting where government intervention has so consistently opposed the development of proprietary rights of exclusion is hardly a useful policy prescription.

The development of effective property rights systems to manage inshore fisheries is an extraordinarily difficult task (Johnson and Libecap, 1982). None of the policy instruments which are frequently prescribed are clearly beneficial. Simply calling for a quota system ignores the great differences in the fishing skills of participants and protects the inefficient from the efficient. Calling for a tax imposed by a larger government raises substantial questions as to how the tax will be used and whether the transfer of funds from the fishers to a government bureaucracy will enhance overall efficiency.

Nor can we simply presume that if the State and Federal governments changed their intervention policies of opposition to locally developed proprietary rights systems, that private, voluntary arrangements would emerge in most fisheries. The number of proprietary fisheries in Maine has steadily diminished and may now be only about 10 percent of the territory (Wilson, 1977: 109). Other proprietary systems have been shown to be relatively unstable when large exogenous changes occur through technology or the expansion of markets (McKean and Cordell, 1987; Andersen, 1979; Johannes, 1978). Instead of blind faith in either government intervention, private ownership, or voluntary arrangements, we need much better understanding of the conditions which enhance or detract from the emergence of more efficient property right regimes. And, the performance of such regimes needs to be measured in a comparative manner with other operational systems. Further, we need a better understanding of the stability or instability of these systems when challenged by various types of exogenous or endogenous changes.

But to do better empirical work requires that we use a more careful, theoretically constructed language to describe the property rights systems we observe and measure. No cumulation can occur when state-owned fisheries containing a variety of claimant and proprietary property rights systems are broadly described as open access fisheries. Nor, does it help develop effective policies simply to call for government intervention, when the dominant government policy has been to oppose the development of proprietary systems to control access. A mixture of better institutional theory combined with in-depth empirical studies may lead us to a better understanding of why fisheries are so difficult to regulate no matter what the regime in use. Then, we may begin to understand what methods may have a greater chance of improving conditions in particular settings rather than making things worse.

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