

## Social Principles Underlying Traditional Inshore Fishery Management Systems in the Pacific Basin

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**Abstract** *Among fisheries management schemes, those based on sole ownership concepts have been relatively little studied. This concept has been most widely applied in the traditional fisheries management or sea tenure systems of the Pacific Basin, where, unlike the West, sole ownership resides in the community or other small social group. Information on Pacific Basin sea tenure systems remains largely anecdotal and unsynthesized. In a partial attempt to overcome that, this article defines and exemplifies six social principles common to many traditional systems of sea tenure in inshore fisheries management in the Pacific Basin, with reference to Oceanian islands, and based on an examination of the literature and supplementary field research. These principles are that: (1) sea rights depend on social status, (2) resource exploitation is governed by use rights, (3) resource territories are defined, (4) marine resources are controlled by traditional authorities, (5) conservation was traditionally widely practiced, and (6) sanctions and punishments are meted out for infringement of regulations. Most remaining systems are hybrids of traditional and modern components, with the latter becoming dominant. Interpretation of the literature without supplementary field verification is severely constrained by the use of the "anthropological present" tense.*

### Introduction

Marine fisheries in Western societies are perhaps the last major resource to have been exploited under open access regimes, which, it is commonly agreed, is the cause of excess effort, the principal and least tractable of marine fisheries problems. Generally, too, it is accepted that the replacement of such regimes by systems of controlled access and associated rights could either eliminate or ameliorate excess effort. Although there is no unanimity of opinion on the nature of any such system, limited access and associated rights systems have been the form of management most widely implemented. All share the common characteristic of assigning fish harvesting rights to selected individuals, who then receive all or part of the economic rent created by the reduction in effort (Keen 1983). Although generally less than successful, often being costly to implement and administer and having exacerbated the excess effort problem by inducing increased investment by individuals seeking to improve their share of the catch, limited access has nevertheless been advocated principally for its political acceptability and resultant ease of implementation, and as a means of raising incomes in fishing communities (Keen 1983).

At the opposite end of the spectrum are systems of specific property rights through sole ownership of resources. The principal basic precept is that full sole ownership must

be invested in a managing agency that owns the biological productivity of the habitat, the cropped species, and the rights to control harvesting and marketing (Keen 1983). But the potential of sole ownership as a fisheries management tool has been relatively little examined, largely, it seems, because of personal values and ideology (Keen 1983), rather than as a consequence of any inherent weakness. Yet the efficacy of sole ownership in fishery management has been recognized, at least in conventional economic terms, as by Gordon (1954), who observed that the social optimum and the sole owner's optimum are coincident; by Scott (1955), who pointed out that management by sole ownership would require a property that embraced the entire asset; and by Copes (1972), who observed that net social benefits under a public sole ownership agency could be higher than under a private one. The application of the sole ownership concept to marine fisheries is discussed briefly by Crutchfield and Pontecorvo (1969) and more comprehensively by Keen (1983, 1988). A contrary tone was introduced by Wilson (1982) who asserted that there was no evidence that property rights schemes were clearly superior to others and socially economical, given that the costs of management should not exceed the social opportunity cost of the problem that led to the implementation of rules. Clearly, given the dearth of in-depth studies of sole ownership management systems of marine fisheries, these various perspectives remain assertions in want of verification.

The neglect to pursue an in-depth examination of the potential of sole ownership rights in fisheries is ironic since Gordon (1954), in a seminal paper that so stimulated inquiry into other forms of fisheries management, observed that, other than through luck, only fishermen who participate in a fishery ". . . that is put under a form of social control that turns the open resource into property rights" become rich. Gordon (1954) further observed that among "primitive" (*sic*) cultures "property rights in some form predominate by far, and, most important, their existence may be easily explained in terms of the necessity for orderly exploitation and conservation of the resource. Environmental conditions make necessary some vehicle that will prevent the resource of the community at large from being destroyed by excessive exploitation. Private or group land tenure accomplishes this end in an easily understandable fashion." He then exemplified his contention with reference to land tenure among the Trobriand islanders of Papua New Guinea, based on Malinowski (1935). Although granted that the bulk of the relevant literature became available only after the early 1950s, use of a Pacific Basin land tenure example in a paper on fisheries management is indeed ironic, since that region contains excellent examples of traditional fisheries management systems, or sea tenure, that operate(d) according to the logic of a sole owner, often the local community, and via which that sole owner controls the local spectrum of marine habitats.

In an attempt to add to the scant literature on sole ownership systems in fisheries, this article details some of the main social organizational principles that underlie traditional inshore fisheries management systems in the Pacific Basin. The conceptual basis on which such systems rest may have much to inform the design of sole ownership systems elsewhere.

A scattered and fragmented literature reveals that traditional systems of sea tenure and fisheries rights have (or had, until fairly recently) been utilized widely throughout the Pacific Basin to manage coastal fisheries in insular contexts where biophysical and socioeconomic circumstances are broadly similar. Since a comprehensive analysis of traditional systems of sea tenure and fisheries rights has not yet been undertaken for the region, this article is limited to distilling from the literature, supplemented by fieldwork, the major social principles that govern the operation of traditional sea tenure systems in the Pacific Basin.

A note of caution is in order: Since recent fieldwork has not been done in all the sites mentioned, it has not been possible to verify the continued existence of systems referred to by earlier authorities. Further, it is not always possible to discern from the literature whether systems described in the present tense were still in existence at the time of the authority's visit, or whether the "anthropological present" was being used at that time. Thus tense switches within the text are deliberate and reflect the current state of knowledge.

### **Traditional Management Systems**

Although traditional systems of fisheries rights have been documented for coastal waters and estuarine areas on all continents, for most localities the tenurial relationship of small-scale fishermen to resource areas and resources is not well known. Indeed, only relatively recently has it been realized that "sea tenure," or the way in which fishermen perceive, define, delimit, "own," and defend their rights to inshore fishing grounds, exists at all (Emmerson 1980; Acheson 1981; Ruddle and Akimichi 1984; Durrenberger and Palsson 1987). In the Pacific Basin such concepts range from the sole quasi-ownership of specific localized sites by individuals, families, clans, or other small social groups, to the complex state legal system of Japan.

Use rights may be to specific locations during particular seasons, to specific species, or for a specific gear type. Other forms of sea tenure are less concrete and may include such concepts as exclusion mechanisms, first-comer's rights, and the like. Despite being binding on the social behavior of a specific small group, most systems of traditional sea tenure are unwritten, informal, or even illicit or covert. Certain systems prevented overfishing and promoted resource conservation and a stable fishery by limiting access to particular grounds or by enforcing temporal restrictions of various kinds (Johannes 1978).

Understanding of traditional systems of sea tenure in the Pacific has been hampered by the dominant Western assumption that fish are an open access resource, which although plausible offshore is far less viable when applied to small-scale, shallow water, inshore fishermen, since such areas are essentially ecological transition zones between land, or "ownable property," on the one hand, and marine waters, a medium that inherently cannot be owned, on the other. Further, the sociological and economic contexts in which inshore fishermen operate often also militate against free access concepts. Many inshore fishing communities in the tropics, as in most Pacific islands, are composed of small and close-knit social groups that must make a living in a geographically restricted area with a strictly limited biomass that is potentially vulnerable to overexploitation. As in parts of the Asia-Pacific region, such communities are more likely than the larger society to maintain concepts of locally controlled inshore seas. Moreover, perhaps the majority of small-scale fishermen in the tropics are still part-timers, and usually farmer-fishermen. Not uncommonly they perceive their occupational patterns as sets of economically and nutritionally complementary activities and do not dichotomize resource space into an "ownable land component" and an "unownable marine sector."

Although traditional systems of inshore fisheries management have been studied in a wide range of societies in Asia and the Pacific, for most parts of the region there has still been little examination of the nature of fisheries and related rights. As a consequence there are few comprehensive accounts of the functioning of systems of sea tenure and associated institutions. The problem is compounded by the fragmentary and commonly

anecdotal nature of, and confusion of tenses in, the existing literature, and the rapid decay and disappearance of such systems since Western contact. Thus the remaining inshore fisheries management systems are commonly hybrids of traditional and modern components, with the former decaying rapidly (Ruddle and Johannes 1985). Further, much of the earlier research in the region has been characterized by a lack of appreciation of the embeddedness within larger socioeconomic systems of local traditional forms of fisheries management (Akimichi and Ruddle 1984; Durrenberger and Palsson 1987).

Fish and other marine organisms comprise the major source of animal protein throughout coastal East and Southeast Asia and the Pacific islands. In many places exploitation has been and still is strictly controlled by systems of local sea tenure, many of which approximate sole ownership by individual communities or smaller social units. Present-day local sea tenure systems remain little changed from their historical counterparts in Japan (Akimichi and Ruddle 1984; Ruddle 1985, 1987a,b; Ruddle and Akimichi 1989). (Since I have published extensively on the Japanese case, it is not discussed further here.)

In both continental and insular Southeast Asia, in contrast, and particularly in the Malay culture realm, only vestiges of what probably were more widespread systems remain. In that region elements of traditional systems of local fisheries management have been described for Sumatra, Central Java, Flores, and Tanimbar, in Indonesia (Polunin 1982, 1984), the Philippines (Smith and Panayotou 1984; Cruz 1986), and Peninsular Malaysia (Ruddle, unpub. notes). Preliminary field surveys by the author suggest, however, that more detailed field research in the region could reveal the continued existence of other systems.

It is not intended here to assume unreservedly that traditional fisheries management systems in the Pacific are or were necessarily effective in every instance. Such an assumption is precluded by both the quality of the bulk of the available literature and by the absence of detailed evaluations of individual systems. But as McGoodwin (1984) has observed, "good studies show that when fishermen have property rights there is less tendency to over-exploit marine resources," and conversely, as in Oceania, for example, stocks are commonly overexploited where traditional sole property systems have been replaced by open access. Johannes (1978) demonstrates that whereas there are in the Pacific Basin a number of documented instances of unrestrained harvesting leading to serious resource depletion, these were the exception, and that wise resource management was the prevailing pattern throughout precontact Oceania.

### **Principal Organizational Characteristics of Traditional Fisheries in Oceania**

In Oceania fisheries have commonly been managed traditionally by systems of tenure and access rights. In this region traditional sea tenure and the exercise of fisheries rights closely reflect social organization and local power structure.

Resource use patterns in nearshore waters and the open sea differ from island to island. On those surrounded by a wide lagoon, lagoon sections are the principal fishing ground, whereas the reef front and open sea are less exploited. But lagoon resources are less abundant on raised coral islands lacking a well-developed fringing reef, so the reef front and open sea (including reefs and uninhabited islands) are exploited heavily (Akimichi 1986). However, it appears that traditional systems of sea tenure in the Pacific were not based principally on ecological conditions; rather, their underlying basis is

revealed in the clear correlation between sea tenure, resource rights, and social organization, with management systems in the aquatic domain mirroring those on land.

### *Sea Rights Depend on Social Status*

A principle widespread throughout the region is that islanders hold sea rights by virtue of their status as members of a social group (Sudo 1984), and that the degree of social stratification within a community is reflected in the local pattern of sea tenure. Such groups range from village through clans, subclans, and the like, to the family. Social groups are commonly ranked by the chronological order in which their ancestors settled on an island, as on Satawal, Central Caroline Islands (Sudo 1984), or in a village, as in the Lau islands of Fiji (Baines 1982).

Many Oceanian societies do not have the concept of dividing natural resources and the space that they occupy into aquatic and terrestrial components. As a consequence, the principles of sea tenure and the rights to exploit marine resources differ little if at all from those that govern land tenure and the use of terrestrial resources. Further, humans, culture, and society are commonly seen as integral parts of nature, and vice versa. Holding such a world view, the entire physical, economic, and spiritual life of some communities is centered on the natural resource assemblage and the resource space belonging to that community. In the Pacific this is apparent in societies as diverse as Fiji in Melanesia (Baines 1982), Yap in Micronesia (Lingenfelter 1955; Schneider 1974; Labby 1976) and the Yolngu of Northern Territory, Australia (Davis 1984, 1985).

Close examination of the relationship between resources and traditional Oceanian societies would indicate a custodial rather than possessive attitude of people toward their resources, as in Lau in the Solomon Islands (Akimichi 1978), and in Fiji (Ravuvu 1983). This close identification of Pacific islanders with their resources is not easily comprehended. Land and reefs are not viewed as commodities to be sold or exchanged—although certain use rights might be granted by resource “custodians” or “owners.” The word “owners” is also misleading, because it indicates a possessive and dominating relationship, rather than the sense of being part of the land or the reef (Baines 1985).

Thus the Fijian word *vanua* has interrelated physical, social, and cultural dimensions. In biological and physical terms it means the land-water area and its plants, animals, soils, and other natural resources. Socio-culturally it means “tribe,” and refers to the human occupants of an area and their traditions, customs, beliefs, values, institutions, and the like. As a whole, *vanua* refers to a social unit that is associated with an identifiable physical territory. This social unit is regarded as the human manifestation of the physical environment and its biological and physical resource assemblage, which the members have claimed for many generations, from the time of a founding ancestor (Ravuvu 1983). Land-water is seen as the extension of the self and, similarly, its human occupants are the personification of the land-water.

### *Resource Exploitation Is Governed by Use Rights*

Throughout Oceania, rights to exploit the fisheries resources of reefs are subject to various degrees of exclusiveness depending on their relationship to social organization and the culture of the communities controlling them. Most commonly, traditional fisheries rights apply to *areas* (Baines et al., in press). Superimposed on sea area rights may be claims held by individuals or groups to a particular species or to a particular fishing technology.

In the Pacific, customary systems rights to marine resources may be exclusive, primary, or secondary, and may be further classified into rights of occupation and use. In general, exclusive rights are locally handed down from time immemorial through ancestral families, spirits, or gods. Possession of the "property" is validated by traditional associations that are partly historical and partly mythological, and the myths, legends, and history of the region are rich in references to islanders' exclusive rights to their islands' resources (Pulea 1985). (The titles are never usually in question, although boundaries are a common cause of dispute.)

Various criteria govern the rights of individuals to natural resources. Inheritance, ancestral interests, and the network of social obligations and cooperative relationships within clans and tribes provide stability and perpetuate the locally perceived systems of ownership and rights.

Commonly, as with most resources, since the first settlement of most Oceanian islands, the rights to fish around reefs in defined territories and the locations for landing boats on beaches have been defined by customary law. Typical is the case of Vanuatu, where the boundaries of a person's fishing spots are determined by where his ancestors landed on the island or by later negotiation (Taurakoto 1984).

The concept of unrestricted ownership rights to natural resources is not found in all customary systems in the Pacific. In many societies land is disposed of by a chief, who exercises his authority—largely via the imposition of taboos and other restrictions—on behalf of the entire community. For example, in precontact Kiribati, and probably Tuvalu as well, land owners had exclusive tenure to the reefs and lagoons adjacent to their lands (Zann 1985). Few details of these traditional systems of sea tenure, which have broken down over the last century, have been recorded. In southern Kiribati the elders of the meeting house ruled clan-owned lands and the reefs and lagoons adjacent to their own land. In the northern atolls, on the other hand, one man (the so-called king) controlled a large tract of reef and lagoon and dispensed the fishing rights to the various clans of the area.

Such traditional rights can be more accurately defined as those to use rather than those to own. Further, rights to use can be exclusive since they can imply that primary rights holders may have a subsidiary right to prevent others from using certain resources within the area over which traditional control is exerted (Pulea 1985).

Primary rights are often those to which a group, or occasionally an individual, is entitled via inheritance, i.e., a birthright. In general only secondary rights can be acquired through marriage, by traditional purchase, or in return for services rendered.

*Acquisition and Transfer of Rights.* In some areas provisions in the system of exclusive marine tenure permitted temporary and occasional shared usage by other social units. For example, in peacetime people could seek species not available in their own waters in the territory of another group. Communities were also permitted to fish elsewhere when their usual waters were temporarily too rough.

Under such circumstances the temporary user paid the rights owners for the privilege with a portion of the catch. Exclusive fishing rights were sometimes transferred permanently from richer to poorer communities. An example occurred in Palau around 1930, when the municipality of Ngeremlengui ceded fishing rights in two areas to the neighboring municipality of Ngatpang (Johannes 1981). The Lau Islands of Fiji provide another example (Baines 1982).

### *Resource Use Territories Are Defined*

The sea territory of a social group is usually defined with reference to proximity to its settlement(s) and with reference to lateral and seaward boundaries.

As a general principle, on most islands the exclusive fishing territory of a community was in the adjacent marine waters within the reef. In Palau (Johannes 1981), Ponape (Fischer 1958), and Yap (Labby 1976), for example, the adjacent waters of the village clusters (municipality) were reserved for the exclusive use of a particular village. In the Marshalls a lineage held exclusive rights to waters adjacent to its land. In most places islanders maintain exclusive rights to all known adjacent submerged reefs, which are named and owned exclusively by particular families, clans, municipalities, islands, groups of islands, or atolls, as the local social organization dictates. Seaward of the reefs, the degree of exclusiveness of rights gradually declines (Nakayama and Ramp 1974).

*Lateral Boundaries.* In general, the lateral or coastwise boundaries of a community's exclusive fishing area were a seaward extension of the community's terrestrial boundaries. Variants on this general principle of direct seaward extension of the terrestrial boundaries occurred where some distinctive physical feature of the reef, such as a passage or channel, was used to mark a lateral boundary, as in Yap (Lingenfelter 1975).

These lateral boundaries were sometimes marked artificially. On Ponape, for example, piles of coral were erected as boundary markers (Fischer 1958).

*Seaward Boundaries.* The sea rights in the waters adjacent to a particular island may be divided conceptually into an inner and an outer zone. Usually an island or atoll maintains either the exclusive or the primary rights to the nearshore waters immediately around it. In the outer zone the island or atoll will usually have dominant but not exclusive rights.

Although the criteria for defining the inner zone are not uniform, in Oceania the exclusive fishing territory of a community generally extends just seaward of the outer reef slope (e.g., Palau) (Johannes 1981). But local variations to this general principle occur. Water depth is the determining factor in the Marshall Island; the point where deep sea species replace reef organisms is the dividing zone in the Central Carolines (Akimichi 1986); the outer edge of the reef, the distance to the horizon, the limit of bottom visibility, and isolated patch reefs are criteria used by different ethnic groups in the Solomon Islands (Baines 1985); and the distance from the shore at which diving for fish or shells is possible is the criterion applied in Vanuatu (Taurakoto 1984).

Criteria for defining the outer zone also vary considerably within the Pacific region. In Palau, some communities claimed that their fishing territory coincided with the seaward range of homing seabirds inhabiting Palau (Johannes 1981). In the Central Carolines the strength of rights within the outer zone extends seaward toward a neighboring island, to a point at which that island's rights become primary.

Figure 1 provides a hypothetical example of Oceanian sea territories and their boundaries, based on part of the Lau Islands of Fiji.

### *Marine Resources Are Controlled by Traditional Authorities*

Depending on social organization, the traditional authority controlling marine resources varies. Four principal types can be recognized: traditional leaders, traditional religious leaders, specialists, and rights owners.

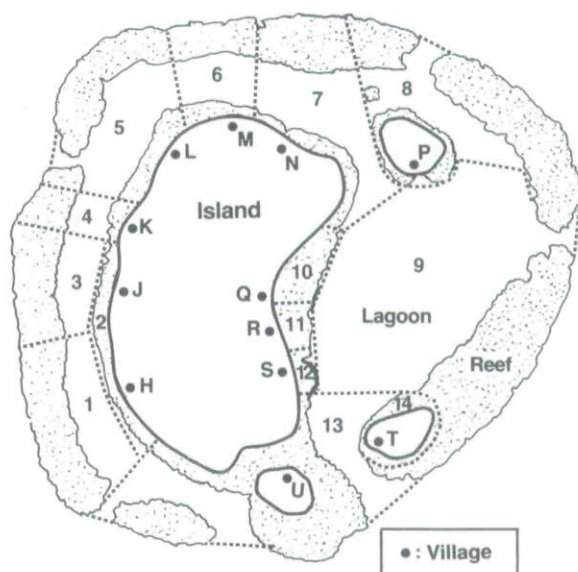


Figure 1. Hypothetical example of traditional fisheries rights in the Lau Islands, Fiji (after Baines 1982).

In most societies a group of traditional leaders or an organization, usually the village councils, controls and conserves marine resources. Such persons or organizations have the right to regulate the use of particular tracts of the community's sea space, as well as the responsibility to protect resources against overexploitation. Commonly, traditional leaders receive their authority or status from the head of the first and highest ranking kin group, which has proprietary rights over land and sea.

On Satawal Island of the Central Carolines, for example, the eight clans are ranked according to their order of arrival on the island. The three highest are regarded as the "original" clans and are known as the "clans of the chiefs." The others, more recent arrivals, are the "clans of the commoners." The eldest man in the senior line is the chief. He controls clan lands and allocates them to the lineage members. One chief, the "Chief of the Sea," controls all fishing activities. Fishing grounds around the reef are open to everybody, but women have rights only within the reef. Fishing in all other areas is strictly controlled by the chief, and his prior approval must be obtained to exploit the distant and separate reef areas (Sudo 1984).

Throughout the Marshall Islands the paramount chief traditionally claimed the reef. He could place a taboo on sections of it, usually near the lagoon entrance, which was rich in schooling fish (Sudo 1984). The inhabitants of the atolls were generally allowed to utilize freely other parts of the sea space, whereas outsiders had to seek prior permission (Tobin 1958). Thus on Ulul atoll, for example, islanders can fish freely anywhere in the island's sea territory, apart from one particularly wide and fish-rich tract of reef flat near a large reef passage, which is reserved for the exclusive use of the chief's clan (Sudo 1976).

On Etal atoll in the Mortlock Islands, the most important kin groups and units of land ownership are matrilineal descent groups, clans, or subclans. All clans are ranked by their order of arrival on the island. The head of the first is regarded as the "paramount chief" of the atoll. The head of this clan holds proprietary rights over all land and sea, which forms the basis of its suzerainty over all later-coming clans (Nason 1971). The



waters of Etal atoll are divided in those areas adjacent to the reef and the open sea, the latter being relatively unimportant to the islanders. Both areas are divided among the clans and subclans, which have exclusive rights to their tracts. Members of other clans must seek prior permission to fish in the rights area of another clan, for which they must pay by presenting 25–50% of their catch to the exclusive rights holders whose waters they work (Nason 1971).

In Palau (Johannes 1981), Ponape (Fischer 1958), and Satawal in the central Carolines (Sudo 1984), inshore waters were considered the common property of all islanders or villagers, and village fishing rights were controlled by a chief or village council.

In Palau (Johannes 1981) public land is owned by the village and administered by the village council. Villagers can freely exploit these areas, whereas inhabitants of other villages must first obtain prior approval from the village council. In some cases they are required to pay a monetary fee for the privilege. Nearshore fishing rights owned by each village are controlled by the chief or village council, and villagers can undertake any kind of fishing in this area. Traditionally, villagers of Kayangel and Ngarhelong shared equal rights to Ngerael and Kossol reefs. Districts can also arrange for reciprocal exploitation of their territory, as in the case of Ngardmau and Ngaremlengui for the trochus catch.

On Ponape (Fischer 1959) an inner reef, coral heads, an outer barrier reef, and small coral island biotopes are distinguished. Together, these sections of the sea were regarded as the "home waters" and were strictly divided among the villages. Villagers enjoy the rights to these waters, which are regarded as belonging to the chief of the village, and they may freely operate therein, without asking permission of the chief of the village. The open sea beyond the barrier reef is not fished by the islanders.

### *Conservation Was Traditionally Widely Practiced*

Several types of marine resource conservation measure were traditionally employed by Oceanian communities to ensure sustained yields. The principal among these were the widespread reef and lagoon tenure systems, whereby the right to fish in a particular area was controlled by a local social unit (Johannes 1978).

A wide range of other restrictions on fishing were clearly designed to conserve stocks. Others, many related to traditional religious beliefs, also functioned coincidentally as conservation devices. Among these were the live storage or freeing of surplus fish caught during spawning migrations; the use of closed seasons (particularly during spawning); the placing of taboos on fishing areas; the reservation of particular areas for fishing during bad weather; size restrictions (although this was uncommon in Oceania); and, in recent times, gear restrictions (Johannes 1978).

### *Sanctions and Punishments Are Meted Out for Infringement of Regulations*

For a variety of reasons traditional authorities frequently imposed temporary or permanent bans, as well as spatial, temporal, gear, or species restrictions, on the exploitation of marine resources. These commonly took the form of taboos.

Some localities governed by a taboo were physically demarcated as such. In the Solomons, for example, although areas were normally placed under taboo by oral declaration, signs on sticks and formal notices are also used (Allen 1957). In Vanuatu rights "owners" made public notification of a complete prohibition on or control of fishing by

erecting a palm frond as a boundary post. The addition of a papaya leaf to this meant that permission to use the area could be obtained from the reef "owner" (Taurakoto 1984).

Sanctions were widely invoked throughout Oceania for the infringement of fisheries rights and the ignoring of regulations such as taboos governing fisheries. Four principal types of sanctions can be recognized throughout the region (Hooper, 1985).

*Social Sanctions.* This category includes ostracism, banishment, and ridicule. For example, Tokelaun elders plan fishing expeditions and then accompany them as leaders. At subsequent meetings crew members are both praised and taken to task: simple incompetence is handled by joking and ridicule rather than by scolding, but behavior that infringes on the rights of other members of the fishing expedition is singled out for disapprobation (Hooper 1985).

*Supernatural Sanctions.* There are numerous scattered references to this kind of sanction throughout the region.

*Economic Sanctions.* This category includes monetary and in-kind fines, destruction of gear, and forced labor, among others. In Vanuatu, disputes arising from poaching by fishing from another family's rock are settled by either cash payments or by in-kind payment in pigs or mats (Taurakoto 1984). In Kiribati, fines are levied and fishing rights forfeited (Zann 1985). On Ulithi atoll in Micronesia, if the authority of the paramount chief is not periodically acknowledged by the gift of fish of a particular species, he can dispossess the rights-holding clan of the section of lagoon and reef from which such fish are obtained (Sudo 1984).

*Physical Punishment.* Physical punishment, including death, was a not uncommon penalty throughout Oceania for the violation of traditional fisheries regulations. In fact, traditional punishment was sometimes more feared than that meted out by the courts. In Vanuatu, death could be the punishment for the violation of a taboo placed on a specifically marked area (Taurakoto 1984), as it could on Kiribati (Zann 1985), and in the Lau Islands of Fiji (Tippett 1968). In response to being shamed for having disobeyed fisheries regulations, individuals in Kiribati often committed suicide by sailing away from the island in a small canoe.

## Conclusion

It has frequently been asserted, although usually with scant proof, that traditional systems of inshore fisheries management can play a potentially major role in the modern world by ensuring equitable access to fisheries, as well as in managing and enforcing conservation measures to ensure the sustainability of coastal fisheries. The thesis generally is that the more the responsibility for the control of local resources can be left to local, traditional users, the fewer will be the social, political, legal, conservation-related, and management cost problems that must be addressed by governments. However, it is important to realize that the "fossilization" of tradition through explicit, detailed legal definition in the terms of state law may both weaken the adaptive flexibility of a traditional system (Ruddle and Johannes 1985) as well as incur high social costs (Wilson 1982).

At first sight the adaptation of traditional systems to a modern purpose may seem

sociologically infeasible. But traditional systems of sea tenure, at least in many parts of the Pacific Basin, may not be so alien to prevailing Western concepts of fisheries management. Perhaps the major commonality is that both appear to have adopted parallel concepts that include limited entry, seasonal, spatial, gear, or species restrictions, prior appropriation rights, and the concept of sole ownership, among others. In Western marine economics, sole ownership, limited entry, individual transferable quotas, and other such fisheries management schemes are based on the theory of the firm. On the other hand, in many Pacific societies the community is the sole owner, and traditions of resource use and management are enforced by community norms that control the behavior of the membership. But this, too, has its parallels in New England and Western European fishing communities, among other places, where socially binding yet unwritten and informal rules carry more weight than official regulations.

The design of management schemes should include as much as possible effective indigenous strategies and should conform closely to existing socio-cultural and marine habitat boundaries. Schemes should also be as simple as possible to mitigate the potentially high social costs of regulation (Wilson 1982). In this, many traditional sea tenure systems from the Pacific Basin may prove instructive in terms of their cost effectiveness and social acceptability.

But much remains to be learned about sea tenure beyond an analysis of the traditional fisheries. Interdisciplinary or "biosocioeconomic" research must also focus on entire national systems of fishery production, and particularly on the relationship between household (traditional) and capitalistic (modern) production within the system. It must also further elucidate the principles of sea tenure and correct many erroneous interpretations that characterize earlier research on the topic.

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