

Only within the past 80 years have westerners discovered that heavy fishing pressure can lead to the depletion of marine fish stocks. Pacific islanders, in contrast, have been aware of the limits of their fisheries resources for centuries. Almost all the marine conservation measures designed in this century in the West were already in use in Oceania when the first western explorer stepped ashore (Johannes 1978).

Within the past 25 years, Western fisheries biologists and economists have reached the general consensus that the cornerstone of sound fisheries management is "limited entry" — limiting the number of fishermen that are allowed to harvest a given stock. Awareness of the value of limited entry occurred much earlier than this in Oceania; reef and lagoon tenure — a form of limited entry — appears to have been the single most widespread marine conservation method in operation before western contact.

Ironically, the use of this measure has declined since western contact. Western colonists, accustomed as they were to the now outmoded doctrine of "freedom of the seas," did not understand the virtues of such a system. (It was "un-American" stated one American critic). Moreover, it stood in the way of their ambition to capitalize on the islands' marine resources. So, consciously in some cases, unconsciously in others, they brought about its decline on a number of Pacific islands (Johannes 1978). Here I discuss the basic features of this practice and its value today where it still survives.



*Ngiraklang, second chief of Ngeremlengui, making a fish trap in his Papuan village; he taught author Johannes a great deal about Palauan fishing.*

## Reef and lagoon tenure systems in the Pacific islands

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In the West, marine fishing grounds have traditionally been open to all. Under such conditions it is in the best interests of a fisherman to catch all he can and to use any means at his disposal to do so. Fishing in moderation amounts to pointless self-sacrifice, for what is voluntarily left uncaught will probably be caught by someone else. Experience has demonstrated repeatedly that depletion of such a fishery is almost inevitable. Freedom of entry to a fishery, designed to be fair to everyone, is thus ultimately fair to no one.

The essence of reef and lagoon tenure is the right to control access to fishing grounds by

district, village, clan or family. Where such control exists it is in the best interests of the controllers to harvest in moderation, thereby ensuring good future yields. The system has an added virtue in that fishermen will often voluntarily police their tenured fishing grounds if their right to do so is secure, thereby reducing substantially the enforcement efforts required today of chronically overburdened Pacific island fisheries departments.

Pacific island marine tenure systems can be sufficiently flexible to permit the use by others of stock surplus to the needs of the owners. The following examples are from

various districts in Palau (Johannes, unpub.). Upon request, outsiders may be allowed to fish, sometimes without payment, sometimes with a small payment of cash or a portion of the catch. Today, restrictions are upheld in some districts only in connection with commercial fishing — catching a few fish for one's own use being looked upon as quite acceptable. (This would change, of course, if too many people took advantage of such generosity). In the past some fishing rights were transferred outright by villagers who did not need them to villagers in neighboring districts who did. In some instances fishing grounds have been shared

by two or three districts.

Reef and lagoon tenure has implications that go beyond conservation of fish stocks. In the absence of limited entry, too many fishermen typically crowd onto the best fishing grounds and more boats and more fishing gear are used than is necessary to harvest the catch. This form of economic waste is doubly unfortunate in Oceania; money paid for most of the boats and fishing gear and all of the motors and fuel flows out of the local economy thereby contributing to the chronic trade deficits that plague the area.

Marine tenure systems take on added significance in the context of the rapidly growing interest in aquaculture in the Pacific islands. Public ownership of mangrove, estuary and reef resources throws up a number of impediments to the siting and management of aquaculture facilities. Hawaii provides an example. Here, where almost all coastal waters are now publicly owned, a tangle of regulations and permit requirements (many of them devised before the recent upsurge in interest in aquaculture) present very expensive and time-consuming problems for prospective aquaculture developers.

There are also the problems of obtaining public approval and preventing public access when aquaculture facilities are sited in public waters. The development of aquaculture in Hawaii's coastal waters is consequently unlikely (Trimble 1975). However, about 30 small areas of reef and lagoon in Hawaii are still privately owned — all that remains of Hawaii's traditional reef and lagoon tenure system. Aquaculture development could proceed in these privately controlled reef areas (known as *konohikis*) unencumbered by the constraints associated with public ownership (Johannes, unpub.).

Reef and lagoon tenure systems facilitate the effective stewardship of marine resources but do not guarantee it. A population of owners of a fishing ground may

grow to such a size that they feel compelled to exert excessive pressure on the stocks. The development of an export market to a district centre, another island or another country can produce the same result. These are situations where additional regulations must be imposed on the fishery to maintain desirable yields (for example, Johannes 1978a). But it would be self-defeating for island governments to allow erosion of traditional marine tenure systems under such conditions just because they did not provide a **total** solution to the problem of overfishing.

Novel problems have developed in connection with reef and lagoon tenure systems in the 20th century generating criticism and further attempts to dispose of some of them. In at least six different island groups, tuna fishermen seeking bait in tenured waters have been forced to land and request permission to put out their nets. These requests were not always granted. And even when they were, the often formal and elaborate procedure involved wasted valuable time. This has discouraged bait fishing and, as a consequence, tuna fishing in some areas.

The problem appears to have been solved recently in two island nations through government mediation. In Solomon Island; bait fishermen pay \$50 per boat month plus \$2.75 per boat night to a local government council. In Papua New Guinea, coastal villages that control bait fishing share 2½ per cent of the F.O.B. value of exported tuna.

In some islands, traditional tenure boundaries extend miles out to sea beyond the outer reef edge. These boundaries are generally not defended very energetically because most traditional island fishing is done on or near the reefs. But efforts could be made to enforce them and this could create additional problems for commercial tuna fishermen.

Moreover, since the commer-

cially important species of tuna are highly migratory, local limited entry does not constitute an effective means of conserving tuna stocks. Consideration should thus be given to restricting tenured areas under local control to shallow water fisheries, leaving regulation of deep water pelagic fisheries largely to central island administrations and inter-island agencies.

To protect and enhance the value of reef and lagoon tenure systems in Oceania several actions seem desirable. First, they must be studied and their details recorded. Thousands of pages have been written on land tenure in the Pacific but very little on marine tenure. Most published information is anecdotal and obviously peripheral to the main interests of the writers. Three useful outlines of particular traditional marine tenure systems are provided by Allan (1957) for the Solomon Islands, by Kosaki (1954) for Hawaii, and by von Bulow (1902) for Samoa.

Official records of tenure boundaries and detailed descriptions of tenure customs are needed. It should not be assumed that the customs prevailing in one district are indicative of customs on the island or island group as a whole. (However, for ease of administration, some consideration might be given to standardizing customs, to the extent that this is practical, within an administrative district.)

Secondly, once marine tenure systems are better understood, the laws relating to them should be reviewed. Some of these systems have been recognised and their legality upheld by the courts. In Pacific Island societies where traditional authority is waning, such "legalization" helps maintain valuable customs. But it may also reduce their flexibility. On a number of islands, for example, marine tenure is legally sanctioned only if it can be demonstrated that it existed before Western contact and has been maintained continuously thereafter.

(Continued on page 34)

Mr. Crossland grew up and was educated in Christchurch, leaving school in 1957 to join the Merchant Navy. After undergoing a year's demanding training at the School of Navigation, Southampton, England, he took up a deck officer's apprenticeship with Port Line of London. Mr Crossland spent eight years at sea, working on British, Australian and New Zealand ships. During this time he gained a 2nd Mate's Foreign-going certificate at London in 1962, and a 1st Mate's at Melbourne in 1965. He has also worked as a commercial fisherman, and has experience in bottom trawling, bottom longlining and fish trapping.

In 1972, Mr Crossland completed a B.Sc. Honours course at Canterbury University, New Zealand, graduating with 1st class honours in Zoology. He then spent five years with the Fisheries Research Division of the Ministry of Agriculture and Fisheries, Wellington, where he carried out a series of research projects on snapper, New Zealand's most important food fish. This work included studies on reproduction and fecundity and surveys of eggs and larvae.

The results of these researches were used to make estimates of the size of the fish stocks, which together with other information, helped in the formulation of a management policy for the New Zealand snapper fishery. Mr. Crossland also carried out a series of snapper-tagging cruises during which several thousands of fish were tagged. The results provided new information on movements and the exploitation rate.

Other studies involved the identification and distribution of planktonic fish eggs and larvae. Mr Crossland is also the author of several scientific papers and fishery bulletins.

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## REEF & LAGOON TENURE

(Continued from page 32)

With the depopulation that occurred throughout Oceania after Western contact, marine tenure boundaries were sometimes allowed by the islanders themselves to lapse; defending these boundaries made sense only when the benefits of doing so justified the effort involved. As populations rebounded over the past few decades the value of defending tenure boundaries has increased once again. But those who, for logical reasons, allowed their marine tenure systems to lapse, and who, for equally logical reasons might want to reinstitute them later, are now sometimes forbidden by law from doing so.

Similar restraints are imposed on those who would modify existing tenure systems or create new ones. Yet, when previously unknown population pressures or new fisheries develop, new or modified tenure systems may be needed. For example, when a new trochus shell industry developed in New Guinea, villagers tried to erect a new marine tenure system to protect their trochus beds from European interests. They were prevented from doing so by the courts (Belshaw 1954).

It must be granted that allowing greater flexibility in reef and lagoon tenure systems would create more work for legislatures and courts. But these systems will never present the volume and complexity of legal problems that land tenure systems have in the Pacific Islands. Tenured fishing areas are generally far larger than most tenured plots of land. There are thus far fewer of them over which to dispute and the ratios of their perimeters (line of potential dispute) to their areas (size of resource) are much smaller than those of typical land plots. In Yap and Palau, roughly 100 disputes over land tenure reach the courts for every one involving reef and lagoon tenure.

To summarize; traditional Pacific island reef and lagoon tenure systems embody a principle recognized today as the cornerstone of sound fisheries

management. Lack of appreciation of the value of these systems by colonials has resulted in their erosion, and in some cases their complete loss. Where they still exist it may be desirable to modify them in order to accommodate new pressures occasioned by commercial fisheries and the adoption of western legal systems. But further erosion of these customs will add inevitably to the difficulties of managing reef and lagoon resources.

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