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THE RENAISSANCE OF COMMUNITY-BASED MARINE RESOURCE MANAGEMENT IN OCEANIA

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■ **Abstract** Twenty-five years ago, the centuries-old Pacific Island practice of community-based marine resource management (CBMRM) was in decline, the victim of various impacts of westernization. During the past two decades, however, this decline has reversed in various island countries. Today CBMRM continues to grow, refuting the claim that traditional non-Western attitudes toward nature cannot provide a sound foundation for contemporary natural resource management. Limited entry, marine protected areas, closed areas, closed seasons, and restrictions on damaging or overly efficient fishing methods are some of the methods being used. Factors contributing to the upsurge include a growing perception of scarcity, the restrengthening of traditional village-based authority, and marine tenure by means of legal recognition and government support, better conservation education, and increasingly effective assistance, and advice from regional and national governments and NGOs. Today's CBMRM is thus a form of cooperative management, but one in which the community still makes and acts upon most of the management decisions.

INTRODUCTION

Twenty-four years ago I published a paper in this *Annual Review* series entitled "Traditional Marine Resource Management in Oceania and Its Demise" (Johannes 1978). In it, I used historical and anthropological information to demonstrate that some tropical Pacific Island cultures invented and employed marine resource management measures centuries before the west did. These included limited entry, closed seasons, closed areas, size limits, and (albeit rarely) gear restrictions. I described how the impacts on these cultures of cash economies, export markets, new technology, and other concomitants of westernization were eroding these practices. As the article's title indicates, I thought their demise was not far off. As the title of the present article reveals, my pessimism was unwarranted.

In Oceania, said Fa'asili & Kelokolo (1999, p. 10), "regardless of legislation or enforcement, the responsible management of marine resources will only be

achieved when fishing communities see it as their responsibility." Today, communities spread widely throughout the region are rising to this challenge and adapting their traditional practices to fit contemporary circumstances. "Community" is used here in the broadest sense of a functional social unit; at different times and in different cultures, the most relevant social unit in connection with local marine resource management may be a group of villages, a single village, a clan, a family, or a chief or other influential individual in the community.

Judging by the literature, community-based marine resource management (CBMRM) may be more widespread in Oceania today than in any other tropical region in the world. And as Hviding & Ruddle (1991, p. 1) have said, the Pacific Island region "has much to contribute to innovative thinking about small scale fisheries management worldwide." Here I describe the revitalization of CBMRM in Oceania in the past two decades, some of the factors that led to it, and some of the lessons that are emerging.

VANUATU

A striking upsurge in CBMRM occurred in Vanuatu fishing villages beginning in 1990. In 27 villages surveyed in 1993, only 1 had not introduced MRM measures in the previous four years (Johannes 1998a). (I define an MRM measure as a measure employed consciously to reduce or eliminate overfishing or other damaging human impacts on marine resources). Enforcement was by village authorities, not the Fisheries Department.

Johannes & Hickey (2002) did a follow-up study of 2l of these villages in 2001 to gauge the success of these initiatives. Direct before-and-after measurements of the health of the reef communities and reef fisheries involved were far beyond our resources. So we determined how many of MRM measures operating in 1993 had lapsed and how many new ones had been initiated. Our reasoning was that maintaining or increasing MRM measures, which all entail short or medium-term sacrifice to fishers, would occur only if the fishers thought they were worth the longer-term benefits. The results revealed that of a total of 40 MRM measures operating in 1993, 5 had lapsed but 51 new ones had been implemented (Table 1). In short, MRM measures had more than doubled.

TABLE 1 Total numbers of marine resource management measures in 21 Vanuatu villages, 1993 and 2001[a]

	1993	2001
Total MRM measures operating	40	86
Average number per village	1.9	4.1
Lapsed MRM measures since 1993	N/A	5

[a]From Johannes & Hickey 2002.

The most often used MRM measures in 2001 were:

- fishing ground closures (18)
- trochus[1] closures (11)
- ban on taking turtles or their eggs (11)
- bêche-de-mer (sea cucumber) closures (10)
- spearfishing controls (8)
- controls on using fishing nets (7)

The main initial impetus for these developments was the Vanuatu Fisheries Department's promotion of a voluntary village-based trochus management program starting in 1990. Initially the program involved only a few fishing villages out of a total of several hundred. Selecting villages that declared an interest in obtaining their advice, the department surveyed their trochus stocks and advised them that regular several-year closures of trochus harvesting, followed by brief openings, would generate far more profit than the usual practice of harvesting more or less continually. They left it to the villagers to decide whether or not to act on this advice.

My 1993 study (Johannes 1998a) revealed that communities that followed the Fisheries department's advice on trochus management found it so profitable that other communities quickly followed suit. Moreover, observing what conservation could do for trochus stocks, many communities decided to implement their own conservation measures to protect other marine animals, including finfishes, lobsters, clams, bêche-de-mer, and crabs, as well as to ban or restrict certain overly efficient fishing practices such as night spearfishing and the use of nets, especially gillnets. One of the surveyed communities set up a marine protected area and stocked it with giant clams (*Tridacna* spp.).

I (Johannes 1998a) described how this locally funded shoestring operation has enjoyed greater success than a foreign-aid-funded fisheries development project in Vanuatu costing tens of millions of dollars.

While the Fisheries Department continued its work in the villages and broadened its scope, another potent stimulus for CBMRM emerged in 1995—a locally renowned traveling theatre group called Wan Smolbag (WSB). Operating out of the capital, Port Vila, since 1989, this group has made many village tours, putting on plays that simultaneously entertain and inform villagers about important issues such as HIV/AIDS, malaria reduction through mosquito control, etc. In 1995, the theme of the main play presented in the villages was the plight of sea turtles and the need to conserve them. The villagers were apparently receptive to this message in part because, as many informants told us, they were already aware of a marked decline in turtle numbers in their waters over the previous several decades. Conserving sea turtles has proven to be one of the most difficult conservation

[1]Trochus is a large marine snail, the shell of which is sold for making buttons and inlay; it is rural Vanuatu's biggest commercial marine export.

measures to persuade fishers to adopt in most tropical Pacific Islands (see World Bank 1999). Nevertheless, out of the 21 villages we surveyed, 11 had banned or restricted harvesting of turtles and turtle eggs within the past several years. None of these villages, or any others, had controlled turtle harvesting in 1993 (Johannes & Hickey 2002).

WSB also encouraged many villages to select turtle monitors to help oversee the conservation of turtles and turtle eggs in their villages. By 200l, 150 turtle monitors had been appointed in about 80 communities throughout Vanuatu. The program was so successful that WSB is training the turtle monitors to expand their efforts to encompass natural resources in general, assisted by the Department of Fisheries and other conservation organizations and foreign-aid sources.

In addition, when national marine conservation regulations[2] were explained to villagers by the Fisheries Department and were perceived by them to coincide with village interests, the regulations were often incorporated into their own management. This adoption greatly enhanced the observance of these regulations according to many informants (Johannes & Hickey 2002). Ignorance of these laws and their purposes had previously been widespread in rural Vanuatu.

Customary marine tenure (CMT)—the right to control access to and actions on one's traditional nearshore fishing grounds—remains generally strong in Vanuatu's villages and is recognized in the country's constitution (Amos 1993). CMT provides villagers—here and elsewhere in Oceania (see below) with the critical incentive to make MRM measures and enforce them. This is because the enhanced resources that result cannot be harvested by outsiders without permission and payment or reciprocal resource-access agreements.

SAMOA

A rapid increase in CBMRM also occurred in Samoa (formerly Western Samoa) in the 1990s. The Samoa Fisheries Division provided the impetus. It began by helping to design and implement a legal device that allowed villagers to overcome their inability to prevent poaching on their fishing grounds.

Samoa once had a strong CMT system (von Bulow 1902). But ownership of marine waters was transferred to the state during colonial rule (Fairbairn 1992). In recent decades, as a consequence, problems arose in connection with enforcement of custom-based fishing regulations by village authorities. Whereas the chiefs could generally control the actions of their own villagers, it became increasingly hard to control the actions of outsiders, especially fishers from neighboring villages.

In earlier times when seafood stocks were abundant, reciprocal rights of access to tenured fishing grounds had often been accorded to neighboring villages. But

[2]These laws set size limits on trochus, crayfish, and green snail, and ban taking turtle eggs or crayfish with eggs, or using poisons or explosives for fishing.

in recent decades, the pressures of expanding populations and depleted marine resources prompted many villages to try to withdraw access to their fishing grounds by outside fishers (Fairbairn 1992).

Some of the latter argued successfully in court cases, however, that since the area from the high water out to sea was legally public domain, CMT was not legally enforceable. The incentive of villagers to manage their traditional fishing grounds was thus undercut. Because outsiders could come into their fishing grounds and fish at will under the protection of national law, villagers had little incentive to manage and conserve their marine stocks.

Legal steps were taken to address this problem beginning in the late 1980s. With the passage of the Fisheries Act (1988), any village regulation concerning its nearshore fishing grounds could now become a legally recognized bylaw after consultation with and acceptance by the Fisheries Division and gazetting by the Legislative Assembly. Traditional authority was further reinforced by the Village Fono (council of chiefs) Bill (1990), which amended the constitution to provide for the exercise of chiefly authority in accordance with Samoan custom and to recognize the primacy of village rights, including the right to manage nearshore fisheries (Ruddle 1994, Fa'asili & Kelokolo 1999). The incentive of villagers to manage their fishing grounds was thus restored. Now, in addition to imposing traditional fines of pigs or taro on their own village transgressors, they could take formal legal action against outsiders if traditional measures did not work.

Converting village regulations into formal bylaws was no small task, however. The implications of the new laws had to be explained to the villagers, and they had to be assisted, village by village, in suitably framing their village laws and getting them gazetted. The Fisheries Division made this a major focus of its activities through the 1990s. [See King & Faasili (1998a) for a description of the methods used and problems encountered.] The results were transforming; after decades of decay, CBMRM underwent a strong revival.

In addition, as described by King & Faasili (1998b, p. 14), "when a village had proposed a reserve in an unsuitable position (e.g., an area of bare sand or coral rubble), additional scientific information was provided to encourage the community to select a more appropriate site. Some villages initially elected to have very large reserves and a few wanted to ban fishing in their entire lagoon area. In such cases, extension staff was obliged to curb over-enthusiasm, and ask the community to balance the perceived fish production advantages of a large reserve against the sociological disadvantages of banning fishing in a large proportion of the village's fishing area. In the latter case, although young men would still be able to go fishing beyond the reef, women (who traditionally collect echinoderms and mollusks in subtidal areas) and the elderly would be particularly disadvantaged in losing access to shallow-water fishing areas."

By August 1998, a total of 51 villages had marine resource management plans in place compared to a design target of 30. Of these, 46 had established village fish reserves compared to three pilot reserves initially envisaged by the Fisheries

TABLE 2 Marine resource management measures implemented by various Samoan villages[a]

Action/ Regulation	Percentage
Ban use of chemicals and dynamite to kill fish	100
Ban use of traditional plant-derived fish poisons	96
Establish small protected areas in which fishing is banned	86
Ban other destructive fishing methods (e.g., smashing corals to extract seafood)	82
Enforce (national) mesh size limits on nets	73
Ban dumping rubbish in lagoon	75
Set minimum size limit for fish	39
Ban coral collection for export	39
Ban removal of mangroves	30
Restrict or ban use of flashlights for night spearfishing	16
Ban removal of beach sand	13
Control or limit numbers of fish fences or traps	7

[a]Figures in the right-hand column indicate the percentage of 62 villages in the Samoan Fisheries Project that implemented the measures listed in the left-hand column by mid-1999 (modified from King & Faasili, 1999).

Division (Fa'asili & Kelokolo 1999). As of early 2002, there were 64 villages with Village Fisheries Management Plans. Of these, 52 had community-owned fish reserves (marine protected areas) (M. King, personal communication). Some of the management actions are summarized in Table 2.

Interviews with fishers and fish management committees in 15 villages (Australian Government Overseas Aid Program 2000) indicated that

- virtually all villages supported the concept of conservation and the establishment of reserves; other coastal villages also wished to be included in the program;
- most villagers were proud of their reserves and highlighted their use as fish dormitories, with fish aggregating in the reserves to sleep and leaving to feed during the day (prompting some villagers to complain about "their fish" leaving their waters to be caught by neighboring villages); and
- many reserves were seen as effective in improving lagoon conditions.

King & Faasili (1999, p. 4) stated, "Because the Samoan Village Fish Reserves are being managed by communities with direct interest in their success, compliance with bans on fishing is high and there are not the enforcement costs associated with national reserves." The most recent assessment of community-based management (in 59 villages) suggests that 23 communities are managing their fisheries and marine environment very well (with a score greater than 85%) and 2 are doing poorly (with a score less than 55%) (M. King, personal

communication). Some communities have built watch houses and routinely use watchmen in patrol canoes to monitor illegal activity in their fishing grounds and marine-protected areas (MPAs).

COOK ISLANDS

CMT and tradition-based MRM in the Cook Islands were once highly developed, but they were largely eroded by colonial regulations, major demographic changes, and other Western impacts (well-described by Sims 1989). These practices have since been revived, however, and adapted to fit contemporary conditions in a number of notable instances.

In 1989, legislation was passed that effectively gave island councils total control over management of the living marine resources in their lagoons. CMT was then reevaluated by Cook Islanders as a means of regulating aquaculture of pearl shell, giant clam (*Tridacna* spp.), and the seaweed *Eucheuma*. In addition, periodic closures of commercial trochus and pearl shell grounds patterned after traditional area closures known as *ra'ui* were implemented. Sims (1989, p. 343) reported that such tradition-based regulations were "fairly well accepted, in contrast with the less traditional concepts of size limits and harvest quotas."

In 1982, the Manihiki cultured pearl shell farming management was transferred to the island council. Initially management was poor and over harvesting was serious (Sims 1989). But by 1992, the fishery was described as being "tightly managed" by the council (South Pacific Commission 1992). In 1994, pearl shell farming was extended to Tongareva, where its island council also managed it under a modified tenure system. As in various other Pacific Islands (Table 3), some Cook Island councils have restricted or banned spearfishing or regulated gillnet mesh size and length (e.g., Sims 1989).

Sims (1989) said there appeared to be little incentive to reinstate tenure over subsistence fisheries resources because demographic and material culture revolutions decreased reliance on them for subsistence purposes. However, in the remote atoll of Pukapuka, where subsistence fishing remains vital, Munro (1996) described a variety of MRM measures in operation, most of them recently implemented. These include a ban on fishing using explosives, bans on spearfishing within the lagoon, a ban on hunting undersized turtles or harvesting turtle eggs, areal bans on using gillnets overnight, seasonal bans on taking milkfish, and seasonal and areal bans on taking coconut crabs and seabirds.

In 1998, the traditional chiefs of Rarotonga (the most populous island and site of the capital of the Cook Islands) designated five coastal areas as marine reserves. Patterned after the traditional *ra'ui*, which had not operated on Rarotonga for four decades, they were initiated entirely by local people, with no push from outside sources such as aid donors, although the latter and the government assisted in their establishment (K. Passfield, personal communication).

By 2000, a permanent sanctuary in the lagoon had also been designated, and three more *ra'ui* were operating. Different *ra'ui* have different management

arrangements. Some are opened temporarily for limited types of harvesting, such as for trochus. The results yield information on the effects of what is, in essence, a form of experimental management and are expected to lead to gradual improvements in *ra'ui* design. The *ra'ui* are repopulating quickly with some species (B. Ponia, personal communication) and are proving to be a significant tourist attraction. There seems to be widespread community support for them, judging by various local newspaper reports, but poaching by islanders returning from overseas for the Christmas holidays has been a problem.

FIJI

In Fiji, stated Veitayaki (1998, p. 57), "It is becoming abundantly clear that customary fishing area owners are taking seriously their role in the proper management of the resources within their areas." He described gillnetting closures at Kaba Point, Verata, and Macuata, banning of all commercial fishing in Lau, and fishing ground closures elsewhere. He also described how the chief and the people of Kiuva repeatedly opposed the construction of a road to their village because it would have involved clearing and draining extensive mangrove areas that provide the people's main fisheries resources (Veitayaki 1998).

Fong (1994) described a variety of CBMRM measures instituted since 1989 in Macuata Province, including bêche-de-mer closures and restrictions on gillnet use and on spearfishing using scuba. She also described a number of statements by villagers and outside commercial fishermen indicating that they believed fishing had improved significantly as a consequence of these management measures. She noted the widespread opinion among villagers that banning gillnets has proven especially effective in increasing catch-per-unit effort and numbers and sizes of fish.

Anderson (1999) reported banning or controlling gillnetting, banning night spearfishing, fishing area closures, and total fishing bans in various Fijian communities. Cooke (1994a, p. 181) mentioned community-based reef closures of one year or more in the Ba area of Fiji "in direct response to declines in relevant stocks," and taboos on dynamite fishing.

Naqasima-Sobey & Vuki (2002) described recent taboos in some Fijian villages on commercial harvesting of various invertebrates, as well as rotating fishing ground closures. They also related how the establishment of community-based MPAs is increasing and discussed some special considerations that must be addressed in order to encourage their establishment. Much of the local interest in MPAs is being generated by the awareness-raising activities of nongovernmental organizations (e.g., Calamia 2000). Villagers are also recognizing the need to protect and enhance their fisheries resources and combat beach erosion by replanting mangroves (Veitayaki 2001).

The Ueunivanua community in the Verata area closed a 24-hectare area of seagrass and mudflats to harvesting of the blood cockle (*Anadara* sp.) in 1997. After being trained by a University of South Pacific team, the villagers did their

own monitoring of the impact. Within two years cockle abundance increased by 1365% and mean size also increased. In the open habitat downstream of the harvest area, cockles increased by 523% owing to increased recruitment. Remonitoring by a university team revealed that the village monitoring data were sound (A. Tawake & W. Aalbersberg, in review). The results so impressed the community that they set up additional closed areas in mangrove and reef areas to protect other species. Word of the success spread to other villages in the area, and seven of them implemented their own tabooed fishing areas. By 2000 the total protected area in these waters had increased to 7 km^2. Following local media coverage of the Ueunivanua project, similar efforts began in four other sites across Fiji, and the Ueunivanua monitoring team was in high demand to serve as trainers (Tawake et al. 2001).

According to Tawake et al. (200l, p. 35), the Ueunivanua "team presented their results to fishery policy makers in the Fijian government. After they recovered from their surprise at being given scientific findings by community members, the government policy makers embraced the idea of adopting traditional Fijian customs to manage marine resources. As a result, the government recently developed a full-time project focusing on locally managed marine reserves within Fiji's coastal waters."

To oversee village fishing regulations and reduce poaching, honorary fish wardens patrol their fishing grounds (Fong 1994). Unpaid and part time, they see this "as a natural part of their traditional service to the community" (Adams 1993). Some receive training from the Fisheries Department or NGOs such as WWF (Naqasima-Sobey & Vuki 2002). Some of their costs may be subsidized by gifts to the community from outside commercial fishermen who must seek permission to use tenured fishing grounds annually.

Cooke (1994a, p. 180) reported from a survey in the Ba area that "most owners said they considered conservation for future generations of their own people more important than deriving revenue from the resource, and even placed it above the option of optimizing revenue while conserving." The seriousness with which some Fijians take marine conservation in recent years is illustrated by Fong's (1994) account of how some chiefs decided to go further than the government regulations in restricting the harvest of bêche-de-mer in their waters.

But despite all these promising developments, nearshore marine resource management in Fiji has some serious problems that are discussed in a later section.

PALAU

In the 20 years since its adoption of a constitution and seven years since independence, Palau has evolved an awkward, complex, three-tiered system of government. Although, in theory, its constitution grants more authority to customary law than most in Oceania, in practice the system has led to its erosion, including the decline of traditional marine tenure (but not marine tenure per se) and the decline of village-based (but not community-based) marine resource management. In an excellent treatment of a complex subject, Graham & Idechong (1998) explained

these distinctions and (p. 143) described how these recent changes "may portend an important shift back toward decentralized, if not exactly traditional, control over the use of Palau's inshore resources."

Palau's 16 states have an average population of a few hundred people except for the state of Koror, which contains the capital. Physically, most states consist of small village clusters rather than what are usually thought of as states.

The line between traditional and modern governance is blurring; it is not uncommon for chiefs to be represented in state governments. But although traditional authority per se is being weakened by this new political arrangement according to Graham & Idechong (1998), CBMRM is not; local authority for purposes of CBMRM is simply shifting from village leaders to state governments and may be strengthening in the process according to these authors.

Seven or more states have established one or more marine reserves and some have placed seasonal closures on a number of important reef-fish spawning-aggregation sites (Graham & Idechong 1998, Johannes et al. 1999; T. Graham, personal communication).

HAWAI'I

Hawai'i is highly cosmopolitan and native Hawaiians have tended to be marginalized economically and numerically by Asians and Europeans. Customary marine tenure, once strong, ceased to function owing to colonial impacts several generations ago (Kosaki 1954).

Yet even there a modest revival of CBMRM has been occurring. There remain a few areas where native Hawaiian communities still dominate nearshore fishing, and local seafood remains an important source of subsistence. Recognizing this fact, as well as the need for better nearshore fisheries management in the state, the Hawai'i State Legislature created a process in 1994 for designating community-based subsistence fishing areas and providing local communities with some degree of management assistance and authority.

Using this opportunity, the community in the Ho'olehu Hawaiian Homesteads on the island of Moloka'i implemented a fisheries management plan, described by Friedlander et al. (2002), in order to revitalize a locally sanctioned code of fishing. They also established a marine resource monitoring program that integrates traditional observational methods and science-based technique. They devised a novel means of circumventing a problem they could not legally control—the behavior of outsiders who use these fishing grounds, which belong to the State. The only road to these fishing grounds goes through their lands. Outside fishers who use this road must observe community fishing rules and regulations. These include closures during the season when many food fish are known to spawn, a ban on night fishing, and size restrictions (Friedlander et al. 2002, Friedlander, personal communication).

The Hawaii State Legislature also established the Kahoòlawe Island Reserve consisting of the island and its surrounding ocean waters within a two-mile

radius of shore. The island and its waters can be used only for native Hawaiian cultural, spiritual, and subsistence purposes, including fishing, for environmental restoration, and for historic preservation and education.

TUVALU

The tiny nation of Tuvalu may have been the first to use bylaws for the purpose of fisheries management in Oceania. I gathered the following information during a visit in 2000. In 1979, a bylaw was passed in Funafuti Atoll banning use of gillnets of less than 1-inch-stretched mesh for catching rabbitfish. In 1980, a bylaw was passed banning fishtraps and nets in designated areas of the reef and lagoon.

According to Nukulaelae Atoll's Control of *Faapuku* and *Kaumu* Bylaw of 1984, fishing with nets or spear for *faapuku*—two species of serranids—is banned when they aggregate during their spawning season. Nukulaelae is possibly the second place in the entire Indo-Pacific to pass a modern law to protect spawning aggregations. Only Palau, as far as I know, was earlier in this regard—1977 (Johannes 2000).

DISCUSSION

Why the Renaissance?

Over the two decades since I described the decline of CBMRM in the Pacific Islands (Johannes 1978), many conditions that led to that decline have intensified. These include the spread of the cash economy, new export markets, improved harvesting and transport technology, burgeoning populations, and the decline of traditional authority.

What, then, has led to the renaissance of CBMRM in the face of such obstacles? Some of the contributing factors are not hard to deduce. One obvious factor is the perception among islanders of the growing scarcity of their marine resources owing to the demands of growing export markets and local populations (see, e.g., Fong 1994). In Marovo Lagoon, Solomon Islands, said Hviding (1989, p. 36) "the conservation of resources is a key concern for most of today's leaders—more so than for previous generations, when population density was low and resources abundant." Another factor is the income that some communities can now earn from keeping their reefs healthy in order to attract tourists (see, e.g., Calamia 2000, Johannes & Hickey 2002).

In addition, pride in one's culture is growing among many indigenous peoples, including Pacific Islanders (see, e.g., Adams 1998). One manifestation of this is that islanders are rediscovering the value of some of their natural resource management practices, albeit often in altered forms to fit contemporary circumstances.

Recent political independence is an important related factor. Most of the island countries of the western and southern Pacific gained independence during the past three decades. And, as described above, many of the resulting constitutions have

granted renewed authority to traditional leaders and customary laws and processes (e.g., Ghai 1988)[3].

STRENGHTENING CMT The renewed status that independence has given CMT in various Pacific Island countries is an especially important incentive for CBMRM. Where the ability to exclude outsiders from ones' fishing grounds is absent or weak, as noted earlier, so is the incentive to conserve ones' marine resources because outsiders can expropriate the benefits.

Recent studies in the Pacific Islands support the conventional (but not uncontested) wisdom that marine tenure plays a vital role in nearshore CBMRM[4]. For example, in Samoa, as described above, CBMRM blossomed only after the legal stumbling block that prevented villagers from excluding outsiders from their fishing grounds was removed. Eight of the 21 Vanuatu villages surveyed by Johannes & Hickey (2002) had internal disputes over control of fishing ground tenure. The mean number of MRM measures operating in these villages was less than half the number found in the 13 villages that reported no such disputes, and the difference was highly statistically significant.

The data in Table 3 further reinforce the importance of CMT for CBMRM, providing a clear contrast between the varied CBMRM measures taken in some Pacific Island countries where community-based marine tenure is secure, and the dearth of such measures in two where it no longer exists.

Kiribati

Little information is available on contemporary community-based management in the nation as a whole. But Johannes & Yeeting (2001) described the decline and disappearance of CMT on Tarawa Atoll because of past colonial government actions. The incentive of fishing communities to conserve is minimal since the law does not recognize their traditional rights to prevent outsiders from taking what they leave unharvested so it can breed or grow. There is, however, a growing push from local communities to legally formalize rights to their surrounding fishing areas to facilitate CBMRM.

A first attempt at CBMRM was initiated recently in Buariki village in order to try to stop overexploitation of bonefish spawning runs in its waters. Although its villagers have no legal authority from the national government to do this, they were able to get some support through their island council by incorporating restrictions in the island council bylaws. Although this attempt is not binding legally, it is a start.

[3]As Ghai (1988) and Graham & Idechong (1998) pointed out, however, these constitutions are not always an umixed blessing for customary authority—they sometimes weaken its power even when nominally intending to strengthen it.

[4]The first published article in which the importance of CMT for fisheries management was recognized in the Pacific Islands is 25 years old (Johannes 1977). Pacific Island fisheries managers (who were, in those days, almost entirely colonial expatriates) considered CMT to be nuisance, an impediment to fisheries development—if they considered it at all.

TABLE 3 Customary marine tenure and some community-based fisheries management measures found in various Pacific Islands today

	Palau	Cook Islands	Solomon Islands	Fiji	Samoa	Vanuatu	Tonga	Tarawa
Customary marine tenure	•	•	•	•	•	•	—	—
Spearfishing restrictions	•	•	•	•	•	•	—	—
Netting restrictions	*	•	•	•	•	•	—	—
Destructive fishing methods ban	*	•	•	•	•	•	—	—
Marine protected areas	•	•	—	•	•	•	Δ	—
Periodic closures–species or areas	•	•	•	•	—	•	—	π

•—community law; *—national law enforced by the community; ◊—de facto (see text); Δ—national law–poorly observed; π—not legal but tolerated (see text).

Sources: Palau: Graham & Idechong 1998, Johannes 2002; Cook Islands: Sims 1989; Solomon Islands: Hviding l998; Fiji: Veitayaki l998, Fong l994, Cooke & Moce 1995; Samoa: Fa'asili & Kelokolo 1999, King & Fa'asili 1998b; Vanuatu: Johannes & Hickey 2002; Tonga: World Bank 1999; Tarawa: Johannes & Yeeting 2001.

Moreover, it seems to be effective. The Kiribati Fisheries Department recognizes the need for some kind of management of this important but threatened fishery but has been unable to do it themselves. So they encourage this initiative as a first step before getting proper national legislative support, which can often be a long process (B. Yeeting, personal communication).

Tonga

CMT disappeared generations ago (Malm 2001). Tonga is also devoid of CBMRM (Table 3). Perminow (1996, cited in Malm 2001) provides an example of the effect of the absence of community fishing rights in Tonga. Although fishers on Kotu island in the Ha'apai group knew that the increasingly intense exploitation of lagoon species and invertebrates for sale might be too taxing on the lagoon resources to be sustainable, they felt that there was no point in reducing the intensity of exploitation because the resources could be exploited by fishermen from other islands in the district. Arguments have been advanced to introduce some legal form of community-based control over local fishing grounds in Tonga (e.g., Pelelo et al. 1995).

EDUCATION FOR CBMRM In the past 20 years, government fisheries managers in Oceania have also come to recognize that the research required to manage complex fisheries on a rigorous scientific basis is far beyond their (or anyone else's) abilities. Centrally based government management is often too expensive to justify the cost in any event (Johannes 1998b). In many circumstances, therefore, nearshore fisheries resources must be managed largely by villagers.

There are, to be sure, important exceptions. For example, central governments can usually best monitor compliance with certain marine resource regulations (e.g., trochus size limits at collection or shipping points, species export bans at airports and ports) as well as license foreign fishing operations.

To foster greater reliance on CBMRM, some government fisheries departments have directed increasing effort into appropriate extension work, some of which has been described above. These efforts include education, which has clearly helped influence many communities to pursue CBMRM.

Those providing education for better natural resource management in the villages include not just fisheries departments, moreover, but importantly the SPC Coastal Fisheries Program, including its new Community Fisheries Section, various NGOs, and the University of the South Pacific. Better education is also taking the form of improved environmental curricula in schools and the increased access that promising island students have to overseas training in the University of the South Pacific Marine Studies Program, the University of Guam Marine Laboratory, and beyond. Without such support, the current growth in CBMRM would decelerate and probably even decline.

The public are not the only ones who can benefit from more education concerning nearshore fisheries in Oceania. National governments need to realize that, in almost every Pacific Island country, subsistence fisheries are worth more than nearshore commercial fisheries (Dalzell et al. 1996)[5]. On economic grounds, then, extension work in rural fishing communities deserves a larger proportion of fisheries funding than it usually gets. Commercial fisheries usually receive disproportionate attention when island politicians and aid donors decide on funding priorities.

COMPENSATING FOR MANAGEMENT RESTRICTIONS King & Faasili (1998a, p. 37) asserted, it is "unreasonable to expect communities to adopt conservation measures, which would (at least in the short term) reduce present catches of seafood even further, without offering alternatives." This is not always so. But it is most likely to be true where inshore resources are severely overfished as in Samoa, to which the above authors were referring, or on atolls with depleted marine resources and extremely limited terrestrial resources.

Some of the cases described above do indicate a willingness to make short-term sacrifices even without outside assistance with alternative employment. This is more likely to happen when alternative fishing grounds, perhaps further from the village, or unused agricultural lands are available for cultivation in order to compensate for restricted fishing (e.g., Johannes & Hickey 2001). In short, some alternative source of income, either from underused community sources or external sources, is usually essential if fishing is to be effectively restricted for management purposes.

[5]The value of the subsistence catch was calculated by these authors as the price it would fetch if it were sold. In the absence of this catch, precious foreign exchange funds would often have to be used to replace it in island diets.

Many early attempts by fisheries departments to provide alternative income sources in Pacific fishing villages failed (see, e.g., Johannes 1998a, Veitayaki 2000). But as experience increased, there have been more successes. In Samoa, for example, the diversion of fishing pressure to areas immediately beyond the reefs through the introduction of medium-sized, low-cost boats has been useful. Encouraging aquaculture, although often fraught with problems (see, e.g., Veitayaki 2000), sometimes worked well, as did pearl culture in the Cook Islands. Fish aggregation devices (FADs) are used with increasing effectiveness to redirect some of the pressure on nearshore marine resources to less heavily exploited offshore stocks (SPC Fish Aggregation Device Information Bulletin).

MAINTAINING FLEXIBILITY OF TRADITIONAL MANAGEMENT CBMRM in Oceania usually implies the operation of customary law. The articulation of customary law and modern, Western-based law is an exceedingly complex and troublesome issue in the region (see, e.g., Ghai 1988, Adams 1998, Graham & Idechong 1998). Among the strengths of traditional law are its culture-specific and locale-specific nature; needs and customs can differ greatly from village to village even on single islands[6]. The statement by Graham & Idechong (1998, p. 150) that Palauan custom is "anything but certain, general, fixed, and uniform" can be generalized to Oceania as a whole.

The ability of traditional laws to adapt quickly to meet changing circumstances is also especially useful in the fast-changing world of Oceania during the past few decades (e.g., Hviding 1998).

National Western-based laws typically possess neither of these attributes; their uniformity and slowness to change is based more on the need to grease the wheels of commerce rather than for community harmony or equity. Thus, explicit and detailed codification in national legislation of customary natural resource law runs the risk of homogenizing and freezing it (e.g., Ruddle et al. 1992, McKinnon 1993). Graham (1994, p. 6) argued, however, that "The question facing governments that want to keep traditional management systems intact is not whether or not to codify; it is to what degree to codify" (see also Aswani 1997). Recent developments have proven Graham right.

Despite the formal recognition of traditional authority and village-based customary laws in the constitutions of the region, the ability of some village leaders to enforce village laws is, in fact, weakening (e.g., Graham & Idechong 1998), especially around urban centers (Johannes & Hickey 2002). Many village leaders

[6]Adams (1998, p. 139) discussed the advantages of village-to-village differences in CBMRM: "Community management goals may not differ only from those of government, but from those of other communities. This diversity of approach is actually one of the main advantages of community-based decision making for artisanal fisheries in the Pacific Islands. Even if there are cases where excessive exploitation, or unwise leadership occurs, if responsibility is sufficiently fine-grained there was will always be converse cases. . .. The effect over the fisheries of the nation as a whole will tend to be more stable than in cases where a centralized government attempts to experiment in maintaining a sustainable fishery by manipulating the rules across the country as a whole."

have, accordingly, moved from avoiding recourse to national law except in extreme circumstances (see, e.g., Johannes 1998a) to seeking ways of enlisting national law to shore up their authority and to back up specific village laws with formal legal recognition (see, e.g., Fa'asili & Kelokolo 1999, Johannes & Hickey 2002).

The introduction of bylaws is proving to be an especially valuable strategy in this connection. Bylaws are selected village regulations that are accorded legal recognition in national courts of law. They are a means of legally sanctioning these regulations without encasing the entire body of customary law in legislative concrete.

Nowhere have bylaws been employed with greater effect in the context of CBMRM in Oceania than in Samoa. There, as described above, it was the introduction in the mid-1990s of the bylaw system that more than any other action precipitated the upsurge in CBMRM. The flexibility of village laws is preserved; from time to time these bylaws may be altered or revoked as required. The heterogeneity of village regulations is also preserved; each village has its own set of bylaws to fit its particular needs.

The Vanuatu Government is also looking into enacting appropriate legislation to strengthen traditional authority. In some villages in the meantime, government police officers are informally backing up the chiefs when necessary (Johannes & Hickey 2002).

The Cook Islands has also adopted the bylaw approach to CBMRM (Adams 1998). Fong (1994) recommended a similar approach for Fiji. In Isabel Province, Solomon Islands, the use of ordinances (similar to bylaws) to provide legislative support for customary owners of natural resources who wish to manage them more effectively is discussed by Peart (1993).

No longer possessing CMT, the people of Kiribati are currently experimenting with bylaws in order to give fishing communities some new form of fishing ground tenure coupled with the ability to manage their marine resources. Bylaws are enabling the people of Abaiang, for example, to regulate a live reef food fish export operation (B. Yeeting, personal communication).

Graham & Idechong (1998) noted a precedent for the use of a similar strategy in Palau. Here a state legislature passed a law that recognized a marine reserve established by local chiefs, strengthening their authority to manage it, especially (as with the Samoan bylaws discussed above) in connection with their ability to control the actions of outsiders. But this law also reflects the new states' growing exercise of their authority to regulate local marine resource use, which, as described above, amounts to a new, nontraditional form of CBMRM. (Recall that most states in Palau consist of small village clusters.)

The differences between the Western free-enterprise concept of natural resource ownership and islanders' quite different concept of communal natural resource tenure can create difficulties. The sea (like the land) is a perpetual source of sustenance rather than a commodity among Pacific Islanders; it is an integral part of their culture, and the depth of their emotional attachment is much greater than many Westerners can easily comprehend. Under these circumstances the sale of the shallow marine areas, like the sale of land, is often virtually unthinkable, and many Pacific Island countries have laws against the sale of tenured land or

nearshore waters. These laws have made it difficult for companies to invest in activities such as aquaculture in tenured waters and thus retail development. A solution increasingly used is long-term leasing. This approach makes available marine areas for commercial development while protecting communal tenure and allowing for the maintenance of those aspects of traditional management and use agreed upon by lessors and lessees. A lease agreement might stipulate, for example, that the leased waters surrounding an aquaculture facility would still be available for community fishing and subject to management restrictions such as closed seasons, exclusion of outside fishers, etc.

FIRMER CONTROL OVER OUTSIDE FISHERIES OPERATORS In the 1990s, outside companies were increasingly required by governments to negotiate formal agreements with villagers, to guarantee their adherence to various measures to protect marine resources before operating in tenured waters. Often government fisheries personnel or NGOs assisted in these negotiations. In connection with live reef food fish export operations, for example, such agreements are used in Fiji (Yeeting 1999), Papua New Guinea (Gisawa & Lokani 2001), Solomon Islands (Johannes & Lam 1999), Vanuatu (Naviti & Hickey 2001), and Palau (Graham 2001).

Other communities have simply banned enterprises perceived as threats to their marine resources. In Solomon Islands, for example, some traditional leaders have closed their tenured lagoon waters to tuna-bait fishing by transnational companies (Hviding l989). Some communities have also unceremoniously evicted companies that did not adhere to their fishing agreements (e.g., Naviti & Hickey 2001, Johannes & Riepen 1995).

SELF-MONITORING OF MANAGEMENT IMPACTS One recent element to emerge in the moves to reinvigorate CBMRM is systematic data gathering by trained community members to determine the impacts their management measures are having on their marine resources. Above, I described the successful community-based monitoring of protected clam stocks in Fiji and the monitoring of marine resources by a Hawaiian community. Communities in some other Pacific Islands are planniing similar activities (see, e.g., Tawake et al. 2001).

BETTER CRITERIA FOR GOVERNMENT ASSISTANCE Government fisheries personnel in Vanuatu and Samoa now accord disputatious villages low priority in providing assistance. These are relatively new policies; it will be instructive to see if they provide a useful incentive for such villages to settle their differences. It should, at a minimum, help reduce government money and effort spent on projects that fail.

The Downside

The trend toward reinvigorated CBMRM in various Pacific Islands is no cause for complacency. Indeed, many islanders themselves are under no illusion that the future of their inshore fisheries is secure. A survey of community fishes in Fiji,

Kiribati, Palau, Samoa, Solomon Islands, and Tonga (World Bank 1999) revealed that only Samoans believed that the condition of their coastal resources would improve in future.

One problem relates to the size of tenured fishing grounds and of marine reserves. Fiji's CMT units seem especially problematic in this regard. Many groups have exclusive rights to territories far from their adjacent waters and sometimes separated from the rights-holding communities by waters belonging to other social groups (Ruddle 1995). Moreover, Fiji's 411 legally recognized customary fishing rights areas range in area from 1 km^2 to a whopping 5000 km^2 (Cooke 1994b, cited in Ruddle 1995). Their sizes and the quantities of resources contained therein are, in addition, only weakly related to the sizes of the populations that depend upon them. Some readjustments in the boundaries, sizes, and locations of fishing rights areas, where politically feasible, might be desirable. The district of Sasa has already combined four of its fishing rights areas into one (Fong 1994) for greater equitability of access.

The problems of enforcement in large Fijian customary fishing grounds are exacerbated by the extensive fishing carried out in them by commercial fishermen with no cultural link to their owners, and thus with a lesser commitment to long-term sustainability of their resources. Many disputes arise relating to revenue distribution in connection with commercial fishing (see, e.g., Lagibalavu 1994, Ledua 1995). Policing is difficult; physical clashes are not uncommon. In one case, wardens who reported fishermen involved in blast-fishing had their own boats blown up (Cooke & Moce 1995). Because of these and other problems, said Ruddle (1995, p. 10), "this seemingly straightforward and modern management of traditional rights areas is, in reality, confused and emotionally charged."

The locations and sizes of tenured fishing grounds in Oceania are not based on biologically optimal management units but on historical developments and geographic features. [It must be stressed, however, that there is little consensus among biologists on how to select ideal unit sizes or locations for these extremely complex nearshore fisheries (e.g., Adams 1998).] Some flexibility is afforded by the collective action of owners of two or more adjacent fishing grounds. In Palau, for example, the chiefs of Kayangel and Ngerchelongl decided to share some of their communities' fishing grounds and jointly close to fishing certain reef channels known to be important spawning aggregation sites (Graham & Idechong 1998).

Even large tenured fishing grounds are too small to protect species that routinely migrate beyond their limits. The incentive to moderate harvest of such species on one's fishing grounds is reduced because they can simply be caught by fishers further along their migration path. This problem has led, for example, to serious depletion of mullet on their spawning migrations in various parts of Oceania (e.g., Johannes & Hickey 2002).

Community-based reserves are sometimes too small or poorly located to be very effective in conserving finfish (see, for example, Samoa, above). The sizes of marine reserves must usually be constrained by the size of the tenured fishing grounds in which they are to be placed (e.g., Adams 1998). Small reserves may

suffice, however, for managing stocks of less mobile invertebrates if they are appropriately sited (e.g., A. Tawake & W. Aalbersberg, in review).

One obvious criterion of the suitability of a fishing rights area is how well it can be policed. Surveillance is difficult in fishing grounds that extend far from shore or far from the fishing communities to which they belong, as in parts of Fiji.

Natural resource rape by some leaders—from village leaders to those high up in national governments—is on the increase in parts of Oceania. Political "irregularities" in the selloff of some islands' natural resources especially to overseas interests, is widely discussed in the regional media. It is fairly well documented in relation to Melanesia's forest resources (e.g., Barlow & Winduo l997). But it has not been adequately studied in connection with the regions's marine resources (e.g., Adams 1998, Johannes 1999). The live reef food fish trade in some island countries is ripe for this kind of of exploitation.

The secretary to Papua New Guinea's Department of Fisheries and Marine Resources reportedly told his law-enforcement officers that within three months of his appointment he had been offered a total of US$23,000 in bribes (which he did not accept) (Fisheries 'Bribes' in PNG. *South Seas Digest* 13(7): June 18, l993).

There are also growing numbers of reports of leaders viewing the profits to be obtained from access fees to their villages' marine resources as theirs, not their village's, leading to the erosion in some areas of traditional principles of redistribution (e.g., Schug 1996).

Additional problems include the following.

- Although some island fisheries departments actively engage fishing communities and effectively catalyze CBMRM, as in Vanuatu and Samoa (see above), others do not (e.g., Adams 1998). A World Bank study (1999) revealed that only about one fourth of the staff time of national fisheries agencies in Oceania is spent on coastal management matters. Only about 40% of the villages in the Bank study team survey had been visited by a government official to discuss coastal resource management issues during the previous 10 years. Many villages do not as yet participate in the new CBMRM
- As Fong (1994) pointed out, good community leadership is critical to good CBMRM (see also World Bank 1999). I have seen more than one CBMRM regime decline when an ineffective leader replaced a good one. But the process works both ways; moribund CBMRM can be rejuvenated when strong leadership succeeds weak.

CONCLUSIONS

Young professionals in Oceania are sometimes discouraged when faced with fisheries management systems that are less than perfect, unaware, perhaps, that there is no other kind. Given the parlous state of fisheries management around the world, the growth of CBMRM in Oceania, despite its imperfections, should be a source of optimism.

The enthusiasm for the CBMRM in Oceania may surprise some tropical small-scale fisheries experts working elsewhere. For those who are fighting uphill battles to introduce community-based controls, such as MPAs, in various parts of the world, the situation in Samoa, for example, can only be greeted with envy. Not only, as noted above, did villagers establish 46 small fishing reserves instead of the 3 that were initially hoped for by the Fisheries Department, but also the Department was "often obliged to curb overenthusiasm for (impractically) large MPAs" (King & Faasili 1999, p. 37).

Space does not permit an adequate appraisal of why these CBMRM successes seem more common today in Oceania than in many other tropical regions. But clearly one important factor is the widespread existence of CMT and its formal recognition by various Pacific Island governments.

RESEARCH POTENTIALS OF CBMRM Adams (1998, p. 139) said "given the current state of tropical fisheries ecology, let alone tropical fisheries management, small-island governments are obliged to experiment wildly when asked to balance cash-economy development against the hope of sustainability." In the small, often well-demarcated fishing grounds that characterize many nearshore fisheries in Oceania, there is much scope for experimental management research as proposed by Walters & Hilborn (1976). As described above, many such experiments are being carried out today, but few are being rigorously monitored (the clam closure in Fiji, discussed above, is one of the exceptions).

Adams (1996, p. 342) pointed out, "Local communities observe the results of their management experiments and adapt accordingly, whilst researchers observe the results of their own management experiments and amend theory accordingly. Scientists however, rarely observe the results of local community adaptations. Whilst these adaptations are not scientific, they can provide a very cost-effective source of information for the formulation of hypotheses to be tested scientifically."

To learn from these management experiments all researchers need to do is identify experimenting villages where village authority is strong and respected (so the experiment is more likely to proceed smoothly)—and monitor the results or train community members to monitor them (see, e.g., Tawake & Aalbersberg 2002) (after obtaining permission from appropriate leaders using culturally appropriate approaches). Ready-made controls are available in some areas—that is, open or unregulated fishing grounds and closed or regulated fishing grounds with very similar environmental features may often be found adjacent to one another. Vanuatu, Samoa, and Fiji seem especially attractive for such research.

For the Doubters

As Hviding & Ruddle (1991, p. 10) have noted, "far from being overwhelmed by commercialization and resource scarcity, many CMT systems in Oceania appear to have considerable capacity for handling and adapting to new circumstances,

thereby becoming potentially important tools in the contemporary management of fisheries and of the coastal zone in general."

A small but destructive group of anthropologists maintains, however, that building contemporary conservation on traditional natural resource management is bound to fail because of differences between Western and indigenous concepts of nature. This is an astonishing generalization, coming as it does from a profession that normally serves to restrain Western ethnocentrism, for it implies that only Westerners are capable of deducing the connection between harvesting pressure and natural resource availability. No one has been more outspoken on this issue than Dwyer (1994, p. 91) who has claimed that, "To represent indigenous management systems as being well-suited to the needs of modern conservation, or as founded on the same ethic, is both facile and wrong." This opinion arises from generalizing too freely from experience gained in certain cultures for which the statement may well be true.

But some Pacific Island fishing cultures have long recognized the relationship between fishing pressure and the state of their fish stocks and have regulated their fishing accordingly. Their traditional management systems not only predated Western ones by centuries (Johannes 1978, in press) but also today provide an invaluable, adaptive foundation for the renaissance in CBMRM in Oceania.

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