The interface between traditional and modern methods of fishery management in the Pacific Islands

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Introduction

Fishery management, like government, is subject to a number of different theories about how it should operate. The proponents of each theory are usually convinced that theirs is the only sensible, workable or equitable method. But, as in politics, there is usually also a prevailing majority trend towards or against any one method at any particular time. Whilst the 1990s have been seen by many as triumphant consolidation of capitalism as a global economic system and for democracy as a form of government, the decade that started with the collapse of the Grand Banks cod fishery has also seen a great upheaval in first-world fisheries management thinking. There has been a widespread reaction against technocratic and narrowly science-based mechanisms of fishery management (1).

Even though this reaction is not entirely fair, since the perceived failure of modern fisheries management has been due more to a shortfall in the political motivation for precautionary action than in the quality of the biological scientific process, there has been a realisation of the need to incorporate management mechanisms that do not catastrophically fail if fish stock assessment is inaccurate (2) or if the political process is flawed. In essence this means that new fisheries management measures are starting to involve more dialogue; to involve better social integration to improve the prospects for compliance; and to be based more on negative feedback mechanisms whereby there are automatic incentives for reducing exploitation if catches exceed sustainable levels.

Increasing mainstream attention is being paid to the study of traditional and community fisheries management measures in an effort to learn from activities that have survived the test of time. Although many traditional fishery management measures have evolved within a specific social framework and may not be translatable into other contexts, others take advantage of widespread human attributes and may be useful in illustrating fundamental principles.

Whilst modern industrial fisheries management theory is paying much closer attention to social factors nowadays, there have always been major social factors inherent in the interface between community and institutional or governmental mechanisms of management in small-scale fisheries. This problems of this interface have usually involved problems of incongruity to a greater or lesser extent.

Incongruity between community and government often occurs at the most fundamental level in the Pacific Islands region over the question of ownership. Almost all Pacific Island societies traditionally involve some sort of marine tenure, and this usually involves ownership of reefs and lagoons, and sometimes a substantial portion of open ocean, by a matrix of relatively small social units. By contrast, governments over the last 100 years or more have invested ownership of the seabed (and by implication, all resources) almost exclusively at the level of the State, and any legal rights remaining with communities have usually been use rights rather than ownership rights. Even in Tonga, the only Pacific island group never subject to direct colonial rule, marine ownership rights were assumed by the Tongan Crown in 1887 (3).

Other fundamental incongruities between community and government often occur in the goals of management itself. Governmental management policy tends to be influenced more by intellectual or academic trends and fashions than community policy, which appears to be more conservative. Both sides are normally influenced by the views of individuals, but the voices of individuals tend to be less diluted by others, and heard for a shorter time, in government offices. At the institutional level, fisheries departments are a fairly new development in the Pacific Islands region, and the oldest dedicated colonial Government fisheries services came into being in the late 1950s. Community policies on fisheries management usually have somewhat less recent origins. And, as described elsewhere in this volume (4) the actual objectives of management themselves may differ widely between government and communities, with resource maintenance being only one of many possible objectives.

These incongruities between State legal rights and traditional expectations have been experienced to different extents in different Pacific island States, just as the original scope and type of traditional marine tenure varied from country to country and island to island, making any definitive region-wide statement difficult. It would, however, be fair to say that the first 50 years of this century were characterised by government indifference to marine issues (except for those islands where high value invertebrate export resources were exploited by colonial governments). The subsequent 30-35 years saw attempts by governments to manage island fisheries on western models (accompanied by the establishment of specialised government fisheries services), and the last 10-15 years have seen increasing recognition of community and traditional roles in the allocation and management of resources (with some devolution of legal rights to the smaller scale, and better mechanisms for maintaining dialogue between the community and government level) (5).

However, in many countries, despite varying level of government "interference", local communities have continued to manage local fisheries, particularly the fin-fish non-commercial food fisheries that still make up the majority of the catch from Pacific Island coastal waters (6). Most Government fisheries services spend most of their effort on promotion and "emergency maintenance" of the few commercial export fisheries, and managing foreign investors and other externalities (7).

Considerable effort has been spent in the past on the development of comprehensive statistical collection services that would enable Pacific island governments to maintain a detailed inventory of the status of all local fisheries, but it is now being realised that government cannot hope to effectively manage every detail, particularly in fisheries that cover more than a hundred different species, and where there is no hope of this management ever paying for itself (in the majority of the less-westernised islands the largely subsistence economy does not provide much scope for the cost-recovery that is becoming the norm in industrialised nations). But where community tenure is the norm, Pacific Island coastal fisheries are managed in self-contained feedback loops at the village level. Although the government may not get much of this information itself, village leaders are continually getting information from village fishermen and applying it to the local regulation of fisheries.

The emerging priority for external activity in the future is to make sure that there are good mechanisms for the government to get involved when the local system cannot cope, or when external linkages derange the system. This will involve the development of "rules of thumb", based on a compilation of practical experiences in the management of various fisheries, to supplement decayed traditional knowledge, and also the development of socially and biologically meaningful "indicators" to give the government level some way of easily measuring what is going on at the local level in fisheries and triggering action. The use of indicators is fraught with danger, of course (what if the wrong indicator is chosen?), but it is certainly more achievable than the previous aim of trying to keep a rigorous statistical overview of everything that is happening with all species in all islands. That only seems to work in special cases, either in rich countries, or in small countries where some unusually

dedicated people are involved. In essence, at the institutional level, there perhaps needs to be more dialogue than data (8), and governmental fishery management systems need to be more fault-tolerant and robust.

It is difficult for any one person to provide a balanced overview of the relationship between institutions and communities in a region which covers 22 island groups without having worked in fisheries in all of those islands. This discussion will thus consist mainly of anecdotes illustrating particular aspects of this interface, from areas with which the author is familiar.

The Aitutaki trochus ITQ system

Individual transferable quotas, or ITQs, have been increasingly applied in modern times to industrial fisheries, initially in Iceland and New Zealand, and latterly in several other industrialised nations. Much-beloved by many economists, ITQs put a value on the right to harvest a proportion of the assessed fishery resource, and allow these rights to be bought and sold in the same way as fishing vessels or fishing gear. Although many ITQ systems involve so few stakeholders that they do not strictly conform to the assumptions of economic market theory, they provide a comparatively equitable system for restricting excessive participation in inefficient or over-capitalised fisheries, and provide ITQ holders with much more confidence to invest in the future of a fishery. Another marked advantage over open access systems is that they also provide a measure of individual responsibility for the maintenance of a sustainable fishery, since the trading value of a quota will normally be reduced if the stock appears to be sub-optimally productive.

ITQ systems have many disadvantages though (9), that are generally considered to accord them little value in the management of small-scale or developing-country fisheries. Chief amongst these are the difficulties in accommodating new entrants to the fishery. These are early days yet, but the most likely social outcome of commercial ITQ systems is the creation of the equivalent of an industrial aristocracy, with fishing power tending to concentrate in fewer and fewer hands, and larger and larger companies. Countries considering installing ITQ systems would be well advised to consider ensuring, at an early stage, safeguards against monopoly formation. Another major problem is that the setting of the total allowable catch (TAC) within which the ITQs are scaled (usually on a yearly basis) is very dependent on accurate stock assessment. This is a commodity in short supply in most developing country fisheries. It therefore comes as something of a surprise that one small island nation has taken this system and, with some modifications, made it into a very effective management tool for a small scale fishery.

Trochus niloticus, a marine archaeogastropod snail of considerable commercial unit-value as mother-of-pearl production (mainly for shirt buttons), was introduced to the Cook Islands, starting in Aitutaki, in 1956/7 (10). Although the introduced stock had multiplied to such an extent that it was probably fishable by 1970 (11), no commercial harvesting occurred until 1980, after worries expressed by the Island Council that the introduced species might be crowding out a local traditionally-consumed gastropod that occupies a portion of the trochus habitat range (12). The first harvest was comparatively unregulated and took in the region of 200 tonnes of shell for export over 18 months before it was decided to restrict the fishery. At this stage, following the decline of commercial banana husbandry, trochus was one of the few sources of export income for the island apart from remittances from family members working in New Zealand and Australia, although income from tourism has since increased. The fact that this was an introduced species, and not a traditional food source, perhaps made it easier for the Island Council to make comparatively sweeping decisions over the disposition of the resource.

A reserve area (the original introduction point, upwind of most of the reef) was set up where trochus fishing was not allowed at any time, maximum (110mm) and minimum (80mm) size

limits were introduced, and a stock assessment was carried out at least yearly by the Ministry of Marine Resources to suggest a total allowable catch for the annual harvest. Harvesting was restricted to the number of 24-hour periods of fishing necessary for the island to obtain the TAC for the year (usually 20-40 tonnes). As fishing became more intense and efficient over the 1980s, this approximately annual assessed TAC could be obtained in only one or two days. Even though the stock was being maintained at a sustainable and prolific level (this is probably the most abundant trochus fishery in the Pacific Islands, in terms of harvest per unit of reef-face length), there were still problems. The frantic rush to harvest during the compressed time-period did not allow the community to pick the best shells for export, or permit the time to observe the size limits very closely, and those villages closest to the best fishing zones were at a great advantage. Anyone not available within this short time would lose out, and there was a tendency to overload boats and damage the reef in order to land as much as possible within the time-limit.

The individual transferable quota system was introduced in 1989 primarily to alleviate the problems caused by the excessive rush to harvest. Following the government stock assessment and recommendation for the TAC to the Island Council, every household on Aitutaki (around 2,000 souls) was given a quota allocation, based on the number of people in the household. Depending on the TAC, the individual allocation might be 10kg, and with the average number of people per household being 7 (13), this was a reasonable amount for one or two people to harvest in a day or two, for a return of around CI$ 350 (approximately US$ 250) per household. Those households that didn't want to, or couldn't fish, could trade their quota to others. Since no-one was allowed to receive money for more than their quota (any excess went to the Island Council), the pressure to harvest as much as possible within a short time was removed. This allowed time both for the selection of the best shells, and for the harvest to be more closely monitored for future stock assessment purposes, as well as generally increasing the overall equitability of the harvest.

This entire system evolved through close cooperation between the government Ministry of Marine Resources and the Aitutaki Island Council and, whilst there have been disputes (the very low assessed TAC for the 1995 harvest, for example, was a bone of contention), it is an example of a very active interface between government and community. The 1989 Cook Islands Marine Resources Act formalises the principles developed in this, and other artisanal fisheries in the Cook Islands, and devolves much of the responsibility for the management of coastal fisheries to Island Councils. Certain fisheries considered to be critical can be *designated* under the 1989 Act, and a management plan drawn up in consultation between the Ministry and the Council. The framework of this plan can then be formalised in by-laws under the control of the council, to define the roles of those involved and the types of measures to be taken. This is a very flexible framework for co-management and appears to be working well in the Cook Islands for the few fisheries that have been designated so far.

The disadvantages of ITQ systems mentioned earlier, the problems of new entrants and the accuracy of stock assessment, are mitigated at Aitutaki by the fact that ITQs are re-issued to the entire population at each harvest, and because the Council's final decision on the TAC is not absolutely dictated by the stock assessment but also takes account of the fishing community's perception of the status of the stock. After a decade of regular controlled, sustainable harvesting by a community where at least one member of the great majority of households goes out onto the reef at least once a week, it has become possible to judge fairly accurately the relative status of the resource. Unlike, say, giant clams, the trochus fishery is fairly resilient and allows some leeway for experimentation.

The reallocation of quota every harvest removes one of the main economic advantages of an ITQ system, in that it does not promote long-term investment in a fishery, or permit economies of scale by concentrating production in the hands of the most efficient participants. However, this is irrelevant in a fishery which requires no additional investment, and where the main aim is not efficiency, but equitable allocation. Obviously, this system would not be

applicable to many other small-scale fisheries, probably not even the growing potential trochus fishery at Rarotonga (the capital of the Cook Islands, where there is no cohesive control by a single island council, and a mixture of cultures), but is of potential interest to all small islands facing problems in the management of an export commodity fishery.

The Makogai marine reserve

One of the most perennially perceived problems in the Pacific Islands marine conservation field has been the apparent difficulty of setting up effective marine reserves, compared to other regions. Although marine reserves have been declared by some Pacific Island governments, a commonly expressed worry is that they are ineffective (14). This worry has become so widespread that it has led more than one commentator to suggest that the money and effort spent on marine reserves in the Pacific might be actively detrimental to fishery conservation, by diverting resources that could be used on more effective fishery management measures. Considerable hope has been pinned on the indications resulting from the work of Russ and Alcala (see 15), and the resulting rule of thumb that reserving 25% of the available fishing area can lead to a 50% enhancement of surrounding fisheries: a net gain (after the 5-10 years necessary for recovery of stocks in the reserve area). However, this work was carried out in the Philippines, in an area that is considered by most observers to be heavily overfished, and the corresponding enhancement of surrounding fishable stocks in the comparatively less-fished Pacific Islands is likely to be correspondingly les noticeable, unless fishery reserves are aimed specifically at the few strongly targeted species and export commodities that *have* been greatly decimated.

However, the overall value of marine reserves is not disputed here. The value of reserves for conserving endangered species and for enhancing tourism is indisputable, and there is considerable inherent value in protecting reefs that are likely to be net natural sources of larvae for recruitment on other reefs. But the setting up of such reserves in the developing Pacific Islands region for the purpose of sustaining or enhancing fisheries in general, may need to take more account of Pacific Island social systems if they are to be effective.

One of the main reasons why it is difficult for governments to set up marine reserves in the Pacific is perhaps because most Pacific islands have, if not full-blown, then at least some vestiges of traditional marine tenure systems. Where fishing areas are finely subdivided between villages, clans or families, it may be difficult for one or more of these units to give up their holdings for the greater good, particularly if that sacrifice is made permanent by legislation. However, recent experience in Vanuatu (16) and elsewhere has shown that fishing rights owners can be unexpectedly willing to sacrifice a great deal of production, in the form of extended (5-10 year) moratoria on fishing for certain species, if they retain ownership of the area under moratorium and if they are allowed to retain control over the disposition of any resultant harvest. An extended moratorium on a reef is, in effect, a marine protected area. The conclusions from this observation might be that, in islands where marine area rights are finely subdivided, that any attempted protected areas should be correspondingly small, and that community-controlled reserves are likely to be preferable to government-controlled or legislated reserves.

The Makogai marine protected area in the Lomaiviti province of Fiji has not figured on any recent regional protected area lists, perhaps because it is not legislated, or perhaps because it was negotiated and supported by the Fisheries Division rather than the conservation service. Although the island is government-owned, the lagoon and barrier reef is part of the registered fishing rights area of the Tui Levuka who is the authority, on behalf of his people, for permitting or restricting fishing in the area. The original (1987) idea behind the current reserve was to provide some protection from casual fishing for the giant clam re-seeding experiments carried out by the government-run hatchery on the island, but it later developed into a more comprehensive, but still little-publicised, experiment in co-management.

The Levuka people own fishing rights around where they live on the main island of Ovalau, as well as the entire islands of Wakaya and Makogai, and this unusually large traditional fishing rights area was thus felt to be a good site for an experimental reserve (taking in the northern half of the Makogai lagoon and barrier reef) as well as having advantages for the giant clam hatchery. However, the Fisheries Division proposal was not initially well received, due mainly to worries about the ultimate ownership and control of the area. After several rounds of reassurance, final agreement was reached in 1990, for an initial two years, and was renewed in 1992, with a potential cut-off every 5 years in the future. This protected area is not defined in legislation, but is maintained in practice by formal written agreement, ratified in the traditional way, between the Tui Levuka and the Minister responsible for fisheries, that no commercial fishing licences will be issued covering this area, and that subsistence fishing will be held in abeyance except for certain special occasions agreed in advance between the parties.

The reserve area is thus not entirely banned to fishing, but fishing pressure is sporadic and minimal and complete protection from permitted fishing is afforded both to the giant clams and to the turtle nesting area on the shore. Significantly, the fishing rights to the area have not been extinguished, and it is this government-community compromise with limited objectives that has enabled the northern half of Makogai lagoon to become probably Fiji's most effective marine conservation area.

Enforcement over this large area is not easy, and the reserve is subject to occasional "raids" by commercial fishermen from Viti Levu anchoring their vessels near Ovalau and coming over in small boats at night. Enforcement will be improved when additional resources can be obtained, but the very fact that these "raids" occur suggests that stock densities are becoming more attractive. Levuka, Fiji's original capital, is growing as a tourist centre and one of the possible future economic benefits of the reserve to the fishing-rights owners (apart from the artificial and natural fishery restocking that is occurring) will be in running snorkeling and diving day-trips by small boat from Levuka to Makogai. The government hatchery on the island also has accommodation available for visiting scientists, so bench fees and living expenses may also contribute in future both to enforcement, and indirectly to the economy of Levuka.

Makogai is located upwind of Bligh Waters - the strait between the two main islands of the Fiji archipelago, as well as being situated in any Koro Sea current eddy flowing along the south coast of Vanua Levu and Taveuni. Makogai is thus very appropriately placed to act as a potential source of larval recruits to a substantial proportion of Fiji's reefs. The migrating whales that are usually seen on the journey between Ovalau and Makogai, a certain times of year, lend further hope to the long-term aim of achieving economic self-sustainability for the exercise through eco-tourism.

The Macuata gillnet fishery bans

The use of gillnets, particularly modern monofilament gillnets, is regretted by many and deplored by some. Whilst gillnets can be tailored and used in ways that are fairly target-specific, particularly in Pacific Island multispecies artisanal fisheries where almost everything caught is consumed, and whilst they can be the most appropriate way of catching non-carnivorous or planktotrophic fish that are low on the food-chain (and thus a more sustainable target for high-volume staple food fisheries than the higher-level predators that are selected by hooks), they are usually deployed in ways that are wasteful or unnecessarily damaging to certain resources. Gillnets are often left unsupervised in the water for excessively long periods (particularly in places where tradition is such that gillnets are used as though they were weirs or fish-fences); mesh-sizes are often inappropriately small (or the hanging-ratio is adjusted to reduce the effective mesh-size in places where size limits are in force), and in places where fish move along well-defined and restricted routes such as reef-passages and

estuaries, a few strategically-placed nets at the appropriate time of year can have a major impact on certain stocks.

Many Pacific Island fishing communities also regret the use of gillnets, but appreciate that they catch more fish per unit of expended effort than other forms of gear, except perhaps explosives. From the individual's point of view, particularly the commercial individual, to give up gillnets when others do not is to give up a competitive edge and, given the marginal nature of most artisanal commercial fisheries, would possibly mean losing a livelihood. Thus there have to be some powerful incentives, either in the form of hard evidence of damage, or heavy political pressure, before leaders will consider restricting the use of any fishing method once it is widespread.

In Pacific Island developing countries where there are no formal fisheries management plans in place to provide a framework for such action at the Governmental level, and where there is little possibility of collecting convincing evidence through the scientific process, such actions tend to arise much more readily from the community than from the government. In Fiji, traditional coastal communities are formally empowered to play a major role in the local fisheries management process, and management interventions often take place without being explicitly driven by Government. These actions, provided they appear to arise from a desire to secure long-term benefit for a broad spectrum of the community rather than short term benefit for a few individuals (as occasionally happens) are officially welcomed by the Fiji Fisheries Division.

The bans that were declared on commercial gillnetting in their areas by the registered customary fishing rights owners along much of the northern coast of Vanua Levu (Macuata, Mali, and Sasa), in 1990, provide a classic example of community action with the sanction of Government. In Fiji, although commercial fishing is subject to licencing by the Fisheries Division, the Division will not issue a licence unless the applicant produces a district administration permit to fish in a certain customary fishing rights area, and the district administration will not issue such a permit without the written permission of the registered customary fishing rights holder. Although it may sound complicated, the main burden of decision-making rests at the local level and the government permits are normally automatic endorsements.

The Macuata coastal communities are noted for their strong interest in the control of fisheries, and it is probably no coincidence that this is one of the few provinces in Fiji where decisions about coastal fishery access policy for the coming year are taken at meetings of fishing rights owners from several areas. In many places, decisions tend to be more ad-hoc and confined to individual fishing rights areas. In 1990, after worries expressed at local community meetings about the state of coastal fin-fisheries and, in particular, about deleterious interactions that had been noticed between commercial and subsistence fisheries, the chiefs of several major fishing rights areas decided not to issue any permissions at all for commercial gillnetting. This decision was taken without the intervention of the Government Fisheries Division and, although the decision was supported by the Division at community meetings and through the licencing procedure, the Government was unable to provide more than circumstantial evidence on the state of the fishery, and on the likely result of this action. The justification, the decision, and the effective action all took place at the local level. Even the subsequent enforcement was mainly at the local level, through the long-established network of honorary fish wardens nominated and maintained by the community.

There was no baseline survey carried out on the state of the fishery before, or just after, the ban was imposed. The Fisheries Division lacked the capability for a scientifically rigorous investigation of a multi-species fishery over such a large area, and requests for external survey assistance resulted in a legally-oriented study (17) but no fishery appraisal backup. Even so, most reports from the area suggested that the bans were having definite effect and, even if it was difficult to judge the difference quantitatively, certain qualitative effects were

obvious. Three years after the initial ban, fisheries staff reported seeing species of fish in subsistence catches from the Labasa River estuary that had not been noted for decades.

Although the Macuata chiefs did not appear to be in any danger of being pressured politically into reversing their decision, the Fiji Fisheries Division decided to make a closer study of this fishery, both to justify their continued support for such a major restriction, and also to document what appeared to be beneficial results as a possible positive example for other fishing rights areas in Fiji. In this instance the South Pacific Commission, a Pacific Islands regional technical advisory organisation, was able to assist in the survey.

When the joint survey team arrived at Labasa in 1996 they did not expect to be able to demonstrate significant changes in the status of resources, given the lack of baseline information, but they concentrated on setting a benchmark fishery assessment through trial fishing, and investigating changes in commercial fishing methods and the marketing of fish, as well as seeking the views of villagers and fishing groups, to try and obtain some kind of overview on the effects of the gillnet ban. They fully expected to find indications of an improvement in resource status but of a decline in the local economy, and that it would be subsequently difficult to advise local decision-makers how to weight these factors. They were thus a little surprised to find that the local fishing economy appeared to have improved substantially since the bans were imposed (18).

In place of relying on near-coastal gillnetting, commercial boats were obliged to fish by hook and line over a much larger area of this broad lagoon, but the resulting high quality fishery, coupled with better private-sector organisation of distribution and marketing, led the sector to thrive. Many of the inboard fishing boats built by the Fisheries Division over the 1980s to help develop the small-scale commercial sector were being bought from other areas of Fiji by Macuata fishermen, and there was a proliferation of small privately-operated ice-machines which, before 1990 had been almost entirely the domain of government. A distribution channel, trucking chilled fish down to the capital, Suva, via a roll-on roll-off ferry, provided a good financial return for the best fish, and many of the fishing boats were organised by "middlemen" into commercial units capable of supporting boats through lean periods in return for a levy on the catch during good periods. At the same time the subsistence fishery, operating mostly without boats, was reporting the ability to obtain sufficient catch to support families either in a shorter time, or closer to home than was previously the case -of great benefit to the women who carry out the majority of this fishing. As far as could be determined, from licencing figures and market throughput, the total fishing pressure and the total volume of catch did not appear to be greater than before the bans, but every sub-sector appeared to be at least as content as before.

All of these developments-the organisation of fishermen into groups providing economies of scale, the private-sector development of iceplants, the development of distribution and marketing arrangements for high-quality fish, improvement of subsistence fishery sustainability-were precisely what the Government fisheries service had been struggling to encourage over the whole of Fiji for the previous two decades or more, without a great deal of success. The main principle suggested by this is not, of course, that community-based decisions to impose commercial gillnet bans will necessarily lead to the immediate improvement of an artisanal fishery, but that the will for action, if it comes from within the community, is far more likely to produce positive results than any external attempts to impose such values.

It suggests that the role of government in Pacific Islands coastal fishery management, as well as providing the framework within which community decision-making can operate (19), is perhaps more effectively concentrated on providing appropriate information to provide a rational basis for community decision-making rather than on trying to actually take those decisions themselves at the government level. At a more specific level, from consultation with many fishing communities and governments around the Pacific there emerges the clear

expectation that restrictions on gillnetting will be followed by immediate hardship. However, this Macuata case-study demonstrates that hardship need not necessarily follow and that, apart from the likely longer-term sustainability benefits, there may also be immediate benefit resulting from the mobilisation and reorganisation of community resources to meet the largely self-imposed challenge.

Government-community relationship problems

The discussion so far has identified some specific positive examples of government-community fishery interactions in named Pacific island nations. It is difficult to cite specific examples of poor relationships between government and community without prejudicing the effectiveness of future work, nonetheless there are many examples of poor relationships in the region, or even an entire lack of interaction. Whilst most of these can be put down to government indifference, many also result from what might uncharitably be termed an "exploitative attitude" by leaders in certain community.

To consider the government side first, some fisheries officers may appear, to the fishing community, to be fixed to their desks, or the entire department may be so concerned with the development of aquaculture or tuna fisheries that they have little to do with the day to day activities of the local fishing community except when problems are brought to their attention through the political process. Sometimes government entry standards are set at such a level that only the academically-minded can be recruited to the fisheries service. Whilst the ability to facilely write reports and analyse statistics is essential, the most effective departments seem to be those that contain a good percentage of officers who actually go out fishing regularly themselves, or who are recruited from the fishing community.

In many ways, the fact that Government fisheries departments have been under pressure from Government central planning offices to concentrate their efforts on the development of commercial fisheries and the encouragement of foreign investment, means that most coastal communities have not been interfered with beyond their capacity to maintain their traditional decision-making ability. Analysis personnel deployment shows that Pacific Island Government fisheries development efforts concentrate mainly on species and methods which are separate from domestic food-fisheries, such as aquaculture, tuna and deepwater snapper fisheries, or export invertebrate fisheries. There have been occasional major efforts to develop artisanal fisheries by aid agencies and governments, and to divert fish from the subsistence to the commercial sector, usually involving the one-off handing-out of fishing gear (appropriate or otherwise), continued subsidies on fuel, gear or ice, or the provision of subsidised vessels, sometimes accompanied by training in fishing and small business operation.

So far, these development projects have had little direct impact on the mechanisms of community and artisanal fisheries management themselves, but since around 1990 management and "sustainability" have become issues that have to be addressed in almost all development projects.

Hopefully this new emphasis on management will not lead to excessive derangement in existing Pacific Island community fisheries systems but will concentrate on helping Government services to be more supportive and effective. There is danger inherent in any attempt to intervene in social systems in the name of ensuring sustainability, particularly when the concept of "sustainability" is as yet largely undefined for most Pacific Island fisheries. For example:-

- are lobster pulse-fisheries on remote reefs unsustainable if the stock is reduced to 20% of its pre-fishing biomass after each fishing episode, and if that biomass recovers to its former level before the next fishing episode in 5 years time?

- is a trochus shell fishery sustainable if the annual catch is strictly controlled to an apparently reasonable fixed level, but if a climatic cycle depresses recruitment for two successive years leading to the non-appearance of those cohorts in the fishery three years later?

- is a multispecies gillnet fishery sustainable if it continues to achieve the same volume of catch, year after year, for the same level of effort, but the catch composition gradually changes to favour short life-span, high natural mortality species?

Another commonly-perceived problem of government/community interaction concerns the contribution of the different sexes to fisheries. Although no detailed and comprehensive overview has ever been compiled of the role of women in fisheries institutional and community arrangements in the Pacific Islands, it is clear that women play a much larger part in the capture side of artisanal fishing than in many other parts of the world. One recent study (20) showed that over 50% of the rural subsistence catch on the largest island of Fiji, Viti Levu, is taken by women, in a fishery where the subsistence sector far outweighs the commercial sector. Women also play a major role in the artisanal post-harvest sector, particularly in the marketing of shellfish, but women are under-represented in most Pacific Island fisheries departments at all professional grades except, perhaps, for biologists. In the relationship between government and community, the Pacific Islands have the opposite problem from the Caribbean, where most of the fisheries officers are female, but few of the fishers (21).

Many Pacific Island fisheries departments exercise positive discrimination when it comes to recruiting female staff in professional grades, but few female fishery professionals emerge from the education system and those that do quickly gravitate to more lucrative jobs outside the fisheries service. The lack of women in government fisheries service is felt most acutely by those countries that devote significant effort to community fishery management and development, since female fishers and male government officers often find it difficult, for societal reasons, to communicate directly. Because the role of women in community fishing is often different to men, a great deal of information is thus effectively unavailable to fisheries departments, and it is not usually easy to directly impart any development assistance or returned information. This also applies to fisheries services where women are in senior positions and where the policy is definitely sympathetic (22).

A fundamental aspect of the general government/community interaction is illustrated by the observation that, several decades ago, many colonial governments felt that "local peoples have little interest in conservation schemes" (23). This view would have been reinforced at the time by the fact that excess munitions left behind after World War II were in widespread use for destructive fishing to feed a disrupted populace. Nowadays the same basic view tends to be expressed through statements like "the goals of community and government in the management of fisheries may differ" (24), but at least this difference is coming to be accepted, rather than fought against, by most government fishery services.

Community management goals may not differ only from those of government, but from those of other communities, and 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 will always be converse cases where fisheries are conservatively managed (sometimes in adjacent areas, as was for example the case for community policy on giant clam exploitation on the neighbouring Fijian islands of Vatoa and Ono-i-lau in the mid-1980s). The effect over the fisheries of the nation as a whole will tend to be more stable than in cases where a centralised government attempts to experiment in maintaining a sustainable fishery by manipulating the rules uniformly across a whole country. And, given the current state of tropical fisheries ecology, let alone tropical fisheries

management science, small-island governments **are** obliged to experiment wildly when asked to balance cash-economy development against the hope of sustainability.

On the community side, there are many cases where traditional leaders abuse their powers of resource custodianship, not always for personal gain, but sometimes for what they may genuinely feel is the benefit of the community, against the advice of the local fisheries office. "Get rich quick" invertebrate export fisheries are particularly prone to such local promotion, particularly under the influence of foreign investment, and one accusation that local fishing joint-venture partners commonly level at sustainability-minded government officers is that "you care more about the fish than you do about people". The usual rejoinder-that the officer cares more about the future of that person's children-carries little weight when the income from a "boom and bust" fishery is hoped to pay the child's way out of the village, to school and then into a job in town, where the state of the fishery will not matter to them directly.

To many observers, both inside and out, traditional wisdom is increasingly overruled by commercial expediency in today's Pacific. How else to explain, for example, the gross overexploitation of giant clams for export by village fishing communities, beyond immediately foreseeable recovery, across almost their entire range? On the other hand, it should perhaps be seen that the community has made a collective decision to liquidate a small part of its natural capital to keep up with the cash demands of the modern world, and that the modern world has put a sufficiently high unit value on giant clam meat to make that seem like a sensible trade-off.

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