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Note from the editor

Three interesting articles make up this issue; one from the region and two from far away.

The first, by Thomas Malm of Lund University, Sweden, provides a comprehensive study of customary marine tenure in the Kingdom of Tonga. Besides its main focus on the causes of the decline of the management system under the fast acting processes of urbanisation, demographic change and general modernisation, this contribution also provides baseline information on the local fisheries management situation in the country.

In the second contribution, 'Strategies and action plans to conserve biological diversity: a cultural and scientific challenge', Robert Kasisi and Peter Jacobs (both of the School of Landscape Architecture, Faculty of Environmental Design, University of Montreal) offer a critical review of the paths African countries have taken towards developing biodiversity strategies, actions plans or programmes. After briefly reviewing the origins of the biodiversity conservation concept, the authors examine the ambiguity inherent in such current terms as 'conservation', 'preservation' and 'protection'. Their debate revolves around the meaning of this concept, the origins of which are located in the cultural and economic domains. They then look at the different approaches used to develop biodiversity strategies and action plans in selected African countries. Each approach selected presents certain strengths and weaknesses. The authors propose an approach that should allow effective participation by all stakeholders via a deep appreciation of traditional or local knowledge, as the 'grass roots communities' frame of reference for natural resource management.

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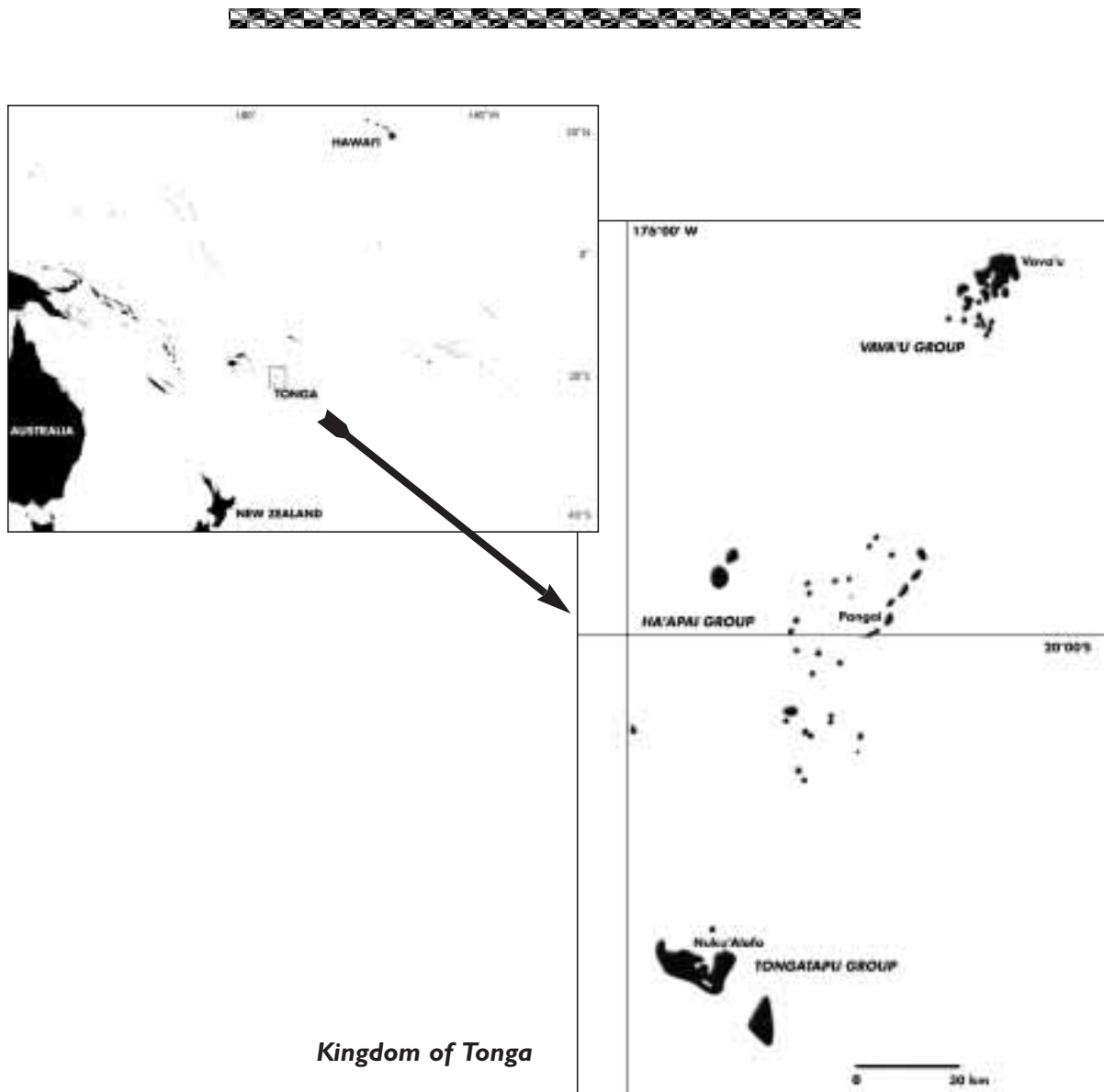


More on local or traditional fisheries knowledge. Brendan Connolly's article takes us to Ireland and the Netherlands, with a report on an inter-disciplinary, human ecological case study of the relationship between fishing communities and their marine resources. The ecological relationship between the selected fishing communities and their marine resources was studied by examining traditional fisheries knowledge and practice. Traditional fisheries knowledge was recorded by qualitative interviews. From this, a quantitative questionnaire, containing 119 questions, was compiled. Sixty-two questionnaires were completed. One of the major findings was that the principle of sea tenure, in combination with appropriate social structures, forms an important basis for sustainable marine resource exploitation. The regulation of fisheries was desired in all six fishing communities studied, but equal enforcement in all regions was stressed as being essential

In this issue we have placed major emphasis on local knowledge. So to conclude we feel it appropriate to reprint an important note by Bob Johannes, 'The need for a centre for the study of indigenous fishers' knowledge'. This is taken from 'Wise coastal practices for sustainable human development – forum of discussion' put online by UNESCO.

Happy New Year to all... you can make it even happier for me if you keep the contributions coming!

Kenneth Ruddle





The tragedy of the commoners: The decline of the customary marine tenure system of Tonga

Thomas Malm¹

Paper presented at the Symposium and Workshop on *Managing Common Resources – What is the Solution?* Lund University, Sweden, 10–11 September 2001

Introduction

In his seminal and much debated article, 'The Tragedy of the Commons', Garrett Hardin (1968) argues that natural resources held in common are subject to massive degradation because they are exploited as if there was no limit. Thus, in combination with population growth, 'freedom in a commons brings ruin to all'. According to Hardin, 'the commons, if justifiable at all, is justifiable only under conditions of low-population density. As the human population has increased, the commons has had to be abandoned in one aspect after another'. This means that 'first we abandoned the commons in food gathering, enclosing farm land and restricting pastures and hunting and fishing areas'. He also states that 'the oceans of the world continue to suffer from the survival of the philosophy of the commons. Maritime nations still respond automatically to the shibboleth of the 'freedom of the seas.' Professing to believe in the 'inexhaustible resources of the oceans,' they bring species after species of fish and whales closer to extinction'. To avoid the destruction of the commons, he concluded that they either must be privatised or kept as public property to which rights to entry and use could be allocated.

Like Hardin, most Westerners have shown a preference for only two types of property rights — private property and state property — while often treating common property as synonymous with open access and largely dismissing it as a means of managing resources even though it may offer the best prospect for optimal conservation and management (Tisdell and Roy 1997:32). It is, however, important to consider the possibility of exclusion under communal-property regimes, rather than assuming that common property necessarily is the same as open access, that is, access

to a resource that is unregulated and open to everyone. In historic and ethnographic material there are actually a number of examples of how the use of commons — resources held by an identifiable community of interdependent users — has been possible to regulate by local communities, so that other users have been excluded.

What Hardin did not mention either was that while a number of examples support his argument concerning degradation due to the inability to regulate access to resources held as open ones, the tragedy in many cases occurred only after existing communal land or marine tenure systems had been transformed, weakened or destroyed as a result of processes following culture contact. This, in its turn, was an effect of the West European expansion and the emergent world system.

In Britain, although the communal areas were once carefully controlled, struggles over a long period of time resulted in them either being turned into enclosed private property or assigned to the Crown or the state. This practice also came to apply in the colonies. The Polynesian Kingdom of Tonga, a microstate in the South Pacific, is an interesting and illuminating example of this. It was never a formal colony, but a target of intense Christianisation by British missionaries throughout the 19th century and a British protectorate between 1900 and 1970. It was therefore under strong British influence during the colonial era.

The purpose of this paper is to outline how a rapid process of modernisation, in combination with urbanisation and population growth, have resulted in a breakdown of the traditional marine tenure systems and an over-exploitation of marine organisms (Malm 1999). Although there are cases in Oceania where marine areas adjoin-

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ing villages have remained under communal control even after having become legal Crown or state property in modern times, Tonga exemplifies how Crown/state ownership has come to replace communal ownership but been *less* able than the local communities to regulate the use of the marine resources.

Freedom in the marine commons of Tonga, commendable as it might seem from the perspective of democracy, could be said to bring ruin to all; and sadly enough, especially to those who need these resources the most. As I shall argue, though, rather than because of population growth beyond carrying capacity in a reductionistic perspective, an unfortunate *combination* of factors is the Tongan ‘tragedy of the commons’, which could also be called a ‘tragedy of the *commoners*’.

Population growth, urbanisation and migration

From observations made by early European visitors, we know that prior to the outbreak of the civil war in 1799, Tongan settlement had followed a fairly dispersed homestead pattern, where nucleated villages were absent and major concentrations of the population confined to a few centres of importance (Kennedy 1958:162–165). The permanent residences of the paramount chiefs were such centres, but they were quite atypical of Tongan settlement as a whole (Walsh 1970:29). While visiting Tonga in 1777, a member of Cook’s expedition noted: ‘The houses do not form towns or villages, but are built about five hundred yards or more from each other, and generally in the midst of a plantation, the whole of which is frequently fenced in with a hedge of bamboo, or reeds with a door-way; and sometimes a man’s whole estate is enclosed in this manner’ (Ellis 1782, I:88–89).

It was of course very practical to live close to one’s gardens without having to take long, tiring walks carrying heavy loads, but such a comfortable settlement pattern required one very important condition: the absence of warfare (which was the result of the strongly centralised rule of the paramount chiefs). The period of civil war, 1799–1852, came to mark the end of this ‘house and garden’ period of settlement. It became more and more common that the people, under their own chiefs, built and moved into earth-walled forts, and until the end of the war, throughout the whole Tongan group of some 40 inhabited islands, settlement came to be characterised by villages within forts (Kennedy 1958:164).

When Tonga became peaceful again, a number of villages spread outside the encompassing walls

and ditches of the forts, and the singular village that was to become of most consequence was Nuku’alofa. It was attractively located by the wide and productive lagoon on the northern side of the largest island, Tongatapu. As the residence of George Tupou I, who at the time was king over the whole archipelago, it became the capital.

Nuku’alofa has never been a big capital by international standards, but to the people from the outer islands it did, in any case, in time come to be seen as a metropolis filled with exciting things. Consequently, as on all other main islands in the Pacific, there has in recent decades been an increasing stream of settlers and more or less temporary residents from outer islands and rural areas to Tongatapu, and particularly the areas close to town. In their home communities it has become increasingly difficult to obtain land rights and make a living as a farmer, and many, therefore, move to Tongatapu hoping to find jobs or get a better education. The island now has close to 70% of Tonga’s total population, on about one third of the land in the country. The expectations of the new residents are far from always met with the realities of life, and many have been forced to live under quite miserable conditions in shanty settlements in the swamp lands surrounding the town.

Due to the lack of reliable data, it is not known how large the total population of the Tongan islands was before the 19th century, but it can be safely argued that it was considerably smaller than today, and was kept in check either by deliberate policy or by natural means. The general opinion among prehistorians is that the population was fairly stable at around 30,000, perhaps 40,000, while a total of 50,000 seems improbable (Green 1973; Kirch 1984:98; McArthur 1967:73).

It has been estimated that a quarter of the Tongan population perished during the civil war (Walsh 1970:28). Many others died from new diseases that had come with the Europeans, and these ravaged the islands well into the 20th century. However, due to medical care and general sanitary improvements, the population has increased tremendously since the 1920s when it was only around 25,000. The birth of more children and the increasing rate of child survival — which meant that more children would live to become parents — caused a ‘baby boom’ after the second world war, and in the 1950s and 1960s the growth rate reached 3% or even more per year (Campbell 1992:189). In 1965, Maude predicted that the population would double within 20–25 years, reaching 150,000 by 1987 and 250,000 by the end of the century. Another projection, made by Dommen (1972:11) some years later was only

slightly less alarming: if the population continued to grow at an average 3% annually, it would reach 185,500 by 1996 and 200,000 by 1999.

Somewhat surprisingly then, the latest census, made in 1996, does not indicate any demographic explosion even close to the scenario depicted in the 1960s and 1970s. In fact, since 1966, the entire population of the islands has only increased by about 20,000 people and within the past decade, at an annual rate of 0.3%, with less than 3000 (South Pacific Commission 1997; Tonga Statistics Department 1997). Its annual population growth is among the lowest in Oceania during recent years and less than 40% of what Maude predicted.

The total number of Tongans is, however, probably quite close to what Dommen predicted. In addition to the natural increase, the reason for this is a high net migration. A large number of Tongans and part-Tongans are now — legally or illegally — forming an ever-growing diaspora in other countries, particularly in New Zealand, Australia and the United States, and their numbers might be close to those in the Tongan islands. In 1993, Marcus estimated the number to be about 100,000, which would exceed the population in Tonga (97,446 in 1996). Remittances sent by overseas Tongans to their relatives back home are very important to the local economy, and have to a large degree been used to enhance consumption (e.g., Ahlburg 1991; James 1991). Those who are lucky enough to receive a high salary, or to have land on which they can grow cash crops, can perhaps realise their dreams on their own, but for a large number of people this is impossible without having relatives abroad and, more or less frequently, receiving remittances.

The customary marine tenure system

Over-exploitation and destruction of the environment are not new phenomena in the Pacific. On the contrary, all over the island world the early inhabitants affected terrestrial as well as marine plant and animal life, causing soil erosion and degradation, modification of the topography and over-exploitation, in several cases leading to species becoming extinct (Bulmer 1982:61–62; Kirch 1984:ch. 6).

The problems described and discussed in this paper are new in another aspect, though: they are a result not of indigenous transformation processes, but rather of foreign influences and a changed relationship between the islands and the global economy. At the root of these problems lies the fact that fishing and gathering/collecting marine organisms are no longer just subsistence activities,

but rather have also become commercial activities during a rapid process of modernisation.

With a sea area nearly a thousand times larger than the Tongan land area (ca. 700 km²), the resources of the marine environment are a source of hope for increasing future exports. Fishing activities are, therefore, considered to be among the sectors of the economy that demonstrate the highest growth potential. Fishermen, however, complain about the dwindling stocks of fish. Many fishermen from Nuku'alofa have to go by boat half way to the Ha'apai group, some 50 kilometres or more, to get enough fish to make a profit — a costly undertaking, as a considerable amount of fuel is needed for the boats. It is also well known that the shells of edible molluscs picked in the lagoon of Tongatapu are neither as abundant nor as large as they used to be. The obvious reason is that these resources are exploited by and for a population that has grown quickly, and without any limited use rights. One may, therefore, ask whether we have here an example of exactly the inevitable 'tragedy of the commons', which Hardin depicted. A look at the historic material reveals that this is not the case.

Let us begin with the roles of the chiefs in Tonga of pre-European times, where the authority of the chiefs derived partly from their control of the production and distribution of food. Their primary tools for this were a taboo against consumption of various protein foods; and the coordination of labour to produce specialised tools and facilities. Data, in fact, do exist from a number of Polynesian and Fijian islands where the chiefs used their authority to control and even increase fish production. In the Lau group of Fiji, even today, anyone who wishes to go fishing in the waters communally owned by another village must first present gifts to its chief and ask for permission, otherwise the result can be fighting between villages (Vuki et al. 1992:22).

In Tonga's case, we find that labour traditionally has been divided not only between women and men, and according to the hierarchical position within the social system (see Malm 1999), but also between people who lived on different parts of the islands: sea people (*siu-'i-tahi*) and land people (*siu-'i-'uta*). This inland-sea opposition is a variation on a pattern described from many places in Oceania, especially Melanesia. Unlike the moiety system in Moala, Fiji, for instance, where land and sea people live in the same villages (Sahlins 1962, 1976:24–46), in Tonga it was a matter of living by the sea or further inland. Into the 19th century, fishing rights, close to shore as well as farther out, belonged only to those who lived on the adjacent

coast, and they were under chiefly control (Fairbairn 1992; Gifford 1929:177; McKern n.d.:347). The chiefs ('*eiki*), or talking chiefs (*mata-pule*), could very well be described as filling the function that Hviding (1996), writing about New Georgia in the Solomon Islands, calls 'guardians of the lagoon'. Actually, the words describing a talking chief in the Tongan Ha'apai group, 'the old man taking care of the territory' (*motu'a tauhi fonua*), translates quite well into 'guardian of the lagoon' (Perminow 1996:78).

In the 1920s, McKern (n.d.:347–351) was able to obtain the following important information on traditional Tongan fishing rights, which were of relevance to the men's fishing as well as marine gathering carried out by women and children:

The chief of each feudal district, *tofi'a*, had land fronting on the water where his fishing operations were carried out. Every commoner who had an allotment of land ('*api*) bordered by water was allowed to fish along its waterfront, but he had to give his first catch, or at least one basket of fish, to the chief. The commoners living in the inland had no waterfront on which to fish, but every chief had water frontage on some of his districts, and the inland inhabitants considered those who were living along a shoreline belonging to the same chief as 'brothers' whether actual blood affinity was involved or not. Because of this it was possible for the inland men to supply their shore-dwelling *tofi'a* 'brothers' with fruit, vegetables, root crops and other inland products, and receive seafood in return.

McKern goes on to describe how the fish walls and similar traps belonged to the chief of the adjoining district or to the inhabitants of the adjoining allotment. In any case, he states, the first catch went to the chief. The inhabitants of the district, however, had exclusive rights to the trapping grounds off its coast. A problem was that not every district had favourable grounds for traps and other types of fishing even if it had beach frontage. When a community from such a district wished to make use of the fishing grounds of a neighbouring district, it would ask the chief in question for permission to do so. If he granted them permission, he would order a line of stakes to be erected about the desired grounds and no one but those of the group that had received his permission could fish in that area until the fishing was finished. McKern states that there were no other circumstances under which a commoner could be banned from using the fishing grounds fronting his allotment.

If an inland man or one from a neighbouring shoreline allotment chose to fish off a shore-dweller's waterfront, he ran the risk of having his traps destroyed or robbed, and his fish could be confiscated by those upon whose precincts he was poaching. McKern writes that at times when fish were to be obtained only with difficulty, a large party of inland dwellers could turn up in force and begin fishing at a favourable site in defiance of all rights, depending upon their ability to defend them. Even in such an emergency situation, when the custom was ruthlessly violated, poaching would take place on the waterfront of a district belonging to the chief of the group in question and he would be presented with the first catch.

McKern also writes there were occasions when a commoner, due to the temptation offered by an exceptionally good fishing ground, would fish in a canoe off a chief's district other than the one in which he lived. He would then give the first basket of his catch to the chief who was in control of that district and this chief might then permit the man to continue fishing for that day.

One could question whether or not customs such as the ones just described were associated with a conscious 'conservation ethic'. For example, Polunin (1984) is of the opinion that the defence of the seaward extensions of the land boundaries in parts of Indonesia and New Guinea had very little to do with any notion on the need for husbandry of marine resources but rather was a result of inter-group rivalry and power struggles. In either case, as Hviding (1993:40) argues, limitations on exploitation often seem to have been an indirect result of customary marine tenure in the Pacific Islands.

In Tonga, limited fishing rights within a fairly small population probably had conservation effects. Certain land and sea animals — the octopus, for instance — were also taboo for some groups of people (Malm 1999:113–126). Bulmer (1982:68) noted that in Papua New Guinea, traditional religious beliefs and practices both sustained interest in, and concern about, the natural environment. Although the preservation of wildlife was not the explicit objective, but rather the well-being of the people who were believed to suffer if certain organisms were killed or eaten, there were nevertheless many cases that provided sanctions, or at least rationalisations, for practices that were soundly conservational in their effects. For a Polynesian comparison, one can mention Kapingamarangi, where the people had the technological capacity to over-harvest many fish species but where a complex and highly hierarchical system of organising fishing, to a large extent

based on religious beliefs, prevented this by spreading the efforts among different groups of people and many species — a system which has broken down in modern times, resulting in over-exploitation of spawning schools of certain species (Lieber 1994).

Neither should we forget the important combination of expertise and indigenous technology. Although traditional fishing methods can be very effective, much less time and skill is needed to achieve the same results with nylon nets and spear guns, not to mention the equipment of large industrial fishing vessels. In the Tokelau Islands, the perfection of fishing skills (according to Toloa et al. 1994:123–124) can be seen as a category of marine conservation with the effect of reducing the need for destructive types of fishing. The title *tautai*, which is known in many areas of Polynesia (in Tonga as *toutai*), is in Tokelau conferred on those individuals who have spent years or decades under the instruction of an older *tautai*. The skills used in the capture of numerous types of fish are refined during the long, intensive training, rather than anything else that may work. In octopus fishing, for instance, a knowledge of octopus behaviour and the manufacture of an octopus lure and its use means that the need for more destructive methods is eliminated.

The transformation of the marine tenure system

The Tongan commoners had some very good reasons to welcome a curtailment of the privileges of the chiefs. Not only were they required to provide them with the best of foods, but the chiefs were also known to treat their subjects very badly. In principle, the commoners owned nothing, as a chief could use his authority to get anything from them, including their labour, produce, possessions and daughters if he desired them. A chief could even have someone killed immediately if he so desired (Williamson 1924, I:151–152).

A first step to curtailment of the authority and traditional privileges of the chiefs was taken in 1839, when Tupou I — after having asked the Wesleyan missionaries for some laws for the regulation of his servants — officially promulgated the first written code of laws at a compulsory meeting (*fono*) in Neiafu, the Vava'u group (Latukeyu 1975:20). In Christianity, Tupou I saw a unifying factor because it could provide a common lifestyle and religious ethic to its followers. Therefore, it became an important tool in his quest to unify the Tongan islands. As for the missionaries, who believed that all men were equal in the sight of God, they had for a long time been troubled by the

arbitrary power of the chiefs and the inhuman way in which the commoners were treated. Following their advice, the king declared:

It is my mind that my people should live in great peace, no quarrelling, or backbiting, having no wish for war, but to serve the God of peace in sincerity, therefore I wish you to allow to your people some time for the purpose of working for themselves; they will work for you as you may require them in working your canoe; in planting your yams, and bananas, and in what ever you may require their services; but I make known to you it is no longer lawful, for you to hunuki, or mark their bananas for your use, or to take by force any article from them, but let their things be at their own disposal. (Code of Vava'u, 1839, Section 4; in Latukeyu 1974:223).

Latukeyu (1975:26) writes that whereas the code of 1839 forbade the chiefs to take anything by force from their subjects, it said nothing about the continuation of those traditions according to which the commoners had to take all things that were of 'eiki status (reserved for chiefs) to the chiefs. While these customs had continued unabated, steps were taken in the Code of Laws of 1850 towards the abolition of these privileges. The following, for example, stipulated about catching fish: 'Any persons catching the larger fish shall not do as they please with them, such as the turtle, albacore, bonito, and ulua [a trevally], etc., but, on obtaining one, shall take it to the Chief; the second he takes shall be his, and so on afterwards' (The 1850 Code of Laws, Clause XLII; in Latukeyu 1974:237).

The total abolition of the chiefs' privileges was finally achieved in 1862 when a new Code of Laws stated the following: 'All chiefs and people are to all intents and purposes set at liberty from serfdom, and all vassalage, from the institution of this law; and it shall not be lawful for any chief or person, to seize, or take by force, or beg authoritatively, in Tonga fashion, any thing from any one' (The 1862 Code of Laws, Clause XXIV.2; in *ibid.*:247).

In 1875, when the country wrote its first constitution, it was specified that 'there shall be but one law in Tonga, one for the Chiefs, and commoners, and Europeans and Tongese. No laws shall be enacted for any special class to the detriment of another class; but one law equally the same for all persons residing in this land' (Constitution of Tonga, Clause 4; in Laukeyu 1975:90–91).

Nothing specific was said about fishing or marine gathering. However, the implication of this and

the statement — reflecting the English common law — that ‘all the beach frontage of this kingdom belong to the Government from 50 feet of high water mark’ (Clause 119; *ibid.*:112) was that no community had exclusive fishing rights or responsibility for a particular marine area, but that all people had the right to go gathering or fishing wherever they liked. The only exception would have been fish fences in the lagoon, because a license from the government for building these on a specified spot in the lagoon was required (Koch 1955:182) as it still is today.

A law such as the one established in Tonga would not necessarily have meant that people exploited resources that traditionally had belonged to other communities. In American Samoa, for example, where the American military governor declared all submerged lands and reefs to be a part of the public domain, Samoans have continued to treat the reefs adjacent to their villages as village property and almost 80% of the subsistence fishing there is carried out accordingly (Hill 1978:78). In Samoa (formerly Western Samoa), the reef and lagoon areas are owned by the state, customary ownership by the village of fishing rights is recognised and remains firmly entrenched (Fairbairn 1992). Fishing by outsiders usually takes place on the outer edge of the lagoon – that is, as far away as possible from the host village — and can only be carried out with the approval, tacit or overt, of the host village. In fact, a legislation in 1990 even enhanced the power of chiefs and district representatives in relation to controlling fishing and related activities in customary marine areas.

Perminow (1996:77–78, n. 2) provides an example of the direct consequences of Tongan law. He writes about Kotu island in the Ha’apai group that although the fishermen there 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 did not feel that there would be any point in reducing the intensity of exploitation because the resources could be exploited by fishermen from other islands in the district.

What we find in Tonga is, therefore, not an inevitable resource degradation in line with Hardin’s (1968) ‘tragedy of the commons’, but a modern (19th century) transformation, following culture contact, of community controlled food-production systems into a common-property with open access. This has resulted in the growing and, on Tongatapu, aggregating population — with its need for food and money — over-exploiting marine resources.

The over-exploitation of marine resources

Today, the inshore and deepwater fisheries of Tonga are moderately to seriously over-exploited. The shallow areas adjacent to villages and towns have been so over-exploited that current landings are close to maximum sustainable yields.

The high pressure is experienced in two obvious ways: 1) some species have become less abundant, and 2) others are decreasing in average size. On Tongatapu, major collapses have occurred in mullet stocks, and catches of most reef species have gradually declined (Zann 1994:55; Zann et al. 1984). It can also be mentioned that a study on sea cucumbers had to be stopped in the 1990s due to depletion of stocks from over-fishing (Fa’anunu et al. 1995).

In the ‘shellfish’ market in Nuku’alofa one can see small spiny lobsters for sale and small specimens of other marine invertebrates and fishes as well. The reason is, of course, that Tongans have an immediate need of food and money. Even if it may be short-sighted, one can understand that they take whatever they find. It has been noted by previous researchers (Tacconi and Tisdell 1992:194) that regulations on the minimum size for harvesting giant clams are difficult to enforce and that a practice of consuming small-sized clams at home while selling larger ones has been adopted. It is not unusual to see Tongans pick and eat ‘giant’ clams (*Tridacna* spp.) that are only a few centimetres long, far below the legal minimum size.

To mention a well-studied example of such a practice, the average size of the very popular *kaloa’a* (*Anadara* spp.) and *to’o* (*Gafrarium* spp.) clams is smaller today than in pre-European times. This was first noted by Poulsen (1987 I:230–231) when, during his archaeological fieldwork in the 1960s, Tongans expressed their surprise at the size of the biggest excavated *to’o* clams in particular. He suggested that the diminished size in latter times was an effect of human exploitation. Spennemann (1987) was able to confirm this. The average size of these clams is smaller today than in the past, simply because people have picked too many of the bigger and thus most desirable ones. However, he argued, even before modern times there was an over-exploitation of them. This, possibly in combination with environmental changes, resulted in a dwindling supply of large-sized *kaloa’a* specimens, whereas increased exploitation appeared to be the sole factor in the case of the *to’o* clams.

Apart from providing protein, molluscs are important for other nutritional reasons. One mani-

festation of malnutrition is, for example, the lack of vitamin A, which can cause blindness among children. Together with the intestines of fish that feed on algae, the only kind of animal seafood that provides vitamin A is the giant clam. It is, therefore, a serious problem that these clams are becoming scarce on many islands. Not only are they consumed by the growing island populations of Oceania, but there is also a large market for their meat in East and Southeast Asia, which through illegal channels, has been supplied by specialised fishing vessels from Taiwan (Dawson and Philipson 1989).

Because of the local as well as potential overseas markets, there is a growing interest in the Indo-Pacific region for giant clam mariculture. Tonga is one of the archipelagos from which a simple form of traditional mariculture of giant clams has been reported. Clams have been taken from outer reefs to be kept in nearshore 'clam gardens' until they are to be harvested in times of bad weather or for special occasions (Fairbairn 1992). The rationale for this was to ensure emergency food stocks rather than stock revitalisation as such. The removal of adult and sub-adult clams from outer reefs to clam gardens, and whether this has beneficial effects or not, is a matter of debate. One can speculate that the concentration of otherwise scattered representatives of depleted reef stocks may very well improve reproduction.

In order to support the demand for aquaculture, a mariculture centre was established in 1978 in Sopu, Tongatapu, with the assistance of the government of Japan. Unfortunately, this centre was damaged by a hurricane in 1982, but an aquaculture research and development project was re-established in 1991. The Fisheries Department has, since 1986, a project aimed at creating an exploitable resource of giant clams (mainly *Tridacna derasa*) through the release of huge quantities of seedling clams to sustain reproduction. Some nurseries have been established, and over 20 'giant clam circles' have been established throughout Tongan waters. A 'clam circle' is where around 100 clams are spread evenly in a circular arrangement over a clear bottom area of about 500 m².

Local marine rangers have been assigned to watch over the clam nurseries, and these rangers are surely needed. It is namely a sign of the high demand for this delicacy that in 1990 some people went at night to the nursery in Sopu and stole all the mature egg-producing clams, each one 15–20 years old. In 1995, the Fisheries Department printed posters, both in Tongan and English, encouraging people to wait until the giant clams, sea cucumbers, spiny lobsters and

fish had grown to maturity. 'Their future is in our hands', was the message. One night in the same year, 60 young giant clams were stolen from the nursery, their flesh was removed and the empty shells thrown back.

Threats against the coral reefs

That all shallow sea life in the tropics depends on corals being alive and healthy is a perspective that is new to the Tongans. Generally speaking, coral is seen as rock by them, something that has always been there and which is certainly not able to become sick. If anything, they are likely to regard it as a nuisance, because of the problems it creates by cutting, stinging, making holes in boats, destroying nets, hiding the fish, and so forth.

Only a generation ago, there were few Tongans who had face masks, snorkels and flippers or who could walk everywhere on the reef with shoes or boots. Today, there are probably more people than ever — including tourists, of course — who can walk on the reef, stepping on live coral and breaking it while searching for food or turning dead or living colonies upside down. People use hammers, knives or iron poles when walking on the reef looking for octopi and molluscs, destroying live coral in the process. Marine invertebrates and fish lay their eggs under live or dead coral colonies, so turning these rocks over means exposing the eggs to death. The breakage of corals is a very serious problem as they are exposed to possible infections from blue-green algae, causing a rapid morbidity of the colonies and attacks by the crown of thorns starfish (*Acanthaster planci*). Diseased coral colonies are now common on reefs off Nuku'alofa and Lifuka (Zann and Muldoon 1993).

Another way in which coral can be damaged is by the large nets that fishermen lay out across the entrance to the lagoon or around a big thicket of branching coral. Then, some of them go inside with poles and masks, breaking the coral into small pieces to frighten the fish into the net. Some years ago, an entire small coral reef was destroyed when dynamite, which is prohibited by law for such purposes, was used for fishing inside a shipwreck off an island close to Tongatapu.

In addition to such 'accidental' destruction, there is also a growing threat to live coral colonies from coral exploitation. The status of the black corals (*Antipathes* spp., *Cirrhipates* spp.) is little known, but one can expect them to become more scarce within the near future as a result of the growing demand for jewellery made from this material. As with various species of seashells they have been locally depleted in parts of Tonga.

On one occasion, in the early 1980s, a foreign fishing boat, working in partnership with a Tongan, gathered countless organisms from a reef by putting down a big heavy steel bar with a tangle net, which was pulled through the coral. That reef was totally ruined, and many fishermen were upset because of this destruction of their fishing grounds (Chesher 1990:33).

Because of environmental concerns, the export of coral rock — not including black and other precious corals — is, however, not permitted. One export company proposed, some years ago, to ship 12 containers of various types of coral per year. The total number of pieces would be 30,000, and each container would contain 8 tonnes of coral. It was suggested that this could be doubled within two years because of the overseas demand for marine curios. This did not win government approval, but it was decided that the export of live coral, for aquaria, should be allowed, because no evidence had been proffered to show that this had caused any major damage to other corals or reef organisms.

What is the solution?

The big question is, of course, how the marine environment can be protected at the same time as everyone having free access to it. Hardin (1968) argued that unless the commons were privatised or kept as public property to which rights to entry and use could be allocated, the result would be the destruction of the commons. The only solution of the two that he suggested for protecting the commons was for the government to control use rights.

The government is well aware of threats to the marine environment, and measures have been taken to protect certain species as well as whole areas. Rock lobsters and giant clams are, for example, protected under resources management legislation, and harvesting turtles or their eggs during the breeding season is not permitted. The latter law is not enforced, though, and the future of the turtles in Tonga can be considered bleak.

A large (2835 ha) wetland reserve on Tongatapu has been established to protect the central lagoons, where there are prohibitions on dumping any effluents, cutting mangrove, fishing commercially and on certain forms of subsistence fishing. In 1976, in order to protect areas of 'special scientific, educational, recreational or scenic interest', five marine reserves and two island parks were legislated, and since then more have been established or planned in different parts of the archipelago. A network of such protected areas has been proposed as a basis for marine eco-tourism, and

Tonga has been marked internationally as 'Nature's Marineland'.

Apo Island, off the southern coast of Negros in the Philippines, offers a good example of how important a marine protected area can be (Bolido and White 1997; Hinrichsen 1997). By the mid-1980s the coral reef that surrounds this island had been over-fished and the fishermen had to travel some 30 km across the sea, at great personal risk, to find fish. It was then realised that conservation measures were needed. Although only 8% of the reef was set aside as a reserve, within two years the stocks of edible fish and shellfish had recovered to such an extent that the people again could catch all that they needed around their island.

For such a measure to become successful, it is of course necessary that the laws and regulations are respected, and that people can be convinced that reefs and the organisms living there are more valuable intact and alive than exploited. This has, unfortunately, been a problem in Tonga. These laws and regulations are a new kind of taboo, or *tapu* (which, incidentally, is a Tongan word), but they do not seem to be understood and respected by all as a natural aspect of everyday life. As pointed out by James (1992:98), whereas pieces of barkcloth or images representing gods in pre-Christian times were placed on land or crops rendering these *tapu*, signs placed on allotments nowadays reading 'No trespassing' do not imply that any 'supernatural sanctions' — that is, punishments from gods or spirits — will follow the transgression but that trespassers will be prosecuted through legal proceedings.

Fishing, harvesting 'shellfish', removing sand (which is used for mixing concrete and for covering graves) or breaking coral in the Tongan marine reserves can lead to a fine of TOP 200 (1 TOP ≈ 0.5 USD) or imprisonment for up to three months. Because of advertising campaigns both on radio and in print, including bilingual (Tongan and English) warning signs by the reserves, all or most adult people are probably aware of which areas are protected by law. Still, the marine resources of some areas are exploited from time to time. A man, who lived close to one of the marine reserves, claimed that he had been both verbally abused and physically threatened in his attempts to stop people who infringed on the reef daily, taking sand, catching marine animals and wrecking the reef.

Obviously, top-down biodiversity conservation is not enough. Kenchington and Bleakley (1994:8), among others, write that where it can be shown it is in the interest of local people to establish and

manage marine protected areas, cooperation with local communities is most likely to be achieved. Local people have, of course, for years or even generations depended on marine organisms caught in the areas that are now designated marine reserves. The Tonga Fisheries Department is, therefore, working to help educate the public about the long-term benefits of safeguarding the reserves, where fish and other marine organisms can breed in safety so that their offspring later on can move to other areas where people are free to catch them. The town officers (government representatives in the villages, normally appointed by local elections) can play a leading role as intermediary agents between the government and the local communities, and there are also tasks for natural as well as social scientists here.

Conclusion

It has been shown here that marine exploitation in Tonga, in recent decades, has become connected to a number of processes that anyone with an environmental concern might regard as sad. Personally, I agree with scholars (e.g., Thaman 1994) who advocate that biodiversity, ethnobiology and biodiversity conservation should increasingly serve as a focus of teaching, research and community outreach programmes for a better understanding and appreciation of biodiversity and its role as a foundation for environmentally sustainable development. It might be argued that if the island people's use of resources is to be managed in a way that is economically sufficient, socially satisfying and ecologically sound, a sustainable scenario must be founded upon community-based biodiversity conservation where traditional knowledge and modern ecological understanding are combined in a neo-traditional system.

Laws instituted via a modern constitution do not necessarily have to mean that people — as in Tonga — exploit resources that have traditionally belonged to other communities. Within Oceania there is an entire spectrum from commons with restricted entry to totally open access, but where in all cases the rules of local resource management are respected. The divergence between these traditional and modern systems of legal arrangements and forms of resource use is a crucial subject for future research. While I have demonstrated the way in which new accumulative strategies correlate with the move toward over-exploitation, the larger process of change is only poorly understood. Comparative studies need to be made and could, in combination with the Tongan case, be valuable for exploring the historical processes and their implications for the future. Such studies could provide us not only with important insights

into the development of ethnoecological systems, but also with the kind of knowledge that could be the basis of a mariculture, a sustainable use of organisms that have belonged to the practical-cultural domain of female nearshore activities.

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Strategies and action plans to conserve biological diversity: a cultural and scientific challenge

Robert Kasisi and Peter Jacobs

Abstract

Ratification of the Convention on Biological Diversity obliges the contracting parties to implement general measures to ensure the development of national strategies, plans or programmes for the conservation and sustainable use of biological diversity as set out in Article Six.

A decade after the 1992 Rio Conference — through a critical review of the path certain African countries have taken in the process of developing biodiversity strategies, actions plans or programmes — the authors propose the main areas of focus that should govern biodiversity conservation planning.

After briefly reviewing the origins of the biodiversity conservation concept, the authors deal with the issue of ambiguity linked to the current use of certain terms such as conservation, preservation and protection. In this section, the debate revolves around the meaning of this biodiversity conservation concept, whose origins can be found in the cultural and economic domains. The rest of the article covers the different approaches used in processes designed to develop biodiversity strategies and action plans. Each of these approaches presents certain strengths and weaknesses. An approach is also proposed that would allow effective participation by all concerned stakeholders and shows how taking account of traditional ecological knowledge (TEK) is a prerequisite for a real participation of peasants in Africa.

Introduction

In the wake of initial efforts undertaken by stakeholders involved in biological diversity conservation, particularly in formulating international biological diversity strategies and action plans, there is a need to critically review progress made since the 1992 Rio Conference and to suggest broad policy guidelines for biodiversity conservation planning.

In recent years, biodiversity conservation practitioners and aid agencies have exhibited a certain amount of enthusiasm in support of the protection of our natural heritage. This enthusiasm has been expressed in the ratification of treaties and the implementation of recommendations made under the Rio Declaration, Montreal Protocol, RAMSAR (a convention on wetlands), CITES (on endangered species), the Convention to Combat Desertification, and a host of other agreements. These commitments provide hopeful signs that ratifying countries are committed to conserving the living resources of the planet.

With specific reference to biological resources, most countries have ratified the Convention on Biological Diversity, thereby acknowledging the

importance and inestimable value of biodiversity for current and future generations. By ratifying the Convention, countries have initiated the actions required to safeguard and protect the diversity of the genetic material, species, habitats and ecosystems that comprise the living resources of the planet. As the terms of the Convention take precedence over national legislation, the laws and regulations of the signature countries must be amended in accordance with the Convention's provisions (UNEP/CBD 1994).

It has proven difficult, however, to achieve the objectives of the Convention driving the efforts and commitments agreed to by most stakeholders as long as the concept of biodiversity conservation varies according to the different meanings it is given within different language groups and different cultural settings.

Ambiguities stemming from different meanings attributed to conservation and to preservation, to say nothing of the concept of sustainable development, are deeply rooted in their cultural settings. Successful strategies and action plans in support of biological diversity will depend, therefore, on our ability to integrate cultural and scientific paradigms.

Historical overview

The concept of biological diversity conservation has evolved in three general stages. The first coincides with the launch of the World Conservation Strategy (WCS) that is based on three general objectives in support of the conservation of living resources. These are:

- maintaining essential ecological processes and life-support systems;
- preserving genetic diversity; and
- ensuring the sustainable utilisation of species and ecosystems.

The World Conservation Strategy formulated by IUCN, UNEP and WWF (1980), attempted to establish a broadly based philosophical definition of conservation as a concept. The word 'conservation' is defined in the document as 'the management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining this potential to meet the needs and aspirations of future generations'. Conservation is conceived in positive terms, embracing preservation, maintenance, sustainable utilisation, restoration, and enhancement of the natural environment.' (IUCN, UNEP and WWF 1980). Thus stated, the concept clearly indicates that conservation and development are not mutually exclusive, but rather, closely related. The Strategy quickly became an important reference document with respect to biological resource management issues.

Although the World Conservation Strategy articulated three essential objectives and an initial vision of sustainable development, the perceived need to simplify the message and even the rationale behind the document encountered criticism. Issues related to rapid population increases in some of the world's regions, economic disparities and urbanisation as well as the urgent need for full gender integration in the natural resource protection and utilisation process were not adequately addressed. The scientific method is presented in a dominant light, and the issue of local knowledge and value systems related to the idea and importance of nature is largely absent.

The second stage developed the links between major social and economic issues as they relate to environmental management, while maintaining strong support for the principles stated in the World Conservation Strategy. This point was introduced in a report submitted to The Special Joint Committee on the Patriation of the Canadian Constitution (Jacobs 1981). One of the paragraphs states:

... we have spent the past 300 years mining rather than husbanding our resources. The wise management and prudent use of our natural resources is critical to the delivery of social and economic justice to Canadians of the current and future generations.

During this stage, heavy emphasis was placed on the economic value of natural resources and on trade relations between states. In this respect, the issue of equitable distribution of risks and benefits derived from economic activity becomes a critical component of the sustainable development process (Jacobs and Munro 1986). Although it was acknowledged that economic imperatives were not the only reasons for preserving species, culture was not given much weight.

The 1987 Brundtland Report addressed issues related to urbanization, military investments in arms, poverty, and a number of other issues that had not been discussed in the World Conservation Strategy. Although the report provided substantial analytical depth, and explored the synergy between various areas and sectors that impact on environmental management, it failed to address, let alone embrace, culture as a driving force in achieving sustainable development (Jacobs and Sadler 1995).

The third and final stage, was initiated by the 1992 Earth Summit held in Rio de Janeiro that led to the Convention on Biological Diversity. The Biodiversity Convention is also based on three general objectives. The first two focus on the conservation of biological diversity and the sustainable use of its components consistent with the three World Conservation Strategy objectives. The introduction of a third objective, the fair and equitable sharing of benefits arising out of the utilisation of genetic resources, was a critical addition, requiring that the relationships between the various parties involved in managing biological resources be re-adjusted. These relationships exist at all levels, whether between individuals, groups of individuals, interest groups, corporations or nations, etc., and the Convention stipulates how these relationships might be re-adjusted in terms of the three main objectives of the Convention (Pimbert 1997).

The 1992 Rio Conference acknowledged the aspirations and opinions of indigenous people, civil society and NGOs (Pimbert 1997). Yet, the role played by value systems and differing perceptions in the biological resource conservation process, and the conflict or even complementarity between traditional and local knowledge and standard scientific knowledge, has not yet been adequately

addressed. The same is true of the need to harmonise relationships between global and local perceptions, which raises the issue of intellectual property, effectively involving all stakeholders in biological resource management processes and national sovereignty. Paradoxically, however, the process of approaching biodiversity conservation holistically, and the major issues considered from such a perspective, actually reduced discussion of the role and importance of local values and concerns. Traditional knowledge based on collective memory received little or no attention, even though the past influences present and future attitudes, strategies and actions.

It is against this backdrop that the implementation of the biodiversity convention must be examined.

Conservation or preservation: a question of semantics and of culture?

The meaning ascribed to conservation in the World Conservation Strategy has been adopted by many authors when discussing natural resource management issues (Jacobs 1981; Jacobs and Munro 1986; Saunier and Meganck 1995; McNeelly et al. 1990). Planning practitioners were also quick to appropriate this concept when identifying and conducting natural resource management activities.

Not surprisingly, however, the original English concept was interpreted in several French-speaking African countries in a way that distorts its intended meaning, so much so that these interpretations carry with them potentially disastrous and unpredictable impacts on the very future of biodiversity. 'Strict biodiversity conservation', a term dear to wildlife management officers, is bandied about at biodiversity conservation strategy and action plan workshops, where conservation and protection are used interchangeably. When legal documents, such as national biodiversity strategies or action plans, confuse these two concepts, the status of some species, habitats and ecosystems also becomes unclear, particularly when the socio-economic stakes are high. The potential to choose one or other of these words may depend on the economic situation or self-interest, with plenty of leeway to interpret existing or proposed regulations and laws that intended to govern biological diversity.

Chauvet and Olivier (1993) raise the question of the exact meaning of biodiversity conservation, protection or preservation, and the different perceptions of natural resource management models expressed in English or Romance languages. The issue is more than one of outward form. These

apparently synonymous words give rise to very different management strategies depending on the language, country or group that uses them. They are value-laden concepts, each with its own history. Chauvet and Olivier (1993) suggest that the French definition of the biodiversity conservation concept offered by IUCN, UNEP and WWF in 1980, is a literal rendering of the English and that French speakers are bewildered by the notion of *amélioration* (used to translate enhancement) and wonder about the relevance of the term *utilisation*, however sustainable. When an area is designated for conservation, it is implied that production is ruled out. Thus, the French version of the World Biodiversity Strategy (1994) suggests that it remain a matter of opinion as to where sustainable development is situated on the spectrum between conservation and preservation.

Perhaps by implicit omission, conservation, and hence conservation requirements, have not been defined at the outset in the Convention on Biological Diversity. It is inherently difficult to determine precise requirements for a vague concept. Even Article 2 of the Convention, which deals with the definition and use of terms, is silent on the word conservation. To make matters worse, only *ex-situ* and *in situ* conservation are defined while, 'Conservation is... the conservation of ecosystems'. Surely it would have been preferable to clearly explain conservation rather than providing a definition by tautology.

Confusion is not only limited to the French language community. In the United States, the word preservation is synonymous with outright protection. Conservation, however, refers to the sustainable use of biological resources (Chauvet and Olivier, 1993). This raises the question of what exactly ecosystem conservation is, if it is to include both the full protection of ecosystems and their sustainable use. And for most French-speaking Africans, conservation is synonymous with protection as borne out by the planning workshops held in several French-speaking African countries (Kasisi 1998, 1999, 1999, 2000).

Some countries are even reluctant to use the word protection. This is emphasised in a publication by Gome (1999) on the Côte d'Ivoire, which states the following:

... the term protection has highly pejorative overtones, particularly in our country where reserved forests and other protected areas were set up by the colonisers who, in their efforts to 'protect' biodiversity, marginalized indigenous people by using often inhumane methods, which have left

an indelible scar on the local population's collective memory.

The worldwide aspiration to 'preserve' and 'conserve' natural resources, and thereby guarantee their sustainable use, was translated into action with the Convention on Biodiversity produced at the United Nations Conference on Environment and Development held in Rio de Janeiro, Brazil in 1992 (SEPA 1999).

The Convention's objectives, as stated in its first article, are: 1) biodiversity conservation; 2) sustainable use of the latter; and 3) fair and equitable distribution of the benefits arising out of the utilisation of genetic resource use. The semantic ambiguity connected with the very concept of conservation, as discussed above, deviates markedly from the original definition of conservation (IUCN, UNEP and WWF 1980) by differentiating between conservation and sustainable use. Article 1 of the Convention appears to 'suggest' that conservation is synonymous with protection and preservation.

It may well be asked, moreover, whether biodiversity, as used in the Convention, is something to be conserved or a process to be managed depending on the culture concerned, and whether it is a scientific issue or a cultural challenge or perhaps an amalgam of both? There is little doubt that biodiversity conservation raises a challenge in terms of the convergence of science and culture. A science based approach often leads to responses designed to provide technical solutions to problems identified in biological resource management within an empirical analytical framework. Culture, on the other hand, adopts a more flexible view of conservation and development.

Sacred forests, for example, are regarded as a vital ecological heritage in the Côte d'Ivoire and their survival is justified in large part by the fact that they are landmarks that contribute to social stability (harmony with the local gods and spirits, land dispute settlement, consolidating political power at the grassroots level and harmony with deceased ancestors who watch over the living, according to black African cosmogony) (Gome 1999).

Yet, in the vast majority of Africa's French-speaking communities, including Côte d'Ivoire, Gabon, Guinea, Mali and Chad, biodiversity strategies and action plans were developed during national and regional workshops using planning techniques based exclusively on empirical methods. If the scientific approach is granted exclusive domain in the formulation of strategies and plans, then grassroots communities cannot be expected

to become involved. In the first case the management of wild natural resources is organized with respect to a logic of empirical and deductive reasoning, whereas traditional or local knowledge is derived from accumulated experience acquired over centuries and is heavily charged with legend and emotion. How can local communities, particularly in Africa, become fully involved unless traditional or local knowledge is appreciated and valued as an important source of knowledge?

Recognising this complementary frame of reference for natural resource management is critical if grassroots communities are to be mobilised in support of the objectives of the Convention on Biological Conservation.

Developing biodiversity conservation strategies and action plans: a participatory minefield

The countries that have signed the Convention on Biological Diversity are known as 'contracting parties'. Each contracting party is required, in accordance with its particular conditions and capabilities, to develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity or adapt for this purpose existing strategies, plans or programmes. The countries are also required, as far as possible, to integrate the conservation and sustainable use of biological diversity into sectoral plans, programmes and policies.

Three biodiversity-planning mechanisms have been developed and are defined in the Convention's glossary of terms and practices and related resolutions. The mechanisms must be used in a participatory, adaptive and cyclical manner (IUCN, UNEP and WRI 1995).

National surveys are assessments designed for gathering information on the status and trends of countries' species, genetic resources, habitats and landscapes as well as on existing conservation and utilisation mechanisms and financial and non-financial costs and benefits (IUCN, UNEP and WRI 1995).

National strategies analyse data and descriptive information contained in national surveys and set potential goals and objectives. They determine any gaps between reality and aspirations as expressed in the objectives, difficulties and options in achieving objectives, the various alternatives' impacts on the environment and the effects on the countries' human, institutional and financial resources and their infrastructure in terms of international cooperation (IUCN, UNEP and WRI 1995).

Action plans are tables defining the public and private organisations and groups that will implement the activities stated in the strategies, the locations or areas in which they will be implemented and the means and resources (labour, institutions, facilities and funding) that will be used. They also establish a timetable (IUCN, UNEP and WRI 1995).

Involving the general public or 'ordinary citizens' in decisions that affect them has become an integral part of the planning process at both international and national levels. The World Environment and Development Commission, or more commonly, the Brundtland Commission, states 'that it is important to have greater public involvement in decisions that could have an impact on the environment and that, in order to achieve this, local democracy needs to be strengthened (Vincent 1994). The Biodiversity Convention also emphasises the need to adopt a participatory approach at each stage of biodiversity management'. This applies to the planning stages as well.

Yet, the participatory process during the biodiversity action plan and strategy planning stages in most French-speaking African countries has been little more than a myth, falling far short of the goals for participation contained in the Convention. At the national survey stage in the Côte d'Ivoire, Gabon, Guinea, Mali and Chad, all data on biodiversity was gathered by scientific researchers, and initial draft strategies were developed exclusively on the basis of this data. It is easy to see why peasant farmers and other citizen groups have shown little interest in the process insofar as their knowledge base and framework of use has not been accessed nor even invited.

Furthermore, it is increasingly unacceptable to describe the environment and analyse the changes it has undergone while ignoring local knowledge. Such knowledge may be general or sometimes very specific, ordered according to different principles, based on several decades and sometimes centuries of observation, and verified through years of trial and error.

Western science and its practitioners often ignore these findings, obtained through other cognitive styles. Happily, however, some scientists, are beginning to show interest in these 'traditional' knowledge systems given the rich data inherent local cultural practices and traditions and a growing awareness of the limits of the scientific method (Mailhot 1993). Traditional local knowledge often provides the best indications of the real biodiversity situation in the field. As well as yielding relevant information on the ecological, economic,

social and cultural aspects of biodiversity, this type of knowledge also provides information of an intrinsic nature. In traditional knowledge, an object has several facets. It simultaneously embodies a material value, symbolic value (totem), cultural value (work of art), economic value and ecological value (role in the ecological pyramid). If such knowledge is ignored from the outset of national surveys, those surveys are impoverished as are the strategies and action plans that result from them.

At the strategy development stage, various measures and forms of investment that address biodiversity objectives are ranked in order of priority. Once again, if the data and information provided by scientific experts are analysed while local and traditional knowledge is ignored, and when any shortcomings are determined only on the basis of such data, the resulting policy decisions are at best partial and in some cases simply inaccurate. Local and traditional knowledge may be taken into account in public awareness campaigns to remind the population, rather quaintly and somewhat paternally, that their ancestors 'cared about' the environment. It is only within this context, that the need for grassroots societies to hold on to their traditional knowledge is considered important. Equally critical, marginalisation earlier in the process is forgotten when it is realised that the intellectual property issues are enormous and the mechanisms for safeguarding the rights to such property are inadequate or non-existent in developing countries.

In addition, data obtained from the participant lists of the various biodiversity strategy planning workshops and planning committee reports held in French-speaking African countries indicate that women never make up more than 20 per cent of participants, yet women perform virtually 90 per cent of all natural resource management-related activities in rural areas. It is unreasonable, moreover, to speak of a fully participatory process, when in most planning workshops, most stakeholders have not been involved at each stage in the process, i.e. from organisation through to report writing.

As the formulation of action plans depends on the previous stages of biodiversity evaluation and strategy, it is extremely difficult to avoid falling into the trap of marginalizing the grassroots stakeholders at this point. And, insofar as the action plan drives the budgeting and scheduling exercise, involving intense negotiations between the key stakeholders and donors, it can hardly be claimed, under the current process, that all stakeholders participate effectively.

A pragmatic framework for local participation to develop strategy and action plans

Most biodiversity action plan and strategy planning exercises in French speaking Africa were conducted using the Logical Framework (log frame) approach (known as *Planification des Projets par Objectifs [PPO]* or *Cadre Logique* in French and *Zielorientierte Projektplanung [ZOPP]* in German). This method is considered to be a good way of organising the planning process in a systematic manner that meets reporting requirements established by funding agencies (EEC 1993).

The log frame approach is a method that can be used to analyse biodiversity-related problems on the basis of a site inventory and biodiversity survey. It can also be used to develop and analyse the objectives set for biodiversity-related action in terms of the problems analysed. It comprises two phases that provide an operational and tabular description of the most important aspects of a particular course of action.

The first phase consists of a situation analysis that includes an assessment of the problems, objectives and strategies. Problem analysis consists of establishing cause-and-effect links between the negative aspects of an existing situation that is presented as a diagram with the effects of a given problem indicated above and the causes below. During the analysis of the objectives, the negative positions in the problem diagram are converted into achieved positive positions. All the positive positions are then indicated in the objective diagram, in which the means-ends ranking is represented. Finally, in the objective diagram, the various 'sets' of similar objectives are grouped as strategies. A number of criteria are used to select the most relevant and suitable strategy.

The second log frame concerns planning. The aim of the exercise is to use a logical framework to design the content of an action plan by systematically and logically presenting its objectives, results and activities plus the causal links between them (vertical logic). This can only be achieved once the available data, i.e. problems, objectives and possible solutions, has been thoroughly analysed (EEC 1993).

Although using a log frame to indicate problems and establish the causal links between negative factors has the advantage of presenting the overall situation that needs to be addressed in tabular form, the various elements are necessarily presented in a linear structure. This provides the impression that biodiversity management issues can be

considered as a string of minor interconnected problems. It is clear, however, that these problems are dependent on social, political and economic forces beyond the local context (e.g. globalised markets, cultural adaptation), but which are, nevertheless, not independent from it. In order to carry the problem analysis to greater depths, therefore, an ever increasing number of external variables need to be taken into account. This extends the analytical capacity of the log frame model beyond its theoretical limits.

Other approaches exist that could fully involve the rural population. An example is the Accelerated Participatory Research Method (APRM), which is used to obtain information on rural and, more recently, urban situations. This method recognises and respects local knowledge and integrates modern knowledge. Information collected through APRM is used as a guide for action based on a community approach to problem solving. It is easier to validate the information collected this way, as the beneficiaries/partners understand and appreciate the project and are therefore prepared to participate in all aspects of the process.

The triangulation principle used by APRM also ensures that a problem cannot be approached from only one angle. When conducting research, APRM views a given phenomenon from at least three perspectives: representative team membership; stratification of the observation units; and varied methods and techniques so as to minimise bias (Gueye and Freudemberger 1991). The advantage of APRM over the log frame approach is that the stakeholders can effectively take part in the planning process. This can lead to positive results in terms of detail, the finer aspects of the situation, and even information on the local population's viewpoints on matters relating to biological resources.

Still, both approaches are limited in that they cannot be effectively used to analyse highly complex systems with multidimensional components. The log frame approach provides linear analyses. Its scope is spatially limited, in so much as it can only be used to analyse problems involving a community, area or country, but seldom a sub-region or region. The external factors that could influence the action are only stated as major considerations, but not analysed (see Figure 1 on next page). Although APRM has a number of advantages as far as understanding the local population's perceptions and aspirations is concerned, its analytical scope is also limited in spatial terms.

Today's analyst is faced with complex phenomena that have multiple causes linked to changing eco-

conomic and social structures. Some theoretical models are known to represent interactive theories that attempt to reflect the relationships between nature, society and technology (triads). Such models can be applied to many varied analytical methods and used to make sense of the profuse multi-causal relationships between the natural world and that shaped by human beings (Thom 1980).

Problems attributed to linear causality, as appears to be the case with logframe problem analysis, give rise to systemic difficulties. Environmental problems that can be ascribed to quite easily identifiable agents give way to complex combinations of economic and social difficulties which are essentially political in nature and are in turn related to the world economy. For example, major issues triggered by globalisation become difficult to identify in analyses conducted within narrow frameworks such as log frames and APRM. As a result, it is essential that a systemic approach be adopted rather than concentrating on isolated elements of causal relationships, as is the case with log frames, or of concentrating on internal group dynamics and their immediate relationship with the external environment, as with APRM.

Conclusion

Twenty years after the World Conservation Strategy (IUCN, UNEP and WWF 1980) was published, an assessment of the sustainable biodiversity management process's effectiveness indicates that the Convention on Biological Diversity ratified by most of the planet's countries has served as a major international legal instrument. As the

Convention is legally binding on an international scale, it is based on an integrated rather than sectoral approach to conservation and sustainable biodiversity utilisation. As the terms of the Convention take precedence over countries' national legislation, laws and regulations have been amended in accordance with the Convention's provisions (UNEP/CBD 1994). In practical terms, this has meant that the new requirements resulting from ratification by most countries have led to several different types of problem.

Most importantly, more attention needs to be given to value systems and to incorporating differences of perception within the biodiversity conservation process. The apparent semantic ambiguity arising from the use of the words 'biodiversity protection', 'conservation' and 'preservation', as discussed, could have disastrous consequences on the way biological resources are managed. One of the sources of this ambiguity is the dual perception of natural resource management depending on whether it is based on an English or Romance-language model.

Understanding and taking into account the various perceptions that lie behind approaches to biodiversity conservation planning, the sustainable use of such biodiversity and the fair and equitable sharing of the benefits derived from it could increase our understanding of the rational bases of such perceptions. It is on such bases that communities determine how they are going to utilise the environment and its resources. It is possible to gain an understanding of their perceptions through their symbolism, literature (e.g. stories, proverbs, sayings, novels) and art. Cultural aware-

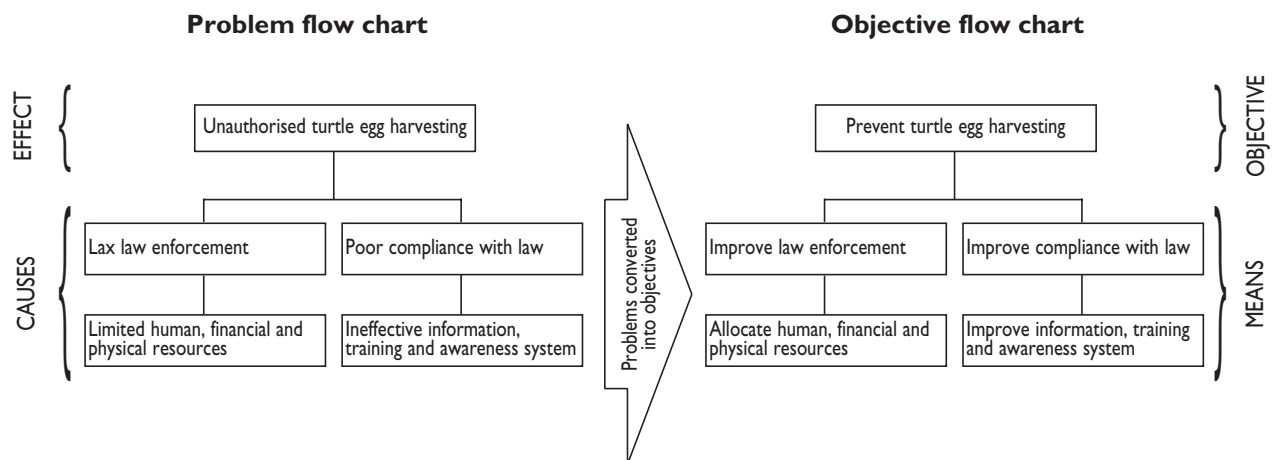


Figure 1. Converting problems into objectives using the logframe approach (Kasisi 2001)

ness can also contribute to obtaining a clearer appreciation of how the mechanisms governing all areas of a community's life interact, so that biodiversity conservation requirements can be better integrated and adjusted to it (Kasisi 1989).

With regard to the issue of traditional and local knowledge versus scientific knowledge, the implementation and success of new practices as a result of applying the Convention on Biological Diversity are limited owing to the costs associated with acquiring the high-quality scientific data required both for formulating most biodiversity conservation strategies and action plans and for providing monitoring programmes. The cost and difficulty of providing effective biodiversity monitoring and management in protected and unprotected areas using standard criteria often prove to be prohibitive. In many cases, a whole host of ecological information on biodiversity already exists in a local population's repository of knowledge. What is more, the local population often conducts management and monitoring programmes or similar activities as part of traditional management systems (Hamilton and Walter 2000).

It is a generally accepted fact, moreover, that cultural information, better known as traditional ecological knowledge (TEK), can be useful to researchers and managers, particularly when used in conjunction with standard scientific data. Strong advocates of field research involving grassroots communities believe that traditional knowledge together with foreign or national researchers' specialist knowledge are more useful than either type of knowledge considered separately when it comes to understanding reality (Christie and White 1997).

Two basic problems can arise when using TEK. The first is due to the fact that TEK and other types of traditional knowledge are integral parts of complex cultural systems and anthropological methods are needed to usefully describe and interpret such information. Acquiring such knowledge is usually difficult. It is time-consuming and requires skills not generally taught to most ecologists, biodiversity strategy planners or biodiversity project managers. The second problem is closely linked to the first and stems from the fact that when researchers have tried to integrate traditional knowledge into their research, the result has been naively reported data obtained from interviews or observations and taken outside their cultural or historical context. The resultant conclusions are often false or misleading (Ruddle et al. 1992).

It is all too often imagined that, in order to take both types of knowledge into account, all that is

required is to collect the information stored in the population's memory and add or compare it to data supplied by Western science. Such data is inserted into conceptual frameworks, regardless of whether it originates in science or traditional knowledge, and is interpreted using highly cultural representation systems. Overlooking such conceptual frameworks renders the information they contain meaningless and, in a sense, neutralises it.

The idea that all data obtained from traditional knowledge can be incorporated into Western science is tantamount to imposing science as a yardstick and forgetting that it is a representation system that is itself the product of a specific cultural tradition. It would be equally misleading to attempt to introduce data generated by Western science into other cultures' conceptual frameworks without taking prior precautions. Once the traditional ecological knowledge concept, if accepted, has been effectively taken into consideration and all the implications understood, it will lead to far-reaching changes in basic research, as other knowledge systems will suddenly appear side-by-side with science and enjoy similar recognition. Because such systems sometimes overlap with science, sometimes contradict it and at other times deal with totally different issues, the traditional ecological knowledge concept would tend to radically broaden our perception of the environment (Mailhot 1993).

Finally, effective involvement of all stakeholders in decisions relating to biodiversity conservation issues is the weak spot in the biodiversity conservation strategy planning process and in the achievement of sustainable biodiversity management.

Such involvement must occur at all stages, particularly the planning, decision-making and management phases. It is an invaluable means of testing and combining economic, social and ecological objectives. Involvement is also a way of avoiding rash decisions and an educational tool for raising public awareness of the importance of conservation and associated problems as well as for alerting planners and leaders to the concerns of the wider public.

Participation is particularly important in rural areas, because little will be achieved unless the rural population is actively involved and understands the issues and solutions (UNEP, IUCN and WWF 1980). The two main approaches used in translating the spirit of the Convention on Biological Diversity into practical action, i.e. log frames and APRM, both have undeniable methodological advantages. It would, nevertheless, be more efficient to subordinate APRM to the log

frame approach by introducing the former when consulting the rural population. The log frame assessment would then integrate the APRM findings during workshops attended by the scientific, technical and political *élite* and rural community representatives. Two birds would thus be killed with one stone, as the general versus local issue would be partly resolved, while at the same time satisfying the requirement to adopt a bottom-up approach. With regard to addressing issues relating to the complex nature of the systems to be analysed for better planning purposes, this would be achieved when additional surveys are conducted during the assessment phase in synergy with baseline TEK data and other standard scientific information. Starting the whole biodiversity planning process again with a view to integrating the concerns raised by this article is not necessary after all, as the three tools, ie the national surveys, strategy and action plan should, in principle, be formulated in a participatory, cyclical and adaptive manner.

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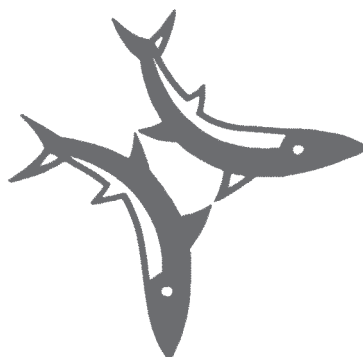
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Conclusions recommending appropriate systems of sea tenure for future fisheries management, arising from the study: 'Traditional fishery knowledge and practice for sustainable marine resource management in Northwestern Europe: a comparative study in Ireland and the Netherlands' (1994–1997)¹

Brendan Connolly²

Summary of the study³

This human ecological case study examined the relationship between fishing communities and their marine resources in Ireland and the Netherlands. It is interdisciplinary in nature, incorporating the disciplines of marine zoological ecology, anthropology and sociology. The ecological relationship between the selected fishing communities and their marine resources was studied by examining traditional fisheries knowledge and practice. This approach is based on indigenous knowledge systems research. Three contrasting study areas within each country were selected and their geographic, geological, demographic and historical background discussed. Traditional fisheries knowledge was recorded by means of a two stage interviewing process, during which a total of 166 interviews were held. Eighty-four qualitative interviews were carried out; 15 in Inishmore, 9 in Inishbofin and 18 in Dingle comprising the Irish study areas; 7 in Katwijk, 10 in Urk and 5 in Goeree, comprising the Dutch study areas. A further 11 and nine background interviews were carried out in Ireland and the Netherlands, respectively. From the topics recorded in the qualitative interviews, a quantitative questionnaire, containing 119 questions, was compiled. Sixty-two questionnaires were completed, 31 each in Dingle and Goeree. The traditional fishery knowledge recorded by the qualitative interviews was discussed under similar subject groupings for each of the six study sites. The results from the quantitative questionnaires were analysed by means of multivariate statistical analyses for category data.

One of the major findings was that the principle of sea tenure, in combination with appropriate social structures, forms an important basis for sustainable marine resource exploitation. The regulation of fisheries was desired in all six fishing communities, but equal enforcement in all regions was stressed as being essential. Fisheries regulation enforcement was not perceived to be equal within the European Union. Markets were seen as the main driving force behind fishing strategy decision making by fishermen. Communications between the fishing communities and fishery authorities were felt to be insufficient. Quantitative data indicated that within the fishing communities of this study, traditionality was positively related with sustainable opinion and practices. A cognitive model of marine resources exploitation, containing five main areas that influence the relationship of fishing communities and their marine resources, was presented. A list of 49 recommendations for future sustainable marine resource management was drafted (see also: <http://homepage.eircom.net/~eufisheries/>).

Sea tenure

Sea tenure is the partitioning of marine resources among the fishing communities that use these resources. The sea does not have boundaries as exist on land. Partitioning of marine resources can be achieved by coming to agreement within and between units of social cohesion. The Irish fishing communities of the study divided the shore and inshore areas and so partitioned the seaweed and lobster resources. These arrangements arose

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1. The research work was carried out based from the Anthropology Department of Leiden University in the Netherlands and also backed by the Department of Zoology, National University of Ireland Galway, and funded by the European Union.
 2. B.A.mod., Ph.D
 3. Summary and explanation of conclusions on sea tenure in English and Dutch, as well as the full report in English are available on the Web at: <http://homepage.eircom.net/~eufisheries/>

between groups of local communities, so units of social cohesion existed on the two islands and the peninsula. Agreements for finfish involved a geographically greater social unit as these resources range over a greater area. In the case of Galway Bay this included Inishbofin to the north of it, as it was also visited by the Claddagh fishermen from Galway city. Arrangements arose between the fishing communities of Inishmore, Inishbofin and the Claddagh, whether by coercion or consent, but the social unit included this whole area. When fishermen from other countries entered Irish waters, Spanish, Dutch and French fishermen came to certain agreements with Irish chieftains about landing and mooring rights (Went 1949). This occurred as early as the 15th century and most likely before that. These non-Irish fishermen paid the 'owners' for this right to use the Irish marine resources.

In the case of the Dutch communities in more recent years, national fishery regulations had virtually complete control over the manner in which fishermen in Katwijk used their marine resources. The unit of social control was very much on a national level.

Fishery agreements within local social units are also characteristic of many other fisheries, such as those controlled by villages on Pacific islands (Ruddle 1988, 1994), Japan (Ruddle 1989), in Canada (Davis 1984), in Australia (Davis 1989) and in many other locations around the globe (Durrenberg and Palsson 1987; Cordell 1989; Ostrom 1990; Dyer and Goodwin 1994).

Fishing is now, however, also carried out on a global scale with fishing fleets of large, high technology ships travelling the oceans (Arnasson 1993; Barcena 1994; Burke et al. 1994; Meltzer 1994). In many cases, local fishing communities share their resource with each other on a national and also on an international level. Agreements and cooperation have to be reached on all these levels in order to achieve sustainable marine resource utilisation.

Traditional local agreement and control played an important role and a lesson should be learned from this type of social structure. The tragedy of the commons was not that common, until fishing grounds were seen and used as a common resource. Social cohesion is an essential part of fishery systems because boundaries are very vague at sea and it was the social unit that substituted agreements and cooperation for boundaries.

The factor that was of prime importance to the respondents in any system of regulations was that the rules would be enforced equally everywhere. This used to be the situation in the traditional

social unit, because each person knew what the other person was doing. Equal enforcement of regulations, leading to equal compliance of regulations, comes about when they are part of a social unit which acts cohesively, and this, in the opinion of many respondents of this study, is not the case with the EU's Common Fisheries Policy. The respondents did not feel that all EU fishermen were part of one cohesive social unit, or that they had influence over the formation of future policy.

Reasons for the recommendation of sea tenure

The conclusion reached was that the root cause of many of the problems of the European Common Fisheries Policy was the unpredictable nature of the fishing resources.

This unpredictability, the fishermen felt, was not due to the sea's inability to consistently produce fish, but due to the changeable nature of EU fisheries management decisions and the unequal manner of their implementation. In fact, most Irish as well as Dutch fishermen in the present study thought EU fisheries policy was a shambles.

The combination of unpredictable quota levels and the uncertainty surrounding access of fishing fleets to the various EU fishing grounds meant that fishermen felt they had to catch as many fish as they could get away with, because they did not know what the situation would be next year. If they did not catch the fish now, someone else would.

Many of the fishermen said they realised, more than anyone, that the way they were fishing was not sustainable in the long term, and furthermore that they resented being forced into this position by national and international fisheries regulations. The Dutch fishermen gave, what they termed 'the horse power race' among their beam trawlers, as an example of a trend they did not want but were forced into by bad fisheries regulations.

In the quantitative questionnaire section of the study one question asked whether fishery rules and regulation were needed. All (100%) of the Irish as well as Dutch fishermen said they were needed, but with the absolutely essential proviso that *the rules must be equally and fairly applied in all countries covered by the European Common Fisheries Policy*. It was the overwhelming perception of the Dutch and Irish fishermen that, at present, EU fisheries regulations are not equally applied in all EU countries.

A fear was also expressed that if fishermen were to put forward the above too forcefully, it might

be used against them; for example, by means of further cuts in fishing quota, instead of addressing the real problem.

The strategy of 'fishing as much as you can, while you still can', is a perfectly sensible strategy to adopt when resources are unpredictable. But fishermen did not want this situation. They wanted predictability of fishing rights so they can afford to plan for the future and fish sustainably.

Ideally, fishermen expressed the wish to have an input into fish stock assessment, to control the catches themselves and thereby keep fish prices buoyant, avoid overfishing, and cut down on operating expenses.

Therefore, the conclusion is that three requirements are needed to form the basis of a future fisheries policy in order to bring about predictability of resources:

- Appropriate systems of long-term stable sea tenure need to be instituted;
- Areas of sea tenure need to be linked to distinct groups of fishermen forming cohesive social units; and
- National and international fishery regulations need to be equally enforced throughout all sea tenure regions.

Long-term sea tenure linked to distinct groups of fishermen is essential, because in this way these groups know that if they manage their stocks with a long-term view in mind, they and their descendants will benefit, without the threat of a sudden influx of other fishing fleets and unexpected quota cuts.

Practical aspects of sea tenure implementation

The size, location and specific system of sea tenure would be influenced by particular circumstances but would have to take factors, such as the geographic range of the relevant fish populations and the long-term economic viability of the fishing communities, into account.

The system of sea tenure would have to be stable in the long term and exclusive to the social unit of fishermen concerned, unless decided otherwise by the fishermen themselves, in order to ensure predictability of resources. Fisheries research and stock assessment services would of course need to be available to the fishermen's groups.

By choosing the cohesive social unit of fishermen judiciously it should be possible to bring about a high level of internal policing, but a system of independent and equal fishery regulation enforcement will also be necessary. Both these approaches are needed for a high level of fishery regulation compliance.

The goal of a long-term, fixed system of sea tenure might seem initially politically problematic. But just as the predictability of the current system of land tenure, on which agriculture in Europe and other parts of the world depends, has amply shown, the future viability of the commercial fishing industry depends on the predictability of its resources. The conclusion is that such is the case in Ireland and the Netherlands and that, being based on sound ecological principles, this is also the case for other EU member states.

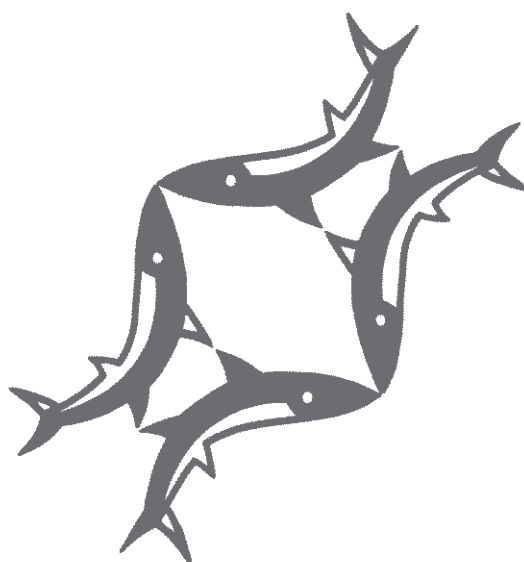
The correct system of sea tenure would have to take fish stock movements into account. It would have to be appropriate for regional circumstances. The system of sea tenure would need to keep the whole fishing community in mind, including small and medium operators as well as big operations. From a human ecological point of view, it would be best, in order to have a sustainable fishing community and an economically stable fishing sector, if there was diversity in economic units within the fisheries sector.

Sea tenure appears to be the way to achieve predictability. The real political difficulties may lie, not so much in the acceptance of the basic concept of long-term sea tenure, but in the fair determination of the geographical location and size of the areas of sea tenure. However, considering the potential benefits of a predictable system of sea tenure on the one hand and the manner in which present EU fisheries policy is functioning on the other, it would seem that this political goal needs to be achieved to ensure the long-term viability of the sea fishing industry

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The need for a centre for the study of indigenous fishers' knowledge

R.E. Johannes¹

Source: Wise coastal practices for sustainable human development – forum of discussion².

There have been more than 200 communications in this forum on Wise Coastal Practices for Sustainable Human Development. Many of them emphasise the importance of co-management — the collaboration between indigenous coastal communities on one hand, and outside institutions such as government departments, non-governmental organisations and aid agencies on the other. Many contributors discuss ways of pursuing this collaboration (Kallie <http://www.csiwisepractices.org/?read=46>). Yet there is a key ingredient that seems to be almost completely missing from these discussions — that of gaining and putting to use the knowledge of these communities about their natural resources. The importance of understanding local fishing practices has been mentioned in some communications (Voi <http://www.csiwisepractices.org/?read=3>; Diouf <http://www.csiwisepractices.org/?read=48>; Wiener <http://www.csiwisepractices.org/?read=131>), and this is important. But it is not the same as understanding local fishing knowledge.

Indigenous fishers often possess unique and important knowledge about their local marine environments and its inhabitants. In areas where the same cultures have been fishing for generations, this knowledge can be encyclopaedic. Fishers often know, for example, the timing and location of important, and especially vulnerable, life history events such as migratory and spawning aggregations, recruitment and nursery areas, or the locations of rare or endangered species.

How can we design effective boundaries for marine protected areas in developing countries in the absence of such knowledge? Yet how many marine protected area planners have seriously canvassed it?

For fisheries managers, for whom knowing the history of a fishery is essential for its management, the elders in these communities are often the only repositories of such information, including knowl-

edge of once abundant species that are now almost gone. Without such information the biologist arriving on the scene to help is liable to assume that such species are unimportant locally and ignore them, rather than determine what depleted them and how the process might be reversed. Yet how many biologists have seriously solicited this knowledge?

For social scientists, fishers can provide knowledge of how this information is implemented in organising their fisheries by means of formal or informal systems of resource allocation. Fishers can also teach us about human impediments to purely biological solutions to resource management problems. For example, simply passing laws against destructive practices is futile if endemic police, military or political corruption renders them ineffective — a point that has been overlooked on countless occasions by those working to improve coastal resource management in developing countries.

We can also learn from fishers whether their communities possess a basic conservation ethic. Sometimes they do, sometimes they don't. This makes a big difference in how education for conservation should be approached. Where a conservation ethic exists, the relevant concepts need to be studied and used as the foundation for local conservation education. Where they do not exist, conservation education is much harder for it has to start from scratch.

So why has there been so little emphasis on indigenous fishers' *knowledge* in this forum? Answers include: 1) Most biologists working on coastal management projects are too busy gathering statistics, their usual stock and trade. They find asking unlettered people about their marine biological knowledge too humbling, too unstructured and too unsuitable for statistical analysis. 2) Social scientists working in co-management projects often don't have the biological training necessary for the effec-

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tive collection and application of indigenous knowledge about natural resources.

As fisheries biologist Frederick Ommaney said almost forty years ago, the indigenous fisher 'has forgotten more about how to catch fish in his waters than we shall ever know'. How can we generate enthusiasm in local fishers for collaborating with us, and how can we function as plausible and useful advisors if we don't first assimilate this local knowledge, test it where practical, and integrate it with our own?

Fishers and outsiders who pursue co-management are both experts. Each group has specialised relevant knowledge that the other does not. Both must be harnessed to improve local fisheries management.

The time is thus overdue for the establishment of centres for the study of the indigenous knowledge of fishers and other coastal resource users. Their invaluable knowledge is vanishing at an accelerating rate as its possessors die and their children no longer show interest in learning it. Of 37 formal institutions established worldwide to study indigenous knowledge, none focuses on marine knowledge.

Institutions are urgently needed to train people to help stem this loss. The demand is there; graduate and post-doctoral students regularly ask me where they should go to get the training to do research in this area. (The young seem much more eager to tackle unconventional interdisciplinary projects like this than previous generations.) But sadly I don't know what to tell them.

Such a centre must be truly interdisciplinary. Social and biological science must both play important roles. Traditional ecological knowledge is best understood, and local resource management best pursued, in a cultural context. Biologists need to comprehend the implications of this for their work. Social scientists need some training in marine biology and marine resource management in order to fully appreciate the practical significance of the information they obtain. Ethical issues regarding the use of fishers' ecological knowledge need to be better defined.

For charitable institutions, universities, aid organisations and agencies concerned with environmental issues and looking for an empty niche to fill, here is one to consider.



SPC

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Past issues of this bulletin, as well as many other publications from the SPC Coastal Fisheries Programme, are now available on SPC's website at:

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Conferences & Workshops

Traditional marine resource management and knowledge



Seventh Pacific Islands Conference on Nature Conservation and Protected Areas, Rarotonga, Cook Islands, 8–12 July 2002: ‘Mainstreaming nature conservation’.

Pacific conference focuses on mainstreaming and the sustainable use of natural resources

Mainstreaming nature conservation is the theme of the much-anticipated Seventh Pacific Islands Conference on Nature Conservation and Protected Areas to be held in Rarotonga, Cook Islands from 8 to 12 July 2002. The four-yearly conference is the pre-eminent event in the region on nature conservation.

Nature conservation is essential to the achievement of sustainable development in the region but is still perceived as peripheral to economic development planning and decision-making, hence the mainstreaming theme.

With about 250 participants expected, the conference will celebrate the significant strides made in nature conservation in the Pacific Islands over the last five years. Its objectives are to review progress in the implementation of the region's *Action Strategy for Nature Conservation* and to define priorities and the region's nature conservation agenda for the next four years.

This conference is important because the Pacific Islands region has more rare, endangered and threatened species per capita than anywhere else on earth.

The Pacific's marine environment is an enormous and largely unexplored resource with the most extensive and diverse reef system in the world, the largest tuna fishery, deepest oceanic trenches and the healthiest remaining populations of many globally threatened species including whales, sea turtles, dugongs and saltwater crocodiles.

There are large blocks of intact rainforests and many unique species and communities of plants found nowhere else in the world. Estimates suggest that 50 percent of the region's total biodiversity is at risk.

Past conferences brought together policy-makers, international funding agencies, regional and global conservation NGOs, community leaders, researchers, trainers and specialists in nature conservation and protected areas. The Seventh Pacific Islands Conference has widened its appeal to attract trade specialists, economists, development planners, tourism operators and others in the more mainstreamed sectors of economic development.

The focus for the agenda is to reflect, explore and share ideas on what mainstreaming means in practice and how to enable it to happen. It also gives delegates the opportunity to have input into the Action Strategy for Nature Conservation in the Pacific Islands Region.

The agenda includes keynote presentations on different perspectives and synergies on mainstreaming nature conservation. Working groups will explore the following areas from a mainstreaming nature conservation perspective:

- Biodiversity conservation, protected areas, species conservation
- New funding mechanisms
- Planning and legal processes

Jointly organised by the South Pacific Regional Environment Programme (SPREP) and the Cook Islands Environment Service and Ministry of Culture, the conference promises a truly Pacific

experience. A steering committee, consisting of members of the Pacific Islands Roundtable for Nature Conservation is providing strategic direction for the conference.

A conference website has been developed and is located at: www.pacificbiodiv.org/conference.

For more information please contact:

Kate Brown, Conference Coordinator,
SPREP, PO Box 240, Vaitele, Apia, Samoa

Phone: 685 21929; fax: 685 20231
email: kateb@sprep.org.ws



New publications

Traditional marine resource management and knowledge



The South Pacific

The Institute of Pacific Studies at the University of the South Pacific, Suva, Fiji, recently published an important new book for people doing business in the Pacific Islands, *The South Pacific*. The author is a well-known Pacific Island researcher, Dr Ron Crocombe.

The South Pacific covers an extensive range of topics and issues across the region, including: environment, people, health, languages, society, culture, governance, regionalism, globalism, and many more.

It is a valuable reference tool and a thought provoking overview of the Pacific Islands region and nations.

Dr Crocombe brings to this subject an insight gained through living and working in the Pacific Islands for over 50 years. The writing is engaging and provides an inside view of the Pacific Islands today and his thoughts on trends in the future.

Professor Ian Campbell of the University of Canterbury in New Zealand had this to say about *The South Pacific*: 'It is impossible to be other than impressed with the author's command of the subject. All will learn from it, whatever his/her special interests. The writing is lucid, balancing close argument with an abundance of evidence and anecdote. No one else could write a book like this, based as it is on 50 years experience during which

the author has been personally acquainted with most of the main political characters, and has acquired unrivalled knowledge of all facets of the Pacific.'

He also went on to describe it as the best value for money of any book in this field.

The South Pacific can be purchased for AUD 45.00 (approximately USD 25.00) plus postage from:

The Pacific Book House
17 Broadbeach Waters
Gold Coast, Queensland 4218
Australia

Phone: +617 5539-0446; Fax: +617 5538-4114,
E-mail: mcgrath@pacificbookhouse.com.au

Also, if you are travelling to or live in Fiji, *The South Pacific* can be purchased from the publishers:

The Institute of Pacific Studies
University of the South Pacific
Box 1168, Suva, Fiji

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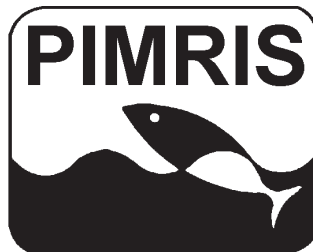
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PIMRIS is a joint project of five international organisations concerned with fisheries and marine resource development in the Pacific Islands region. The project is executed by the Secretariat of the Pacific Community (SPC), the South Pacific Forum Fisheries Agency (FFA), the University of the South Pacific (USP), the South Pacific Applied Geoscience Commission (SOPAC), and the South Pacific Regional Environment Programme (SPREP). This bulletin is produced by SPC as part of its commitment to PIMRIS. The aim of PIMRIS



Pacific Islands Marine Resources Information System

is to improve the availability of information on marine resources to users in the region, so as to support their rational development and management. PIMRIS activities include: the active collection, cataloguing and archiving of technical documents, especially ephemera ('grey literature'); evaluation, repackaging and dissemination of information; provision of literature searches, question-and-answer services and bibliographic support; and assistance with the development of in-country reference collections and databases on marine resources.