



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

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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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