# Traditional marine resource management in Vanuatu: Acknowledging, supporting and strengthening indigenous management systems

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## Abstract

Much of the marine related traditional knowledge held by fishers in Vanuatu relates to increasing catches while managing resources of cultural, social and subsistence value. Traditional beliefs and practices associated with fisheries and their management follow natural cycles of resource abundance, accessibility, and respect for customary rules enshrined in oral traditions. Many management related rules that control fishers' behaviours are associated with the fabrication and deployment of traditional fishing gear. A number of traditional beliefs, including totemic affiliations and the temporal separation of agricultural and fishing practices, serve to manage marine resources. Spatial-temporal refugia and areas of symbolic significance create extensive networks of protected freshwater, terrestrial and marine areas.

The arrival of Europeans initiated a process of erosion and transformation of traditional cosmologies and practices related to marine resource management. More recently, the forces of development and globalisation have emerged to continue this process. The trend from a primarily culturally motivated regime of marine resource management to a more commercially motivated system is apparent, with the implementation and sanctioning of taboos becoming increasingly less reliant on traditional beliefs and practices. This paper reviews a number of traditional marine resource management beliefs and practices formerly found in Vanuatu, many of which remain extant today, and documents the transformation of these systems in adapting to contemporary circumstances. By documenting and promoting traditional management systems and their merits, it is hoped to advocate for a greater recognition, strengthening and support for these indigenous systems in Vanuatu and the region.

## Introduction

Vanuatu is a Y-shaped archipelago, roughly 1000 km long, located in the western South Pacific (Fig. 1). There are 82 islands, mostly volcanic in origin, 70 of which are inhabited. Most are surrounded by narrow, highly productive fringing reefs, which are relatively small due to the steep nature of volcanic islands. There are only a limited number of other highly productive aquatic ecosystems such as mangroves, estuaries and lagoons (Cillaurren et al. 2001).

There is great linguistic and cultural diversity among Vanuatu's lush tropical high islands, with approximately 113 Austronesian languages spoken by a predominantly Melanesian population (Tryon 1996). There are also a number of Polynesian outlier islands and villages throughout the group and many other islands exhibit varying degrees of Polynesian influences (Spriggs 1997).

A number of factors affect food security on the islands. Volcanic eruptions, cyclones, tsunamis, earthquakes, landslides, storm surges, floods and droughts all affect crops and reefs. Various mitigating strategies were traditionally employed, including the creation of the complex network of refugia and other fishery management strategies described in this paper.

To ensure a successful communal harvest of fish, a taboo was placed on the area to be fished prior to harvesting. Such taboos could forbid anyone to swim or even walk by on the shore. This would both maintain the sanctity of the taboo and make the fish less wary of entering the area, an important consideration when harvesting resumed.

While the season for a communal harvest was clearly prescribed by local custom (which in turn was based on seasonal resource abundance and/or annual tidal cycles and therefore accessibility), specialists determined the actual timing of the harvest. Optimal tidal conditions, clearly recognized to coincide with lunar phases, were carefully chosen for fish to migrate shoreward over the tidal reef flats from the deeper waters beyond the reef edge.

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The optimal reef-gleaning season was also determined by annual tidal cycles whereby reefs were fully exposed during daylight hours.

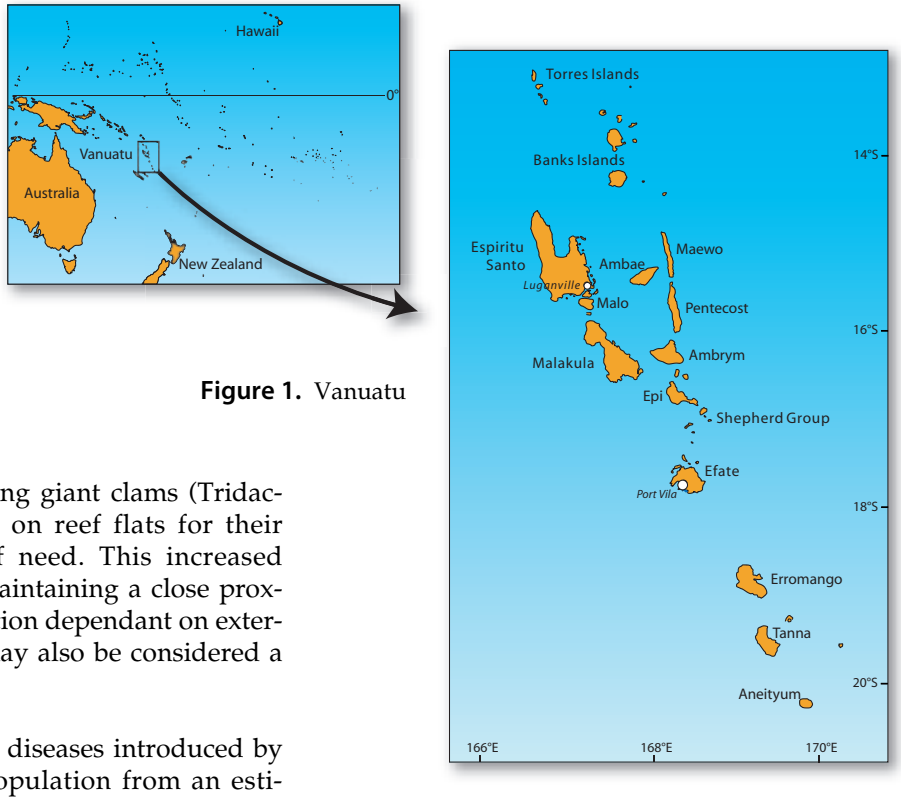


**Figure 1.** Vanuatu

Methods of overcoming food shortages included storing fermented fruits and utilizing alternative foods (such as wild yams and cycad fruits) not normally eaten. Another strategy was to create "giant-clam gardens", with fishers gathering giant clams (Tridacnidae) into discrete areas on reef flats for their exclusive use in times of need. This increased reproductive success by maintaining a close proximity of a breeding population dependant on external fertilization. Thus, it may also be considered a management strategy.

Starting in the early 1800s, diseases introduced by Europeans reduced the population from an estimated half million or more in the pre-contact period to 45,000 by the 1940s (Bedford 1989). By 1999, the population had rebounded to 189,000 (National Statistics Office 2000). Christianity, primarily the Presbyterian, Anglican and Catholic faiths, was introduced some 150 years ago and overlaid and influenced island traditions to varying degrees. The diversity of traditions, coupled with extensive migration from inland to coastal areas, the introduction of modern fishing gear, and the commercialization of resources, often makes it difficult to generalize about customary fishing beliefs and practices. Clearly though, despite the impacts of the colonial period, Vanuatu has maintained a strong cultural heritage of traditional resource management.[2] While some traditions have been severely undermined and transformed by contact with Europeans, others are still extant and much cultural knowledge remains in living memory.

The Vanuatu Fisheries Department emphasizes the fundamental role of traditional management practices, while also introducing some national regulations; these include measures such as setting size limits for some commercialized invertebrates, protecting turtle nests and eggs, and banning the harvesting of berried spiny lobsters. However, the monitoring and enforcement of these regulations in rural areas remains extremely difficult and cost prohibitive, and the regulations are rarely enforced outside urban areas due to logistical and financial constraints. Their main value is to control the export of commercial fisheries products such as trochus from the two urban centres.

The increasing population, concentrated in coastal regions, and the global market pressure for Western-style economic development make the strengthening of traditional management of marine resources critically important to ensure sustainability.

## *Traditional fisheries*

Traditional fishing methods vary somewhat among islands and cultural groups. Most traditional harvesting, however, is focused on nearshore reefs. Reef gleaning for various fish and shellfish, crab, octopus, sea urchins, spiny lobsters and numerous other invertebrates provides a significant portion of the catch. Women and children's contribution in providing sustenance through reef gleaning is significant and often under-acknowledged. Other methods, including fish poisoning, spearing and shooting fish with bow and arrow from reef edges, hook and line fishing, netting and fish trapping, and communal harvesting methods like coconut leaf-sweeping, fish driving, and weir fishing are commonly used in different areas. However, hooks and lines were apparently not used everywhere in former times.

2. The term traditional here is meant to refer to practices, beliefs and knowledge considered to have a foundation in the past, particularly before European arrival.

There are also fisheries for marine turtles and, in the past, for dugongs (*Dugong dugon*), as well as the annual harvesting of the palolo seaworm (Polycheata). In some areas, there are traditional offshore fisheries for deepwater Eteline snappers, breams (Lethrinidae) and groupers (Serranidae), as well as for flying fish, tuna and tuna-like species, although the latter were fished mainly in areas of Polynesian influence. All of these fishing methods are based on extensive traditional ecological knowledge (TEK) of the various resources so as to optimize catches, and encompass a significant corpus of traditional beliefs and practices, including numerous prohibitions controlling fisher behaviour.

Most of these fishing practices are still in use today. However, their modern counterparts have largely replaced traditional nets and hook and lines. Newer methods, such as the use of snorkelling gear, spearguns, underwater torches and long gillnets have become increasingly common. Outboard motor boats are now widely used for pelagic and deepwater fishing and interisland transport. However, the outrigger canoe, with styles varying among islands, still serves most coastal villages for nearshore fishing and transport (Hickey 1999).

## Traditional resource management

### *Cosmology*

Marine resource management was never formerly compartmentalized. The knowledge, beliefs and practices that contributed to the management of resources pervaded all facets of life. Numerous beliefs, practices and protocols governed much of the activities and behaviours, not only of fishers but of all clan members engaged in any of the traditional activities of life. Arts such as weaving baskets and mats, making ceremonial carvings and headdresses, preparing traditional medicines or making canoes, all involved following strictly prescribed protocols based on area-specific cosmologies.

These protocols, encoded and enshrined in oral traditions, were often derived from island deities/cultural heroes and sanctioned by the ancestors as "the way". The way was orally transmitted to subsequent generations as a holistic approach to life on the islands, including the synergistic management of resources. Following the way specified by island deities led to a fruitful life on the islands, where people were also ritually part of that sanctified world and were symbolically one with the gods and ancestral spirits (Eliade 1957).

Consequently, it is important to consider the context in which management measures, as well as harvesting techniques, were practised: that is, within the framework of the cosmology or belief system held in ancient times. Life in the islands of Vanuatu had, and still largely has, an inherent sanctity stemming from the animistic cosmological belief that "all things have a spirit" and that all things and events, are inherently connected through this spiritual medium. By extension of that belief, people may hope to influence natural forces otherwise beyond their control by the use of sanctified rituals, and so mitigate against various threats to food security.

Many practices stemming from this underlying cosmology are highly ritualized and are undertaken by specialists who received this knowledge from elders. Most involve the use of sacred stones and leaves often used synergistically, along with other rituals whose secrets are closely guarded as revealing them undermines their power. In many cases, the power of the omnipresent ancestral spirits that live "on the other side" is evoked to achieve the desired influence over nature and worldly events. Communication with these spirits was often ritually enhanced through the use of a narcotic drink prepared from kava (*Piper methysticum*) (Lebot et al. 1992).

Evoking the power of the ancestral spirits or island deities to intervene and increase resource abundance was an integral part of traditional taboos placed on resources. Reef taboos were never formerly static, but were always accompanied by ritualized practices underpinned by cosmological beliefs invoking ancestors/deities to increase resources. Today the abandonment of these practices is sometimes cited as the reason for resource depletion.

### *Environmental knowledge and indicators*

Tidal patterns are important, since much of the nearshore marine resources come from reef gleaning or communal fishing activities requiring good low tides. The overall maximum tidal amplitude in Vanuatu is roughly 1.5 m. The annual lows, often zero or negative tides, generally occur during the austral winter months of June and July. Extreme low water of the winter spring tides occurs at midday, so reefs are optimally exposed for gleaning during daylight hours around the new and full moons. During the summer months, extreme low water occurs at midnight during the new and full moons, but these low tides rarely get as low as those of the winter months.

Winter is also the optimal season for communal fish harvesting methods such as the traditional leaf sweep, fish drives, use of fish weirs and fish poisons in tide pools. These techniques all depend on spring tides that are high enough to allow fish to come inshore over reef flats to feed, yet low enough

to strand fish in pools behind natural barriers or those created by these methods. The winter season also coincides with the period when many nearshore resources are not reproducing but are fattening up.

The flowering of *waelken* (*Miscanthus* sp.) in late summer is the environmental cue that indicates the seasonal spawning of many reef fish in the southern islands of Vanuatu (where seasonal temperature variations are more pronounced). As the flowers swell up in maturation, the fish also swell up with eggs. When the flowers burst in late February and March, the fish release their eggs. The post-spawning period is considered good for hook-and-line fishing, as reef fish feed hungrily to recharge fat reserves depleted through egg production, and are quick to take bait. Other species, such as Siganids, have spawning peaks earlier in summer, from October to January, and are indicated by the onset of flowering of the coastal tree *Excoecaria agallocha*.

In the "colder" winter months, when the reefs are optimally exposed for harvesting through gleaning, many of the nearshore resources charge their fat reserves, and are thus preferred for their taste. A commonly cited environmental cue is the flowering of *narara* (*Erythrina variegata),* when reef fish, crab and lobster are said to be full of fat. This time is also known to be best for catching octopus, which are said to come out of their holes to see the bright red *narara* flowers. The appearance of the constellation Pleiades on the western horizon after sunset (in April) is used on many islands to herald the New Yam season, and the return of the seasonal low tides.

Some islands (such as Ambrym) cite Orion's Belt, which follows about a month later in the same position, as symbolic of a fisher returning from the exposed reefs with baskets of shellfish to be prepared with yam puddings of this season, while for other islands it is symbolic of people returning from the gardens with baskets full of yams. The annual cycle of tidal patterns that determine optimal reef gleaning and communal fishing methods is thus synchronized with the annual agricultural cycle of yam production.[3]

Communal fish harvests in the winter months capable of producing large catches were thus part of an annual cycle of ceremonial feasts or ritualized exchanges with inland villages in return for resources such as yams or fruits from island interiors. These practices served to redistribute a seasonal abundance of resources between different island biomes while strengthening alliances and maintaining peaceful trade relations between kinship groups.

### *Seasonal cycles*

Seasonal abundance — the occurrence of spawning migrations and aggregations — in addition to harvesting method constraints such as tidal patterns, also determined which species were targeted at particular times. Nearly every marine resource had a discrete season when it was targeted, often encoded by an environmental cue such as a flowering plant or other cue. This is expressed by village elders who say: "Everything has its own time." Many species would, for example, primarily be targeted when their fat reserves were at a maximum and thus, when they tasted better. As this was also generally the time preceding spawning peaks, this cycle minimized fishing pressure during reproductive periods and assisted significantly with their management.

Nearly every month of the year, different resources would be considered ripe or become abundant; an example is the annual seasonal appearance of the marine Palolo worm. In later months, sharks would come ashore to bear live young. Shark pups remain inshore for some time and are easily harvested using hand spears. In the early summer months, with the return of the rains, terrestrial crabs (*Cardisoma* spp.) would intensify their foraging activity near the coast, fattening up prior to aggregating to specific coastal areas to release their eggs in the sea, making them easily harvestable. Summer months would also see flying fish (Exocoetidae) and their predators, the tunas, come inshore where they could be harvested. Later, the pelagic scads (*Selar* spp.) and small mackerel (*Rastrelliger* and *Scombrus* spp.) would mature, forming large schools in inshore lagoons and bays. Sardines (*Sardinella* spp.) would also form large shoals inshore where they could be easily harvested, and rabbit fish (Siganidae) would migrate to a known location to aggregate for spawning purposes. All of these smaller species would, in turn, attract larger predators such as jacks and trevallies (Carangidae) and barracuda (Sphyraenidae) that could also be harvested.

This annual cycle of different resources becoming plentiful at different times clearly indicated the season to target them. In this way, fishing pressure on various resources was concentrated on a given resource for only a brief period of the year on a

3. Communal fishing methods such as the coconut leaf sweep is still ritually practised on some islands, but the introduction of long monofilament gillnets now allows for large catches with much less communal effort. However, the optimal tidal pattern for large catches of reef fish on diurnal migrations from drop-offs to reef flats using modern nets largely remains as described for communal harvesting methods.

rotational basis. Even if some were harvested during a spawning migration or aggregation, there would be only minimal pressure on the population in the remainder of the year.

## Traditional management in transition

Except for a few high-value benthic species, tropical, small-scale, multi-species fisheries in places such as Vanuatu are prohibitively expensive and notoriously difficult to manage using Western models that require extensive data collection (Johannes 1998a). Johannes (1998b) suggested that unrealistic emphasis on quantitative management ideals, such as optimum or maximum sustainable yields for these fisheries, could justifiably give way to a new paradigm that he called "data-less marine resource management", emphasizing that it is not management in the absence of information. The use of reproductive and lifecycle information, coupled with TEK of resources and traditional marine tenure, is invaluable for achieving management objectives. The qualitative monitoring of resources by communities through direct observation has always been part of Pacific fisheries and serves to increase the TEK held by fishers.

### *Traditional marine tenure*

The fundamental management strategy for nearshore reefs in many parts of the Pacific, particularly in Melanesia, is based on traditional marine tenure (TMT) and the accompanying traditional beliefs and practices that prohibit or restrict the harvest and consumption of marine resources. The principle underlying TMT is the ability of families, clans, chiefs and/or communities to claim exclusive rights to fishing areas, exclude outsiders, and regulate activities in these areas. The benefits of their restraint may then be realized at a later date, thus providing the motivation to protect resources. The systems of TMT in the Pacific have been relatively well documented by Johannes and MacFarlane (1991), Ruddle (1994, 1996) and Hviding (1996) among others. The well-entrenched heritage of TMT is legally recognized in Vanuatu and continues to provide an ideal framework for a decentralized system of village-based management of marine resources.

TMT effectively devolves responsibility for marine resource management to traditional leaders, communities, clans or families; that is, to those with the most intimate knowledge of the resources and the greatest motivation to manage well. Devolution of management responsibility is possible, as the government of Vanuatu recognizes and supports TMT[4] in the constitution of the republic, and traditional leaders and resource custodians continue to see the introduction of village-based prohibitions as their traditional right and responsibility.

However, a growing concern is that contemporary taboos tend to be less firmly rooted in tradition, and consequently command less respect than traditional ones. The ancient traditional taboos, as outlined below, were associated with elaborate traditional practices and ritual underpinned by traditional cosmology's and sanctioned through supernatural forces. Contemporary taboos tend to be less ritualized and therefore less steeped in tradition, with a consequent decrease in reliance on supernatural sanctioning. The influence of the church, particularly the notion that traditional beliefs are "heathen and uncivilized", makes this ritualization and reliance on supernatural sanctioning less acceptable in some communities.

### *Bans and taboos*

The earliest transformations of traditional marine management systems stemmed from the introduction in the late-1800s of an export trade in nearshore resources for dried sea cucumbers (Holothuroidea) and later included trochus (*Trochus niloticus*) and green snail (*Turbo marmoratus*). Traditionally derived taboos began to be regularly placed on these resources in response to commercial pressure. This trend in protecting commercially harvested resources through the use of taboos has continued into the present, as more resources are targeted for commercial purposes for export to urban centres and overseas.

Contemporary village-based management prohibitions, often referred to by villagers today as "bans" to distinguish them from ancient traditional taboos, continue to be locally monitored and enforced by village leaders. These bans are enforced through the traditional institution of the village court which, although not legally recognized, continues to effectively adjudicate on most offences occurring in rural areas, as it has for centuries.

Fishers recognize that fish often retreat into areas under taboo when being pursued. Taboo areas, even when they are not particularly large, if widely distributed act as a mosaic of refugia or sanctuaries for mobile marine life. Turtles are found to become accustomed to the presence of divers observing

4. More recently, the forces of development and globalization are increasingly eroding government recognition and support for TMT as new legislation is introduced affecting land tenure and more land titles (which affect reef accessibility) are transferred to foreigners for development purposes.

them in areas where hunting is taboo for sufficiently long periods (pers. observ.). Dugongs (*Dugong dugon*), protected from hunting for some years now, have even been tamed to swim with humans, and along with unwary turtles are used to attract tourists to generate revenue. The knowledge that fish and other marine life increase in abundance and lose their wariness in areas under taboo is put to good use by the regular placement of closures for a variety of resources in most coastal villages of Vanuatu today (Hickey and Johannes 2002).

## Traditional marine resource management practices of Vanuatu

The categories of traditional marine resource management practices vary significantly among cultural groups in the archipelago, reflecting their cultural diversity. Some of these practices are extant today, while others survive only through oral histories. Many of the marine management strategies described are also applied to freshwater and terrestrial resources. Reefs were viewed as extensions to the land, and their custodianship was generally, but not always, the responsibility of the adjacent land custodians. The information below summarizes research conducted by the author in collaboration with the Vanuatu Department of Fisheries and Vanuatu Cultural Centre over the preceding decade. Virtually all of the traditional strategies described below have direct parallels in modern resource management strategies founded on Western scientific principles, but long predate them. The Western classification terms are used below to highlight these parallels.

### *Privileged-user rights*

The right of reef custodians to control and restrict fishing and other activities is fundamental to the principle of TMT and is reflected in the modern management strategy of limited access. Under TMT, there may also be complex tiers of user rights for different groups, based on historical connections with reef areas. Groups arriving later in an area may be accepted, but only with secondary rights by the original founding group who retain primary rights. Also, neighbouring, often inland, groups may retain tenure over original canoe-landing sites or may in the past have bartered for user rights to defined reef areas, and these rights may remain in effect for ensuing generations.

Respect for TMT is said to have been universally very high in the past, and transgressions would be dealt with harshly, as well as through supernatural intervention. While remaining flexible through consultation among allied groups, the system thus controlled and limited fishing effort within nearshore areas.

### *Species-specific prohibitions*

In most areas it was taboo to eat turtle or turtle eggs if one planned to go to the yam garden in the next couple of days. It is said that to do so would result in one's yams being stunted like the fins or eggs of a turtle. In some areas, equivalent prohibitions applied to octopus, lobsters, giant clams, certain species of fish and other foods, including oily fruits and nuts. These prohibitions also applied to working in water taro (*Colocasia esculenta*) and other types of gardens, such as those for bananas. In some areas, it was taboo to go to gardens if one's leg had made contact with the sea, as doing so would risk damaging crops.

Food prohibitions could sometimes be overcome by making a small "devil's garden", distant from the main one, after consuming one of the prohibited foods[5]. Yams from the devil's garden would then be offered to the spirit responsible for stunting the yams, and the yams from the main garden would thus be spared.

Various informants suggest that these prohibitions may relate to the negative effect of introducing oily substances from turtles and other foods to gardens, as these could attract wild pigs or insects to food gardens. Making small devil's gardens prior to working in the main yam gardens would result in most of the oils being deposited in the devil's garden, though it would require additional time and energy. Salt also harms many garden crops, which may explain the negative association between seawater exposure and gardening. These effects apparently led to a temporal separation of gardening and fishing activities throughout many areas of Vanuatu and are elaborated on below in the section on seasonal closures.

Another species-specific prohibition is the practice of showing respect to the memory of recently deceased clan members by placing a taboo on their favourite food or the last food items they ate. For example, a taboo may be placed on a certain type of fish, spiny lobster, octopus, shellfish or fruit in honour of a deceased clan member for a year or more. The time period is generally commensurate with the respect shown to their memory. This relieves fishing pressure on that resource within the clan's area during that period.

Additional species-specific restrictions include prohibitions against children and pregnant women

5. The term "devil", introduced by early missionaries, is commonly used today to refer to various manifestations from the spirit world.

eating turtles, as this was found to result in children developing sores. In some areas, those with asthma were also prohibited from eating turtle as it aggravated their condition. In other areas it was taboo for young girls to consume giant clams (Tridacnidae) until after their first menstruation, while young boys were forbidden to consume many species of large angelfish (*Pomacanthus* spp.) until they were circumcised. These prohibitions stemmed from area-specific cosmological beliefs and resulted in reduced fishing pressure on these resources.

In some areas, size limits were imposed on certain species, as it was taboo to collect small gastropods (e.g. *Turbo* spp.) that had no encrusting growth on them to avoid taking immature ones.

### Seasonal closures

During the summer months when yams were being cultivated and many reef resources were restricted by gardening taboos, as well as by the tidal cycles outlined above, a wide range of fruit and nut trees ripened to provide alternative sources of nutrition. When new yam gardens were prepared, there was considerable labour involved in clearing garden plots and planting tubers. With the coming of the spring rains, weeding and training the vines required frequent trips to the garden. The production of yams was a central aspect of food production and featured prominently in the customs of most areas of Vanuatu. Cultivating yams was thus treated as a serious endeavour. Given the importance of agricultural production in Vanuatu (Weightman 1989), it is apparent that gardening restrictions that limited fishing activities also served to reduce fishing pressure on nearshore reefs during the months of yam production. As noted above, the tides of this season are also less suitable for reef-gleaning activities, and thus reef gleaning and communal harvesting methods were further separated temporally from gardening activities by tidal cycles.

The yam production period, starting as early as August/September, and extending until April/May, covers the entire hot season. This period includes the nesting season for turtles, the time when they are most vulnerable to exploitation by humans. It is also thought to be the season when many nearshore reef species are at their spawning peaks. Fishing prohibitions during the main agricultural season thus have highly significant management value because they reduce fishing pressure during peak reproductive periods. The yam production season also encompasses the period when trade winds collapse and winds become light and variable. Johannes (1978) highlights the advantage for fish of spawning during periods when prevailing winds and currents are at their weakest, which will reduce the transport of larvae far from their point of origin.

In areas such as Futuna, Tanna, Aniwa, Paama and Ambrym Islands, the consumption of nearshore resources is considered to be taboo from the time yam gardens are initiated until the New Yam Ceremony some six months later. This would ensure a good harvest of seafood for New Yam celebrations as well as during the subsequent months of ongoing yam harvesting. As this summer closure coincides with the time when most nearshore fish and invertebrates are believed to be at their spawning peaks, the annual half-year taboo serves to protect resources during this vulnerable period.

However, the hot months are the best season for fishing offshore for flying fish, tunas and other pelagic species. Deepwater snappers found far from nearshore waters may also be fished during these months. The seasonal abundance of pelagic fish and lighter winds during summer months allowing easier offshore fishing thus compensated for the restricted fishing of the nearshore during summer months.

An additional incentive to limit consumption of nearshore reef fish during summer months is that oral traditions record that they are more frequently found to be ciguatoxic during this period when new coral growth is observed to be highest.

### Food avoidance

Many cultural groups in Vanuatu are associated with different totems that include specific types of fish, octopus, giant clams, turtles, sharks and moray eels as well as various terrestrial resources. The practice of not consuming one's ancestral totems out of respect and reverence for them serves as a management strategy by reducing or controlling fishing pressure on those resources. In some areas, highly controlled, ritualized harvests of totemic species are undertaken for exchange to other areas, thereby limiting fishing pressure.

### "Protected areas"

In virtually all parts of Vanuatu there were formerly numerous coastal protected areas, known locally as "taboo places", that had spiritual significance and which people had the greatest reverence and would respectfully avoid. These taboo places were also common in terrestrial and freshwater areas and were often associated with areas of high biodiversity. Examples of such areas include burial places, and places where spirits resided or island deities were based. Volcanic lakes on Ambae and Gaua Islands are two such large inland freshwater areas high in biodiversity. Many rivers and creeks

were also considered taboo areas and were thus protected, as they were considered to be paths of spirits travelling between the sea and inland areas.

These permanently taboo areas, or areas with very restricted access, were commonly found along coasts, as well as at offshore islands and reefs. Access to them was restricted or controlled at all times, unlike spatial-temporal refugia. The taboo areas formed a network of marine and terrestrial protected areas whose management benefits included the production of larger, more abundant marine organisms that export larvae (and marine plant propagules) as well as spillover effects. By protecting a number of different habitat types colonized by species unique to them, taboos also preserved and enhanced biodiversity.

These areas were, by their very nature, protected and sanctioned by the spirits residing there. Compliance was thus very high, as the enforcement of these areas was endogenously based on the belief system of supernatural sanctioning. This is unlike the Western counterpart of marine protected areas that is sometimes promoted in Vanuatu, which relies increasingly on state sanctioning. While many taboo places are no longer respected by the younger generation, primarily due to the influence of Christianity, Western education and development pressure, many others continue to protect resources in areas where respect for them remains.

## Behavioural prohibitions

The numerous customary protocols associated with the fabrication and deployment of traditional fishing gear and techniques were integral to the traditional resource management regime. Once certain fisheries were initiated with the fabrication of, for example, a spiny lobster trap, a fisher's behaviour became regulated by protocols associated with that fishery. Taboos could vary among cultural groups and depended on the fishery type.

A widely known example of a behavioural prohibition is the requirement for sexual abstinence before engaging in fishing activities as well as during the fabrication of fishing devices. This reduces fishing pressure within a clan's area while providing additional benefits relating to birth control. Other examples of behavioural prohibitions that reduce fishing pressure follow:

- In some areas, it is taboo to swim or remain on the shore during sunset, as certain spirits are known to be active then. As spawning aggregations are known to occur at sunset, this prohibition protects them (Johannes 1978).
- Fishers cannot be seen departing, or at least others must not know they are joining a fishing expedition, as this brings "bad luck" and so the trip may be aborted. Also, it is taboo to call out or make noise when embarking on a fishing trip.
- If a visitor arrives and spends the night, then it is taboo to go fishing the next day.
- It is taboo to eat certain foods or drink kava or go to certain places when one is involved in the fabrication or deployment of certain fishing devices.
- Pregnant or menstruating women, and men with pregnant wives, are automatically excluded from most fishing activities. This taboo relates to the belief that the spirit of an unborn child has a negative effect on fishing activity.

Thus, there is an extensive and complex web of taboos associated with fishing that act synergistically with other traditional management measures to reduce fishing effort. A fisher who is unable to respect any behavioural taboos must refrain from fishing for the following day or two, thereby reducing fishing effort in a given area. As there are ways to find out who has not followed the rules, this puts shame on offenders, affecting their reputations as fishers, and is thus avoided.

## Spatial-temporal refugia

Some of the cultural practices that created spatial-temporal refugia throughout Vanuatu are outlined below. These refugia allowed for an increase in abundance and diversity and provided spillover benefits, decreasing the wariness of resource species while also protecting spawning activities and increasing biodiversity. Events associated with such spatial-temporal refugia are described below. These areas would be open to fishing once the taboo has been removed so as to make use of resource abundance in line with Pacific peoples' strong social, cultural and subsistence links with resources (Fig. 2).

### *Death of a traditional leader*

In some areas, such as the Banks Islands, the death of a traditional leader ("chief" or highly ranked member of a hierarchical society) would be honoured by the placement of a taboo on the reef of the leader's clan. Depending on the degree of respect, this total closure could last for many years. This taboo is associated with the enactment of many rituals. When the reef is re-opened, a final communal feast is held to honour the deceased, using in part the resources harvested from the closed area.

### *Death of any clan member*

The death of any individual of a clan — man, woman or child — may mean that the clan's area of reef is put under taboo, or closed to all harvesting for one to three years, as is the case on northern Epi.

**Figure 2.**
A *namele* leaf recently placed after a pig killing ceremony used to indicate a reef tabu at Mangaliliu village on Efate.

### *Grade-taking*

In areas of north and central Vanuatu, the all-important rituals of grade-taking by men, and in some areas women, as part of ascending a social and spiritual hierarchy (Layard 1942; Bonnemaison 1996) are accompanied by taboos placed on terrestrial, freshwater or reef resources from one to four years, and often for as long as six years in the case of marine taboos. These practices include multiple pig killings, kava drinking, dancing, singing, feasting and other rituals.

### *Passing on of a hereditary chief's title*

In the Shepherd Islands of central Vanuatu, the practice of hereditary chiefs' passing title to their progeny is associated with a reef taboo. The taboo duration may be the time taken for a young pig to develop a full circle tusk, some six to seven years. Offerings to ancestors are also traditionally made to evoke their assistance in monitoring and enforcement. The tusked pig will be sacrificed to remove the taboo, and marine resources harvested from the taboo area are used as part of the ordination feast.

### *Yam season*

As outlined above, in some areas of Vanuatu, most nearshore reef resources are annually closed to harvesting during the summer months from around the time of yam planting until the New Yam celebrations approximately six months later. In other areas the taboos are species specific, but nearly all areas protect turtles. These agricultural related taboos are now less commonly respected, while some areas continue to limit fishing during this period because of the management value of doing so during spawning periods. It is also generally acknowledged that yams produced these days are much smaller than in former times due to the loss of respect for traditional practices and knowledge.

### *Circumcision*

Cleansing rites that are part of circumcision rituals are sometimes associated with reef taboos, which are generally of a short duration, sometimes one month. These short closures are particularly effective in conserving resources if their timing coincides with spawning migrations or aggregations.

### *In preparation for specific feasts or other traditions*

In most areas, specific feasts or other traditions, such as the harvest and exchange of marine resources to inland villages, are preceded by a reef taboo. Ritual specialists then evoke the ancestors to increase resources and ensure a good catch. Inland villages would later reciprocate with foodstuffs from their areas. This highly ritualized system of exchange effectively controlled fishing pressure on resources both spatially and temporally while redistributing resources during periods of seasonal abundance and strengthening trade and peaceful relations. These taboos are still found in some areas and are sometimes integrated into Christian rituals, for example, celebrations of a saint's day.

## *Marine resource management through a mosaic of spatial-temporal refugia*

The variety of traditional area closures ensured a number of areas were closed at any one time. When visiting north Pentecost in northern central Vanuatu in 1998, the author was informed of 11 marine closures associated with grade-taking ceremonies. These closures formed a mosaic of spatial-temporal refugia across the top end of this relatively small area, protecting various marine habitats. In 2005, the number of areas closed due to these rituals had increased due to the strong adherence to traditional grade taking practices in this area.

## *Consequences of violating traditional taboos*

The consequences of taboo violation included supernatural retribution from island deities and ancestors. This curse could also be ritually removed once the offender revealed their transgression. Individuals who repeatedly broke these taboos could be set adrift or given a sign that their leader had sanctioned their death, giving them a brief period to escape.

Traditional leaders, under the auspices of the *nakamal*, or village court, also imposed fines of pigs,

kava, woven mats and other traditional wealth items as an additional deterrent and means of removing the "wrong" in the eyes of ancestors and other clan members. Typically, ancestral spirits would punish transgressors, or their family members, by making them ill, sometimes terminally so. Some were capable of assuming various forms, including sharks or barracuda that could directly enforce a marine taboo. Practices to ensure the participation of ancestors in enforcement included placing culturally specific taboo leaves in the area to symbolically monitor and enforce the taboo (Fig. 3). Communication with the spirit world was often enhanced by ritualized kava drinking.

**Figure 3.** A traditional leader in the Banks Islands placing the taboo leaves unique to his cultural group to indicate a reef taboo.

Ancestral icons may also be concealed in the area to symbolically invoke their participation. The killing of pigs at the initiation of the taboo also serves as a symbolic sacrifice to ancestors for their part in monitoring and enforcing the taboo. The killing of another pig is thus required within some cultural groups to remove the taboo and make it safe to harvest again in the area. In other areas, additional culturally significant gifts (such as pigs, kava, yams or white fowl) were offered, sometimes set adrift on a raft, to ensure the ancestor's role in monitoring and enforcing the taboo. This system of sanctioning was considered highly effective in the past, and remains so in numerous areas where traditional belief systems remain strong.

## Discussion

Traditional leaders and reef custodians in Vanuatu increasingly use their rights under TMT to put resources, fishing areas, seasons or fishing methods under taboo for varying periods of time (Johannes 1998a; Hickey and Johannes 2002; Johannes and Hickey 2004). Some of these taboos are extant versions of ancient traditional practices. Through the Vanuatu Cultural Centres' network of over 120 fieldworkers working voluntarily throughout the archipelago, these traditional practices are strengthened by the fieldworkers reviving, encouraging and supporting their communities in continuing to practice their traditional taboos.

Many taboos imposed today, however, are more contemporary expressions of earlier ones that have integrated modern issues and concerns including introduced gear and the cash economy. The Fisheries Department, Environment Unit, and Vanuatu Cultural Centre have supported these traditionally derived contemporary taboos through a programme of cooperative management. Cooperative management of marine resources was initiated by the Fisheries Department Research Section in the early 1990s, initially targeting trochus resources (Amos 1993). It provides relevant biological knowledge and awareness to communities for use in conjunction with traditional knowledge in the management of nearshore reef resources. These cooperative management efforts quickly spread to include other commercially important resources as well as those important for subsistence. This programme was later introduced to the Department's Extension Services by providing appropriate training to rural-based Extension Officers.

Part of this process included raising awareness among rural communities of Department regulations about size limits and other state prohibitions on resources. Once villagers were aware of the regulations and understood the rationale behind them, they generally adopted the regulations as part of their village-based management regime (Johannes 1998a). Village leaders and villagers then took over monitoring and informally enforcing these regulations on behalf of the government.

The knowledge gained of the management value of traditional practices, including area and species closures and other prohibitions on harvesting marine resources, has thus been adapted and applied in the expression of contemporary taboos. If the taboo was of sufficient duration, resources were observed to become larger, more abundant and less wary, leading to increased catches after the taboo is lifted. Also, taboos placed during periods of spawning activities assisted recruitment processes.

Another aspect influencing respect for closures is that the benefits of traditional taboos were generally distributed to the entire community through communal feasts and distribution of resources. Today, however, individual reef custodians often expect to prosper from the sale of trochus and other resources. Thus, there is often less incentive for the entire community to respect the taboo. In former times, the paramount traditional leader of an area would have the right, through consensus, to put large reef areas controlled through different clans' tenure under taboo for traditional purposes. In this way, management of large areas was harmonized for communal benefit. Many reef custodians recognize the relationship between respect for taboos and communal benefit sharing, and allow reef access to the entire community to promote widespread respect for taboos placed on individual clans' reefs.

Many communities recognize that the decrease in respect for contemporary taboos is exacerbated by a general decline in respect for traditional authority by youth influenced by Western education or individualistic ideals learned in urban centres. Disputes over land or reef tenure as well as village leadership are also found to weaken respect for village-based taboos (Hickey and Johannes 2002; Johannes and Hickey 2004). In response to these factors, some communities endeavour to strengthen and revitalize traditional beliefs regarding resource management by emphasizing the inclusion of more traditional practices in their implementation. Others, in areas where traditional beliefs are more influenced by introduced cosmologies, choose also to integrate Christian beliefs and practices in implementation, and this is often effective in assisting with management; still others look increasingly toward the state for assistance in sanctioning village-based taboos.

The trend towards greater state sanctioning, as well as Western notions of conservation that may ignore traditional links to resources, have been assisted by aid donors, regional and volunteer organizations and NGOs. These groups often have limited appreciation of ancient traditional resource management systems, and are primarily familiar with Western models from their own countries. Some outside groups take village-based taboos and repackage them in Western forms such as "conservation areas and MPAs", but these models are poorly understood and are largely viewed with suspicion by rural communities (Bleakley 2004). In most cases, Western models are unsustainable once outside assistance is finished. A traditional village leader sums it up by saying: "European conservation approaches always seems to cost a lot of money, whereas our traditional system of sustainable management is within our own means." However, government policy makers and bureaucrats, often educated in industrialized countries and increasingly isolated from rural communities, often acquiesce to the introduction of Western models, following the locally entrenched notion that "the West knows best".

This recent trend towards Western repackaging of traditional practices is of concern as it implies that Western models are superior, when in fact parallels to Western science-based resource management strategies already exist in Vanuatu's traditional systems, as documented above. Reliance on state sanctioning of village-based resource management also has significant limitations, as government capacity to perform this role is severely limited in an archipelago with so many coastal villages. It also raises community expectations and fosters a mentality of depending on the state to solve rural community problems, which rarely respond well to legislation. The application of Western law in villages is seen as divisive, with a win/lose outcome that further erodes social cohesion necessary for cooperation in village-based management (Johannes and Hickey 2004). Recognising and supporting the existing strong cultural heritage of decentralized village-based resource management and strengthening efforts to adapt it to contemporary needs would be much more effective. This could be facilitated by continuing to build the capacity of traditional leaders and communities to manage resources under their tenure by promoting consultation with all stakeholder groups to increase understanding, consensus and compliance prior to implementation of taboos. In many cases, it is simply a matter of strengthening traditional leadership and governance systems and facilitating traditional conflict resolution options to settle existing community divisions.

In cases where enforcement remains problematic, legal recognition of traditional village court systems, where village-based transgressions including those related to resource management are adjudicated, would be an effective means to assist with enforcement. Legislation to empower traditional leaders and communities to manage resources under traditional tenure would be more effective and economical than creating a parallel system that transfers that power to the state and serves to undermine traditional authority. Fa'asili and Kelokolo (1999) report that legal empowerment of the Chief's Council in Samoa has been successful in supporting the community-based management of resources while reinforcing traditional authority.

## Conclusion

Vanuatu has a strong cultural heritage of traditional resource management, and a well-entrenched and legally recognized system of TMT to draw upon in continuing to adapt its indigenous

system of resource management to contemporary needs. Many elements of traditional systems and authority remain extant and are well respected by the majority of the rural population. Some community elders still retain a large corpus of TEK that is useful for resource management, but this number is now dwindling rapidly. Culturally appropriate awareness and education programmes, including the use of popular theatre directed towards traditional leaders, fishers and communities have been shown to be highly effective in facilitating the adaptation of traditional systems to contemporary needs (Amos 1993; Johannes 1998a; Hickey and Johannes 2002; Johannes and Hickey 2004).

Further support is needed to continue to develop the capacity of traditional leaders and communities in the decentralized management of resources under their tenure through the strengthening of traditional leadership and governance, village-based consultation, consensus building and conflict resolution mechanisms. It is also particularly important that young people are made more aware of the practical value and modern-day relevance of traditional management systems and TEK held by elders, as the value of this knowledge is rarely promoted in the western educational system they are now primarily exposed to. This can best be achieved by the active involvement of elders in curriculum development and formal education and the inclusion of traditional activities as part of the school curriculum as well as through informal educational channels. This will enhance the intergenerational transfer of knowledge and promote greater appreciation, pride, self-reliance and transmission of such knowledge and practices. Mobilising local TEK for use in resource management also assists to empower communities with the use of their own knowledge while fostering a stronger sense of ownership of a resource management initiative. TEK is often much better understood and trusted than science-based knowledge in many communities. These factors have been observed to enhance the long-term sustainability of village-based resource management initiatives in Vanuatu.

Government policy makers, foreign donors, NGOs, volunteer and regional organizations working in the environment sector could all benefit from greater awareness of the value and efficacy of supporting and strengthening traditional management systems and the risks of blindly introducing foreign conservation methods originating in industrialized countries without TMT or a strong cultural heritage of traditional resource management. The trend away from working to strengthen TMT and existing traditional resource management systems by limiting marine resource management efforts to primarily promoting MPAs, as seen in the Pacific in recent years, ignores the value of a wide range of existing traditional resource management systems available that operates synergistically. The widely promoted and donor-supported uni-dimensional MPA approach driven by the Western ideal of optimizing biological conservation is likely to remain an object of suspicion by rural communities who rely on their resources for food security and other needs on a daily basis. In contrast, traditionally managed areas (TMAs), as widely seen in Vanuatu, provides the sustainable management of nearshore areas through a balance of various restrictions placed on fishing areas, seasons and gear but with the option to harvest resources to satisfy socioeconomic requirements (such as payment of school fees and other community needs).

Harvest openings are also possible when resources are perceived as over-abundant and benefits may not be realized due to the impacts of cyclones and other threats that periodically destroy nearshore areas. Living with such devastating threats as cyclones, tsunamis, storm surges and coral bleaching have taught people not to let their resources go to waste. Instead, an ethic of sustainably managing resources to maintain ecosystem integrity *with people as an integral component*, is a primary feature of the Pacific approach to resource management. TMAs are not only flexible in dealing with, and integrated into rural socio-cultural-economic norms but also are based on natural cycles of resource abundance, tidal influences, agricultural and resource reproductive cycles and is underpinned by locally based corpus of TEK of the environment and resources.

The current trend seen in the promotion of MPAs in the Pacific is also moving increasingly towards devolving resource management authority from community leaders under TMT to the state through legislation. This trend risks raising community expectations, while fostering dependency on governments that often lack the capacity (both human and financial) to deliver. The repackaging of existing village-based taboos as Western conservation models, often for the edification of tourists and development agencies, is likely to tacitly erode remaining traditional resource management practices found in the Pacific. Attempts at introducing the Western ethos of conservation inherent in MPAs is perceived as ignoring the strong social and cultural links of Pacific Islanders with their resources and the efficacy of existing traditional systems of management. Eroding traditional rights of communities of autonomy over land/reefs and resources is not likely to solve problems in Melanesia, but is more likely to create them. Strengthening existing traditional systems not only reduces the burden on governments (and aid donors) but also offers other spill-over benefits such as stronger community governance systems, increased long-

term community capacity and self-reliance and more sustainable marine resource management.

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