



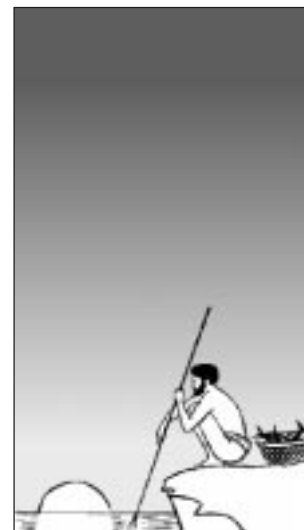
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NOTE FROM THE CO-ORDINATOR

In this issue we are pleased to include the first of our long-planned contributions from outside the SPC region, with Robin Mahon's information on fishes knowledge in the Caribbean region.

We lead our articles with a long contribution on south-western New Georgia, Solomon Islands by Shankar Aswani, a doctoral candidate at the University of Hawaii. Three shorter contributions follow: T. Akimichi's field-notes from fishing communities in Vanuatu, Anna Tiraa-Passfield on the use of holothurians in Rarotonga, and Kelvin Passfield on canoe-making in Tuvalu.

Responding to reader feedback, we are trying to satisfy the request for a balanced mixture of articles, timely news on recent publications and other information of relevance to people concerned with coastal – marine research and management in the Pacific region. So in this issue we are pleased to be able to include a mixture of long and short contributions, those based on recently completed fieldwork and others derived from more casual, but nonetheless valuable, observation and recording. We would like to encourage other readers to emulate these examples! In particular we wish to encourage people to submit brief contributions on topics which interest them from their own background and/or their own communities.

Kenneth Ruddle

Inside this issue

Troubled water in South-western New Georgia, Solomon Islands: is codification of the commons a viable avenue for resource use regularisation?

by Shankar Aswani p. 2

The harvesting of rori (sea cucumbers) in Rarotonga, Cook Islands

by Anna Tiraa-Passfield p. 16

Fieldnotes on some cultural aspects of marine resource use in four coastal villages of Vanuatu

by Akimichi Tomoya p. 18

Construction of traditional outrigger fishing canoes in Tuvalu

by Kelvin Passfield p. 20

Welcome to the International Year Of the Reef (IYOR) list-server

p. 22

Recent publications

p. 23

etc...



S O U T H P A C I F I C C O M M I S S I O N

Troubled water in South-western New Georgia, Solomon Islands: is codification of the commons a viable avenue for resource use regularisation?

by Shankar Aswani¹

In recent decades there has been a growing interest in indigenous sea tenure institutions and their possible role in establishing a framework for sustainable resource use and conservation. Yet the feasibility of these institutions to cope with social and economic changes have been seldom explored. In this paper a case study is presented where internal de-regularisation of the 'commons' is the result of existing socio-cultural principles combined with outside influences. Two territorial models are compared to elucidate emerging internal instabilities of sea tenure institutions and possible ways to correct existing problems. The codification of the commons is suggested here as a possible measure to strengthen indigenous common property regimes.

Introduction

Few publications in the last two decades have incited so much academic debate as Hardin's (1968) 'Tragedy of the Commons'. Hardin's thesis contends that unregulated access to common property resources, such as open sea fisheries, leads to unchecked exploitation and environmental degradation. Hardin prescribed that to prevent this 'tragedy', common property be 'privatised'. This idea has appealed to many Western economists and biologists because of its simplicity. The common-property debate has not been limited to the academic arena, but has had sweeping implications in policy formulation. Numerous resource economists employed by government and non-government organisations around the world have granted Hardin's thesis the status of divine law.

Hardin's thesis, however, has not been left undebated. A myriad of researchers have pointed to Hardin's conceptual confusion between common property (*res communis*) and open access (*res nullis*) (Berkes, 1989; Ciriacy-Wantrup & Bishop, 1975; McCay & Acheson, 1987). Under a common-property regime, participants in the commons present outsiders from accessing resources while enforcing resource-use limitations on their participants. Conversely, an open-access regime is a situation where there is no resource-access excludability or harvest control (Feeny et al., 1990). Hardin's semantic confusion between 'common' and 'open' access has been seized on by anthropologists who have shown, through numerous case studies around the world, that common-property regimes are controlled and regulated by identifiable groups of people². Such studies suggest Hardin's 'tragedy' is avoidable.

While numerous anthropologists have been unrelentingly critical of resource economists for accepting Hardin's thesis, anthropologists themselves have uncritically accepted the notion that common-property regimes are conducive to resource-use regulation. This leap of faith is clearly apparent in the field of maritime anthropology, where numerous authors have argued that indigenous environmental knowledge, cultural practices and marine tenure are responsible for the conservation of marine resources (Cordell, 1989; Dahl, 1988; Foster and Poggie, 1993; Hyndman, 1993; Johannes, 1978).

In recent decades there has been a great deal of interest in indigenous sea-tenure institutions and their possible role in establishing a framework for sustainable resource use and conservation. The viability of these institutions to cope with social and economic transformation, however, has seldom been established.

In reviewing contemporary changes in community-based marine resource-management institutions, this paper presents a case study in which internal de-regularisation of the 'commons' emerges from a consideration of existing socio-cultural precepts and the influence of outside forces, and suggests some measures to strengthen indigenous common-property regimes. To illustrate this process two marine territorial arrangements in the Roviana Lagoon, South-western New Georgia, Solomon Islands, are compared: the 'territorial - enclosed' and the 'mosaic' models of property relations.

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2 The rejection of Hardin's thesis by anthropologists seems contradictory because Hardin's prescription for 'tragedy' is 'privatisation' or equitable to corporate tenure or 'common-property' regimes as understood by other social scientists. However, Hardin's enclosure of the commons really pertains to individual tenure rather than corporate tenure (i.e. communal ownership), and, therefore, 'common property' regimes as understood by anthropologists are still qualitatively different to individual 'privatisation' of open space access resources as forwarded by Hardin.

The former is a situation where territorial boundaries are well-defined, jurisdictional power is centralised, and sea-space entitlements are regionally recognised by local communities. The latter is a condition where territorial boundaries are not secure, administrative control is decentralised, and sea-space entitlements are regionally scattered and contended by local communities.

It is argued here that whereas both models suffer from internal regulatory instabilities, the 'territorial – enclosed' model of sea tenure provides a more stable framework to establish co-management goals than the 'mosaic' model of property relations.

Instabilities in these two systems originate from the centralisation of chiefly power and the structural fluidity of the Roviana kinship system. The first dilemma results from chiefly control of territorial seas and the lack of involvement of the subject population in the protection and monitoring of the 'commons'. The second dilemma follows from the Roviana bilateral kinship system, which links individuals to multiple kin groups, thereby permitting the accumulation of land and sea entitlements. This, in turn, allows fishers to have access to multiple territorial seas and enable competing groups to use their tenure rights for territorial expansion. The same process has been noted by Hviding (1996) in nearby Marovo Lagoon, although Hviding has not seen it as problematic. The internal instabilities of these two regimes are considered problematic here only as far as their managerial effectiveness is concerned.

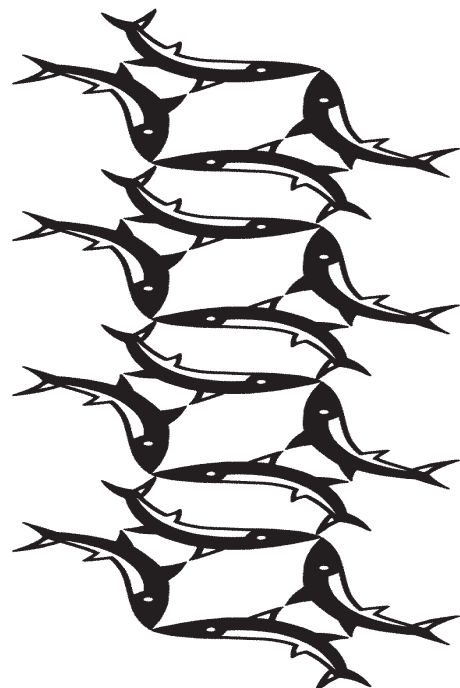
Effective regulatory measures imply monitoring, control, and enforcement of existing access and harvesting rules. Although its focus is narrow, this definition differentiates itself from the more ambiguous indigenous 'cognised' view of territorial enforcement. 'Cognised' control is how people having rights to a given sea area perceive their access and user rights and those of others. Effective control, on the other hand, is the actual physical enforcement of those rights to prevent free-riders from over-exploiting resources and interlopers from trespassing into a territory. The cognised view of property relations has been used by anthropologists to refute Hardin's assertion that 'freedom in the commons brings ruins to all' (1968: 1244). But little attention has been paid to the 'actual' social and ecological practices which define the failure or success of a common property regime to regulate its resource base.

Some social scientists have justly argued that sea tenure does not occur in a social vacuum and, therefore, cannot be solely reduced to issues of fisheries management. Further, they contend that sea tenure should be viewed in the larger context of indigenous rights to resource control and political autonomy (e.g., Hviding, 1996; Ruddle et al., 1992). The issues presented in this paper do not question indigenous rights to self-determination and control of their resource base, but assess the ability of indig-

enous sea tenure institutions to deal with contemporary problems of inshore fisheries management. It is not an overstatement that reducing entire socio-cultural phenomena to their fisheries management utility is a lesser evil in the face of dwindling global resources and exploding human populations.

The disagreement between anthropologists and resource economists on the regulatory characteristics of common property regimes originates in the conflicting goals of each discipline. The anthropologist's objectives are to ensure the rights of marginal populations, whereas the economist's main goal is to achieve economic efficiency (Brox, 1990). Rather than dichotomising the commons into an 'either/or' situation, it is more fruitful to recognise that, like private property and state property, common property regimes can be effective in regulating resource use and access in some cases and cannot in others (Bromley, 1992; Quigging, 1988). Although this has been recognised by some social scientists (Carrier, 1987; Feeny et al. 1990; Ruddle, 1996), the general trend in the anthropology of marine common-property regimes is to reaffirm indigenous rights by promoting the notion that sea-tenure institutions are designed to conserve resources.

Admitting that micro-tragedies may take place in some regions does not diminish the importance of indigenous sea tenure as a fisheries management tool. Conversely, accepting its vulnerability to internal de-regularisation may actually strengthen co-managerial effort between outside forces and local peoples to prevent further ecological degradation. Co-management as understood here is a joint effort between local peoples, government and NGOs to implement regulatory measures to manage small-scale inshore fisheries.



Roviana Lagoon: social context

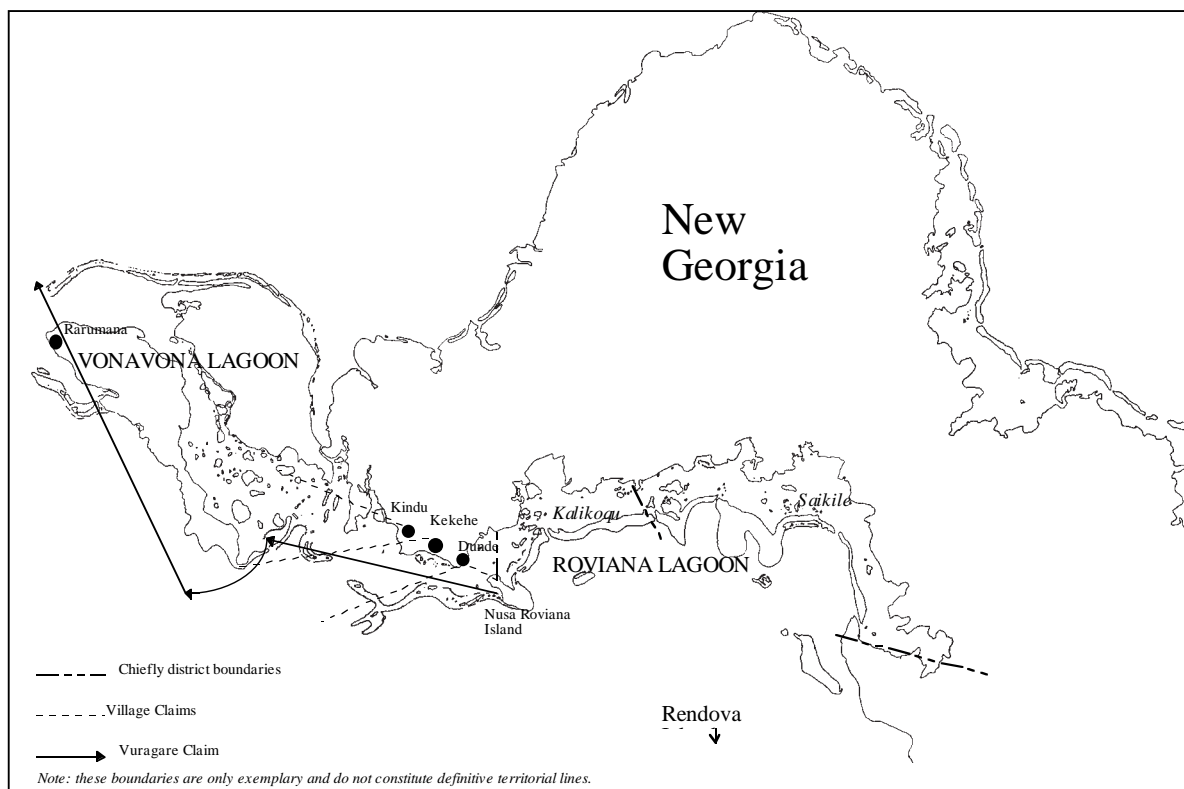
Roviana Lagoon is located between the Marovo and Vonavona Lagoons on the island of New Georgia, Western Solomon Islands. It extends for over 52 km southward from Munda to Kalena Bay (Map 1). The lagoon is protected by a series of offshore raised coral reef islands 20–40 m high. The lagoon, with a maximum depth of 40 m, comprises numerous habitats, including seagrass beds, river mouths, shallow reefs, deep lagoon, and the seaward slope. Numerous human settlements dot the barrier islands and the New Georgia mainland. Extending from the south-eastern end of the lagoon all the way to Munda and beyond, rain forests cover both the New Georgia mainland and the raised coral islands which enclose the lagoon.

Various tribal groups, sharing cultural and linguistic affinities, comprise the inhabitants of Roviana Lagoon. The larger tribal groups are the Saikile and Kalikoqu chiefly districts and the smaller Munda area districts of Nusa Roviana – Kokorapa, Dunde, Kekehe, Lodu Maho and Kindu. Although each of these groups has independent control of its marine and terrestrial estates (*pepeso*) they all share kinship ties originating from a long history of tribal inter-marriage between the inland groups of Kazukuru, Taghosaghe, Lio Zuzuloqo and Hoava

with the coastal groups of Vuragare and Koloï (Fig. 1). In addition, kinship relations extend inter-regionally to include bonds with Rendova, Marovo, Simbo, Kolombangara, Ranongga, Choiseul, Vella Lavella, Isabel, and other parts of the Western Solomons.

Historically, the Munda area has been identified by Western observers as the geographical and cultural core of the Roviana Lagoon. As missionaries and traders established themselves there at the turn of the 20th century, all historical accounts of Roviana centre on the Munda area. It should be noted, however, that Munda is comprised of several decentralised tribal groups that have traditional political authority over relatively small land and sea territories.

This decentralisation detracts from its importance as a cultural core, and has established Munda as a small regional government and trade centre. Today, the most prominent tribal groups are the inner lagoon chiefly districts of Saikile and Kalikoqu. Unlike Marovo Lagoon, which is divided into numerous territories, the Roviana Lagoon is divided into two main socio-political enclaves, each under the centralised power of a chief. The smaller polities comprising each of these two political entities have, through a long history of intermarriage, pooled



Map 1: Roviana Lagoon. Munda area, Kalikoku and Saikile districts

Note that the illustrated boundaries are not definitive and are not intended to portray exact boundary divisions.

their land and sea entitlements under the jurisdictional umbrella of the chiefs. Nonetheless, individual descent groups within the larger political entities have a high measure of control over their particular customary territories.

Commencing at Koqu Kalena, at one extremity of the Roviana Lagoon, all the way to Rarumana, at the end of the Vonavona Lagoon, the Roviana vernacular (of the Austronesian language family) is spoken. As most people in the region share a common ancestry, the social and political characteristics of each group occupying this large section of south-western New Georgia are fairly homogeneous. The main core of inhabitants now living throughout the Roviana and Vonavona Lagoons progressively radiated outwards from Nusa Roviana Island, near Munda, over a period of at least eight generations. These moving populations intermarried with other localised groups as they expanded eastward and westward. It is enough to say that most people in the region are genealogically linked at some point in their descent line. This common heritage has created a sense of 'Roviananess', or rather a pan-Roviana consciousness.

The primary differentiating element for each tribal group in present day Roviana is church affiliation. The Munda area is riddled with competing religious denominations, ranging from the United Church (former Methodists) to smaller evangelical groups, such as Rema. The larger political blocks of Kalikoqu and Saikile are mainly adherents of the Christian Fellowship Church (CFC), with smaller pockets of United and Apostolic church followers at Saikile. The CFC is an indigenous church which blends Methodist doctrine with indigenous beliefs. The importance of the CFC church cannot be understated, as it is the major player in the cultural, social, political and spiritual life of the lagoon inhabitants. CFC followers see their church as independent and not bound to the colonial legacy of other Christian denominations. Adherence to the CFC church transcends the traditional spiritual role of other Christian denominations in the Solomon Islands and translates into political regionalism.

The local economy is mainly subsistence-oriented, with primary focus on shifting agriculture and fishing. Small-scale commercial activities, such as shell-diving, marketing of fruits and vegetables, copra production, small-scale logging, operation of village stores, sale of petrol, and other occupations are carried out by household members to meet such cash requirements such as church donations, school fees or purchase of store goods. In recent years major development schemes, such as the opening of a tuna cannery at Noro and the introduction of logging operations in Roviana, have given young

men and women access to labour markets. To young people, wage-earning represents a temporary period with minimal training, and an opportunity to earn some cash.

The kinship system

Households in Roviana Lagoon are not independent from the larger system of social relations, which links all household members to a series of kindred attachments. Generally, family units live in extended compounds, which include many of their closest relatives, and share a series of obligations to assist their kinsmen. Social groups in Roviana are formed around the concept of *butubutu*, or kindred groups that share consanguine ties. However, a *butubutu* is not a kinship designation that refers to a specific consanguine condition. Rather it represents multiple social relations which range from extended families to full socio-political units (e.g., *butubutu* Kalikoqu). Roviana social organisation resembles that of Marovo Lagoon (see Hviding, 1996), and Simbo (see Scheffler, 1962), and is probably similar to others social forms in the region.

Affinity to a descent group is cognatic (ambilineal descent), i.e., membership in a kinship group can be acquired by matrilineal and/or patrilineal association. While an individual's possible array of kinship associations is manifold, propinquity to a group usually depends on place of residence, marriage, possible advantages in terms of resource accessibility and social prestige.

Roviana's kinship manifold relations allows an individual to redefine his or her kinship alliances at any time and under any circumstances (Keesing, 1972). Notwithstanding the fluidity of the bilateral kinship system, for Roviana people matrilineal descent carries more weight. Inheritance rights to land holdings, or a *hinia* (share), that are held by a specific kin-based group can be transferred, with equal entitlement rights, to their offspring from either the father's or mother's side. On the other hand, rights to virgin forested land (*muqe*) not held by any specific lineage but conjointly controlled by all the members of a tribal group (*butubutu*) are stronger when inherited through matrilineal descent. In the context of land disputes men will often refer to their association with central females in their descent line (*podo pa varikaleqe* or 'born to a woman') to emphasise the strength of their claims. Individuals who can trace their descent to an unbroken line of females, or what Hviding has termed as 'cumulative matrilineation' (1996: 150), tend to have stronger decision-making power in matters of a tribal land and sea territories (*pepeso*) than do those who trace their descent patrilineally. Ties to chiefly lineages (*tututi bangara*), however, whether from the maternal or paternal association, also constitute a powerful filial link.

A person in Roviana obtains access to land and sea resources by virtue of his or her birth rights (*pinodo*), spousal affiliation (*roroto*), or location of residence (*koa vasina*). Rights to use resources must be distinguished from decision-making rights which allow individuals or groups to regulate resource use and access. Note, that while the bilateral kinship systems give individuals access to various land and sea territories, it does not generally bestow an individual with decision-making powers to more than one or two territorial units (*pepeso*). Persons usually have 'strong' (*ngingira*) rights to a certain territory by virtue of their birth into the controlling descent group. The degree of one's rights' strength (*tinaqo*) varies according to one's cumulative filiations to that descent line (number of times linked to a descent line).

Social organisation and marine tenure

A territorial unit (*pepeso*) in Roviana Lagoon is a property domain which extends conceptually from the top of the mountains of South New Georgia (*tutupeka*) to the barrier islands which form the Roviana Lagoon (*toba*), and beyond to the open sea (*lamana*), midway between the channel separating South New Georgia and Rendova Island. Although Roviana people see land and sea as integrated, the actual enactment of property rights between these two realms is economically and jurisdictionally differentiated. This separation originates in the settlement patterns of merging coastal and inland populations before the establishment of British colonial rule, at the end of the 19th century.

Much of the literature on Pacific Islands' tenure systems has stressed the lack of indigenous separation of land and marine spheres of ownership. The prevalent theme is that sea and land space exist as a continuum and that indigenous thought categories do not dissociate these realms as Westerners do (Johannes, 1978; Klee, 1980; Ruddle, 1988). Examples of compounded land and sea territorial units in the Pacific, like the Hawaiian *ahupua'a* (Meller & Horwitz 1987), the Fijian *vanua* (Ravuvu, 1983), and the Marovo *puava* (Hviding, 1989; 1996) are put forward to accentuate this conceptual difference.

The Roviana tenure system, although conceptually similar to those portrayed by other researchers, exhibits some contrasts. It is important to differentiate between the indigenous 'conceptual' view of

land and sea entitlements and the 'actual' enactment of these rights. Even though Roviana people see entitlement rights to their respective *pepeso* as all-encompassing, they make a clear economic distinction between land – soil (*pepeso*) and sea – reefs (*kolo-sagauru*) spheres. Land is a physical environment that can be actually worked on and altered. Most importantly, it can be claimed through its physical modification. For instance, when access to an untouched parcel of land (i.e., primary forest – *muqe*, or coastal mangrove groves – *petupetu*) is conferred to an individual by the chief or village head man, that individual can establish permanent claim to the parcel by altering its biotic features³. Usually, coconut palms or *Canarium* nut trees are planted, although in recent years some people have begun to plant avocado and mango.

This process encourages a sort of pioneering land grab, resulting in the clearing of coastal mangroves and forests to give way to coconut plantations. The establishment of a small coconut plantation can be used as a pretext to gain access to land. Disregarding the unprofitability and labor requirements of copra production, people continue to clear coastal zones to make coconut plantations. This process occurs at two levels: the 'intra' and 'inter' kindred-level competition. At the intra-level, siblings compete with each other to seize their parents *hinia* (i.e., land share) of clearing as much land as possible to establish their individual claims. At the inter-level, diverse descent groups within the larger group (e.g., Kalikoqu or Saikile) compete among themselves to gain access to communal lands⁴ (*muqe*) that are under the supervision of the chief and which have not been previously cleared or claimed by any specific descent group. The environmental repercussions of these pioneering activities are manifold.

On the other hand, the sea remains a domain which is not easily transformed, and which, compared to land, does not provide the same kind of sustenance and income benefits. Most significantly, the sea cannot be claimed through its physical modification as can land and, therefore, it remains an 'untamed' (*pinomo*) domain. However, there are a few instances where individuals have claimed jurisdictional control over waters contiguous to their coastal land holdings (*hinia*) but then have been overruled by the chiefs, who strongly assert communal tenure and access to all lagoon marine habitats. Further, people tend to ignore such individual claims, on the rationale that reefs

3 Note that this process does not include usufructuary (use) rights to communal garden land.

4 In recent years this process has been heightened by various descent groups competing with each other to access communal land for small-scale lumbering ('walk-about sawmilling'). This is especially prevalent in the Vonavona Lagoon, where individual parcels (*hinia*) have already been cleared and people are moving into communal lands. This, of course, is creating many problems, because profits from lumbering are not distributed to the community.



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The International Year of the Reef has a World-Wide Web Home Page at the following URL:

<http://www.coral.org/IYOR/>

Etiquette

1) When responding to a posting to the list, do not respond *back* to the entire list unless you feel it is an answer everyone can benefit from. I think this is usually the case, but responses such as "Yeah, tell me, too!" to the entire list will make you unpopular in a hurry. Double-check your "To:" line before sending.

2) Do not 'flame' (i.e., scold) colleagues via iyor-list. If you feel compelled to chastise someone, please send them mail directly and flame away.

3) If you have technical/scientific questions about coral, please conduct as much preliminary research into a topic as possible before posting a query to the list. (In other words, you shouldn't expect others to do your research for you.) Please consider:

- Your librarian (an extremely valuable resource),
- The CHAMP Literature Abstracts area at the CHAMP Web Site:
<http://coral.aoml.noaa.gov>
- The CHAMP Online Research@s Directory (i.e., search for your topic, ask the experts directly),
- The CHAMP (and other) Web sites' links page(s)

But please *do* avail yourself of the list when you've exhausted other sources.

5) Please carefully consider the purpose of iyor-list before posting a message. This is a forum comprised of conservation groups, scientists, aquariums, government agencies and others interested in sharing ideas about IYOR.

6) Succinct postings are greatly appreciated by all.



(*kali*) (eastern side) of Nusa Roviana Island, at the Munda area. Their roots originated in the Kazukuru inland groups who descended to the coast of Nusa Roviana some 13 generations ago⁶, and the Vuragare coastal inhabitants, who lived in the western section of Nusa Roviana. As *kali-koqu* inhabitants had also intermarried with the inner lagoon groups of Taghosaghe, Lio Zuzuloqo, and Koloï, they had also accrued strong rights there. After the shelling of Nusa Roviana by the British, in 1891, *kali-koqu* inhabitants moved into the inner lagoon. Over the years this assemblage of tribal groups has emerged as a large socio-political enclave now called Kalikoqu (Fig.1). The forging of tribal entities in present day Roviana, however, has been superseded by church adherence as an organisational force.

The amalgamation of 'coastal' and 'bush' tribal identities, as well as the differentiation between 'conceptual' and 'actual' way of dealing with territorial entitlement, are essential issues to understand contemporary regulatory problems of land and sea tenure in the Roviana Lagoon. Two territorial arrangements, the 'territorial – enclosed' and the 'mosaic' models are compared here to illustrate de-regularisation processes caused by a series of precepts embedded in the Roviana socio-cultural system.

The territorial – enclosed model of sea tenure.

The territorial – enclosed model of marine tenure (Fig. 2) characterises a situation where members of several tribal groups under the administrative umbrella of one authority jointly use commonly-held aquatic resources. Boundaries to territorial seas are well defined and participants in the commons preclude outsiders from accessing resources (See Map 1). In this model the groups comprising the large socio-political enclaves of Kalikoqu and Saikile chiefly districts have surrendered their localised territorial control to sea space and have vested the chief with that jurisdictional authority. It is argued here that while inner instabilities arise in this territorial model, enclosure of the commons provides a framework that is more adaptable to the influence of exogenous forces. To understand some of the existing regulatory problems, as well as the potential of this model to regulate resource use and access, it is necessary to understand the chiefly control of sea space at Kalikoqu and Saikile.

As a result of a long history of intermarriage among the groups forming each of the main chiefly districts of Saikile and Kalikoqu⁷, tenure rights to passages, reefs and other marine habitats that were held by specific descent groups in

INTERMARRIAGE

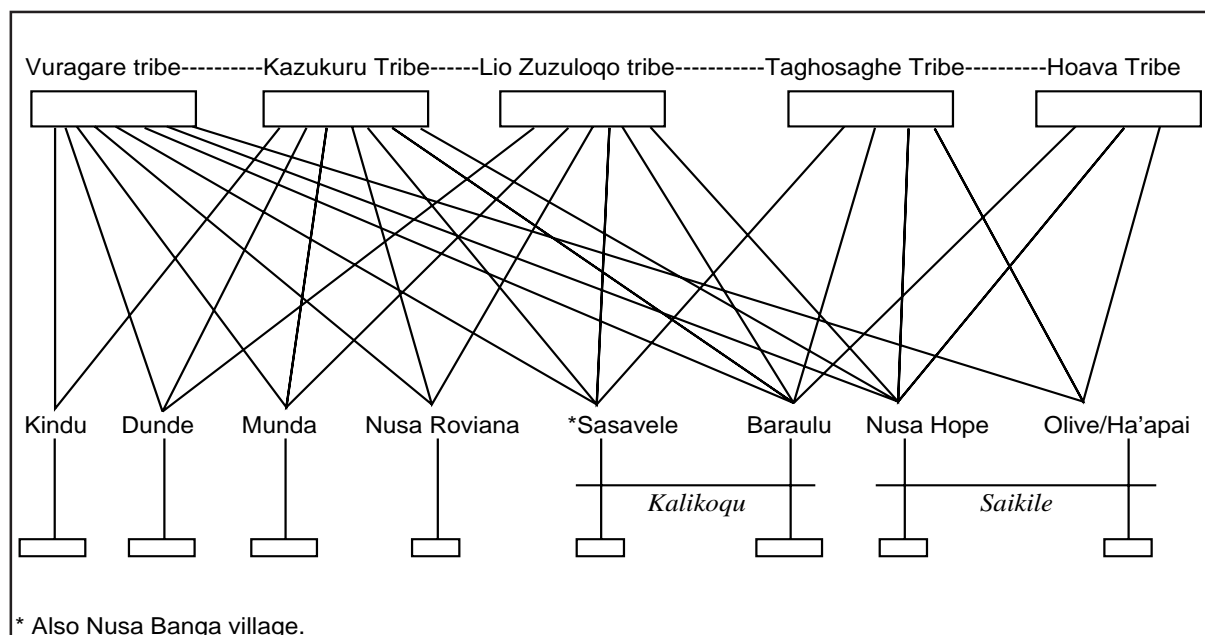


Figure 1: Ethnic homogenisation and realignment of territorial seas along village or coalition lines

6 It should be noted that ethnohistorical accounts are not uniform throughout the region. The chronology presented in this paper is only an approximation, and does not represent the views of all Roviana inhabitants.

7 Inhabitants of Kalikoqu have also widely intermarried with Saikile inhabitants.

the past have been pooled into the larger collection of land and sea entitlements held by all members of these two socio-political enclaves. As there are no secessionist claims to sea tenure by any specific descent group within each of the chiefly districts, jurisdictional trusteeship (*kinopu*) over territorial sea is confided in the chief (*bangara*). Nevertheless, waters proximate to each of the constituent villages are still co-supervised by local leaders (*palabatu*).

At Baraulu Village, in Kalikoqu, for example, the Reregana Passage is recognised by many in the district as 'owned' (*tinaqo*) by descendants of *kota*. The chief, who resides at a different hamlet within Kalikoqu, also traces his descent line to *kota*, and therefore also holds strong rights at the passage. If a non-Kalikoqu fisher wishes to fish for subsistence or small income at Reregana Passage, asking permission from the local headman would suffice. However, large-scale commercial activities at the passage would require authorisation of the chief. This situation is replicated in other villages throughout the area. Notwithstanding localised administration of sea space, it is reckoned by everyone that trusteeship of all sea space at Kalikoqu is under one chief.

In the daily discourse of Roviana fishers, it is frequently heard that chiefs 'own' (*taqo*) the reefs. Although many people are aware that chiefs do not own the reefs *per se*, the concepts of 'trusteeship' (*kinopu*) and 'ownership' (*tinaqo*) are commonly

confounded. Obviously, not everyone misconstrues these concepts. A few elderly individuals still recall intra-tribal boundaries within the larger polity of Kalikoqu, and still refer to their localised rights. They contend that the chief only 'keeps' the *butubutu* and that each descent group still has some degree of jurisdictional autonomy over its land and sea states (*pepeso*). Further, they argue that open access to all Kalikoqu members does not equate with corresponding entitlement rights. Some people have stronger rights than others by virtue of their filial association to the original owning descent lines, thus those having stronger rights can categorically impose access restrictions at any time. Opinions as to who possesses jurisdictional power over territorial waters vary according to kindred affiliation. Generally, internal dissent to chiefly control of tribal land and sea results from closely-related kin groups opposing the hegemony of the chiefly lineage.

Younger fishers, conversely, feel that all territorial waters within the boundaries of Kalikoqu and even beyond are a 'public' good that is supervised and regulated by the chief himself. In fact, younger fishers range well beyond their localised territorial boundaries and enter those of Saikile and Munda. Fishers justify access to other territorial waters by invoking their kin relations to the area's dominant lineages or by citing prior customary binding agreements between their group and that of the visited territory. As commercial demand for marine products rises, younger fishers further proclaim that

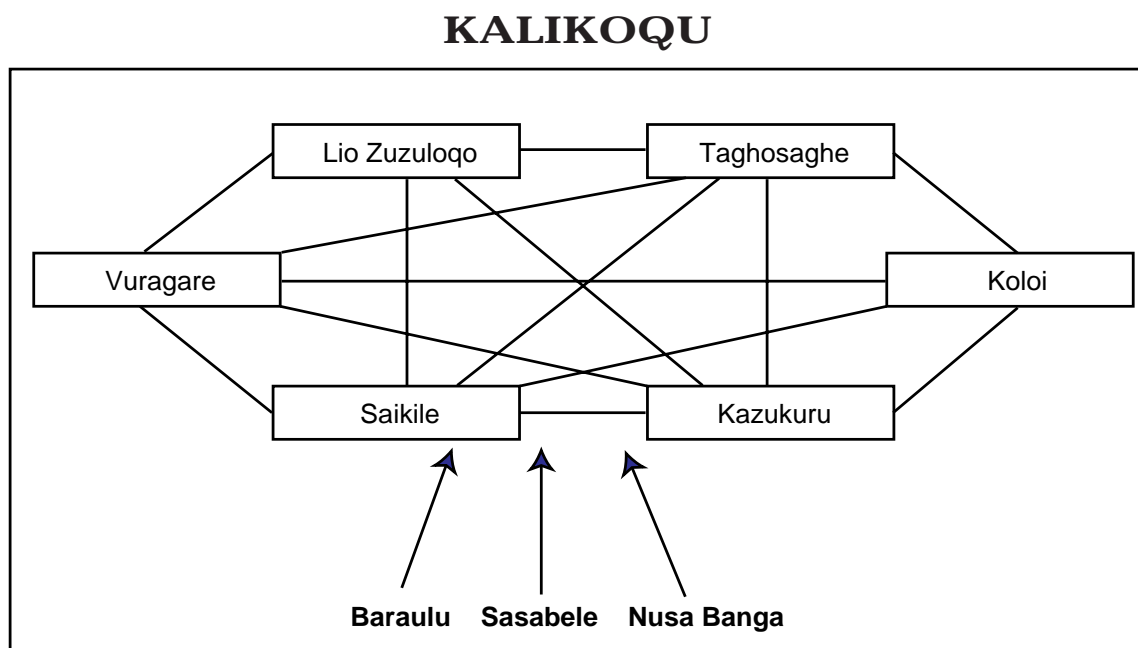


Figure 2: 'Enclosed model' of sea tenure (e.g., Kalikoqu)

everyone in Roviana should be able to fish everywhere, owing to a shared ancestral origin. This 'kinship rationale' is manipulated to gain access to as many areas as possible. For the most part fishing is localised, and crossing of territorial boundaries by Roviana fishers is common but not rampant.

Several key processes make the chiefs custodians of land and sea; First, the chiefs' multiple filial links to the major founding groups magnify chiefly authority over traditional territories. Over many generations chiefly lineages have married into all the landowning groups forming the chiefly enclaves of the Roviana Lagoon, and therefore have become vested with the authority to control all holding interests. Second, chiefs can have direct 'ownership' of reefs. For instance, at Saikile the chiefly lineage is reckoned as 'owning' a large reef complex within the larger pool of common entitlements. Thirdly, major court decisions of recent decades have awarded chiefly lineages legal entitlement to timber rights in communal tribal lands within each of the chiefly districts. This contentious development has empowered the figure of the chief beyond his traditional role as keeper or caretaker. The legal accreditation of chiefs by the government's judicial system has been *de facto* extended to sea tenure (especially in Saikile). Finally, the pragmatic conceptual division between land and sea spheres bestows on chiefs the jurisdictional trusteeship of sea space.

From the standpoint of fisheries management, chiefly control of sea space gives rise to some internal regulatory problems that are worth exploring. The inability of chiefs to regulate the fishery relates to a dialectical process between fishers and the chief. Fishers expect the chief to make decisions concerning regulatory measures before any restraint is exercised. If no rules are instituted, then fishers do not exercise any control. On the other side, chiefs do not consider it urgent to establish any regulatory measure that could occasion hardships for members of their respective constituencies. This results in a sort of 'free rider' effect, as fishers do not feel the responsibility to control the level of their catch rates nor to enforce their property rights against interlopers, especially if they belong to the Roviana Lagoon. In economic terms, the costs are externalised. Fishers obtain the benefits of their harvest but pass the environmental cost of their actions to all the members of the group. Like citizens of nation-states who do not generally participate in the coastal protection delegated to the state, Roviana fishers do not take an active role in managing the fishery, as chiefs are entrusted with that care.

These regulatory problems translate into the over-exploitation of various resources, including turtles, several species of parrot-fish, mullet, crayfish, mud-crabs, trochus, beche-de-mer, and other species. In fact, some species have almost disappeared from the lagoon, including dugong, *aromoi* shell (*Ostreidae* spp.) and milkfish (*poqu*, *Chanos chanos*), among others. A growing problem is habitat degradation in the inner lagoon. For instance, increasing collection of *belangavi* (*Begonia semiorbiculata*), a shell sold to Malaitans from the Langalanga Lagoon for the manufacture of customary shell money, is leading to coral reef deterioration. To collect these shells, coral reefs are hacked away with a hammer and chisel⁸, resulting in diminishing desirable habitat for larval recruitment. Other problems include the increased netting of mullet for marketing during spawning periods, and the continual predation on juvenile reef fish in the angling fishery. As in other parts of the Pacific, juvenile fish are regarded as 'sweet' (*lomoso*) and therefore are targeted for this desirable 'sweetness'. Although the eventual impact of these activities is not clear, increased commercialisation and an exploding human population are destined to make problems even worse.

These adverse effects, however, are balanced to some extent by the ability of traditional authorities to fend off the threat of large-scale development, such as industrial baitfishing⁹, in the lagoon waters. It is worth mentioning, as far as resource management is concerned, that not all exogenous influences have a negative effect. For example, in the Saikile chiefly district the increasing commercial value of the *bangapodu* shell (*Nassarius camelus*) led the chief to impose some rules on access to all Saikile territorial waters by non-members, even to those individuals with Saikile kinship affiliation living elsewhere (e.g. Kalikoqu). Besides dealing with exogenous forces, local tenure institutions are potentially well-equipped to deal with interlopers, because each individual fisher is a potential monitor. Moreover, local controls are not totally absent. Chiefs and important local leaders have sometimes imposed regulatory measures, such as gear restrictions (e.g. dynamite fishing), and periodically closing shell beds to permit recovery.

Despite some of the regulatory problems mentioned here, the centralisation of chiefly power in concert with each village's localised administrative patterns can offer an appropriate context to establish co-management regulatory measures between traditional authorities and government and NGOs.

8 It should be noted that in 1993 logging began in the Roviana Lagoon. The impending damage created by river run-off siltation will surely surpass any damage caused by divers.

9 This applies only to Kalikoqu and Saikile, as since 1973 the Munda area communities have opened their reefs to baitfishing.

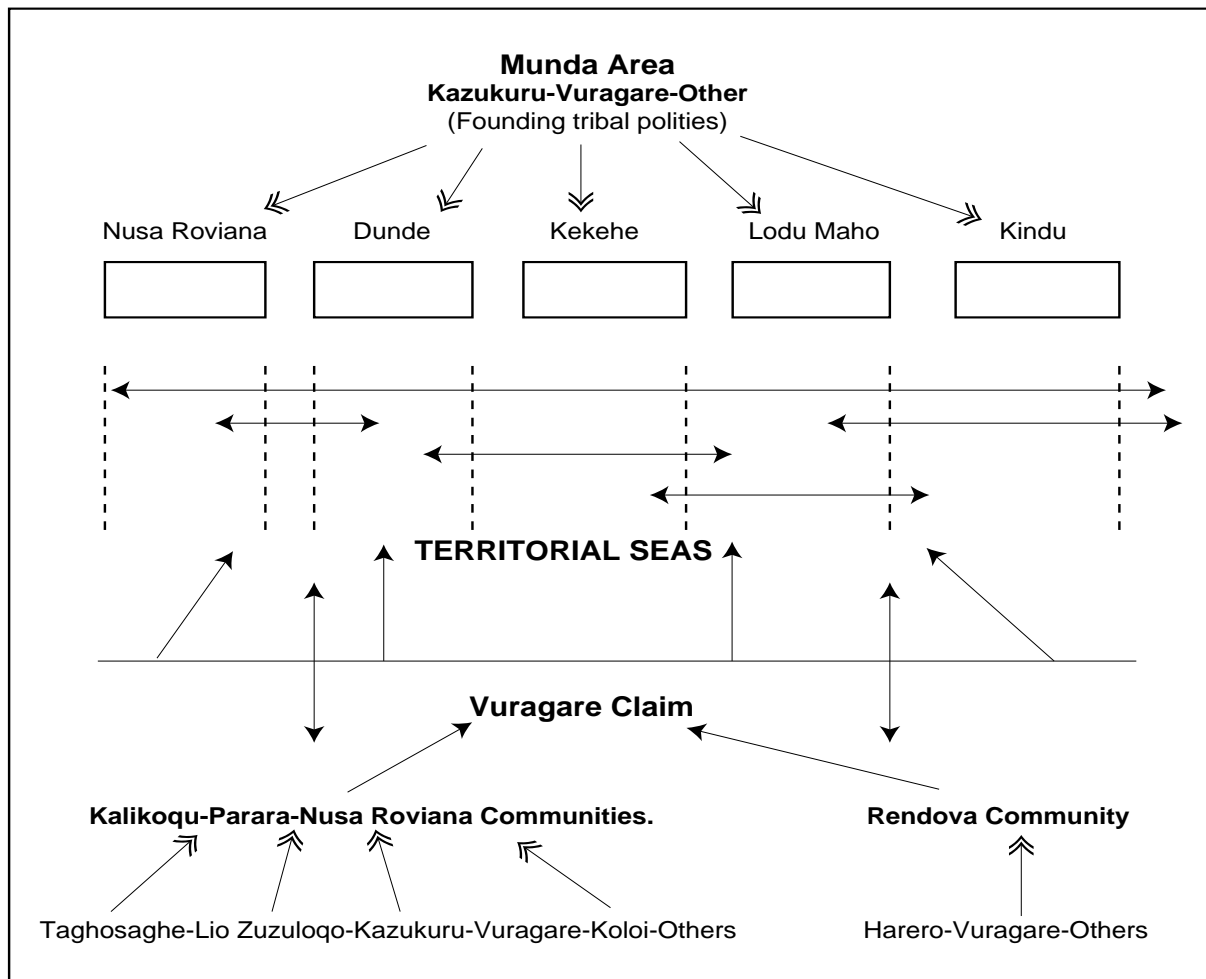
More troubling, however, are the difficulties which arise when enclosure of the 'commons' is not recognised by competing groups, and when traditional leaders are unable to legitimise their authority in controlling resource use and access.

The 'mosaic' model of sea tenure

The 'mosaic' model of sea tenure (Fig. 3) comprises a condition where entitlements to a large reef complex (in this case, stretching northward from Munda) are decentralised and regionally scattered (See Map 1). The previous monolithic entitlement to these reefs has been carved into sectorised territories, a sort of entitlements mosaic, by the villages bordering the

area. Munda area hamlets have acquired entitlement rights to these reefs as a result of intermarriage with the original controlling group and through binding agreements between tribal chiefs. Although boundaries are locally defined among Nusa Roviana, Dunde, Kekehe and Kindu (all in the Munda area), they are not recognised by the other reef-owning descendants living at Kalikoqu, Saikile, Parara¹⁰, Rendova and some at Nusa Roviana¹¹. This lack of recognition by surrounding communities renders this model of sea tenure very unstable, especially as it faces increasing pressures from such outside forces as fisheries development.

The present-day descendants of a coastal dwelling group named the Vuragare (lit. 'where the waves break') reside throughout Southwestern New Geor



Major Founding tribal polities = —————>>
 Claim = —————>
 Movement between territorial waters = <————>

Figure 3: 'Mosaic' model of sea tenure

10 Large island which runs parallel to Kohinggo Island. These two islands form the Vonavona Lagoon. It should be noted that this area is also subjected to many of the aforementioned processes (but this is not discussed here).
 11 Half of the village inhabitants are Vuragare descendants who have allied themselves with Kalikoqu.

gia and Rendova Island, and do not constitute a centralised group. Rather they are a set of splinter groups that have been absorbed into the larger regional groupings. In the past, the Vuragare tribe dominated a reef complex which stretched from Nusa Roviana island all the way to Patu Parao, near Gizo. Today, however, identifying Vuragare as an autonomous group is a misnomer, as the descendants of the Vuragare jointly with their mixed 'bush' ancestry¹² are the constituting populations of the region. Ethnic homogenisation, as mentioned above, does not entail the capitulation of ancestral rights. Within this mosaic of entitlements, not everyone descends from Vuragare, and differential entitlement scales exist amongst descendants. By virtue of their cumulative filial links along their descent line to Vuragare, some individuals have, stronger rights than others. To understand this complex situation it is necessary to grasp two opposing views, those of the Munda communities that reaffirm their control of the disputed reefs and those of Vuragare descendants living elsewhere who reaffirm their ancestral rights to control the reefs.

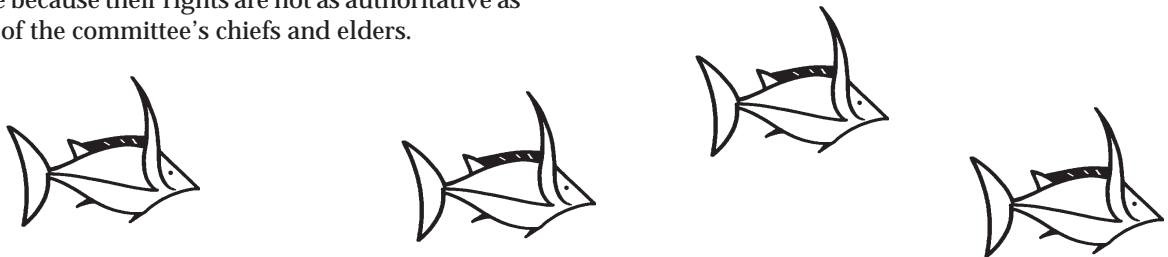
The Vuragare claim

In advancing their hegemonic control of land and sea territories in South-western New Georgia, descendants of the Vuragare tribe living at Kalikoqu have established the 'Vuragare Tribe Chiefs' Committee' and the 'Vuragare Tribal Association' and have asked Vuragare descendants living at Rendova, Parara, Nusa Roviana and Munda to join their association. Their objective is to reclaim control of the Vuragare reefs.

This move is not intended to preclude Munda area fishers using the reefs for subsistence purposes, but to assure that any benefits reaped from economic development¹³ in the area will be evenly distributed among all Vuragare descendants. Members of the Chiefs' Committee, which is dominated by Kalikoqu, argue that people who live at Munda have only usufructuary rights to exploit the reefs, and cannot claim permanent control to them. Further, they contend that even Munda inhabitants who descend from the Vuragare tribe cannot oppose the Chiefs' Committee because their rights are not as authoritative as those of the committee's chiefs and elders.

In the early 1990s the Kalikoqu Tribal Association appointed a 'Chief of Vuragare' to show that it was reclaiming control of the Vuragare reefs. The following account recounted by the Vuragare chief in 1994 summarises their claim:

We are the rightful owners of the reefs, and the people of Nusa Roviana, Dunde, Kekehe, Lodu Maho and Kindu (Munda area) who do not descend from the Vuragare tribe want to do away with us and our inherited birthright. Even those who are Vuragare descendants among these communities are not claiming the reefs of their respective areas in the name of the Vuragare tribe but in the name of their communities. People who want to do away with the Vuragare appellation are people who have long departed from the original birth place of their ancestors and integrated into other communities. Islands in the Vuragare reef complex were never 'cut off' (*kumatia*) from their original owners, as the Kazukuru tribe never paid *bakiha*¹⁴ for these islands but only '*kokopa*', a sort of rent. Even if people at the Munda area could prove that they had made such payments, that would still not give them rights over the adjacent reefs.



12 Also genealogical links throughout the region including Marovo, Vella Lavella, Kolobangara, Simbo, Rendova, Luru, Kusaghe, and other areas.

13 These include the royalties paid by Taiyo, an industrial fisheries conglomerate associated in a joint venture with the Solomon Island Government since 1973; also, in recent years 'diving fees' paid by some of the hotels that have sprung up in the area. The prospect of tourist development in the area is well anticipated by the Central and Western Province Governments, and the people of Roviana.

14 Traditional ring-shaped currency made from fossilised giant clam shell (*Tridacna gigas*).

Views from Munda on the Vuragare reefs

The Munda area communities of Nusa Roviana, Dundu, Kekehe, Lodu Maho, and Kindu see the steps taken by Kalikoqu and other self-claiming Vuragare groups at Rendova and Parara as expansionist and dangerous. To Munda inhabitants, regardless of their kinship background, the disputed reefs are inalienable. Their views are best reflected in the comments of an old Dundu man (who is also a Vuragare descendant):

The reefs that are at present being verbally reclaimed by the Vuragare Chiefs Committee have long been left under the jurisdiction of the Dundu, Lodu Maho, Kindu, Nusa Roviana and Kekehe chiefs. These reefs were taken over by these communities by previous agreements with Vuragare chiefs, and owing to direct acquisition of rights through intermarriage with Vuragare tribe members. People of Vuragare descent who do not live here are trying to recreate the Vuragare tribe for economic reasons (Taiyo and baitfishing). Vuragare claimants want to alienate people of our communities from their rights for reason of greed only.

Instabilities in the 'mosaic' model of sea tenure arise at both the micro and macro levels. At the micro level, disputes ensue from increasing transgressions of territorial seas by divergent tribal groups who claim hegemony over the Vuragare reef complex via the rationalisation that their ancestral rights cannot be denied. These disputes usually on increasing commercial use of resources rather than subsistence fishing. Commonly, people in the Roviana Lagoon do not exclude anyone when fishing for food, and both customary and church beliefs encourage sharing and altruism among Roviana people. Disputes emerge when fishing and diving for income, especially in the Munda area where inner lagoon reefs have been greatly depleted of commercial shell stocks such as trochus and green snail and reef fish.

In the Munda area, boundary transgression occurs at two levels internal to the Munda area communities and external transgression by Rendova and

Kalikoqu fishers (Fig. 3). Within the Munda area, fishers range between each localised territory (e.g. Dundu, Kindu, Lodu Maho) either because they share tenure rights by way of their kin relations to each other, or because they can claim descent from the Vuragare tribe. While the former is an acceptable rationale for crossing traditional boundaries, the latter is not. To Munda communities, Vuragare affiliation does not constitute a licence to transgress local boundaries as, according to elders, 'Vuragare tribe chiefs forfeited their entitlement rights to these reefs over a hundred years ago'.

More contentious, however, is the use of the 'Vuragare rationale' by divers from Rendova and Kalikoqu who come into the Munda bar area. To these individuals their Vuragare ancestry warrants use of resources in these reefs. Even though boundary infringements are not too common, in recent years there has been an increasing number of interlopers ranging beyond their fishing territories in search of valuable shells and fish. The Roviana Lagoon Area Council, which represents the government, has attempted to deal with these problems but lacks the manpower to enforce either customary or government rules.

Traditional leaders at Munda have failed to sanction younger interlopers owing to the internal dynamics of kinship relations. It is easy to identify the 'other', the outsider (e.g., Malaitans living at Noro tuna cannery), and ask them to leave or pay their respects. However, it is harder to ask one's own kin to leave, even if they have weak or non-recognised rights to fish or dive at a specific site. Because of a lack of a central authority in the Vuragare reefs¹⁵, any Vuragare descendant living anywhere can, theoretically, have access to them. Interlopers can use the 'kinship rationale' to transgress into areas where their rights may not be recognised. Younger fishers manipulate the system for their own benefit, abusing the privileges conferred by traditional law and customary ethics.

At the macro level, disputes have been magnified by the introduction of large development schemes which have brought tribal groups sharing entitlement to the Vuragare reefs into direct conflict. With the introduction of industrial baitfishing in the Munda area, in 1973, an ongoing dispute between Munda area hamlets and Kalikoqu (and other communities) has developed. Descendants of the Vuragare tribe living at Kalikoqu, Rendova, and Parara have called on all kin-related Vuragare members at Munda to defy their localised alliances and join the 'Vuragare Tribal Association' to claim the benefits from baitfish harvesting. Non-Vuragare descendants at Munda villages do not recognise the claims of the 'reconstructed

15 Kalikoqu elders are trying to re-organize tribe descendants to administer this huge chain of reefs. In the Munda area - the opposing communities - no chiefs have been elected since the death of the last few, in the 1980's and early-1990's. Today traditional seas are administered by a committee of elders in each of the polities. Land tenure on the other hand is so widely contested among Munda area communities that all kinds of splinter groups are claiming autonomy from each other. This, obviously, is eroding the tenure system.

coastal group,' whereas those who are Vuragare descendants are caught in a dilemma between possible economic benefits and challenging their kinsmen. In recent years an agreement has been reached among all communities to share the profits generated by the industry. But the discontent on both sides is evident, as no single community profits from a larger share of the revenues.

As population pressure increases¹⁶ and commercialisation of the fishery develops, the Vuragare reef complex could be heading into a de facto 'open access' regime if no steps are taken to provide local communities with statutory entitlement to their adjacent reefs. On New Georgia, a fisher's use of his or her kinship ties as a rationale to move between territorial waters is a permissible cultural practice which allows individuals to increase the range of resource-harvesting opportunities. Because subsistence fisheries are usually localised, the dynamic nature of the kinship system usually does not pose a serious problem from the standpoint of inshore fisheries management. In the Vuragare case the decentralised power base and entitlements rights scattered throughout the region bring forth conflict at the two mentioned levels. First, they permit different groups to exploit a resource without the prior consent of the others, and second they allow different parties to claim rights to an area to the detriment of others¹⁷.

Finding a formula to satisfy everyone, including the government, is a major dilemma. If Munda area communities can enclose sections of the reef and legitimise their claims to them, Vuragare descendants elsewhere will be alienated from their ancestral birthrights. On the other hand, if no action is taken to enclose the commons and provide Munda communities with statutory stability, further ecological degradation and social disharmony will occur.

Conclusion and policy implications:

It is evident that micro-tragedies can occur. The case study presented here does not intend to polarise marine tenure as an either/or situation. Rather it seeks to alert social scientists that the range in variability and possible outcomes of human behaviour cannot be easily simplified by being placed into tidy, logical categories. The role of tradition-based systems of resource management in modern inshore fisheries management is not questioned here. It makes little sense for governments to nullify such systems by establishing 'open-access' regimes when localised management frameworks are already in place (Johannes, 1978; Ruddle, 1988). From the standpoint of the government it is cost-efficient to keep fisheries manage-

ment decentralised and to maintain control in the hands of local communities (Ruddle, 1996). It has been my objective here to alert researchers that, while decentralisation of fisheries management can be economically and socially efficient, they should be cautious before pronouncing indigenous practices of resource management to be a panacea for all the ills afflicting coastal fisheries.

A constructive approach to the role of corporate sea tenure in modern fisheries management is to recognise that in some cases common property regimes can be effective in regulating resource use and access; in others they cannot. This dynamic approach to common property regimes contrasts with the more orthodox stand taken by numerous social scientists who have accepted the notion that traditional systems of resource management are self-regulatory and that any breakdown in these regimes stem largely from the encroachment of outside forces, such as capital markets. This *a priori* conclusion has led researchers to suggest that where indigenous systems of sea tenure are still viable, measures to control inshore fisheries should be largely left to local traditional authorities and not to government central administrations (e.g., Cordell, 1989; Dahl, 1988; Hyndman, 1993; Johannes, 1978).

The case study presented here suggests that deregulatory processes not only originate from the influence of outside forces, but also from the structural constituents of indigenous social institutions themselves. The two models presented here, the enclosed model and the mosaic model of sea tenure, indicate that 'micro-tragedies' can occur in the political structure and in the dynamism of indigenous social institutions as they are faced by population pressures and the increasing magnetisation of the rural economy. In averting a foreseeable 'tragedy', I suggest in this paper the statutory enclosure of the commons as a policy measure. The Roviana Lagoon case indicates that where territorial boundaries are 'enclosed', social and ecological stability are achievable goals. Conversely, the 'mosaic' model of sea tenure presents a situation where disputed territorial boundaries and the structural fluidity of property relations lead to social and ecological instabilities.

Numerous researchers (e.g., Hviding, 1989; Johannes, 1978; Ruddle et. al. 1992) caution that codifying the commons could 'fossilise' traditional systems by the establishment of statutory law. But it is the adaptability and plasticity of marine tenure institutions that, in some cases, led to resource use de-regularisation and social conflict. To prevent the instabilities which emerge from 'exposed' boundaries such as those of the mosaic model, the formalisation and codi-

¹⁶ Note that the Solomon Islands has a 3.7% annual population growth rate, among the highest in the world.

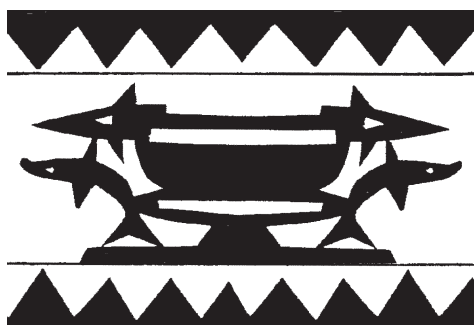
¹⁷ This is more significant than it appears as a reef dispute could interfere with baitfishing in the area. This impending development makes the government increasingly impatient. The key here is for local communities to maintain their control via a non-confrontational resolution.

fication of tenure institutions are suggested here as a possible venue. Any legislative moves, however, should explicitly include provisions to incorporate the flexibility of corporate institutions of sea tenure (see Ruddle, 1996) and to allow all competing groups to participate in the formalisation process. Economic benefit derived from development projects should be evenly distributed among all participating communities. Further, statutory rules should be decentralised and locally administered.

A 'middle down – middle-up' approach is suggested here. The government's role is to provide a 'unit of coercion' (Bromley, 1992) by empowering traditional authorities to punish free-riders and interlopers. In legitimising local coercive measures, the government has to establish a 'unit of guarantee' by furnishing the legal means for indigenous people to formally hold tenure to their land and sea territories. Statutory measures should be modelled after local patterns of resource utilisation and existing social institutions. It is imperative, however, that any regulatory steps are first understood and accepted by local peoples. Once accepted, the implementation and enforcement of rules are carried out conjointly by local peoples and government agencies. In this way a partnership between local peoples and outside forces may be forged to achieve the common goal of resource-use sustainability.

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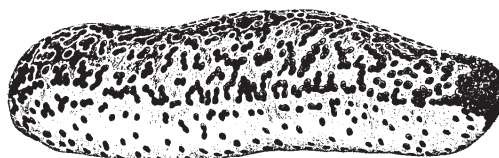
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THE HARVESTING OF RORI (sea cucumbers) IN RAROTONGA, COOK ISLANDS

by Anna Tiraa-Passfield¹

In this article I look at the harvesting of *rori* (sea cucumbers) in the lagoon and reef flats of the island of Rarotonga, Cook Islands. Collection of *rori* is done mainly by women at low tide. *Rori* are a traditional food. Several species are harvested, either for their mature gonads, locally called *matu rori* or their body wall (Table 1). Other uses include traditional medicine and in fishing.

For fishing, *rori toto* is sometimes used to draw an octopus from its hole in the reef flat. This is done by rubbing the body of the *rori* on a stick, which is then placed inside the cavity of the reef flat. The bitterness of the *rori* draws the octopus out of its hole (pers. comm. Teina Rongo). Similarly, rubbing the skin of *rori toto*



in a rock pool is reported to have been used in the past to stun fish trapped by receding tides.

Beche de mer is sometimes used in traditional medicine. However, for several reasons, the practice of traditional medicine in the Cooks Islands is a closely guarded secret among practitioners.

Some fear that outsiders may abuse the knowledge of traditional medicine for their own purposes. It is also thought that the *mana* (strength) associated with this practice might be lost were the knowledge to be revealed. Therefore my informant, a traditional practitioner, understandably would not reveal which species are used for what illness.

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In a 1989 population study, it was found that *rori toto* and *rori tapou* were the commonest species in the lagoon. *Rori puakatoro* are also reasonably abundant on the reef-flat surf zone.

The species most commonly harvested is the *rori tapou*, sought for its mature gonads (*matu rori*), which appear as a mass of white strands. The *matu rori* season is October to January. To remove the *matu*, the pointed tip of a knife or nail is inserted near the head of the animal. This is to avoid the white sticky substance (cuvorian tubules) ejected from the anus. The *matu* is then removed from the incision. The *rori* is then tossed back into the sea, since it is believed that after about 2 weeks, its gonads will have regenerated and so it can be harvested again (More Rua, pers. comm.). Immature gonads are red, and are not normally eaten. *Matu rori* can be eaten either raw or fried in butter.

One lady told me that when the *tiare taina* (*Gardenia augusta*) flowers it indicates that the *matu rori* is ready to harvest. Normally, *matu rori* is harvested from one area of Rarotonga first, followed by other areas as the *matu rori* becomes ripe elsewhere.

The *matu* is also removed from *rori pua* during the same season as *rori tapou*, and from *rori kanaena* all year round (pers. comm. Linda Taramai).

The body wall of several *rori* species is also used to prepare a local delicacy, called *mitiore*. The basic dish is prepared by marinating the finely chopped body wall with crushed *koiti* (*Ocyboda lativs*), a crab found on the beach, and finely scraped coconut. The best time to collect *koiti* is at night during new moon. However, they can be collected during the day, but this involves digging them from the sand. This mixture is

then left to ferment. Other ingredients can be added to this basic recipe to provide variety. *Mitiore* is usually served as a side dish to accompany a main meal.

Glossary

Rori - Sea cucumber.

Mitiore - A local delicacy. In the case of the *rori*, it is prepared by removing the bitter outer layer of the body wall by scrapping with a knife or by rubbing the animal in sand. The body wall is cut finely and mixed with lightly scraped coconut and crushed crabs called *Koiti* (*Ocyboda lativs*). Other marine invertebrates can be used instead of *rori*, such as trochus meat, or turban snails.

Matu rori - Mature gonads of the *rori*.

Acknowledgements

Most of the information reported here is from my aunties, Linda and Tai Taramai, uncle Tira Albert, Teina Rongo, More Rua. A small amount of my own knowledge of the *rori* is also included. Thanks to Ian Karika Wilmott for checking the Maori names and the contents of this article.

Meitaki maata



Rarotongan Name	Scientific name	Uses and comments
<i>Rori toto</i>	<i>Holothuria atra</i>	Food (<i>Mitiore</i> , see glossary); fishing.
<i>Rori tapou</i>	<i>H. leucospilota</i>	Mature gonads (<i>Matu rori</i>) eaten raw or cooked.
<i>Rori pua</i>	<i>H. cinerascens</i>	<i>Mitiore</i> , <i>Matu rori</i>
<i>Rori puakatoro</i>	<i>Actinopyga mauritiana</i>	Prepared in <i>rukau</i> (taro leaves) with coconut cream in the traditional earth oven. Tastes like pork.
<i>Rori kanaena</i>	<i>H. hilla</i>	<i>Matu rori</i> . Animal emerges at night from under coral rocks. Collection in daytime involves turning rocks over.
<i>Rori ngata</i>	<i>Stichopus horrens?</i>	(not established)
<i>Rori urari</i>	(not established)	<i>Mitiore</i>

Table 1. Names of *Rori* harvested and their uses

Fieldnotes on some cultural aspects of marine resource use in four coastal villages of Vanuatu

by Akimichi Tomoya ¹

Introduction

As a member of a JICA mission to several South Pacific nations, I conducted a brief field survey in Vanuatu in April 1988, to examine the development potential of inshore fisheries and aquaculture. Among the locations visited in Vanuatu were Port Olry (Espiritu Santo Island), Uripiv Island, Makatea Village (Emae Island), and Anelgowhat village (Aneityum Island). Although the main purpose of the mission was to describe the status of local fisheries, opportunities were taken to seek information in my own particular areas of academic interest. Since relatively little is known of the cultural aspects of fishing communities in Vanuatu, some preliminary information from that wider survey is reproduced here.

Local ideas on marine resources

The general terms used to signify marine resources in Aneityum are *numu* or *mu*. Within these, different categories are distinguished. These include shellfish (*nesungamo*), sea crabs (*numu dalenget*, lit. 'crawling *numu*'), finfish (*numu sungan*, lit. '*numu* with meat'), seaweeds (*nelom*), octopus (*nith*), turtle (*nahou*), and the other categories shown in Fig. 1. Seaweeds, shellfish, crabs and lobster, finfish, octopus, and turtles are divided into named generic and specific categories. With the exception of holothurians (*nesiahao*), most marine species are used as human food.

At Makatea village, Emae Island, the generic term for marine organisms is *nea tai* (lit. 'things of the sea'). It includes finfish (*ika*), shellfish, octopus (*feke*), spiny lobster (*ula*), sea urchin (*sawaki* and *watuke*), seaweeds (*rimu*), turtle (*fonu*) and holothurians (*makasun*), all of which are consumed by humans.

In Uripiv the generic name for marine food-stuffs is *mesal*. It includes fish (*naï*) and all items taken from the reef (*nal*).

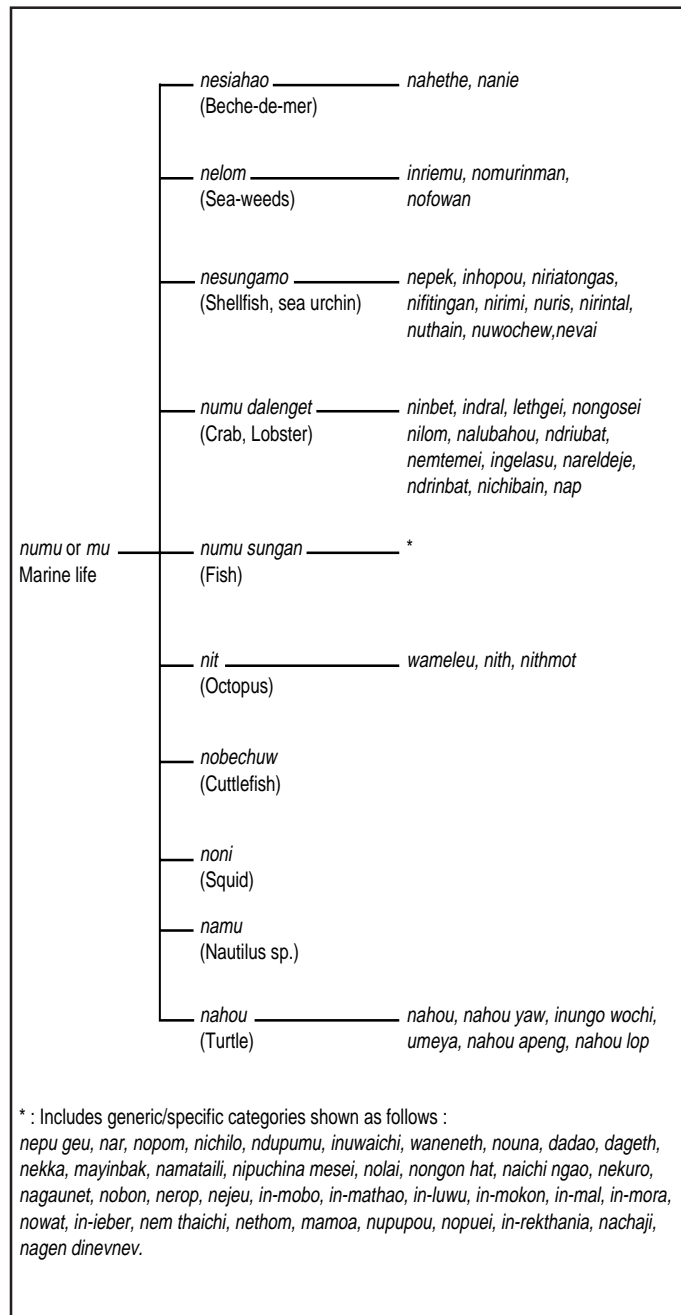


Figure 1: Classification of marine life in Aneityum

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In all the societies surveyed, classification of marine resources is basically hierarchical. The classification is arranged first with unique life form, followed by either two or three generic or specific sub-categories. For example, at Aneityum *numu* (marine life), *numu sungan* (fish) and *neju* (tuna) form such a hierarchy (Fig. 1).

A second basic distinction is made between reef and off-shore species. For finfish, for example, the prefix *in* indicates a reef (*in*) species, as exemplified by *in-mora* and *in-ieber*.

Local knowledge regarding ciguatera poisoning

Ciguatera poisoning is widespread in Vanuatu². In the four villages surveyed four fish were identified as poisonous by informants. Of these, sea perch (*Lutjanus* sp.) and jacks (*Caranx* sp.) were the main groups identified.

According to Emae villagers, ciguatera is associated with the growth of specific kinds of corals (*tuputupu fou*), during the period April – December. Similarly, Aneityum Islanders recognise that fish become poisonous when feeding on those soft corals that also cause a diver’s skin to itch.

The special use of marine resources

During ceremonies and feasting, certain species are reserved for consumption by specific persons or groups. This is a widespread practice in Pacific Island cultures. For example, at Uripiv, at times of the

yam harvest, weddings and childbirth, *Naso unicornis* (*natiw*), blue parrotfish and *Hemipteronotus pavo* (*bulbul welum*) are dedicated to village chiefs. On Aneityum the heads of turtles as well as large fish are given to the chiefs. And at Makatea, when large fish and turtles are caught, the head of the fish, or even the whole fish, and the forefins of the turtle are given to the chiefs.

Methods of cooking seafood

Traditionally, fish and other seafoods were cooked using a variety of methods, including grilling, baking, steaming in an earth oven in *laplap*, and smoking. Seafood is also consumed raw. The most common methods are grilling or baking either on a fire or hot embers. Steaming in an earth oven is widely used to prepare seafood for a large number of people on ceremonial occasions or for feasting. Usually the seafood is cooked along with grated banana and taro, and meat, flavored with coconut milk and wrapped for cooking in *Heliconia* leaves. Bamboo containers are used for roasting. Fish smoking is probably not common. Cooking method by village is shown in Table 1.

Acknowledgement

Information abstracted with permission from: AKIMICHI, T. (1990). Inshore fisheries and marine resource management in Vanuatu: an anthropological study. **In:** Report of technical and socioeconomic baseline study for fisheries development in oceania: with reference to reef and lagoon resources and aquaculture. 199–241. Tokyo: Japan International Cooperation Agency (JICA).

Table 1: Cooking Methods for Fish and Other Seafoods in the Four Locations

Method	Port Olry	Uripiv	Emae	Aneityum
Fire/embers	NA	NA	NA	OB
Stone	OB	OB	OB	OB
Earth oven	OB	OB	OB	OB
Raw	NA	OB	OB	NU
Bamboo	NA	NA	NA	OB
<i>Laplap</i>	OB	OB	OB	OB

Table Notes: NA = Not Ascertained; NU = Not Used; OB = Observed.

2 Ciguatera is known as *kalo* (Port Olry), *aru-eci* (Uripiv), *ekona* (Emae), and *agen* (Aneityum).

Construction of traditional outrigger fishing canoes in Tuvalu

by Kelvin Passfield¹

Tuvalu consists of a group of 9 islets and atolls situated between 5° and 10° S and 175° and 180° E. The nation has a population of about 9600 persons, of whom about half live on Funafuti, the capital island.

Fishing still plays a very large part in the lives of Tuvaluans, especially in the outer islands. For example, at a recent meeting to form a Fisher's Association, on Nukufetau Atoll, a total of 61 fishers were registered. This represents about 10 per cent of the total atoll population of around 600 people. Undoubtedly there were several others who did not attend the meeting.

Some of these fishers use plywood or aluminum skiffs powered by 15–40 hp motors. But many still use traditionally-constructed outrigger canoes propelled by sails. It is locally believed that some fish, particularly the large yellowfin (*takua*), will more likely be caught by a sail-powered trolling canoe than by an outboard-powered skiff. A 1996 survey conducted on Nanumea (population around 1000) found some 80 such canoes still in use.

These outrigger canoes are made from local trees. In some islands of Tuvalu, notably Nanumea in the north, the *fetau* tree (*Calophyllum inophyllum*) is

mostly used for the main hull (*vaka*) and outrigger beams (*kiato*), whereas the lighter-weight *puka* (*Hernandia nymphaeifolia*) is used for the outrigger (*ama*). In Nukufetau and Nui, in the central Tuvalu group, the main hull and outrigger are constructed from *puka*, and the beams from *fetau*.

A suitable tree is selected, felled and trimmed. At the same time, a smaller tree from which to make the outrigger is also felled and then debarked, so that it will be dry by the time the main hull has been finished. The trees usually come from land owned by the family of the person requiring the canoe. Otherwise, compensation for the tree might be required by the land owner.

The main hull tree is then formed roughly along the sides into the shape of the canoe, using an axe and short-handled hoe. A chainsaw, if available, can be substituted for the axe, making the work easier and faster. The inside of the canoe is then removed by making crisscross cuts with the chainsaw or axe, and then chipping out the sections with the hoe. A metal adze is used for finishing.

The top plate of the canoe (*oa*) is cut from another tree and shaped accordingly. It is attached to the top of the main hull by stitching with cord. (Nowadays monofilament fishing line is used.) The join is heavily covered with tar or paint, to prevent leaking.

The whole process can take 2–3 months or longer to complete, depending on whether or not the undertaking is regarded as a full-time occupation. There are still a number of canoe-builders in the islands of Tuvalu, and old men still pass their knowledge down to their sons. A young man may be assigned such heavy work as chopping and rough shaping of the tree, while the older man offers technical advice and assists in the lighter, finishing work.



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It is said that a canoe made from *puka* can last more than 10 years if properly cared for. This involves protecting the timber with paint, and keeping the canoe out of the sun when not in use. In recent years in Nukufetau approximately 15 *puka* canoes have been constructed annually. Canoes from *fetau* wood are reported to last much longer than those made of *puka*. This is perhaps the reason that few canoes were observed being built in Nanumea, although a large number are in use there. Although most canoes are used locally, several may be transported to the capital, Funafuti, where a shortage of land and trees means canoes are no longer built there.



The sail (*la*) is a simple crab claw design, made locally from synthetic fiber either tarpaulin or sail cloth. Canoes are skilfully steered by means of a paddling/steering paddle (*foe*).

With fuel on the outer islands of Tuvalu costing up to A\$1.15 per litre, these locally-produced craft are an economical choice for local fishers.

Acknowledgements

Much of this information was obtained by watching Moinga, a Nukufetau fisher and canoe-maker, construct a 6 m canoe. Additional information was obtained from Teisio Faiaki in Nukufetau, and Katagi in Nanumea.

Welcome to the International Year Of the Reef (IYOR) list-server

We encourage you to use this list to communicate with others around the world who are interested in the International Year of the Reef. You can use this list to publicise your own IYOR activities, to share information or ask questions about IYOR. Please do not use the list for personal communications or promoting commercial ventures.

The International Year of the Reef (IYOR) 1997 is a global effort to increase public awareness about coral reefs and to support research and conservation projects. Scientists and conservation organisations are collaborating to produce a variety of courses, video tapes, brochures and other educational materials. Individual coral reef areas are creating or revising management plans for their coastal zones. With the involvement and financial support of governments, foundations and individuals, these initiatives and more can be put in place to

ensure that the world's coral reefs are preserved for the future. Coral reefs around the world are being threatened by factors such as overfishing, coastal development, runoff from agriculture and logging, untreated sewage and other pollutants. Concern about the state of the world's reefs has inspired scientists and conservation groups and governments around the world to accept the following challenges:

- executing a major programme of public education about coral reefs,
- assessing the conditions of coral reefs worldwide,
- collaborating with governments, local communities and other reef managers to develop and implement plans for the sustainable use of irreplaceable reef resources.

To subscribe to the list

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To post a comment or announcement of meeting

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Other IYOR-related information

The International Year of the Reef has a World-Wide Web Home Page at the following URL:

<http://www.coral.org/IYOR/>

Etiquette

1) When responding to a posting to the list, do not respond *back* to the entire list unless you feel it is an answer everyone can benefit from. I think this is usually the case, but responses such as "Yeah, tell me, too!" to the entire list will make you unpopular in a hurry. Double-check your "To:" line before sending.

2) Do not 'flame' (i.e., scold) colleagues via iyor-list. If you feel compelled to chastise someone, please send them mail directly and flame away.

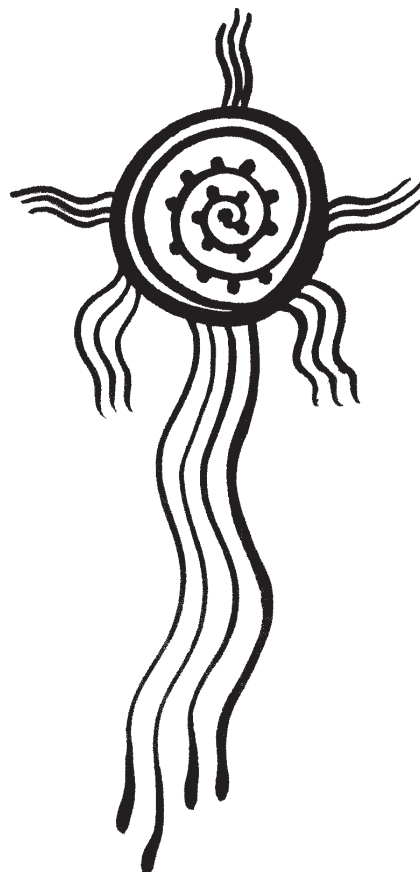
3) If you have technical/scientific questions about coral, please conduct as much preliminary research into a topic as possible before posting a query to the list. (In other words, you shouldn't expect others to do your research for you.) Please consider:

- Your librarian (an extremely valuable resource),
- The CHAMP Literature Abstracts area at the CHAMP Web Site:
<http://coral.aoml.noaa.gov>
- The CHAMP Online Research@s Directory (i.e., search for your topic, ask the experts directly),
- The CHAMP (and other) Web sites' links page(s)

But please *do* avail yourself of the list when you've exhausted other sources.

5) Please carefully consider the purpose of iyor-list before posting a message. This is a forum comprised of conservation groups, scientists, aquariums, government agencies and others interested in sharing ideas about IYOR.

6) Succinct postings are greatly appreciated by all.



TRADITIONAL MARINE RESOURCE MANAGEMENT AND KNOWLEDGE

RECENT PUBLICATIONS



Guardians of Marovo Lagoon: Practice, Place and Politics in Maritime Melanesia.

HVIDING, E. (1996). *Guardians of Marovo Lagoon: Practice, Place and Politics in Maritime Melanesia*. Pacific Islands Monograph Series 14, University of Hawaii Press, Honolulu, Price USD 45.00 (cloth). 473 p.

Based on almost two and one half years of fieldwork, Hviding examines the marine tenure system of the people of Marovo Lagoon, New Georgia, Western Solomon Islands. The author examines in meticulous detail the complex inter-relationships between the people of Marovo and their lagoon and marine environments. He also carefully documents the his-

torical and contemporary external forces that impinge on the Marovo people and their struggle to remain in control of their own resources and destiny. This case study is a major contribution to the maritime anthropology. It is also an outstanding demonstration of how to bridge the social and natural sciences by weaving together concepts from cultural anthropology and cultural ecology with those from history and marine biology.

(To obtain, contact: University of Hawaii Press, 2840 Kolowalu Street, Honolulu, Hawaii, USA 96822.)

Relationships between catch and effort in Fijian multispecies reef fisheries subject to different levels of exploitation.

JENNINGS, S. & N.V.C. POLUNIN. (1995). *Relationships between catch and effort in Fijian multispecies reef fisheries subject to different levels of exploitation*. *Fisheries Management and Ecology* 2: 89-101.

The catch per unit effort (CPUE) and value of catch per unit effort (VPUE) of reef-associated fish species from six Fijian traditional fishing grounds (*qoliqoli*) subject to different fishing intensities were determined using records of fishing activity from a voluntary logbook scheme. Line and spear fishing techniques were used during more than half the fishing time in all *qoliqoli*, despite the favoured technique being less efficient (lower CPUE) than other methods. This implies that fishers do not

always attempt to maximise catches. Fishing effort in the different *qoliqoli* was compared by rescaling effort based on its recorded efficiency and expressed as hours equivalent to boat-based spear fishing over coral by day to catch fish for sale. Total fishing intensity in the six grounds studied ranged from 72 to 4310 h km⁻² reef year⁻¹. Since the relationship between catch and effort at all fishing intensities was linear, it suggests that the grounds are being fished sustainably.

(First author's address: School of Biological Sciences, University of East Anglia, Norwich, NR4 7JJ, UK; and Ministry of Agriculture, Fisheries and Food, Fisheries laboratory, Lowestoft, NR33 0HT, UK.)

Comparative size and composition of yield from six Fijian reef fisheries.

JENNINGS, S. & N.V.C. POLUNIN. (1995). Comparative size and composition of yield from six Fijian reef fisheries. *Journal of Fish Biology* 46: 28–46.

The size and composition of finfish yield from six Fijian reef was determined using catch records from a voluntary logbook scheme. A total of 172 logbooks was issued for three 30-day periods. They provided information on 1369 fishing trips. Catch records were weighed, using the results of contemporaneous fishing activity and fleet sizes surveyed to provide yield estimates for each fishing traditional ground (*qoliqoli*). Yields from all grounds were dominated by Serranids and Lethrinids, favored for

both consumption and sale. There was no evidence of the adoption of more powerful fishing techniques or catching fishing from lower trophic levels to maintain maximum yield. The authors suggest that the fisheries examined could sustain the reported yields of up to 3.4 t/km² ground /year or 10.2 t/km² coral reef/year, and that yields might be increased on other sites were smaller harvests were reported.

(First author's address: School of Biological Sciences, University of East Anglia, Norwich, NR4 7JJ, UK; and Ministry of Agriculture, Fisheries and Food, Fisheries Laboratory, Lowestoft, NR33 0HT, UK.)

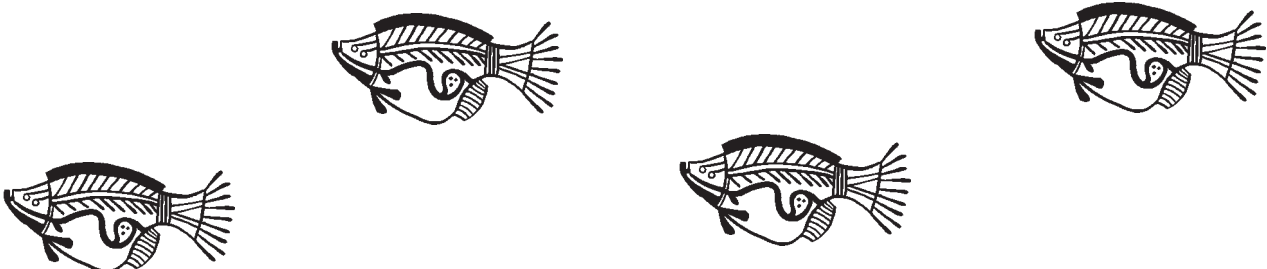
Fishing strategies, fishery development and socioeconomics in traditionally managed Fijian fishing grounds.

JENNINGS, S. & N.V.C. POLUNIN. (1996). Fishing strategies, fishery development and socioeconomics in traditionally managed Fijian fishing grounds. *Fisheries Management and Ecology* 3: 335-347.

An increasing rate of urbanisation together with more Fijians in full-time employment has led to both a greater demand for fish and higher prices. Traditionally-managed reef fisheries are now exploited to meet existing subsistence needs and to supply large urban markets. The fishing strategies employed by fishers in the communities were compared at different stages of their development toward a market economy. It was

suggested that the fishing-rights owners have expanded their fisheries for economic gain, but that so far such expansion has had only minimal impact on preferred fishing strategies and management regimes. However, the socio-economic impact of the transition to a market economy is profound, with increasing reliance on fishery incomes.

(First author's address: School of Biological Sciences, University of East Anglia, Norwich, NR4 7JJ, UK; and Ministry of Agriculture, Fisheries and Food, Fisheries Laboratory, Lowestoft, NR33 0HT, UK.)



Comparative size and composition of yield from six Fijian reef fisheries.

MATTHEWS, ELIZABETH (ed.) (1995). *Fishing for Answers: Women and Fisheries in the Pacific Islands*. Women and Fisheries Network, University of the South Pacific. 177 p. (No price given).

This volume of 15 papers highlights and addresses the major concerns that face women involved in fisheries. It is a valuable contribution to a growing yet still relatively meager literature, and provides important lessons to fisheries planners and all involved in the sustainable use of tropical fisheries. The contents are:

- 'Women in fisheries in the Pacific islands: a retrospective analysis' (P. Schoeffel)
- 'Roviana women in traditional fishing' (L.Gina-Whewell)
- 'Notes from Kiribati (August 1992)' (T.Taniera and J. Mitchell)
- 'Fishing activities of women of the Suva Pony Club squatter settlement, Fiji' (A.Tiraa-Passfield)
- 'Edible seaweeds: an important source of food and income to indigenous Fijians' (G.R.South)
- 'Women workers in the Taiyo cannery, Noro, Solomon Islands' (M. Sasabe)
- 'Teach a woman to process fish and ...' (P.Fairbairn-Dunlop)
- 'Changes to women's roles in fisheries development in Fiji' (V. Ram-Bidesi)
- 'Security, women and tuna: a look at Fiji' (R.Alexander)
- 'Subsistence fishing, women and modernisation in Fiji' (A. Vunisea)
- 'Linking population, environment, and gender: the case of Suva harbour' (M.Chung)
- 'The need for invertebrate conservation in the Pacific islands' (E.Matthews)
- 'For food or foreign exchange? Subsistence fisheries and the commercial harvesting of marine resources in the Pacific' (C.Slatter)
- 'Women in Pacific island fisheries: an annotated bibliography' (C. Whippy-Morris)
- 'Not just talk: the discussions that spawned the Women and Fisheries Network' (The Women and Fisheries Network).

(Editor's address: c/o The Women and Fisheries Network, Private Mail Bag, Suva, Fiji.)

The Roles of Women in Fisheries: A Selected Annotated Bibliography.

WHIPPY-MORRIS, C. (compiler) (1995). *The Roles of Women in Fisheries: A Selected Annotated Bibliography*. Technical Report 1995 No. 1. The University of the South Pacific Marine Studies. USP, Suva. 45 p. (no price given). (Reprinted in Matthews, E. (ed.), above).

This publication is the beginning of a database of recent publications (1979-1994) on women in fisheries. It contains 143 entries of publications with world-wide coverage, with an emphasis on

the Pacific Islands. Annotations are provided of those publications that were examined by the compiler. The bibliography can also be accessed at the International Oceanographic Institute Operational Centre, at the University of the South Pacific.

(Compiler's address: c/o The Women and Fisheries Network, Private Mail Bag, Suva, Fiji.)



TRADITIONAL MARINE
RESOURCE MANAGEMENT
AND KNOWLEDGE

MISCELLANEOUS



1997 CONFERENCES

17-19 March *Fourth International Conference on Remote Sensing for Marine & Coastal Environments: Technology & Applications.*

Venue: Orlando, Florida.

Contacts: Tel: +1-313-994-1200 x 3453; FAX: +1-313-994-5123

e-mail: raeder@erim.org

Website: <http://www.erim.org/CONF/conf.html>

24-27 March *California and the World Ocean '97 Conference*

Venue: San Diego, California.

Contacts: Tel. +1-707-987-2385 x 208; e-mail: otmagoon@aol.

Website: <http://ceres.ca.gov/cra/ocean/>

4-9 May MARTINIQUE '97: Island & Tropical Aquaculture

Venue: Les Trois-Ilets, Martinique, West Indies

Contacts: European Aquaculture Society, MARTINIQUE '97, Slijkenseteenweg 4, B-8400 Oostende, Belgium. Tel: +32-59-32-38-59; Fax +32 59 32 10 05; e-mail: eas@unicall.be

Website: <http://allserv.rug.ac.be/~jdcaiuwe/easho.htm>

May 12-14 Oceanology International Pacific Rim 97

Venue: Singapore

Contacts: Angela Paderzoli, Conference Executive, Spearhead Exhibitions Ltd., Ocean House, Kingston Rd., New Malden, Surrey KT3 3LZ, UK. FAX: +44-181-949-8186; e-mail: sec@mba.ac.uk

23-25 June COASTAL 97: *Computer Modeling of Seas & Coastal Regions*

Venue: La Coruna, Spain.

Contacts: Sue Owen, COASTAL 97, Wessex Institute of Technology, Ashurst Lodge, Ashurst, Southampton, SO40 7AA, UK.

Tel: +44-(0) 1703-293223; FAX: +44-(0)1703-292853; e-mail: Liz@wessex.witcmi.ac.uk

20-26 July *The International Coastal Zone Management Conference, CZ97*

Venue: Boston, Mass.

Contacts: Dr. Martin C. Miller, USAE Waterways Experiment Station, Attn.: CEWES-CR-O, 3909 Halls Ferry Rd., Vicksburg, MS 39180.

Tel: +1-601-634-3999; e-mail: m.miller@cerc.wes.army.mil

7-11 September *Pacific Coasts & Ports*

Venue: Christchurch, New Zealand

Contacts: John Lumsden, Conference Chairman, Centre for Advanced Engineering, University of Canterbury, Private Bag 4800, Christchurch, New Zealand.

Tel: +64-3-364-2219; FAX: +64-3-364-2069; e-mail: j.lumsden@cae.canterbury.ac.nz.

Website: <http://www.cae.canterbury.ac.nz/coastal/pacific.html>

8-11 September *First International Symposium on Stock Enhancement & Sea Ranching*

Venue: Bergen, Norway.

Contacts: PUSH, Bontelabo 2, N-5003, Bergen, Norway. Tel: +47-55-317395;

e-mail: borthen@telepost.no; Website: <http://www.irm.no./sear.hav97.html>



Traditional knowledge of Caribbean fishers ¹

Because fishers in most Caribbean islands are relative newcomers to the region (in the last 300 years), having come from distant and often inland areas, traditional knowledge and management systems for Caribbean marine resources are not likely to be as well developed as in other parts of the world, such as the Pacific Islands. Indigenous peoples are more common in the Caribbean countries of the South and Central American mainland. However, I know of no studies of traditional knowledge or management practices among these people. Nonetheless, it is now becoming apparent that there is a valuable accumulation of knowledge among Caribbean fishers which should be tapped. Only recently have there been explicit attempts to acquire and document this knowledge. The abstracts provided here represent some of the studies which have been carried out.

One area in which fisher knowledge has the potential to be particularly useful in the short term is the identification of spawning aggregations of reef fishes, mainly snappers and groupers. These have been fished out in many places (e.g., AUIL-MARSHALLECK, S. 1993. A review of the occurrence of spawning aggregations in the Caribbean and the implications for fisheries management. CARICOM Fisheries Resource Assessment and Management Program LPRSF Assessment SSW/WP/24: 44 p.). Fisher knowledge is the only way that the original extent, timing and location of now extinct or very depleted spawning aggregations can be determined. This information is essential if there is to be successful rehabilitation of the populations of these fishes to levels where they can re-establish viable spawning aggregations.

Another potentially valuable area is in the identification of areas and species known for their high incidence of ciguatoxicity. A study in progress by the CARICOM Fisheries Program (contact Susan Singh-Renton e-mail CFRAMP@Caribsurf.com)

has shown that fishers know and can identify such areas. These areas may be best used for non-consumption purposes, such as SCUBA diving. They could be closed to protect consumers, while still serving as a spawning stock biomass to enhance recruitment to adjacent areas.

GOMES, C., R. MAHON, S. SINGH-RENTON & W. HUNTE. (1995). The role of drifting objects in pelagic fisheries in the southeastern Caribbean. CARICOM Fishery Research Document No. 13: 45 p. Marine Resource Environment and Management Program (MAREMP), University of the West Indies, Cave Hill, Barbados (e-mail maremp@sunbeach.net)

To determine whether information acquired directly from fishers can be valuable in investigating the role of drifting objects in fisheries for pelagic species in the southeastern Caribbean, a questionnaire survey was conducted of 253 fishers from St. Lucia, Barbados, Grenada, Tobago and St. Vincent. Results indicate that drifting objects play an important role in large pelagic fisheries in the south-eastern Caribbean, by attracting fish and thereby increasing the availability of fish to fishers. This effect is seasonal, being greatest between January and March in all islands, but having a more extended seasonal duration in Grenada and Tobago. Drifting objects are prevalent in water which is green or brown in colour, and fish associate with both natural and anthropogenic drifting objects, with no apparent preference within or between these groups. Fishers actively seek and fish around drifting objects. Fishers from St. Lucia, Barbados, Grenada, and Tobago target flying fish by deploying drifting objects which they construct of naturally-occurring material. However, no fishers deploy drifting objects to target large pelagics. In this study, the fisheries and biological – oceanographic information obtained from fishers was largely consistent with relevant information reported in the literature.



¹ Contributed by Dr. Robin Mahon, 48 Sunset Crest, St. James, Barbados (rmahon@caribsurf.com).

MARTINEZ, J. E. & M. VALDES PIZZINI. (1996). Culture and development: historical distortions of conservation efforts in the fisheries of southwestern Puerto Rico. Presented to the 49th Annual Meeting of the Gulf and Caribbean Fisheries Institute, Barbados.

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An historical analysis of the fisheries in southwestern Puerto Rico suggests that government development efforts (both local and federal) have contributed to the depletion of marine resources, despite official advocacy for conservation practices. Through years of daily contact with resources, local fishers have also developed perceptions and cultural constructions of conservation and unsustainable practices. It is argued that productive and social processes in the fisheries are heavily influenced by market forces. Thus, the practices of small-scale fishers, as well as their cultural perceptions on conservation issues are often 'distorted' by such forces, fitting into their logic of production and reproduction of daily life. It is this logic and cultural construction that tends to influence their decisions related to the technology they use and the fishing grounds that they exploit. This paper explores the many instances in which the fishers in southwestern Puerto Rico express through their discourses about production the importance of conservation practices. It also takes a critical look at the actual conservation practices and those circumstances that prevent full sustainability on their behalf. Perhaps the most crucial speech and praxis event related to conservation is the action movement towards the development of a Marine Fishery Reserve (MFR). The fishers from La Parguera chose a reef

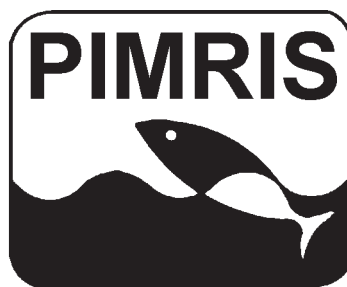
area for designation as a MFR, thus countering the local and government view of them as non-conservationist. Using data collected by ethnographic methods and in-depth interviews, the authors discuss and analyse the historical patterns of resource use in the area, the conservation practices and discourses of the fishermen, and the array of socio-economic pressures that 'distort' the local efforts towards conservation.

VALDES PIZZINI, M., J. POSADA, M. ROSADO, I. LOPEZ & D. CABAN. (1996). Cognitive constructions of fishery resources among the fishers of Southwestern Puerto Rico. Presented to the 49th Annual Meeting of the Gulf and Caribbean Fisheries Institute, Barbados.

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Fishery and marine resources exist in two different dimensions: in the environment and habitats, and in the cognitive (cultural) constructions of the fishers. Popular (folk) knowledge of marine resources and their spatial distribution is the result of years of observation, formal / informal learning through information transfer, and experimentation. More important, it is based on the formulation and articulation of a schema, or cognitive model, developed over time. This paper discusses the results of an interdisciplinary project (anthropology, popular knowledge and fisheries biology) that explores the schema and local system of classification and understanding of fishery resources. Data used were derived from ethnographic observations, informal interviews, and various in-depth interviews that included free-listing and pile-sorting procedures. Preliminary analysis shows that species are grouped by habitat and behaviour which correlates to fishers' productive behaviour.

PIMRIS is a joint project of 5 international organisations concerned with fisheries and marine resource development in the Pacific Islands region. The project is executed by the South Pacific Commission (SPC), the South Pacific Forum Fisheries Agency (FFA), the University of the South Pacific (USP), the South Pacific Applied Geoscience Commission (SOPAC), and the South Pacific Regional Environment Programme (SPREP). Funding is provided by the Canadian International Development Agency (CIDA) and the Government of France. This bulletin is produced by SPC as part of its commitment



Pacific Islands Marine Resources Information System

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

