

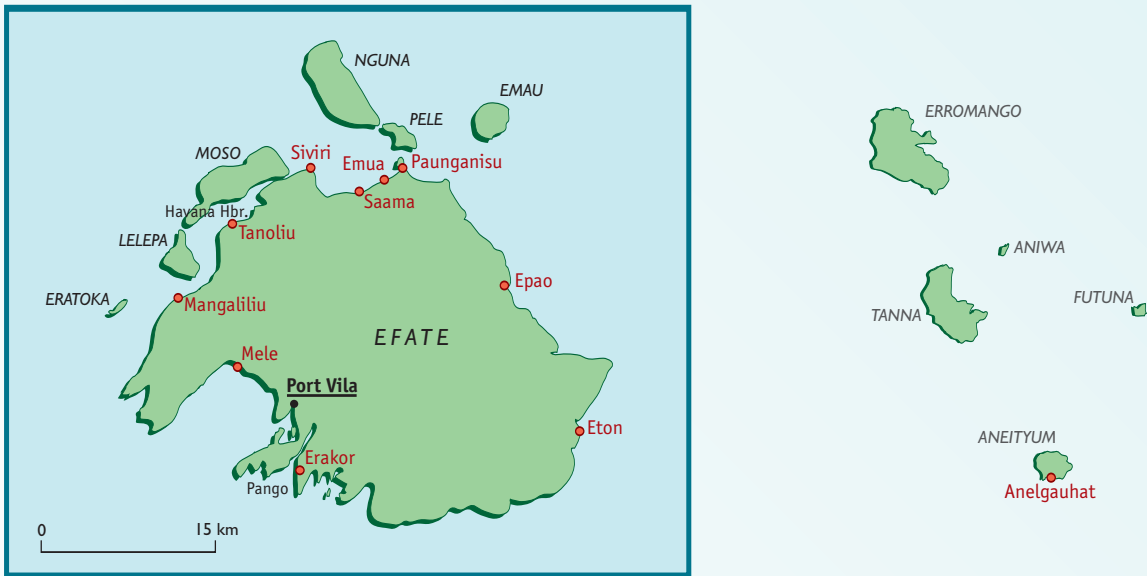
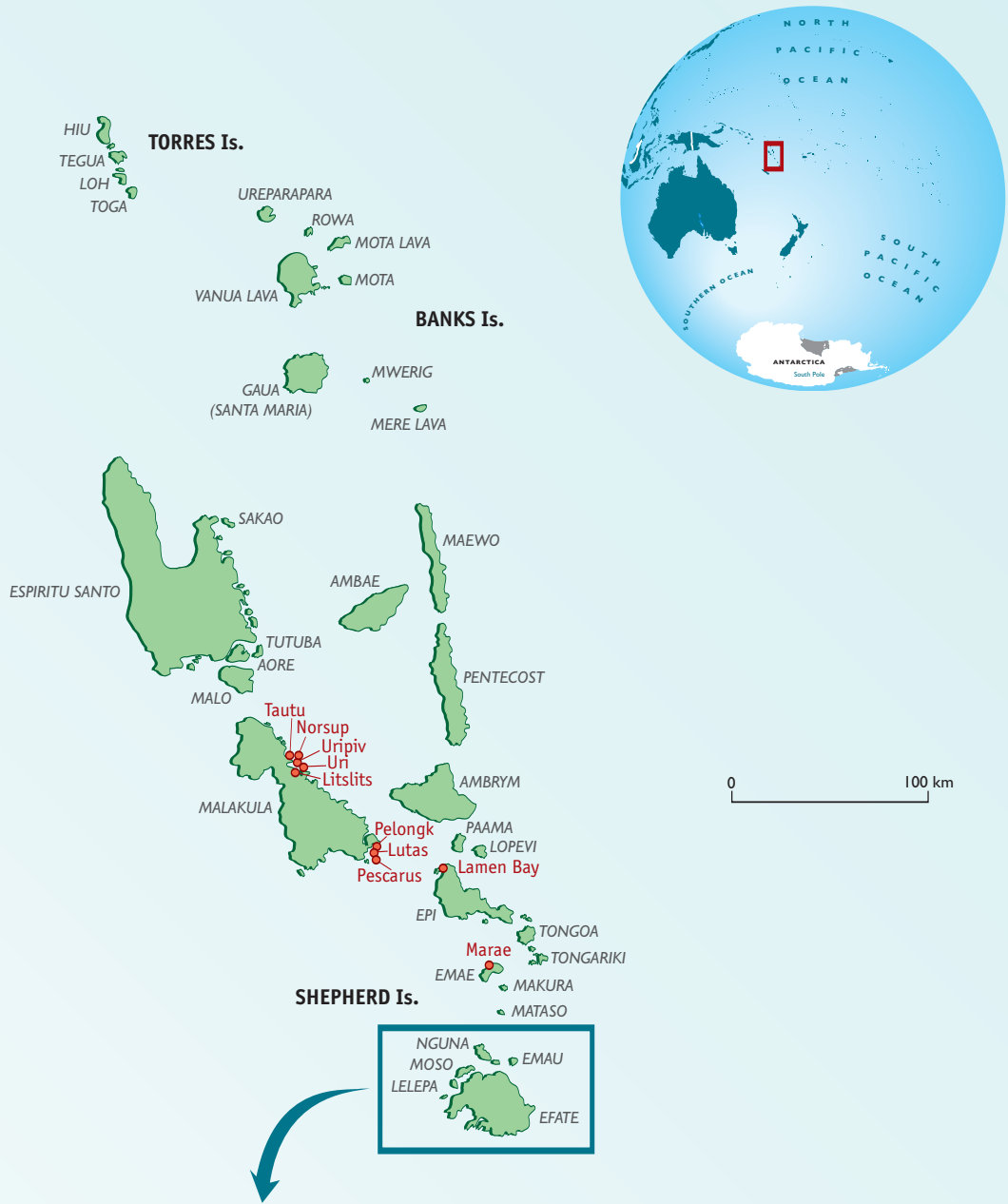
Evolution of
village-based
marine resource
management in

VANUATU



Vanuatu marine resource management survey sites

(The survey sites are marked in red)





**Evolution of village-based
marine resource management in**

VANUATU

between 1993 and 2001

by R. E. Johannes and F. R. Hickey

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The 'Coastal region and small island papers' series was launched by the Organization in 1997.
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The Local and Indigenous Knowledge Systems (LINKS) initiative is a cross-cutting theme project launched by UNESCO in 2002.
website: <http://www.unesco.org/links>

Cover photos:

Background: Relaxing out on the water as sunset approaches on north Pentecost; *top:* A fisher throws his cast net in the sandy shallows off Santo; *middle:* Green turtle swimming near the Maskelyne islands, south Malekula; *bottom:* A tabu leaf indicator found at Lamén Bay, north Epi. This leaf signifies that a clan's fishing area is closed to all fishing due to the death of a clan member.

Photo credits: Francis R. Hickey; photos on p.24, courtesy of Wan Smolbag Theatre.

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Foreword

In 1995 the intersectoral platform for Environment and Development in Coastal Regions and in Small Islands (CSI) was created within the United Nations Educational, Scientific and Cultural Organization (UNESCO) with the express mandate to follow up issues concerning sustainable living and development in small island countries such as Vanuatu. Traditional marine management regimes are of particular importance in this area and recent attention at the World Summit for Sustainable Development in Johannesburg in 2002 has focused renewed interest on the interrelationships between biological and cultural diversity. In addition, a full and comprehensive review of the Small Island Developing States' Programme of Action, adopted in Barbados in 1994, is being carried out under the aegis of the United Nations Commission on Sustainable Development. This will lead to an international meeting in Mauritius in January 2005 and to refocussing of further implementation. Consequently it is especially timely that reports such as the current volume can be highlighted to contribute to this process and draw attention to the critical importance of traditional knowledge and resource management at the community level. As the Programme of Action noted in Paragraph 43:

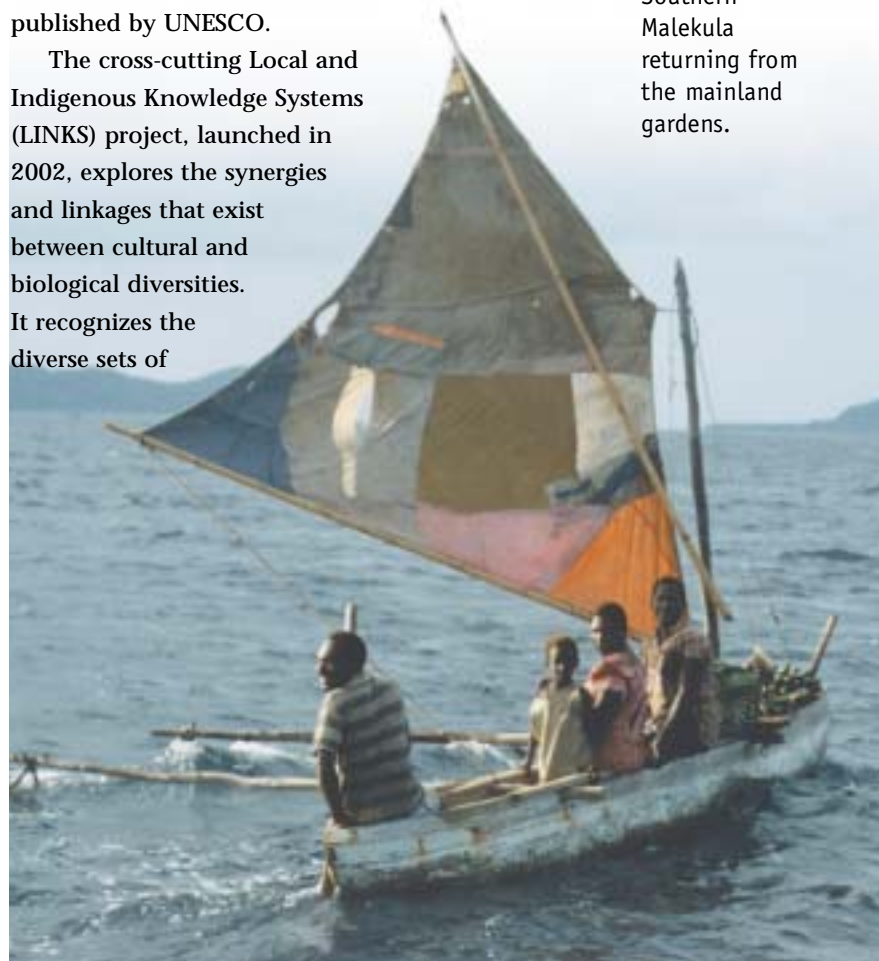
'The nature of traditional, often communal land and marine resource ownership in many island countries requires community support for the conservation effort. Without that local support and commitment and the opportunity to integrate sustainable income generation into the conservation effort, even the most highly studied and well planned conservation area will not be sustainable.'

Indigenous knowledge, also referred to as traditional knowledge, has emerged as a priority concern on the international environment and

development agenda. Work in this domain has nonetheless been ongoing for several decades. Already in the 1970s and 80s, traditional marine resource management systems in the Pacific Basin were under investigation through UNESCO's Coastal Marine Programme. In fact, Bob Johannes, one of the authors of the current report, was a major contributor to this effort and, in collaboration with Ken Ruddle, edited two benchmark publications, 'The Traditional Knowledge and Management of Coastal Systems in Asia and the Pacific' (1985) and 'Traditional Marine Resource Management in the Pacific Basin' (1990); both volumes were published by UNESCO.

The cross-cutting Local and Indigenous Knowledge Systems (LINKS) project, launched in 2002, explores the synergies and linkages that exist between cultural and biological diversities. It recognizes the diverse sets of

A sail canoe of the Maskelyne Islands, Southern Malekula returning from the mainland gardens.



knowledge and representations of nature anchored in cultures around the world, and affords them a central role in shaping biodiversity conservation priorities and processes. The aims of the LINKS project are twofold: to strengthen local community control over processes of ecological, social and cultural change, and to revitalize traditional knowledge transmission within local communities.

Many people have contributed to this publication. Sincere thanks for the support from all the people at the Department of Fisheries, in particular Moses Amos, Director of Fisheries, William Naviti, Senior Resource Manager, Graham Nimoho, the Principal Fisheries Extension Officer, and Felix Ngyuen and John Mahit from the Research Section. Thanks also to the Environment Unit and to Wan Smolbag, and especially to the Vanua-tai resource monitors who

have taken up their management roles in rural communities with such enthusiasm. Special thanks also to all the committed people of the Vanuatu Cultural Centre, including the network of fieldworkers who work tirelessly to support the value and transmission of traditional knowledge in Vanuatu. And many thanks to linguist Catriona Hyslop for translating the Executive Summary into Bislama. Finally, a heartfelt thanks to all the Chiefs of the villages visited and to other informants who took time to contribute to this survey, particularly the cheerful Karl Plelo in Central Malekula and Dick Dickenson of the Cultural Centre who helped greatly in southern Malekula.

Dirk Troost – Chief CSI

Douglas Nakashima – Team Leader LINKS

Derek Elias – Editor

Memorial for a remarkable man -

ROBERT E. JOHANNES

It is indeed an honor to dedicate this posthumous publication¹ to the memory of Bob Johannes, who passed away in September 2002. Bob was a true pioneer, a colleague, a source of enormous inspiration and, I am honoured to say, a friend. He was also a visionary who introduced a number of new and, at the time, radical paradigms regarding the management of nearshore reef fisheries. He realized that the conventional scientific approach to tropical fisheries management was seriously flawed in that it lacked a consideration of perhaps the most important component of managing fisheries, the human component. Imposing the rigorous tenets of fisheries models intent on realizing an optimum or maximum sustainable yield on a traditional fishery in the Pacific was just not going to work. Bob had the insight and pragmatic sense to break from established scientific conventions to seriously consider the existing customs, social and economic needs of local communities and to advocate for culturally sensitive management plans that considered and addressed all of these needs.

Bob also opened our eyes to respect the knowledge gained from centuries of observation and intimate association with the natural world held by people living in traditional societies. He systematically revealed to us that these people were indeed 'Natural Scientists' with far greater knowledge of the resources they depended on than a scientist with a handful of degrees. Bob

had the respect, humility and conviction in his beliefs to go and live with a rural community in Palau in the 1970s (despite his colleagues in the scientific community accusing him of 'going troppo'), in order to scientifically document the knowledge these traditional fishers held. The landmark publication 'Words of the Lagoon', now a classic work in ethnobiology, was the popular product of that extended field trip. His insights helped the western world to shake off yet another layer of the ethnocentric mentality that the knowledge held by traditional societies was of a primitive nature.

Vanuatu was fortunate to have the direct benefit of Bob's insights and support for community-based co-management. His survey of 26 villages in 1993 showed clearly for the world to see that the ancient systems of customary marine tenure continue to provide an ideal framework for communities to effectively manage their own resources and is sufficiently adaptable to be applied to contemporary fisheries management. His support for the Vanuatu Department of Fisheries' early cooperative work in managing trochus and other nearshore reef resources helped to raise the profile of these community-based grass roots management strategies. He eloquently contrasted their success with the less impressive results of the multi-million dollar donor-driven aid development efforts to increase fisheries production and improve nutrition.

Bob went on to advocate a new direction and emphasis in fisheries extension work in the Pacific, which focused on cooperative management for improved nearshore fisheries as a priority. He highlighted the value for training

¹ This posthumous publication is based on an earlier report submitted by R. E. Johannes and F. R. Hickey to the Coastal Regions and Small Islands platform, UNESCO.

extension personnel to include social science research methodology to assist with this new emphasis. Even bolder, he championed the idea that data-less management based on traditional and scientific knowledge, coupled with cooperative and adaptive management strategies, offered a practical solution to the enhanced management of tropical multi-species fisheries. The respect and credibility that Bob earned amongst the scientific community helped to convince donors and politicians that community-based cooperative management was indeed not only viable but preferable and deserved further support. Who could possibly be better placed and motivated to manage one's own resources than those living with and dependant upon them and those who had inherited so much management-relevant traditional knowledge? Bob never missed an opportunity to advocate for more support and resources to be given to community-based management, and tirelessly demonstrated to us why this should be so through his extraordinary research and publication record².

It was Bob's idea to re-survey these villages some eight years later to document the outcome of the earlier initiatives of rural Vanuatu communities to better manage their own resources based on their ancient traditional framework of customary marine tenure. I am convinced it was one of the things Bob considered important to do before taking his leave. The findings of this new survey validate Bob's convictions that Vanuatu's coastal communities are highly motivated and have the capacity, utilizing the support and assistance of some well directed awareness input, to continue to adapt their ancient systems of management to the pressures of the modern world.

Although Bob, as mentor and warm hearted friend, will be sorely missed by all who knew him, we can be thankful for the vast amount he

has published to continue to guide and provide the wisdom we will need to remain true to his vision. Bob planted the seeds of change, energetically and intelligently nurtured them and lived to see the fruits of those efforts. Much of what he proposed regarding the value of traditional knowledge and management systems to fisheries management is now accepted practice and is applied in various fisheries throughout the world. I am sure it was only then that he allowed himself to take the step to set himself free of the pain he felt due to his illness. I am also sure he left knowing he had lived his life well and fully, and that he had truly made a difference to the people he had set out to assist.

Bob, may you rest in peace and be assured that we will continue to strive to see the things you saw so clearly and easily, and nurture the seeds and fruits of your life's work.

Francis R. Hickey

June, 2003

Vanuatu Cultural Centre

PO Box 184, Port Vila, Vanuatu

² Special Edition of the Secretariat of the Pacific Community's Traditional Marine Resource Management and Knowledge Information Bulletin, March 2003, which is dedicated to the life and memory of R. E. Johannes and includes his achievements, contributions and publication record (<http://www.spc.int/coastfish/News/Trad/Sp1/Sp1.htm>).

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Executive summary

A 1993 study of coastal villages in Vanuatu, an archipelago in the tropical western Pacific, revealed that, within the previous three years, marine resource management measures, designed to reduce or eliminate overfishing or other damaging human impacts on marine resources, had rapidly increased.

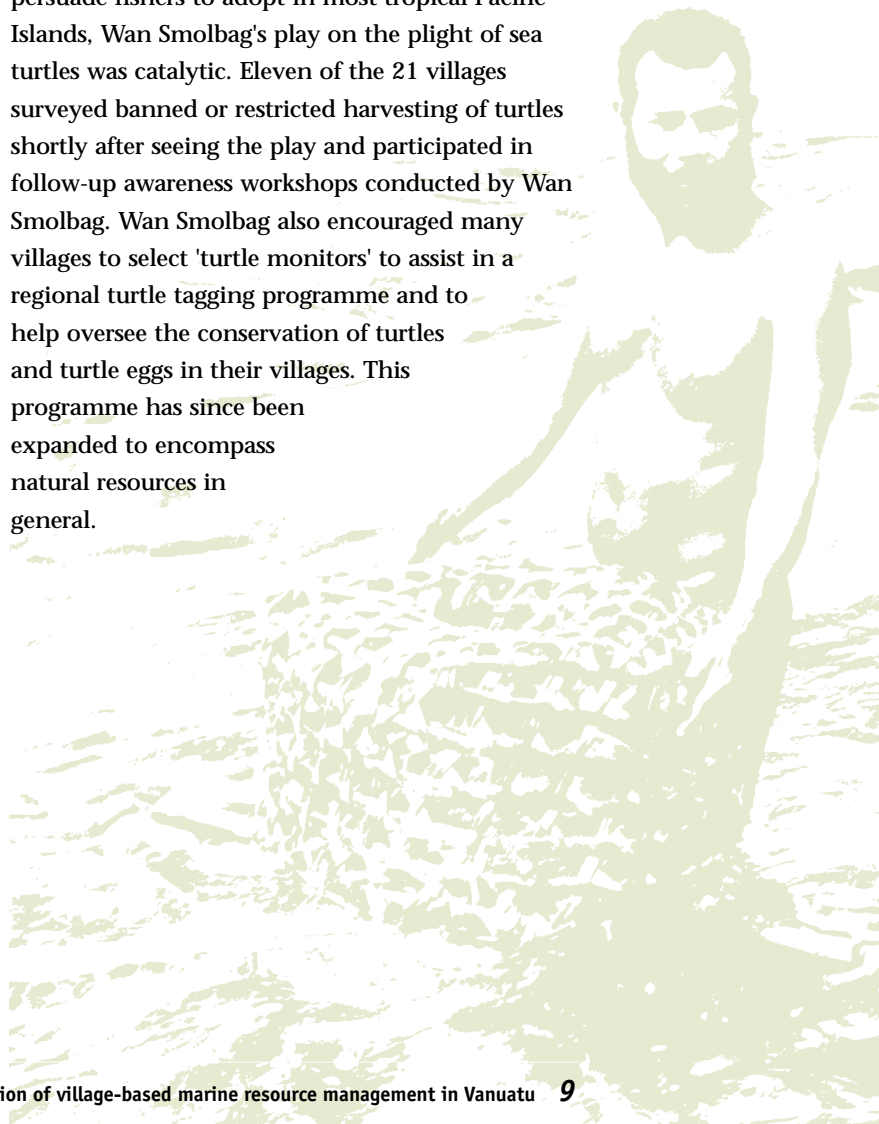
The main impetus for these events was the Vanuatu Department of Fisheries' promotion of a voluntary village-based trochus management programme. Trochus is a large marine snail whose shell is sold for making buttons, inlay in fine wood carvings and as an ingredient in certain paints, and is rural Vanuatu's largest commercial marine export. Initially the programme involved only a few fishing villages and the Department surveyed their community trochus stocks and advised villagers on the benefits of regular several-year closures of their trochus fishery, followed by brief openings. It was left to the villagers to decide whether or not to act on this advice.

The 1993 study revealed that villages that followed this advice found it so profitable that other villages quickly followed suit. Furthermore, observing what conservation could do for their trochus stocks, many villages decided to implement their own conservation measures to protect other marine animals, including finfishes, lobsters, clams, bêche-de-mer (sea cucumbers) and crabs, as well as to ban or restrict certain harmful fishing practices such as night spearfishing and the use of nets, especially gillnets. One of the surveyed villages had also set up a marine protected area and stocked it with giant clams (*Tridacna* spp.).

In 2001, 21 of the villages originally surveyed in 1993 were revisited in order to determine how successful these community-initiated management measures had been in the eyes of the villagers. The main criterion for assessment

was based on determining how many marine resource management measures had lapsed and how many new ones had been initiated. The results revealed that village-based marine resource management measures had more than doubled between 1993 and 2001.

While the Department of Fisheries continued its extension work in the villages and broadened its scope, another potent source of motivation for village-based marine resource management was the renowned travelling theatre group, Wan Smolbag. Although conserving sea turtles has proven to be one of the most difficult conservation measures to persuade fishers to adopt in most tropical Pacific Islands, Wan Smolbag's play on the plight of sea turtles was catalytic. Eleven of the 21 villages surveyed banned or restricted harvesting of turtles shortly after seeing the play and participated in follow-up awareness workshops conducted by Wan Smolbag. Wan Smolbag also encouraged many villages to select 'turtle monitors' to assist in a regional turtle tagging programme and to help oversee the conservation of turtles and turtle eggs in their villages. This programme has since been expanded to encompass natural resources in general.



Several lessons emerged from the study.

1. When properly targeted, village education on marine conservation can be a very powerful tool.
2. The initial focus of both the Department of Fisheries and Wan Smolbag on single important animals (i.e. trochus and turtle) seems to have been more effective in enhancing village conservation awareness than if total coastal resource management had been targeted right away.
3. The study supported the finding that customary marine tenure (the traditional right of villagers to control activities on their traditional fishing grounds and to exclude outsiders) provides the essential foundation for nearshore marine resource management in Vanuatu.
4. One way of encouraging the resolution of customary marine tenure disputes is the withholding of outside marine resource management assistance from villages where such disputes are active.
5. Government personnel and aid donors need to be aware of the fact that subsistence fishing in nearshore waters is worth more in almost all Pacific island economies (including Vanuatu's) than nearshore commercial fishing. The distribution of government fisheries management resources often suggests the opposite. Fisheries extension work targeting village-based marine resource management deserves significant support.

Résumé analytique

Une étude menée en 1993 sur des villages côtiers de Vanuatu, archipel du Pacifique tropical occidental, a montré qu'au cours des trois années précédentes le nombre de dispositions concernant la gestion des ressources marines visant à éliminer la surpêche, ou tout autre effet nocif d'une activité humaine, avait connu une augmentation rapide.

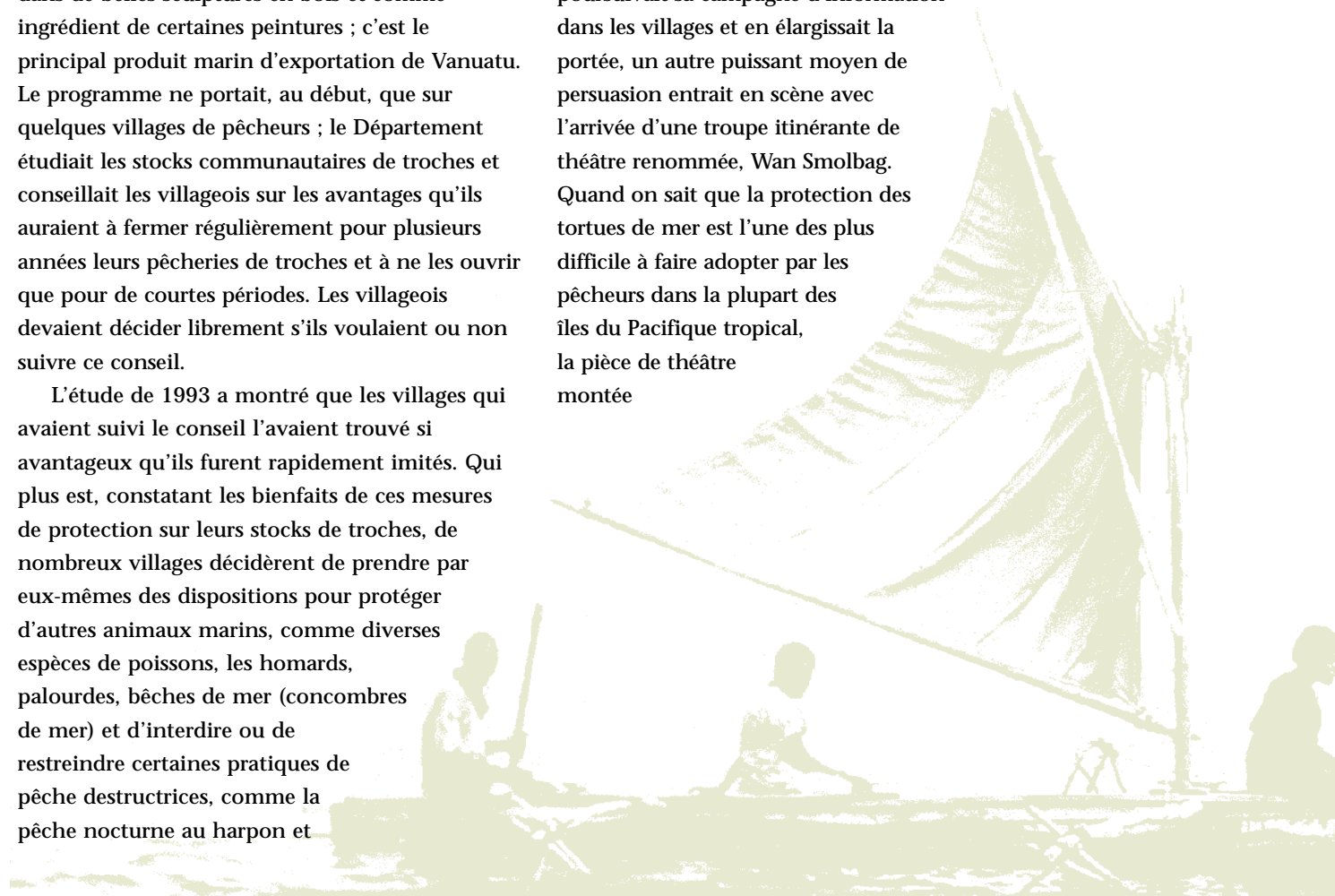
Tout a commencé lorsque le Département des pêches de Vanuatu a lancé une campagne invitant les villageois à gérer, s'ils le désiraient, un programme d'exploitation des troches. La troche est un gros escargot de mer dont on vend la coquille pour faire des boutons, des incrustations dans de belles sculptures en bois et comme ingrédient de certaines peintures ; c'est le principal produit marin d'exportation de Vanuatu. Le programme ne portait, au début, que sur quelques villages de pêcheurs ; le Département étudiait les stocks communautaires de troches et conseillait les villageois sur les avantages qu'ils auraient à fermer régulièrement pour plusieurs années leurs pêcheries de troches et à ne les ouvrir que pour de courtes périodes. Les villageois devaient décider librement s'ils voulaient ou non suivre ce conseil.

L'étude de 1993 a montré que les villages qui avaient suivi le conseil l'avaient trouvé si avantageux qu'ils furent rapidement imités. Qui plus est, constatant les bienfaits de ces mesures de protection sur leurs stocks de troches, de nombreux villages décidèrent de prendre par eux-mêmes des dispositions pour protéger d'autres animaux marins, comme diverses espèces de poissons, les homards, palourdes, bèches de mer (concombres de mer) et d'interdire ou de restreindre certaines pratiques de pêche destructrices, comme la pêche nocturne au harpon et

l'emploi de filets, notamment de filets maillants. L'un des villages étudiés avait même créé une zone marine protégée pour y stocker des palourdes géantes (*Tridacna* spp.).

En 2001, vingt et un des villages qui avaient fait l'objet de l'étude de 1993 ont été visités de nouveau, afin de déterminer le degré de satisfaction que ces mesures de gestion voulues par la communauté avait atteint aux yeux des villageois. Les résultats ont révélé que le nombre des mesures de gestion des ressources marines appliquées par le village avait plus que doublé entre 1993 et 2001.

Pendant que le Département des pêches poursuivait sa campagne d'information dans les villages et en élargissait la portée, un autre puissant moyen de persuasion entra en scène avec l'arrivée d'une troupe itinérante de théâtre renommée, Wan Smolbag. Quand on sait que la protection des tortues de mer est l'une des plus difficile à faire adopter par les pêcheurs dans la plupart des îles du Pacifique tropical, la pièce de théâtre montée



par Wan Smolbag sur la situation critique des tortues de mer a été décisive. Après avoir vu la pièce, onze des 21 villages étudiés ont interdit ou restreint la capture des tortues et participé à des ateliers de sensibilisation organisés par la troupe de théâtre. Wan Smolbag a également encouragé de nombreux villages à désigner des 'surveillants de tortues' pour participer à une campagne de marquage des tortues, et veiller à la protection des tortues et de leurs œufs dans les villages. Le programme a, par la suite, été étendu à la sauvegarde de toutes les ressources naturelles.

Plusieurs leçons se dégagent de cette étude :

1. Convenablement ciblée, la sensibilisation d'un village quant à la protection de la vie marine peut devenir un instrument très puissant.
2. Le choix d'une unique espèce animale importante (la troche ou la tortue) par le Département des pêches ainsi que par Wan Smolbag semble avoir été plus efficace pour sensibiliser le village que n'aurait été celui de viser dès l'abord la gestion de l'ensemble des ressources côtières.
3. L'étude a confirmé le fait que le régime coutumier de la mer (le droit traditionnel des villageois à régenter collectivement les activités menées dans leurs propres pêcheries et d'en exclure les étrangers) constitue à Vanuatu le fondement de la gestion des ressources du proche océan.
4. La résolution des conflits éventuels quant à l'exploitation coutumière de la mer est plus facile si l'on évite toute intervention extérieure pour gérer les ressources marines.
5. Le personnel administratif et les bailleurs de fonds doivent garder à l'esprit le fait que la pêche de subsistance dans les eaux côtières est plus précieuse pour l'économie de presque toutes les îles du Pacifique (y compris Vanuatu) que la pêche côtière à but commercial. La répartition des subventions gouvernementales pour la gestion des ressources marines donne souvent l'impression contraire. Les campagnes d'information visant la gestion des ressources marines par les villageois eux-mêmes méritent de recevoir tout le soutien possible.

Eksekutiv Samari

Long 1993 ol i bin mekem wan stadi blong ol vilej long Vanuatu we ol i stap klosap long solwota. Stadi ia i bin faenemaot se long trifala yia bifo long stadi hem i bin tek ples, ol man ol i bin traem blong tingting hevi blong lukaotem gud ol risos blong solwota blong olgeta. I minim se ol i bin traem blong mekem se man i no fising tumas long solwota long wan wei we bae i save mekem se ol fis bae ol i finis kwiktaem, mo ol i wantem mekem se man i no spolem ol rif mo narafala risos blong solwota.

Men risen behaen long ol aksen blong olgeta hem i se Dipatmen blong Fiseri long Vanuatu hem i bin promotem wan program long saed blong troka we i stap insaed long wanwan vilej we ol man ol i save jus blong tek pat long hem. Troka hem i wan sel we ol i stap salem blong man i mekem sam samting olsem baten, ol dekolesen blong kaving, mo blong mekem pen. Long saed blong ol ekspot blong Vanuatu we i kamaot long solwota, hemia nao men wan. Taem ol i bin statem program ia, aot long hamas hundred vilej we i stap klosap long solwota, i gat fiu nomo we i involv insaed long program ia. Dipatmen blong Fiseri i bin mekem wan sevei blong luk se hamas troka i stap yet long solwota blong olgeta. Afta ol i bin advaesem ol man long vilej se sapos ol i putum tabu blong fiu yia blong blokem ol man blong karem troka, afta ol i save tekem blong sot taem nomo long wan yia, bae i save givhan long olgeta. Ol i bin talem se sapos ol i mekem olsem insted blong karem troka eni taem truaot long yia, bae i minim se ol i save winim moa

mane long hem. Ol i bin advaesem olgeta nomo, afta ol i bin talem se i stap long ol man long vilej nomo blong disaed sapos ol i wantem mekem olsem.

Stadi we ol i bin mekem long 1993 i bin soemaot se ol vilej we ol i bin folem advaes ia ol i faenem se ol i bin mekem plante mane, mekem se ol narafala vilej ol i stat blong folem sem tingting. Mo tu, taem ol i luk se fasin blong konsevesen i save mekem namba blong troka i kam antap bakegen, plante vilej ol i bin disaed blong tekem sem aksen blong protektem sam narafala samting blong solwota, olsem ol fis, naura, natalae, besdemea mo krab. Tu, sam ol i bin putum tabu blong ol man ol i no save mekem sam kaen fising long solwota, olsem blong sutum fis long naet wetem masket mo blong yusum net, speseli ol longfala net. Wan vilej we ol i bin mekem sevei long hem ol i bin setemap wan spesol eria long solwota we ol i putum tabu blong hem, afta ol i bin putum plante natalae long ples ia.

Long yia 2001 ol i bin gobak long 21 vilej aot long ol sem vilej we ol i bin mekem sevei long hem long 1993 blong askem ol man long vilej se ol i ting se ol aksen we komiuniti i bin tekem hem i wan sakses o no. Men samting we ol i bin luk long hem i se hamas aksen we ol i bin tekem ol i lego finis mo hamas niuwan ol i bin statem. Risen bihaen long tingting ia i se blong holem taet mo mekem i kam antap ol aksen we ol i stap mekem blong protektem

ol risos blong solwota i minim se ol i luk save se long fiuja bae i benefitim olgeta bigwan. From sapos ol i jas statem nomo blong sot taem, bae ol i no save luk risal blong hem yet mo bae ol i mas lego janis blong winim mane long hem blong sot taem. Ol risal i soemaot se ol aksen we ol vilej ol i bin tekem blong protektem ol risos blong solwota ol i bin dabolem bitwin 1993 mo 2001.

Taem Dipatmen blong Fiseri i stap gohed wetem wok blong olgeta long vilej mo traem blong leftemap i kam moa bigwan, wan narafala samting tu i bin stat we i bin leftemap tingting blong ol man long vilej blong mekem se ol i tingting hevi long envaeronmen mo ol risos blong solwota. Hemia hem i grup blong Wan Smolbag, we long 1995 ol i bin mekem wan pleplei blong soemaot se namba blong ol totul i stap go daon bigwan, mo ol i bin soemaot long ol vilej long ol rurol eria. Truaot long Pasifik yumi save luk se ol man we ol i wok long saed blong konsevesen ol i faenem se i had tumas blong traem mekem ol man ol i luk save se hem i impoten tumas blong no kilim tumas totul. Be pleplei blong Wan Smolbag i rili bin kasem tingting blong ol man mo long 11 aot long ol 21 vilej we ol i bin mekem sevei long hem, ol i bin putum sam tabu blong man i no save kilim totul, afta we ol i bin lukluk pleplei blong Wan Smolbag. I no even bin gat wan long ol vilej we ol i bin traem blong stopem man blong no kilim totul, taem we ol i bin mekem sevei long 1993.

Tu, Wan Smolbag i bin enkarejem ol vilej blong jusum sam man olsem 'turtle monitors' blong givhan long wan program we i stap gohed truaot long Pasifik, blong putum mak long ol totul (tagging) mo blong lukaot long program blong sevem ol totul mo eg blong totul long vilej blong olgeta. Long 2001 i bin gat 150 'turtle monitors' we i stap long sam ples 80 vilej raon long Vanuatu. Program hem i wan bigfala saksen tumas, mekem se Wan Smolbag ol i stap givim trening long ol 'turtle monitor' blong ol i no jas luk long ol totul nomo, be se wok blong olgeta i kavremap evri kaen risos blong envaeronmen blong yumi. Ol i bin kasem sam fanding mo Dipatmen blong Fiseri wetem sam oganaesesen we ol i stap wok long saed blong konsevesen ol i stap givhan long olgeta.

I gat samfala tingting we i bin kamaot long stadi ia.

1. Sapos ol i tagetem gud, blong eduketem ol man long vilej long saed blong konsevesen long solwota, i gat bigfala paoa blong hem. Ol man blong vilej ol i bin leftemap bigwan ol aksen blong olgeta long saed blong manajem ol risos blong solwota, mo tu ol i stap respektem moa ol loa blong fiseris blong solwota blong Vanuatu.³ Wan men risen from wanem ol man long vilej ol i no bin folem ol loa ia bifo hem i from we ol i no bin save long olgeta o ol i no harem save risen blong olgeta. Taem ol i save gud long ol loa mo harem save gud risen blong olgeta, tingting blong olgeta blong folem ol loa i kam antap bigwan.
2. From se Dipatmen blong Fiseri mo Wan Smolbag, tufala i bin tagetem wanwan animol nomo fastaem, olsem troka o totul, i mekem se i moa isi blong leftemap save blong man, bitim we sapos ol i bin traem blong kavremap evri topik long saed blong konsevesen long solwota. Ol i save luk long bigfala topik bihaen. Nao ia Dipatmen blong Fiseri mo Wan Smolbag, tufala i stap mekem olsem.
3. Kastom fasin blong holdem mo lukaotem solwota hem i givim stamba tingting long saed blong hao blong manajem ol risos blong rif mo solwota long Vanuatu. Hemia hem i polisi blong Dipatmen blong Fiseri mo stadi ia tu i sapotem tingting ia. Namba blong ol aksen blong lukaotem ol risos blong solwota (ol tabu) we i stap tek ples long ol eifala vilej we ol i gat sam rao long saed blong graon blong solwota o blong laen blong jif, hem i no kasem haf kompea wetem ol 13 vilej we ol i nogat rao olsem.
4. Wan wei blong enkarajem olgeta blong solvem ol kaen rao olsem, hem i blong no givhan blong manajem ol risos blong solwota long ol vilej we i gat kaen rao olsem. Eksampol, Fiseri i no wanem putem ol

³ Eksampol, ol loa ia ol i limitim saes blong troka, naura mo grinsnel we man i save tekem mo ol i blokem man blong karem eg blong totul o naura we i gat eg, mo blong yusum posen o danamaet blong fising.

smolmol troka long wan eria we i gat rao
frum oli save se mbae ol man oli no save
respektem tabu blong hem.

5. Ol man blong gavman mo olgeta we ol i stap
givim fanding ol i sud save se long ekonomi
blong ol aelan long Pasifik (inkludim Vanuatu),
valu blong ol samting we ol man mo woman
blong vilej ol i kasem fising blong kakae nomo
long ol rif blong ol olgeta, hem i bigwan bitim
valu we hem i kasem blong salem. Sapos yumi
luk long hao nao gavman i seraotem ol fanding
blong manajem solwata, yumi luk olsem se
tingting blong gavman mo man blong givim
fanding hem i no luk save. Hem i klia se ol i sud
sapotem bigwan wok blong fiseri we i givem
awaenes mo tingting long ol jif mo pipol long
vilej blong manajmen ol risos long solwota
blong olgeta.

The style of sail
formerly found
in the southern
islands of
Vanuatu and
recently revived
on Aneityum
Island.



1

Introduction

Recognizing the fundamental role that indigenous knowledge and the customary systems of land and sea tenure play in biodiversity conservation, the Department of Fisheries, the Environment Unit and the Vanuatu Cultural Centre, with support of central government and local non-governmental organizations (NGOs), have recognized that the implementation of any effective conservation strategy in Vanuatu must be based and initiated at the community level. Furthermore, it is considered fundamental that such approaches must be founded on the traditions of sustainable resource use and management that already exist in Pacific countries. The conservation community, international NGOs and aid donors have increasingly come to share this view, especially given the severe limitations (financial and technical) of many central government

institutions in the Pacific to evaluate, monitor and manage natural resources.

As Ruddle *et al.* (1992) have observed: 'The design of management schemes should include, as much as possible, effective indigenous strategies and should conform closely to existing socio-cultural and marine habitat boundaries, and endeavour to adapt many of the traditional institutions underlying such customary tenure systems as are appropriate'. This conclusion is all the more relevant given the 'lack of physical and administrative infrastructure, trained manpower capacity and the funds to do this...'

Among Pacific nations, Vanuatu is a prime example of how continuing community-based management of marine resources, rooted in traditional knowledge and practice, can inform both national and regional policy. The research presented in this publication serves to illustrate the strength of indigenous knowledge and practice which is integral to strategies and programmes aimed at enhancing biological and cultural diversity in this unique region of the world.

Customary marine tenure in Vanuatu

Understanding traditional marine resource-use rights is central to understanding marine resource management in Vanuatu. The rights to coastal waters contiguous to traditional land holdings usually extend to the clans, chiefs or villages that own the land. Rights may be subdivided and allocated to individual heads of families. These rights are recognized in Chapter 12, Article 73 of the Constitution of Vanuatu that states: 'all land in the Republic belongs to the indigenous custom owners and their descendants'. Under the Land Reform Act (Cap. 123), the term 'land' includes 'land extending to the seaside of any offshore reef but no further'. In addition to providing the



Fisheries and the communities. In instances where ownership disputes weaken customary marine tenure, the Department generally will not invest efforts in marine resource management support until communities initiate action to resolve the disputes.

Background to Vanuatu

Vanuatu is a small, independent, tropical archipelago about 2,000 km east of northern Australia, and between 12 and 22° South. There are over 80 islands, 67 of which are inhabited. A 1999 population census revealed that 78.5% of the population of about 187,000 lives in rural areas. On average over 75% of the total population lives along the coast. Overall there are about 790 villages, with an average population of less than 200. The islands' reefs, mangroves and other shallow nearshore habitats are important sources of animal protein for these people. A Vanuatu Statistics Department survey reveals that, collectively, 67% of the households in the 21 villages discussed in this document carry out subsistence harvesting of fish and other seafood, while 23% sell some of their catch (see front inside cover for map of Vanuatu marine resource management survey sites).

Some reef animals are exported, or sent for sale to urban centres. Trochus has been the single most important commercial marine product for many coastal villages. Through the 1980s, trochus populations were typically overharvested and yields became very low. Responding to this problem in 1990, the Vanuatu Department of Fisheries initiated a programme to encourage



Catching needlefish off Futuna using a spiders web as bait – note catch stuffed in legstraps.

foundation for village-based marine resource management measures, customary marine tenure can also contribute to the equitable distribution of the harvest and spread fishing effort.

The initiator of the Department of Fisheries trochus management programme, Mr Moses Amos, stressed to the authors that the fundamental cultural institution that provides the foundation for village-based management in Vanuatu is customary marine tenure⁴. He also emphasized that customary marine tenure forms the primary link between the Department of

⁴ Customary marine tenure cannot, however, protect populations of species whose movements take them through more than one tenured fishing ground, unless all villages involved combine to regulate their exploitation. For example, it takes only a single village with modern monofilament nets to overharvest mullet spawning migrations paralleling the coast, and eventually cause all villages along the path of the migration to suffer from the depletion or demise of the mullet (Johannes, unpubl.).

communities to manage their trochus stocks (Amos, 1993). Initially the programme was introduced in five fishing villages which had responded positively to radio announcements stating the availability of the Department of Fisheries for such activities.

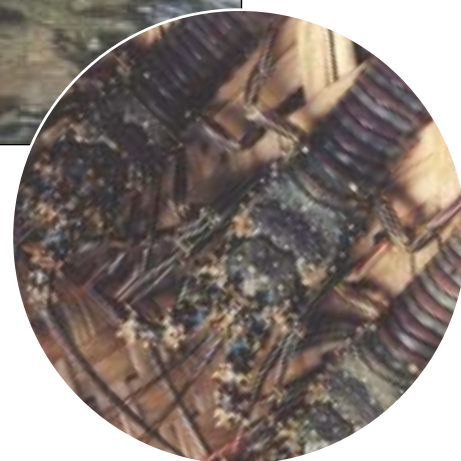
Villages that adopted the trochus management measures suggested by the Department of Fisheries (harvest closures followed by short harvest periods, plus strict observance of size limits) often reported much improved subsequent harvests, and the practice spread to other communities. Hearing reports of the success of this programme, Johannes (1998a) interviewed villagers in 26 coastal villages in Vanuatu about their marine resource management measures in late 1993.

Johannes (1998a) found that 25 of the 26 villages surveyed had, since 1990, implemented marine resource management measures based on the success of the five original trochus management trials. These measures varied from village to village and covered not only trochus but also, in some villages, lobster, octopus, *bêche-de-mer*⁵ (sea cucumbers), green snails, various clams, crabs, various types of reef fishes, and/or marine resources in general. These measures, rooted in traditional practices, consisted of closures on taking various species, or restrictions of fishing areas, seasons, or the use of certain fishing gear including spearguns and nets, especially gillnets (Johannes, 1998a). These closures are widely known as *tabus*, or bans, and are still commonly applied throughout most of Vanuatu today (Hickey, in press).

The results of this modest initiative by the Department of Fisheries, costing a few thousand dollars in the initial years, had a more positive impact on marine resource use than a multi-donor, aid-funded Vanuatu fisheries development project that had cost tens of millions of dollars (Johannes, 1998a).



Completing the construction of a spiny lobster trap, its deployment on the reefs of Futuna, and a resulting catch.



⁵ The term *bêche-de-mer* is more properly applied to the dried commercial product produced from various sea cucumbers, but is often also applied to the live animal in Vanuatu and some other areas. Trepang is another term commonly used in parts of the Indo-Pacific region.

2 *Survey of marine resource management measures, 1993 and 2001*

Methodology

The objectives of the present study were: (i) to determine the extent to which marine resource management methods were perceived by the villagers themselves as successful or otherwise; and (ii) to identify lessons that might be useful in future efforts in Vanuatu and elsewhere to better facilitate community-based marine resource management measures and indicate how governments, NGOs and aid donors might better assist with these activities.

In this study, interview surveys were used to determine the success of marine resource management measures. A statistically valid before-and-after marine biological survey in each of the village's fishing grounds would have been an alternative method, although extremely expensive and time-consuming.

In 2001, interview surveys were carried out in 21 of the villages originally studied by Johannes in 1993. Villagers' testimony as to the effectiveness of marine resource management measures can sometimes be embellished by a desire to impress the

interviewer. With this in mind, two criteria were used as indicators of the perceived success of the management measures.

The first criterion was whether or not these measures were still in effect eight to ten years after they had been implemented. Like most conservation measures, the ones implemented in the early 1990s involved sacrifices by fishers. Closing trochus harvesting for example, involved foregoing for up to five years (the length of the longest closure) the money that could be made from selling the shell. Closing of reef areas to other types of fishing or imposing tabus on the use of certain types of fishing gear similarly involved sacrifice. If such sacrifices were judged worthwhile by villagers, then the relevant management measures would still be operating.

The second criterion was the extent to which communities had implemented additional marine resource management measures since 1993.

The traditional net used on the reef flats of southeast Tanna.



Informal interviews were conducted by Hickey with chiefs and villagers of the surveyed communities, along with government officers and NGO personnel assisting with marine resource management, over a five-week period between June and August 2001. A set of general questions was used to focus the interviews loosely, but interviewees were encouraged to respond well beyond the immediate subject of the questions. Johannes *et al.* (2000) have described why formal questionnaires may limit the scope of information obtained on broad subject areas, when used as the main tool in interviews with local natural resource users.

In compiling the list of village-based marine resource management measures, improved compliance with national conservation laws by villagers have not been included as a separate measure. This is in order to clearly distinguish village-based management initiatives from those of the government, although improved compliance is also discussed under the specific marine resource management methods section in Chapter 3. Awareness efforts to educate villagers about national conservation regulations and of their underlying rationale generally led villagers and village leaders to be more aware and supportive of these laws once they were informed of their existence and of the reasons for them.

Grouped results of marine resource management measures

Based on the survey results and the criteria adopted, the data indicate a high level of approval by villagers of their marine resource management measures. There were a total of 40 marine resource management measures in the 21 villages in 1993. By 2001, five of these had lapsed and 51 new ones had been implemented (Tables 1 and 2). In only two villages were there fewer measures in 2001 than in 1993. One of those was a village where there were marine tenure disputes. Village-based marine resource management measures thus more than doubled in the 21 villages surveyed, rising from a mean of 1.9 per village in 1993 to 4.1 in 2001 (Table 2).



Preparing coconut leaves for the fabrication of a coconut leaf fish net, Anelguahat, Aneityum.

In 2001, the most often used marine resource management measures were fishing ground closures (18), trochus closures (11), tabus on taking turtles (11), bêche-de-mer closures (10), spearfishing tabus (8) and controls or bans on using nets (7). All of the turtle tabus had been implemented since 1993. Of the five measures that lapsed, three involved fishing ground closures. However, during the same period six new closures were initiated in five other villages.

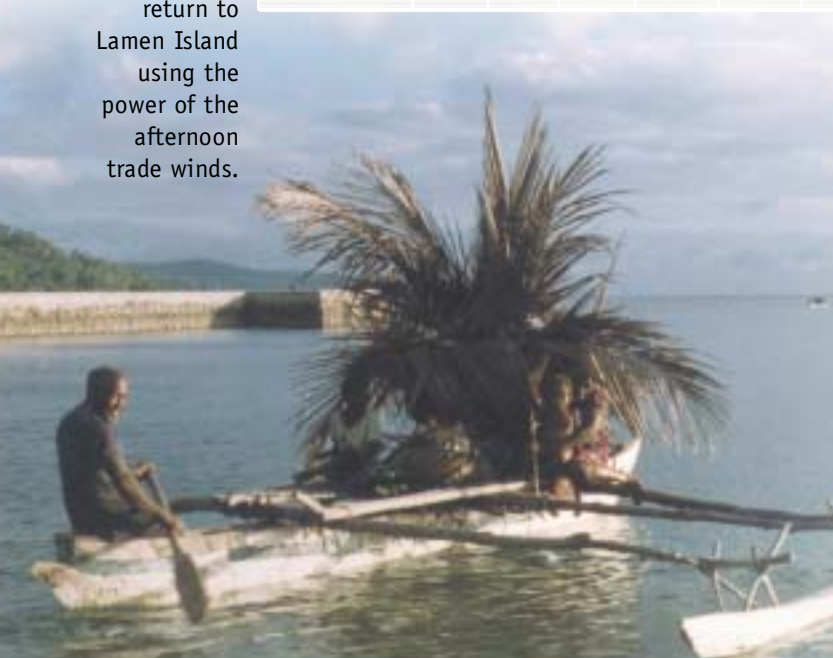
The three Maskelyne island villages surveyed (Pescarus, Lutas and Pelongk) had an average of 8.7 marine resource management measures – more than twice as many as the mean number (4.1) for all 21 villages surveyed. This may reflect their growing populations' relatively heavy dependence on their rich marine resources as a means to generate cash and fill subsistence needs, thus creating the incentive to manage well. These villages are located on a small offshore island with limited agricultural potential (they have additional agricultural land on the mainland but it is relatively far away).

A recurring theme among those interviewed was that the experience of the past decade has shown that where village reefs are divided into several sections with different owners, marine resource management operates more smoothly if the owners cooperate to manage the entire area as a single unit rather than managing different sections independently. This would have been more in line with the way reefs were most likely managed throughout most of Vanuatu in the past. A traditional leader would often have had the right to introduce management measures over larger areas under their domain in the interests of the various clans (Hickey, in press).

Table 1
Marine Resource Management Initiatives in 21 Vanuatu villages, 1993 and 2001
(More detailed explanations of the information are given in Annex I.)

		Management involving:											#
		Trochus	Fishing ground closures	Turtles	Bêche-de-mer	Spearfishing	Use of nets	Marine protected areas	Giant clams	Crabs	Fishing methods destructive of habitat	Miscellaneous	
Anelguahat	D	•	•		o							•	4
Mele		•	•										2
Mangililiu		•	•	o		•							4
Tanolio			o	o	o	o			o				5
Siviri		•		o	o				o				4
Saama		o		o									2
Emua		o	x	o	•								3
Paunangisu	D		x	o	o			o					3
Epao			x	o	•						o		3
Eton	D		o		o		o						3
Erakor						o	o				o		3
Marae	D	•	•									o	3
Lamen Bay		•	• ²	o								•	5
Pescarus		•	•	o	o	•	•	o	o*	•			8
Lutas		•	•	o	o	o	o			o			7
Pelongk		•	•			•	o	•	•*	o		• ³	10
Litslits	D		• ^o										2
Uri			• ^{o²}	o	o	•	•	o ²	o*	•		o ²	12
Uripiv	D		• ^o			o	o						4
Norsup	D	x	x										0
Tautu	D												0
TOTAL	8	11	18	11	10	8	7	5	5	4	2	9	86+

The 'one-way' coconut leaf sail used to return to Lamen Island using the power of the afternoon trade winds.



Key

- Operating in both 1993 and 2001
- o Operating in 2001
- x Operating in 1993 but since lapsed
- D Marine tenure disputes reported as current
- * Giant clam initiative that is also listed as MPA.
- + This figure is 3 less than the sum of the totals for each marine resource management measure because the 3 giant clam sanctuaries in which all other species are also protected, are also listed as MPAs, but were not double counted to calculate the total.
- # Total number of village management initiatives in effect in 2001.
- TOTAL** Total number of village management measures of each type in 2001. Numerals indicate more than one such initiative operating in a single village.

Table 2
Number of marine resource management measures in 21 Vanuatu villages, 1993 and 2001

	1993	2001
Total measures operating	40	86
Average number per village	1.9	4.1
Lapsed measures since 1993		5

Specific marine resource management measures

Trochus and green snail management

Trochus is probably the most easily managed of all reef resources. The species moves only short distances during its adult life and its populations are relatively easy to count. The enthusiasm of villagers for trochus management is often based on easily measurable results (e.g. sales receipts). Surveys by the Department of Fisheries or by trained villagers can readily reveal when a trochus reef is ready to be harvested. In areas where communities follow the recommended management strategy of short annual openings (after an initial 3–4 year closure to allow overfished stocks to recover) and a strict adherence to minimum size limits, the indication is that these trochus stocks remain stable.

Green snails, whose shell is exported to Asian markets as material for inlay in lacquer ware, furniture and jewelry, are generally subject to the same village-based regulations as trochus in Vanuatu, i.e. trochus closures generally also cover green snail for the same period. Green snails had also been heavily overfished in most areas in the 1980s. They reach maturity slightly later than trochus and one individual can produce millions of eggs with larvae that, like trochus larvae, settle soon after they are released (Yamaguchi, 1993). Under the circumstances, green snail stocks might be expected to respond well to the same closure periods as trochus, but this does not seem to be the

case. The later maturation of green snails compared to trochus may account for this depletion and in the future, village-based management measures may well need to account for this to improve their management.

Yamaguchi (1993) refers to 'the rapid depletion of green snail in actively fished areas and the slow rate at which populations re-establish after termination of fishing'. Green snails have become so depleted throughout most of the area surveyed that some teenagers reported that they have never seen a live one. It is ironic that the Asian economic upheavals of the late 1990s have significantly reduced demand, and in turn, fishing pressure for this species in Vanuatu.

Two of Vanuatu's most commonly targeted commercial nearshore reef resources, trochus (right) and green snail (left).



Control of sea turtle harvest

Tabus on the taking of sea turtles constituted the largest proportion of new regulations (11 out of 51) and involved the most villages (11 out of 21). Clearly there has been an unprecedented enthusiasm for turtle conservation in many villages since 1993. Whereas it is against national law to dig turtle eggs, there is no national law in Vanuatu prohibiting the taking of adult turtles. Until recently in most coastal communities, turtles and their eggs were harvested whenever the opportunity arose. In 1993 none of the villages surveyed mentioned a tabu on the taking of turtles, whereas in 2001 more than half the communities



Wan Smolbag theatre troupe performing the turtle play, to raise awareness about turtle management at the village level.

interviewed recorded such a tabu. The reason for this striking change is unusual and instructive.

Many Vanuatu villages are visited periodically by the locally celebrated travelling theatre group Wan Smolbag. Operating since 1989, this group has made many village tours, putting on plays that simultaneously entertain and inform villagers about important issues such as HIV/AIDS and malaria-reduction through mosquito-control.

In 1995 the theme of the main play they presented in the villages was the plight of sea turtles and the need to conserve them. The villagers were apparently receptive to this message in part because, as many informants said, they were already aware of a marked decline in turtle numbers in their waters over the last few decades.

Not only did Wan Smolbag suggest that turtles should not be killed, but also that each village should select a 'turtle monitor' in order to help encourage turtle conservation and to tag nesting turtles and turtles caught in nets before they are released. In 2003 there are almost 200 turtle monitors in over 100 coastal Vanuatu villages. In 11 of the 21 villages where survey interviews were conducted, a turtle monitor had been appointed and in two villages two

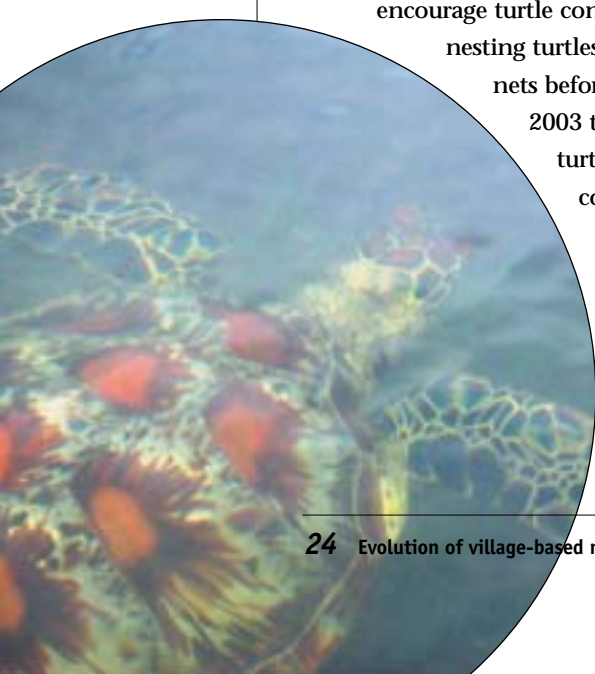
monitors had been appointed. Turtle monitors also report to the village leaders anyone who is found taking turtles or turtle eggs. Some turtle monitors post signs in villages to encourage villagers not to harvest females, as well as at nesting beaches during the egg-laying season to remind people that it is prohibited to take the eggs.

Some villages surveyed now tabu the killing of turtles outright and some villagers are under the impression that taking turtles is illegal according to national law. In general, only communities with turtle monitors have recently put tabus on their harvesting and in these villages compliance with the government prohibition on disturbing turtle nests has also generally increased significantly.

In some villages people are allowed by their leaders to kill one or more turtles on special occasions, as in many areas of Vanuatu the consumption of turtle has ceremonial significance. In villages where these management measures were in effect, a number of informants reported seeing many more turtles in their waters than they had seen for many years. Due to these animals' low growth rates, adult turtle numbers through local recruitment could not have increased significantly during just a few years of protection in Vanuatu. However, local numbers in protected village waters could be expected to increase within this time simply due to the turtles not being harvested and being quite mobile, i.e. moving in from elsewhere to feed as well as becoming less cautious given their protection. Protecting nesting females and turtle eggs could, of course, have an immediate positive effect on reproductive success.

Experience in many other Pacific Islands has shown that protecting sea turtles is one of the hardest conservation measures to persuade islanders to observe. The World Bank (1999) found, for example, that 'the perceived compliance with turtle regulations was very low' and 'was perceived to be quite poor' (during a survey of attitude in Pacific Island communities). Communities felt that these rules conflicted with cultural obligations such as the custom at some sites of giving turtles to chiefs, and that 'turtle meat was just too tempting to resist'. Wan Smolbag's accomplishments in this regard thus seem to be setting a new standard.

Green turtle swimming near the Maskelyne islands, south Malekula.





Above: Turtle Monitor placing a tabu leaf over a turtle nest.

Right: A sign used by the Turtle Monitors, to promote turtle conservation, translates: 'Help to increase the number of turtles – Don't kill female turtles'



Fishing ground closures and control of spearfishing and use of nets

The costs of getting statistically sound information on fisheries and fish stocks in so many villages would doubtless greatly outweigh the potential benefits (Johannes, 1998b). Other studies have demonstrated the difficulties involved, e.g. Anderson *et al.* (1999) were unable to demonstrate differences in abundance of fin fishes in open and closed reefs in five Vanuatu villages. Their data were based on an average of only two underwater visual censuses per fishing ground, each of which consisted of counting fishes within a 7m radius of a stationary diver. The statistical power of the consequent analyses was thus very low.

Russ and Alcala (1996) present more persuasive data from the Philippines (and cite other studies)

that support their statement that gains in biomass of finfish 'of a magnitude potentially useful in fisheries management are likely to occur in reserves on scales of five to ten years, rather than just a few years'. With four exceptions (two marine protected areas along with two other areas closed to enhance snorkelling for tourists), total finfish closures reported in 2001 in Vanuatu villages lasted from six months to three years, with a

With funding from the World Wildlife Fund and the European Union and the participation of the Department of Fisheries and other government departments, Wan Smolbag now runs workshops to further train turtle monitors. At their meeting in June 2001, the turtle monitors voted to broaden their mandate to coastal resources in general and to change their name to Vanua-tai resource monitors ('Vanua' means land; 'tai' means sea). With their latest play covering a wide range of issues on coastal resource management, Wan Smolbag is shaping up to become an important conservation force in Vanuatu.

mean of about 1.5 years. According to Russ and Alcala (1996), even the longest of these bans would be too short to be of much value as a conservation measure for large predatory reef fish. Although obviously the shorter bans would benefit trochus and short-lived, faster growing herbivores and small predators.

Even short closures, properly timed, could facilitate greater spawning. However, the consequent potential for improved reef fish production would take longer to manifest itself. Due to the small size of most of these tenured fishing grounds and the prolonged pelagic larval stage of most reef fishes, improved reef fish

production would generally occur outside the fishing grounds where spawning takes place.

Why, then, do Vanuatu villagers persist with relatively short closures for finfish? One answer to this question came up repeatedly in the interviews. When constantly pursued by fishers, reef fish tend to get 'wild', i.e. harder to approach in order to spear them or scare them into nets. 'Resting' the fish for a period causes them to lose their caution and they become easier to catch. As any spearfisher who has stalked reef fish in both fished and unfished waters quickly learns, fish in the unfished waters are far less wary of the approaching diver and present much easier targets.

Short closures of fishing grounds to destructive fishing methods, such as using small mesh nets or night spearfishing for bumphead parrotfish, could be effective for these stocks. There is increasing evidence that the tabus against night spearfishing help conserve parrotfish (especially the prized bumphead parrotfish, *Bolbometapon muricatus*) which, when undisturbed, sleep in shallow water during part of the lunar month and are then very

easy targets for night spearfishers (Johannes, 1981). Fishers in many Pacific Islands are critical of the impact that night spearfishing has on these highly prized fish. For this reason, banning night spearfishing is one of the most common marine resource management measures that have been implemented in the Pacific Islands' villages in the past 25 years (Johannes, 1978; Sims, 1989; Hviding, 1996; Fa'asili and Kelokolo, 1999; Dulvy and Polunin, in press; Johannes, in press).

Dulvy and Polunin (in press) have demonstrated in Fiji that the bumphead parrotfish has probably been extirpated around at least six islands and has become rare around six others where it was once reportedly abundant. In some Vanuatu villages night spearfishing is tabued for part of the year; in others it is tabued throughout the year. The second alternative is preferable, although seasonal banning of night spearfishing in spawning aggregations would clearly help protect various spawning species.

Over the past 25 years the regulation of banning gillnets and other nets has been another management measure often initiated in Pacific Island villages (Johannes, 1981 and unpublished; Sims, 1989; Fa'asili and Kelokolo, 1999; Hviding, 1998), including seven of those in the present survey. This undoubtedly helps protect against catching undersized fish, unwanted species and more fish than are needed. In Vanuatu it also protects against overharvesting mullet and rabbitfish on their spawning migrations and in their spawning aggregations; the locations and timing of these are sometimes well known to village fishers. Johannes (1981 and unpublished) has been told by villagers of mullet migrations/aggregations no longer forming, because of their elimination by gillnetting during these vulnerable periods in Papua New Guinea, Palau, the Solomon Islands and Vanuatu.

One argument put forward by fishers in Vanuatu for allowing gillnet fishing at certain times and places is that it facilitates the capture of some species that are not readily caught by other methods, including mullet, scads (*Selar* spp.), sardines (*Clupidae*) and some species of rabbitfish (*Siganids*).

A modern iron tipped spear used for fishing on Aneityum Island.





A fisher throws his cast net in the sandy shallows.



Controlled harvesting of bêche-de-mer

In recent years interest in harvesting bêche-de-mer has decreased in many of the villages surveyed. This was due, at least in part, to some unusual beliefs that have recently emerged concerning the roles of bêche-de-mer in the ecology of local waters. Because bêche-de-mer are sediment deposit feeders, the belief has apparently been fostered by some conservation personnel that they 'clean up the reef'. Many villagers have taken this comment to heart. In several villages informants said that their waters had become cloudier since the bêche-de-mer populations had been overharvested, or conversely that their waters had become clearer since ceasing to fish for bêche-de-mer. In some villages there was a belief that if bêche-de-mer were overharvested, this was likely to cause ciguatera (the development of a substance in reef fish that is toxic to humans, resulting from consumption of a toxic dinoflagellate directly or via the food chain). Ciguatera is not uncommon in Vanuatu. In several other villages it was said that, when bêche-de-mer were overfished and disappeared, white sand turned yellow with algae and slimy green algae also proliferated.

Many sea cucumbers feed by using their tentacles to gather and ingest particles in the top few millimetres of sediment and digest the microbial coatings on them. This may reduce microbial growth that might otherwise turn some



sediments yellow. Other species feed on hard substrates such as dead coral or coralline-algal pavements by ingesting the thin dusting of sediment and associated microbiota on them. This activity may prevent green algal slimes from proliferating and perhaps reduce levels of the dinoflagellate responsible for ciguatera. It is not clear why the absence of bêche-de-mer would result in greater turbidity of the overlying water, although claims to this effect by Pacific islanders are not limited to Vanuatu (Garry Preston, personal communication). Indeed



some sea cucumbers' feeding activities have been found to destabilize sediments (Massim, 1982). This is a subject worthy of further scientific investigation.

In one village the belief was expressed that bêche-de-mer give birth to certain reef fish and shellfish and it was good to protect them for this reason. This belief may have arisen from the fact that sea cucumbers provide shelter to various species of small crustaceans, gastropods, worms and fish which live on their surface or in their coelom or respiratory trees (e.g. Hamel *et al.*, 2001).

Marine protected areas

After sufficiently long closures, reef marine protected areas have proven to benefit fisheries through the export of fish into adjacent fishing grounds (Roberts and Hawkins, 2000). The establishment of marine protected areas in countries such as Vanuatu where community-based

marine tenure exists, raises both novel problems and novel opportunities. Establishing marine protected areas in traditionally tenured Pacific Island waters requires obtaining the permission and cooperation of tenure owners after providing incentives to reassure them that they have more to gain than to lose. Larger marine protected areas would often require obtaining the permission and agreement of several groups of tenure owners. This would seldom be an easy task. On the other hand, once established, marine protected areas would be more likely to attract strong surveillance and enforcement by local people because of their traditional defence of local fishing grounds.

Two of the villages surveyed had declared portions of their fishing grounds as permanent marine protected areas – Ringi te Suh of Pelongk and Narong Park of Uri. Two other communities, Mele and Paunangisu, were indefinitely protecting their marine resources in areas important to tourists. In addition, several other communities said they were planning to introduce marine protected areas.

In developing countries where, unlike Vanuatu, local marine tenure is weak or non-existent, surveillance and enforcement in marine protected areas is correspondingly weak to non-existent, hence the preponderance of 'paper' marine protected areas in some of these countries (Alder, 1996; McClanahan, 1999). With the strong customary marine tenure ethic coupled with the limited capacity of central governments to monitor and enforce marine protected areas in countries like Vanuatu, there is a strong argument in support of communities maintaining control over the initiation and management of marine protected areas. Compliance is also observed to be enhanced when as much customary protocol as possible is integrated into the establishment of these areas, in order to maintain and reinforce traditional beliefs and practices as the cornerstone of any village-based management initiative (Hickey, in press).

A *namele* leaf placed by a village chief at Erakor on Efate to indicate the area is under tabu to all fishing activities.



3 *Assessment of village-based marine resource management measures*

The previous chapter documented that village-based marine resource management measures, initiated prior to 1993 in the surveyed villages, had with few exceptions been continued through to 2001. Furthermore a considerable number of additional measures had been implemented during this period. This chapter discusses some possible reasons for the ongoing introduction of these village-based measures which reflects general support by communities for them and their potential future evolution.

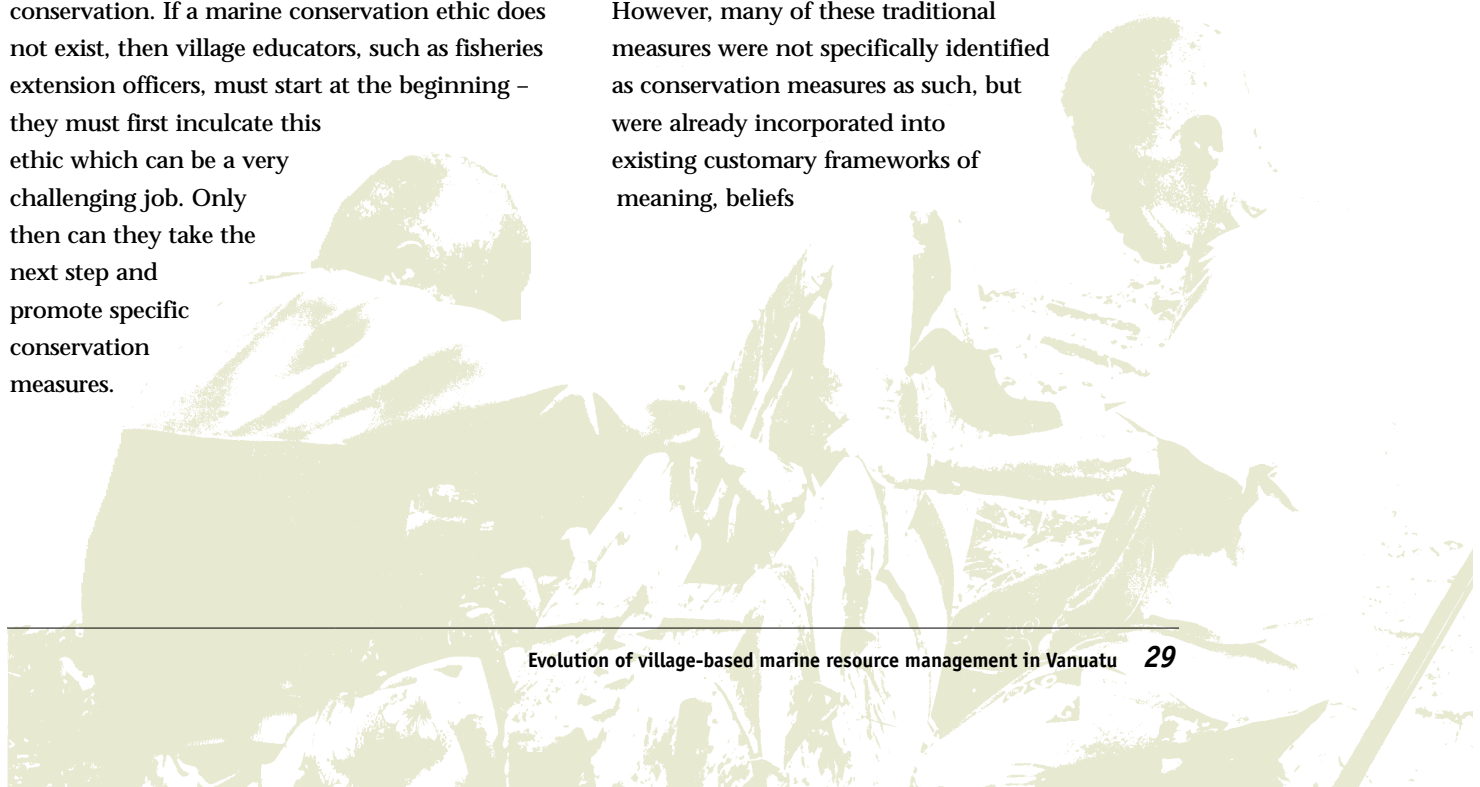
A local conservation ethic

A conservation ethic can be defined as an awareness of the ability to overharvest or otherwise impact natural resources coupled with a commitment to reduce or eliminate the problem. Marine conservation ethics can be found in some tropical fishing cultures but not in others (Johannes, 2002). The existence or absence of such an ethic determines how to go about education for conservation. If a marine conservation ethic does not exist, then village educators, such as fisheries extension officers, must start at the beginning – they must first inculcate this ethic which can be a very challenging job. Only then can they take the next step and promote specific conservation measures.



A fisher from Maevo Island demonstrating his traditional net making skills.

The number of different traditional reef closures in addition to the numerous other cultural practices that contribute to marine resource management (Hickey, in press) supports the contention that there was a strong conservation ethic at work in pre-colonial times in Vanuatu. However, many of these traditional measures were not specifically identified as conservation measures as such, but were already incorporated into existing customary frameworks of meaning, beliefs





Above, a traditional woven basket from Pentecost Island and below, a fish trap from Futuna, used by the women for catching small fish from the nearshore reefs.



and practices. A marine conservation ethic is also clearly in evidence in Vanuatu today. During a study in the mid-1990s, representatives of 12 Vanuatu fishing villages employed a total of 48 individual marine resource management measures (Anderson and Mees, 1999). Enhancing, preserving or protecting marine resources were the explicit reasons given for 43 of these measures. Other reasons included financing village development,

protecting spawning fish and providing a source of occasional income. Additional implicit reasons were operative in six instances that related to protection or establishment of property rights. Villagers' appraisals of the observance of the 48 marine resource management measures by fishers was 'good' in 37 instances, 'fair' in ten instances and 'poor' in one instance.

This research supports the observation of this present study that most of the surveyed villages did manifest a marine conservation ethic; they were not only aware of the need for marine resource management in their waters but were also taking concrete actions to address this need. Young men were sometimes singled out as the group least imbued with this ethic and were usually identified as the main breakers of marine resource management tabus and government regulations.

Department of Fisheries extension activities

Since 1993 the Department of Fisheries Extension Services focused less effort on fisheries development and more on nearshore fisheries management work. The new focus for fisheries extension officers was to assist with the management of nearshore resources by providing scientifically relevant management advice and information to fishing communities while advocating for the use of traditional marine management practices. The officers were provided with preliminary training in cooperative management, whereby the combined value of both traditional and scientific knowledge was highlighted during a ten-day workshop. The Research Section of the Department played an active role in this training and follow-up by working with the fisheries extension officers in the field to help introduce this cooperative management approach. The enforcement officer was also involved in this process.

Since then fisheries extension officers have made numerous 'awareness tours' to villages in most parts of the country and have broadened their focus from trochus to all nearshore living resources. According to the Department of Fisheries, their work has resulted in numerous

communities asserting their customary rights in placing tabus on select resources, reef areas and fishing methods, as well as adapting other aspects of their traditional management practices within the framework of customary marine tenure to the needs of contemporary village-based semi-commercial and subsistence fisheries (Hickey, in press). An important aspect of this awareness work was to inform chiefs and villagers of national fisheries regulations and, most importantly, their underlying rationale to protect a number of marine resources.

Beginning in 1999, the Extension Services initiated steps to assist in providing alternative sources of income for rural communities, in part to compensate for the sacrifices required in order to rebuild nearshore seafood stocks through closures and other tabus. The new initiatives include the culture of *Eucheuma* seaweed, giant clams and blacklip pearls, revitalizing the canoe enhancement programme (using local canoes for the deepwater fishery), deploying new fish aggregation devices to promote the pelagic fishery, and the reseeded of reefs with trochus juveniles and adults. A green snail reseeded programme is also being planned to assist with the management of this species. A number of new ice-plants were also purchased and will be placed at provincial centres to assist in the development of the deepwater and pelagic fisheries. The Extension Services now spends roughly half its time on cooperative management and the other half promoting new development initiatives. The Extension Services underwent a name change to reflect this shift in focus and is now termed the Rural Fisheries Development Programme.

Most of the above-noted initiatives are donor-funded. Ongoing training will also be provided to Rural Fisheries Development Programme officers to enhance their ability to continue to provide the cooperative management needs of communities. For example, a workshop to train the officers in basic reef assessment techniques was held in 2002. With these skills, the fisheries extension officers will be able to better assist communities in monitoring the impacts of exploitation and management of their reefs.



A large sail canoe used to access deepwater reefs off north Ambrym.

Marine tenure disputes

While customary marine tenure provides the basic foundation on which sound, village-based marine resource management in Vanuatu can operate, it does not guarantee it. Johannes (1998a) reported that reef ownership disputes interfered to varying degrees with marine resource management in Vanuatu in 1993. Ownership disputes were reported in five of the 21 villages in 1993 and in eight in 2001. While the difference is not statistically significant, it is consistent with the prediction made by some village leaders to Johannes during the 1993 study; namely, that disputes over natural resources will increase as cash economies and export markets become increasingly important in rural Vanuatu, the population continues to increase and access to natural resources become more valuable (Johannes, 1998a).

Such disputes sometimes related initially to land tenure, but had spilled over into contiguous fishing grounds. Aswani (1997) and Foale and Macintyre (2000) report similar disputes in nearby Solomon Islands.

In 2001, the eight Vanuatu villages reporting internal disputes had a mean of 2.25 marine resource management measures in place. In two of these villages there were none. In the 13 villages where no disputes were reported, the mean number of marine resource management measures was 5.3. The difference was statistically significant ($p < 0.01$). These findings thus provide strong statistical support for the conclusion of the Vanuatu Department of Fisheries that village-based marine resource management is stronger in those communities where there is an absence of

disputes over community leadership and customary marine tenure.

With respect to land/reef tenure dispute resolution, commencing on December 10, 2001, a Land Tribunal Act was enacted in Vanuatu to formalize the provision of 'a system based on custom to resolve disputes about customary land' and including 'the waters within the outer edge of any reef adjacent to customary land'. This new legislation allows for the establishment of Village, Custom Sub Area, Custom Area and Island Land Tribunals to adjudicate all customary land disputes. Effectively, appeals of the Village Land Tribunal decisions can only go as far as the Island Land Tribunal, hence, under this new legislation, customary land disputes will be resolved locally through custom on the island where the dispute exists. Prior to the introduction of this legislation, many land disputes were appealed all the way to the Supreme Court in the capital and delays in processing these appeals resulted in a lack of timely resolution of land disputes. The application of the western legal system was found to be not only slow but also expensive and culturally inappropriate to be adjudicating on matters concerning customary land.

Prior to the introduction of Land Tribunals, there were six levels of resolution for fishing disputes available to the owners of Vanuatu fishing rights. These ranged from adjudications involving heads of families, clans or villages, Area Council of Chiefs, to Island Courts up to the Supreme Court of Vanuatu (Johannes, 1998a). Resolution of customary land disputes by heads of families, clans or villages through purely customary means still remains an option, but, if this fails, then the newly established Land Tribunals are meant to be drawn upon to resolve them. This system is gradually being introduced to rural areas of Vanuatu.

The Department of Fisheries' decision to withhold its support in the form of trochus transplants or other village-based mariculture developments from villages with unresolved marine tenure or leadership disputes, provides an additional incentive for villagers to resolve them.

Village-based enforcement and factors affecting compliance

The punishment for breaking village-based marine resource management rules ranges from simple admonition to fines in the form of money and/or local foods such as yams or mats, and other articles of customary significance like pigs or kava (*Piper methysticum*) – a large pepper root from which an extremely popular and mildly intoxicating drink is made. The largest fine noted during the survey was in Pelongk, and consisted of two pigs, two 25 kg bags of rice, six kava roots, some other food, plus 30,000 vatu (about US\$250). This fine is roughly equivalent to the amount expended in the initiation ceremony of this closure. This is a very high price to pay for the average rural villager. Some villagers also mentioned the shame and embarrassment involved in being caught and fined in village court. The comment applies mainly to villages where respect for traditional authority remains high. This respect generally tends to be weaker in peri-urban villages.

Chiefs and their councils impose these fines on individuals or groups found to break the tabus. It has been noted by a number of villagers that compliance is generally more common when customary practices are drawn upon to initiate a tabu. These may include pig killings, kava drinking, communal feasts and the placement of locally significant custom leaves used to clearly indicate the area or species under tabu. These customary practices anchor these tabus more firmly in the continuing traditions of the past and this significantly increases respect for them (Hickey, in press). Compliance is also found to be stronger when the fine for breaking the tabu is made clear at the time of initiation of the tabu. Many tabus initiated today also draw upon blessings from the church which serves to further increase sanctification and respect for the tabu (Hickey, in press). The responsibility for the payment of fines by offenders is entirely customary as the village courts have no formal legal recognition.

Police support for customary law

Another interesting trend encountered in some peri-urban villages during this study is the increasing use of state police to informally back-up decisions made by the chiefs. Individuals who repeatedly ignore their chief's rulings and do not pay their fines for breaking village tabus, including those relating to marine resource management, may be referred to the police.

This is only done when a chief has exhausted other possibilities within the village to ensure the compliance of the individual concerned. The offender is typically held by police overnight or longer in the local 'calaboose' (temporary detention accommodation) and encouraged to rethink their position on ignoring their chief's wishes. In this way, chiefs and police cooperate to maintain order within the village. The chief still makes the decisions, generally through consensus within his community, but the police sometimes help enforce his rulings where necessary. This cooperation, to date, is done on an informal basis.

Unlike peri-urban communities, most rural communities do not have police readily available to intervene in such situations. On most islands it is the chiefs who manage to maintain the day-to-day order and social harmony among their communities, as has been done for centuries.

However, with the ongoing social changes brought about by the intrusion of western lifestyles and individualism resulting in a gradual erosion of respect for traditional institutions, many chiefs are feeling the need for some sort of support from the government to formalize their ability to enforce their rulings. At present, decisions made by chiefs in the village courts are not legally recognized. This situation is currently under review by the government, which has commissioned a 'Chief's Legislation Project' to explore this issue and survey the chiefs' viewpoints on this matter. Depending on the recommendations of the project, the government may consider enacting legislation to formally empower the chiefs' village court decisions. This has essentially been done recently regarding the adjudication of customary land tenure disputes

through the enactment of the Land Tribunal Act referred to above.

Legislated support for marine resource management

Despite the autonomy with which most communities continue to manage their marine resources, the Department of Fisheries recognizes the potential need to extend assistance to those who are unable to manage their marine resources. One of the major factors undermining their management ability stems from internal conflicts within the community. These may concern disputes over customary rights to land and/or reefs or leadership disputes. Both of these problems are related to the colonial histories of these islands. With the extensive depopulation and land alienation that took place during colonial times and lasted for a number of generations, it was often difficult post-Independence in 1980 to determine who were the rightful custom owners. Also, it was a fairly common practice of missionaries after their arrival in a village to appoint someone more to their liking as a new 'chief'. By doing this they would upset the traditional balance of power within the village. This would also effectively change the bloodline of subsequent chiefs in these areas by interrupting the hereditary leadership system. The internal conflicts arising from these impacts are still felt today in some villages and this often results in the communities' inability to effectively manage their resources due to the lack of cooperation and respect for the chiefly tabus imposed to protect resources.

Closed Area Order

To assist these communities, the Department of Fisheries is considering the introduction of legislation referred to as a 'Closed Area Order'. Under this legislation, communities unable to effectively manage their own resources, due to internal conflicts or due to the loss of respect for chiefly authority, could apply to the Department to close an area to fishing or any other form of harvesting. The closure could be species specific, for



Grating *Barringtonia* fruits for use as a fish poison on Tanna.

example, for trochus and green snail only, or could be a complete closure to all fishing, depending on the community's needs. The important point is that the community and their chief make the decisions on initiating a closure, the area to be covered and what species would be restricted. Complete long-term closures approaching the concept of a marine protected area are also being considered by some communities due to such an area's ability to attract tourists for snorkelling and diving activities. This reflects villagers' increasing awareness of the relationship between maintaining their marine resources and attracting tourist dollars. Further, under the proposed legislation, individuals or groups who contravene the Closed Area Order would be charged as such and be subject to a fine, imprisonment or both.

Under the proposed legislation the Department would consult extensively with any community interested in the Closed Area Order option to determine why they consider it to be necessary to help them to manage their resources. Requests for this service from groups simply wishing to exclude others from fishing their area, that is to exert their customary rights and/or ownership to an area while they continue to harvest resources, will not be entertained. Any closure would apply to all individuals within the community including the chief and all reef owners. However, there will be a provision within this legislation for communities to apply to the Director of the Department to allow them to harvest resources within the closed area

from time to time, to generate cash by selling trochus or bêche-de-mer, for example. This would typically be for Christmas or Independence celebrations, or in other times of need such as when school fees are due.

Upon receiving such a request, the Department would respond by assessing the resources within the closed area and, based on that assessment, allow the community to harvest a specified proportion of the resources, or alternatively, decline the request if the assessment indicated that the resources were not sufficient. Thus, the Closed Area Order would give the Department the mandate to make resource assessments within the Closed Areas and their response to the community would be based on that assessment.

Given the potential demand on the Department's time and budget to facilitate these resource assessments and to monitor the communities' subsequent harvesting levels, the Department is looking towards training their extension officers based in rural areas to perform the assessments and monitor the harvest levels. In time, this training could also be extended to members of the community, for example to the Wan Smolbag Vanua-tai resource monitors. Localizing the assessments and monitoring in this way could also strengthen a community's sense of ownership and responsibility over their resources, thereby further enhancing compliance with management decisions.

The Department regards the provision of the Closed Area Order option to communities as an extension of the cooperative management concept, whereby the Department provides backup support in enforcement on behalf of the chief. The Department will only consider this option where the area is either undisputed, but requires assistance with enforcement due to a diminishing of respect for chiefly authority (for example in peri-urban areas), or where all involved parties in a disputed area request the Closed Area. This may well be the only way to manage disputed areas on an interim basis until the dispute is resolved. As this survey has shown, disputed areas of customary ownership are often the first to suffer in terms of village-based resource management.

Community Conservation Areas

In March 2003, the Government of Vanuatu, for the first time ever, passed a comprehensive Environment Act. Within this Act there is a provision for creating 'Community Conservation Areas' in agreement with communities in areas held under customary tenure. Its primary purpose will be to assist in the preservation of areas of significant and/or 'unique genetic, cultural, geological or biological resources' or that constitute 'the habitat of species of wild fauna or flora of unique national or international importance'. This legislation calls for the community, with the technical and financial assistance of the Environment Unit, to develop and implement 'an appropriate conservation, protection or management plan' for such an area.

The Environment Unit, which is responsible for administering the Act, envisages that the establishment and registration of Community Conservation Areas under this legislation will also be applicable to assisting and supporting communities that can no longer achieve their conservation goals due to erosion of chiefly authority. The communities and their chiefs will continue to make all of the decisions regarding the area, but these areas will be formalized and given legal recognition under this Act. The Environment Unit considers that this legislation will primarily be for areas that will be protected for long periods of time, i.e. for terrestrial reserves or marine protected areas. However, communities may terminate, amend or modify their arrangement under this legislation at any time through application to the Director of the Environment Unit.

Proponents of a legislated approach to community-based resource management see the steps outlined above as an inevitable progression to adapt to changing times. Critics of this approach point out that it may well have the long-term effect of undermining the chief's status and power within the village, once power of enforcement is effectively transferred to the state. Another important consideration in this process is that the state has very limited resources available to monitor and enforce such regulations in an archipelago of



Women and children from the Banks Islands reef gleaning on a low tide.

more than 80 islands dispersed over 1,000 kilometres. This leads to the danger of the state being entrusted with enforcement of village-based resource management when it clearly does not have the capacity to do so, yet simultaneously removing that power from the chief. Such an approach could initiate confusion as to who is in charge within the village, and trigger a downward spiral in compliance with community-based resource management due to a lack of effective enforcement.

One final issue that arises is that the application of western law in the village context is generally poorly received in that it is perceived as creating a winner and a loser, as opposed to traditional forms of conflict resolution that tend to be based more on consensus, compromise and a sensitivity to the needs of all parties. The outcome of traditional conflict resolutions typically results in a cessation of the original conflict and a resumption of harmony and cooperation within the village as this conflict has been effectively 'washed out' through customary means. However, the winner/loser outcome of western law is perceived as divisive within the community leaving a lingering conflict and ongoing lack of cooperation. This is liable to manifest in a further deterioration in community cohesiveness and to negatively impact upon the cooperation and respect necessary for community-based resource management.

4 *Final remarks*



A fish weir on northern Pentecost Island

There have been many attempts to generate improved marine resource management in Pacific Island villages and few seem to have achieved such widespread success as the turtle and trochus initiatives in Vanuatu. Although it must be noted that Samoa, using quite different extension methods, has seen a major upsurge in village-based marine resources management in the past few years (Fa'asili and Kelokolo, 1999).

Some of the factors that have influenced the growth in marine resource management in Vanuatu were already identified in the 1993 survey (Johannes, 1998a). Customary marine tenure provides the foundation upon which village-based marine resource management is built. Strong leadership and village cohesion are important in determining how well marine resource management functions. Villagers can benefit greatly from well directed, culturally appropriate assistance to help focus and refine village-based marine resource management initiatives to fit contemporary circumstances. These conclusions are also relevant to other Pacific Islands where customary marine tenure is

found (World Bank, 1999). There are several specific factors in Vanuatu that have promoted the recent upsurge and success of village-based marine resource management that demonstrates clearly how outside assistance, properly targeted, can generate major benefits. Certain elements of this assistance are unusual and perhaps unique.

The demonstration of the value of trochus closures by the Vanuatu Department of Fisheries was clearly the original catalytic influence on the growth of community-based marine resource management. This motivated community experiments with other forms of management (such as gear restrictions, quotas, etc.) and on other important subsistence and commercial resources. The Department's extension work continues to the degree that its limited budget allows. Trochus management education has been carried out extensively and juvenile trochus have been planted in over 25 villages around the country. While it has not been proven that trochus planting improves population numbers any more than simple closures, the instigator of the programme, Mr Amos observes that trochus transplants enhances communities' support for and compliance with the closures.

This is due to the increased awareness associated with training of villagers, along with their participation in re-stocking the reef with juvenile trochus and follow-up monitoring. Part of the increased commitment to trochus conservation may be because the villagers were given something tangible (the juvenile trochus) and in return they feel more committed to

regulating the resulting fishery. A strategy for further enhancing the feeling of community involvement is that the Department of Fisheries actually borrows adult trochus, collected by members of the community, for breeding the stock they subsequently plant there.

Furthermore, focusing on a single commercially valuable marine resource such as trochus was another important element in the success of the village-based marine resource management measures. Once villagers saw the benefits of trochus management, it encouraged them to think about how they could better manage their other marine resources. Turtles were another species on which attention was focused, and are of particular interest to coastal villagers since they are an important food and in some areas also have customary significance.

It would probably have been hard to motivate villagers from the start to accept the more complex goal of improving marine resource management in general. As previously described, Wan Smolbag and the Department of Fisheries are now working towards that goal, but only after having gained credibility through the turtle and trochus initiatives. Perhaps

noteworthy is the fact that the play, performed by Wan Smolbag in the villages a year before the turtle play, was entitled 'On the Reef' and addressed the importance of protecting the total reef environment. It did not seem to have nearly the same impact on village marine resource management as the turtle play, judging by the comments of interviewees.

Assistance from the Environment Unit and the Foundation for the Peoples of the South Pacific has also significantly contributed to village-based management of resources in Vanuatu, through promoting environmental awareness and their support for the establishment of conservation areas on some islands. The Vanuatu Cultural Centre,

particularly through their fieldworker network throughout the islands, has also assisted numerous communities to strengthen and revive traditional management systems in response to contemporary resource management needs by promoting awareness of the value and efficacy of these systems so strongly rooted in local customs.

The strengthening and ongoing adaptation of customary management systems is in response to the contemporary need for additional management efforts with a growing population and commercialization of resources, but also part of a broader revival of traditional practices since independence from colonial rule in 1980. With the introduction of various new fisheries like the live reef fish and aquarium trades, there is the ongoing



Irrigated taro patches on Maevo Island where freshwater prawns, fish and eels may also be collected.



need to raise awareness of the pro's and con's of these fisheries to villagers and their leaders and continue to develop their capacity in adapting their customary systems to manage them.

The effectiveness of enforcement of marine resource management measures in Vanuatu varies with factors such as the strength of respect for village leadership, the respect for customary practices and beliefs including tabus, fishing ground geography and ease of surveillance, and the presence or absence of tenure or leadership disputes. The need of rural villagers to generate cash income for basic needs, including education and medical attention, is an additional factor that may lead people to disobey village resource regulations. A re-occurring theme from this study was that the placement of village-based restrictions must also take into account the subsistence and cash generating needs of rural communities. Closures are more closely respected when alternatives are made available to community members to satisfy these needs. The fact that these village-based resource management regulations are not always effectively enforced does not distinguish them from marine resource management in most other countries.

Education - not just for villagers

Another lesson emerging from this study relates to education. When national conservation regulations and their underlying rationale were clearly explained to villagers and were perceived by them to coincide with village interests, they were often incorporated into village management measures. This greatly enhanced their observance according to many informants. Ignorance of these laws, and of the reasons for them, had previously been widespread in rural Vanuatu – as it was in the villages in five other Pacific Island countries recently surveyed by the World Bank (1999).

Effective enforcement of national conservation regulations by central government agencies in developing countries such as Vanuatu is quite impossible. In most cases these regulations must be enforced by village authorities or not at all. Village authorities will

not enforce them if they are not informed of their existence, their purpose and their ultimate value to the community. It is much more cost-effective for villagers to manage their own coastal marine resources than central governments.

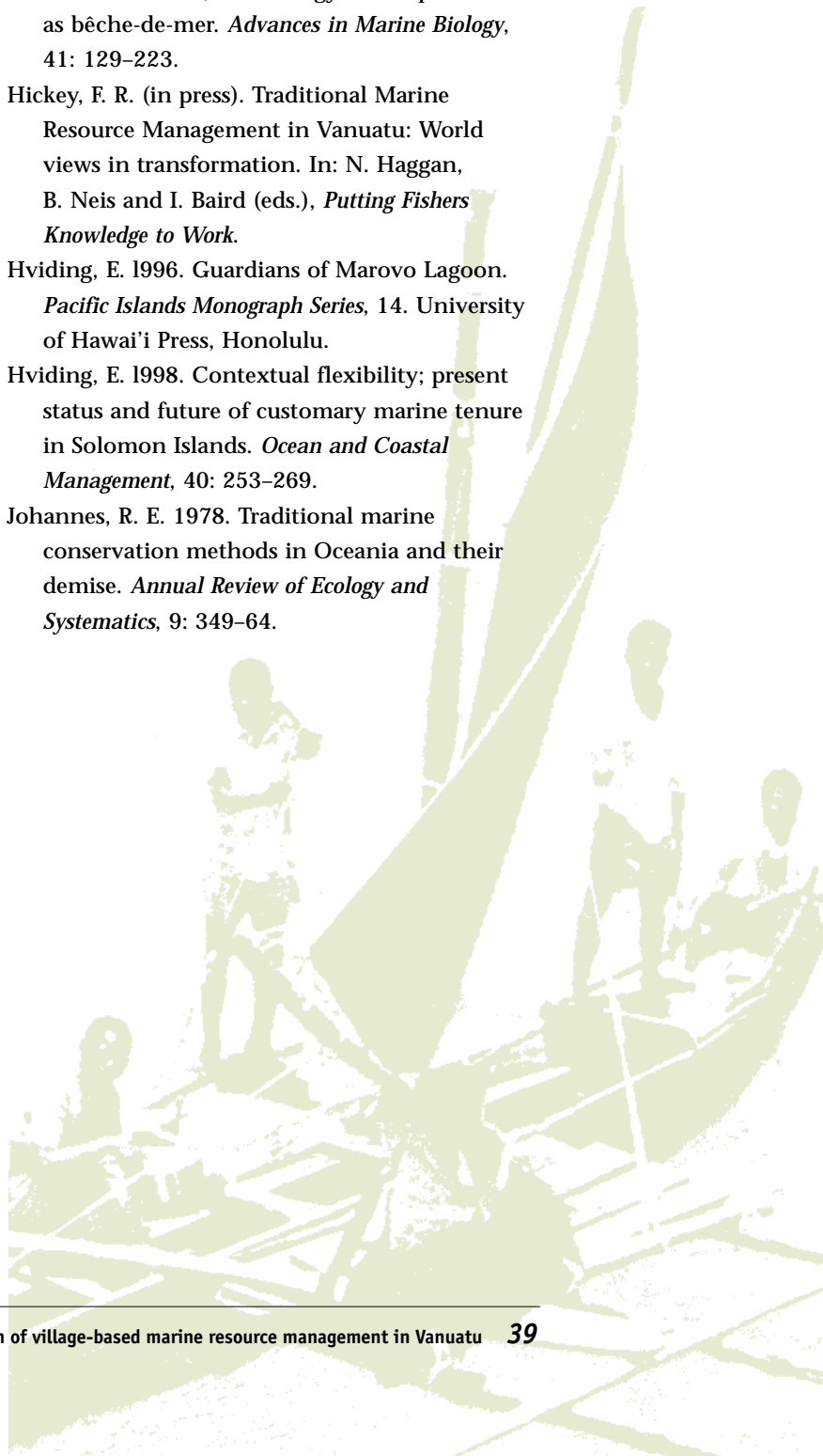
Johannes (1994) argued that fisheries extension work should focus on management rather than development in Oceania. The results of this present survey provide further emphasis for this argument along with the work of Johannes (1998a), Fa'asili and Kelokolo (1999) and World Bank (1999). Yet the World Bank (1999) study of fishing communities in five Pacific Island countries in 1998 revealed that only 40% of the 31 communities they surveyed had been visited by a government official to discuss coastal management issues during the previous decade, and that an average of only 25% of Department of Fisheries' budgets were for extension work (including both management and development components).

Villagers are not the only ones needing more education concerning rural marine resource management. National governments need to understand that nearshore subsistence fisheries in almost every Pacific Island country are worth more than nearshore commercial fisheries (Dalzell *et al.*, 1996). (The value of the subsistence catch was calculated by these authors as the price it would fetch if it were sold.) In the early 1990s, subsistence fisheries in Vanuatu provided five times the catch of nearshore commercial fisheries and were worth almost 1.5 times the value. If the foreign exchange cost of imports to support higher technology commercial fisheries were factored in, the benefit/cost ratio of subsistence versus commercial fishing would have increased further (Johannes, 1998a). Commercial fisheries have often attracted more attention when island politicians and aid donors decide on funding priorities.

Thus on economic and social grounds, extension work in rural fishing communities, where subsistence fisheries often dominates the catch, deserves a larger proportion of fisheries funding than it usually gets.

References

- Alcala, A. C. 1998. Community-based coastal resource management in the Philippines: A case study. *Ocean and Coastal Management*, 38:179–186.
- Alder, J. 1996. Have tropical marine protected areas worked? An initial analysis of their success. *Coastal Management*, 24: 97–114.
- Amos, M. 1993. Traditionally based marine management systems in Vanuatu. SPC* *Traditional Marine Resource Management and Knowledge Information Bulletin*, 2:14–17
- Anderson, J. A. and Mees, C. C. 1999. The performance of customary marine tenure in the management of community fishery resources in Melanesia. Final Technical Report to the UK Department for International Development, MRAG Ltd., London.
- Aswani, S. 1997. Troubled water in SW New Georgia: Is codification of the commons a viable venue for resource use regularization? SPC* *Traditional Marine Resource Management and Knowledge Information Bulletin*, 8: 2–16.
- Dalzell, P., T. J. H. Adams and N. V. C. Polunin. 1996. Coastal Fisheries in the Pacific Islands. *Oceanography and Marine Biology: An Annual Review*, 34: 395–531.
- Dulvy, N. K. and N. V. C. Polunin. (in press). Detecting declines and extinctions of vulnerable exploited reef fishes.
- Fa'asili, U. and L. Kelokolo. 1999. The use of village by-laws in marine conservation and fisheries management. SPC* *Traditional Marine Resource Management and Knowledge Bulletin*, 11: 7–10.
- Foale, S. and M. Macintyre. 2000. Dynamic and flexible aspects of land and marine tenure West Nggela: Implications for marine resource management. *Oceania*, 71: 30–45.
- Hamel, J.-F., C. Conand, D. L. Pawson and A. Mercier. 2001. The sea cucumber *Holothuria scabra* (Holothuroidea: Echinodermata): Its biology and exploitation as bêche-de-mer. *Advances in Marine Biology*, 41: 129–223.
- Hickey, F. R. (in press). Traditional Marine Resource Management in Vanuatu: World views in transformation. In: N. Haggan, B. Neis and I. Baird (eds.), *Putting Fishers Knowledge to Work*.
- Hviding, E. 1996. Guardians of Marovo Lagoon. *Pacific Islands Monograph Series*, 14. University of Hawai'i Press, Honolulu.
- Hviding, E. 1998. Contextual flexibility; present status and future of customary marine tenure in Solomon Islands. *Ocean and Coastal Management*, 40: 253–269.
- Johannes, R. E. 1978. Traditional marine conservation methods in Oceania and their demise. *Annual Review of Ecology and Systematics*, 9: 349–64.



- Johannes, R. E. 1981. *Words of the Lagoon: Fishing and Marine Lore in the Palau District of Micronesia*. University of California Press, 245 pp.
- Johannes, R. E. 1994. Co-operative fisheries management: major changes in training required for government fisheries personnel. SPC* *Traditional Marine Resource Management and Knowledge Information Bulletin*, 4:7-10.
- Johannes, R. E. 1998a. Government-supported, village-based management of marine resources in Vanuatu. *Ocean and Coastal Management Journal*, 40: 165-186.
- Johannes, R. E. 1998b. The case for data-less marine resource management: Examples from tropical nearshore fisheries. *Trends in Ecology and Evolution*, 13: 243-246.
- Johannes, R. E. 2002. Did indigenous conservation ethics exist? SPC* *Traditional Marine Resource Management and Knowledge Information Bulletin*, 14: 3-7.
- Johannes, R. E. (in press). Use and misuse of traditional ecological knowledge and management practices: Pacific island examples. In: D. Dallmeyer (ed.), *Values at Sea: Ethics for the Marine Environment*. University of Georgia Press (being reprinted in *Environmental Ethics and Policy*, Thomson Learning).
- Johannes, R. E., M. M. R. Freeman and R. Hamilton. 2000. Ignore fishers' knowledge and miss the boat. *Fish and Fisheries*, 1:257-271.
- Massim, C. 1982. Effects of feeding on the environment: Holothuroidea. pp. 493-497. In: M. Jangoux and J. M. Lawrence (eds.), *Echinoderm Nutrition*. Balkema, Rotterdam.
- McClanahan, T. R. 1999. Is there a future for coral reef parks in poor tropical countries? *Coral Reefs*, 18: 231-241.
- Roberts, C. M. and J. P. Hawkins. 2000. *Fully-protected marine reserves: A guide*. WWF Endangered Seas Campaign, Washington D.C., and Environment Department, University of York, York, UK.
- Ruddle, K. and R. E. Johannes (eds.). 1985. *The Traditional Knowledge and Management of Coastal Systems in Asia and the Pacific*. UNESCO, Jakarta.
- Ruddle, K. and R. E. Johannes (eds.). 1990. *Traditional Marine Resource Management in the Pacific Basin: An Anthology*. UNESCO, Jakarta.
- Ruddle, K., E. Hviding and R. E. Johannes. 1992. Marine resource management in the context of customary tenure. *Marine Resource Economics*, 7: 249-273.
- Russ, G. R. and A. C. Alcala. 1996. Marine reserves: rates and patterns of recovery and decline of large predatory fish. *Ecological Applications*, 6(3): 947-961.
- Sims, N. 1989. Adapting traditional marine tenure and management practices to the modern fisheries framework in the Cook Islands. pp. 323-358. In: K. Ruddle and R. E. Johannes, *Traditional Marine Resource Management in the Pacific Basin: An Anthology*. UNESCO, Jakarta.
- World Bank. 1999. *Voices from the Village: A Comparative Study of Coastal Resource Management in the Pacific Islands*. Summary Report. Washington, D.C.
- Yamaguchi, M. 1993. Green snail. pp. 497-511. In: A. Wright and L. Hill. (eds.), *Nearshore Marine Resources of the South Pacific*. Institute of Pacific Studies, Suva, Forum Fisheries Agency, Honiara and International Centre for Ocean Development, Halifax.

* Secretariat of the Pacific Community (Noumea, New Caledonia)

Annex I

VANUATU VILLAGE-BASED MARINE RESOURCE MANAGEMENT REGULATIONS FOR TENURED FISHING GROUNDS, 1993 AND 2001

ANEITYUM ISLAND

ANELGUAHAT

1993

- Clans have independent control over portions of the fishing ground and inter-clan disputes prevent community-wide conservation measures. Clan measures include: total fishing closures, staggered so some fishing grounds are always open; trochus closures; rock lobster closures.

2001

- Fishing grounds nearest village are closed to trochus, and all methods of fishing for finfish, shellfish and bêche-de-mer.
- Marine protected area status being considered for waters surrounding a tourist development within village's tenured fishing grounds.

Comments: Regulations have evolved considerably. Nominally (for calculating trends, see Tables 1 and 2) no regulations have lapsed and one (bêche-de-mer) was initiated.

Comments: Largest village in Vanuatu. Peri-urban, with high unemployment among youth. Despite these unpromising circumstances, defense against encroachment by residents of the nearby capital is strong. Two new initiatives were started.

MANGILILIU

1993

- Trochus closures with short openings periodically.
- Bêche-de-mer closure had been abandoned recently.
- Night spearfishing tabued.
- Closure of village fishing grounds.

2001

- Trochus closures, night spearfishing tabu and fishing ground closures all continue. Some gleaning of the undersized trochus for food, and some poaching of trochus and fish, but not seen as major problems. Trochus poachers apprehended and catch confiscated.
- Tabu on catching turtles.

Comments: All 1993 management measures still in operation; one new one.

EFATE ISLAND

MELE

1993

- 'There will be no tabus until various land claims are settled'. Mele is also disadvantaged by being very close to the capital, Port Vila.

2001

- An excellent reef closed since 1994 to cater to resort users.
- Two year tabu on trochus following juvenile outplanting by the Department of Fisheries.

TANOLIU

1993

- No tabus.

2001

- Tabu on giant clam (*Tridacna crocea*) harvesting but not well observed. Although the wording is ambiguous, recent national law prohibits export of wild (i.e. not cultured) giant clams from the island of Efate and its offshore islands. Large areas of reef damaged

by use of crowbars to extract this species which lives imbedded in coral.

- Closure of a portion of village fishing grounds to all fishing. This closure is associated with a new tourism development.
- Tabu on night spearfishing.
- Tabu on bêche-de-mer.
- Tabu on taking turtles. Not observed rigorously.
- Tabu on using nets under consideration.

Comments: Five new controls initiated. The tabu on giant clams was not working well but this should change because of new fisheries legislation. Turtle tabu being reformulated in hopes of better observance.

SIVIRI

1993

- Trochus closures.

2001

- Trochus closures still operate, but significant poaching suspected judging by poor harvests during official openings.
- Closure of half of the fishing ground, later rescinded due to unpopularity.
- Tabu on bêche-de-mer.
- Tabu on commercial (but not subsistence) harvest of giant clams.
- Tabu on taking of turtles except for special occasions.
- Permanent mangrove reserve under consideration.

Comments: Since 1993 four new controls initiated, one of which failed.

SAAMA

1993

- No controls.
- Some poaching by outsiders.

2001

- Trochus closures, some poaching by locals.
- Taking turtle tabu except on special occasions.

Comments: Since 1993 two new controls initiated, but implementation has been difficult. Major prolonged ciguatera problem means little need for finfishing tabus. This village is unique on north Efate in that the residents are from other islands, mainly Pentecost and Paama, having worked on plantations prior to Independence. They now lease the land and reef of their village area from the neighbouring village of Emua.

EMUA

1993

- Fishing ground closed to all harvesting periodically.
- Bêche-de-mer tabu.

2001

- Bêche-de-mer tabu continues.
- Fishing ground opened to general harvesting in 1997 to compensate for new trochus closure. Fishing ground will stay open for foreseeable future, although permanent closure of an area around mangroves under discussion.
- Three-year trochus closures begun in 1997, continuing after harvest in 2000. Trochus closure concurrent with that of neighbouring Saama. Some poaching has occurred and poachers fined.
- Tabu on taking turtles.

Comments: Since 1993 one closure lifted; two new controls initiated.

PAUNANGISU

1993

- Nearshore fishing grounds closed to all harvesting for one year except for bivalves in sandy areas and crabs in mangroves.

2001

- Half of their fishing ground closed from 1995–1997, some poaching by outsiders.
- Tabu on bêche-de-mer.
- Tabu on taking turtles.
- Permanent closure of waters adjacent to a resort.

- Long running leadership dispute has reduced conservation efforts. Dispute now resolved and the need for another fishing ground closure being actively discussed.

Comments: Since 1993 three new controls initiated.

EPAO

1993

- Half their fishing grounds closed to all fishing, some poaching by outsiders.
- Bêche-de-mer not taken.

2001

- Fishing ground closure terminated after three years.
- Bêche-de-mer are still not taken.
- Tabu on taking turtles.
- Tabu on breaking up reef to get octopus.

Comments: One regulation terminated; two initiated.

ETON

1993

- No management regulations.

2001

- Periodic closure of half the reef to all fishing for two years.
- Small mesh nets tabued.
- Bêche-de-mer not taken.

Comments: Originally no regulations, now three, with more being planned.

ERAKOR

1993

- Trochus and other controls failed due to lack of respect for traditional authority among young people. (Erakor is a very urban village close to the capital, Port Vila.)

2001

- Closure of portion of fishing ground for a year in 1997 was well observed by most, tabu

breakers were punished and their canoes smashed, yet the tabu was nevertheless unpopular enough that villagers wanted it discontinued.

- Local law that those who turn over rocks on the reef while gleaning should turn them back again, but not well enforced. Tabu on use of nets in waters nearby a tourist resort.
- Tabu on use of spearguns in waters adjacent to a tourist resort.

Comments: Typical problems of a large, peri-urban village, where traditional authority is weakening and undermined by an ongoing leadership dispute, while the population continues to grow and high unemployment makes conservation difficult. Fish fence blocking lagoon entrance appears to be a serious environmental threat but chief unable to prevent it. Three new initiatives.

EMAIE ISLAND

MARAE

1993

- One half of fishing ground closed to all fishing.
- Trochus closure.

2001

- Complete two year tabu on fishing on a large portion of the reef.
- The open portion of the reef cannot be used for commercial fishing.
- Trochus closure has been abused.

Comments: Land/reef ownership disputes are worsening, one new initiative.

EPI ISLAND

LAMEN BAY

1993

- Trochus closure for whole reef.
- Some family closures of their portions of fishing grounds.

2001

- Both 1993 regulations still in effect. (Two of the current closures were year-long traditional closures to observe the death of a community member.)
- Two additional areas tabued specifically to keep out a live reef fishery that was planning to operate in the area.
- Turtles protected inside the bay (very abundant and easily approached).

Comments: Three new initiatives.

MASKELYNE ISLANDS, SOUTHERN MALEKULA

PESCARUS

1993

- Trochus closure.
- Four clans each own part of fishing grounds. They alternate closing of one of these portions.
- Night spearfishing tabued in some areas.
- Gillnets tabued in some areas.
- Taking crabs with eggs tabued.
- Periodic tabu on taking octopus.

2001

- Trochus tabus still in effect but poorly observed.
- Tabu on bêche-de-mer.
- Tabu on taking all invertebrates (e.g. octopus, lobster, clams, crabs) October through February, only line fishing and spear throwing allowed.
- Night spearfishing tabued October through February.
- Nets tabued October through February. (These last three controls imposed from October through February were agreed to and enacted by the Maskelyne Council of Chiefs and are also in effect in the two other Maskelyne Islands surveyed (see following), as well as the two other unsurveyed villages nearby, Avok and Okei. These tabus were described as 'indefinite'.)

- Small giant clam preserve with no fishing of any kind allowed (marine protected area); clam recruitment around it very evident.
- Taking turtles tabu except during yam celebration.

Comments: Many commercially minded young men with declining respect for traditional laws or authority. Three new regulations, but the observance of some believed to be poor.

LUTAS

1993

- Trochus closure.
- Four clans alternate general closure of their fishing grounds.

2001

- Trochus closure still in effect.
- Tabu on bêche-de-mer (to be in effect for the next 4–5 years).
- Tabu on taking all invertebrates (e.g. octopus, lobster, clams, crabs) October through February; only line fishing and spear throwing allowed.
- Spearfishing tabued October through February.
- Nets tabued October through February.
- Turtles harvested only during annual yam celebration.
- Land crabs tabu during reproductive season November to February.

Comments: Unlike 1993, different clans' reef closures now combined, but the use of hook and line, spears, bow and arrow and diving by day (for finfish only) are allowed; five new management initiatives.

PELONGK

1993

- Trochus closure for 4–5 years.
- Some fishing grounds closures except for line fishing and daytime spearfishing.
- Night spearfishing tabued.
- One area of about 150 m by 150 m was fenced off by one individual and turned into a giant

clam reserve with about 1,200 small clams transplanted there, all fishing tabued (marine protected area).

- Fishing for some fish tabued 'when they have eggs'.

2001

- Clam reserve still in effect. Closed to all fishing (marine protected area).
- Three-year tabu on all fishing from deep water to mangroves on shore in one large area (very heavy fine for breaking this tabu).
- Trochus closures reduced to 3–4 years (some poaching occurs).
- Tabu on taking all invertebrates (e.g. octopus, lobster, clams, crabs) October through February; only line fishing and spear throwing allowed.
- Spearfishing tabued October through February.
- Nets tabued October through February.
- Taking of turtles tabued, but so unpopular that it was changed to restricting the eating of turtle to annual yam ceremony.
- During the open season most net-caught fish can be used for subsistence only.
- During the open season octopus can be caught for subsistence use only.
- During the open season only fish caught near the boundaries with other villages may be sold.
- Tabu on taking land crabs (*Cardiosoma* spp.) and unidentified land crab from November to February during their reproductive season.

Comments: The five-month annual tabus from October through February are said to be timed to coincide with the time when most species, including finfish, have eggs. (This advice came from the Environment Unit.) Regulations have evolved since 1993, but none have lapsed; six new ones.

CENTRAL MALEKULA

LITSLITS

1993

- Six-month alternating fishing closures shifting between fringing reef and the reefs around four small mangrove-covered islands.

2001

- Six-month alternating closures still operating, although in the intervening period there have been some territorial disputes.
- Fishing, except for gleaning, tabued in one passage.

Comments: The older regulation not as well enforced and territorial dispute weakens the one new initiative.

URI

1993

- Mangrove crab closure for six months per year (planned to close for a full year in 1994).
- Night spearfishing tabued.
- Gillnetting tabued.
- One hundred hectare reserve closed to all fishing for five years.

2001

- Giant clam reserve permanently protected from all fishing (marine protected area).
- One hundred hectare reserve now designated as a park and permanently protected from all harvesting (marine protected area).
- Tabu on oyster gathering in one mangrove area.
- Cutting of mangroves tabued in another area.
- Total fishing bans of different lengths in two different locations.
- Bêche-de-mer no longer collected.
- Night spearfishing still tabued.
- Night netting still tabued.
- Ban on commercial collecting of shore crabs for six months of the year (includes season when the crabs have eggs).
- Only limited catch of turtles allowed by chief.

- Controls on harvesting mangrove crabs, bivalves and trochus under consideration.

Comments: Strong support for marine conservation. Some individual controls have been modified much since 1993. Eight new management measures and more planned.

URIPIV

1993

- Three clans closed their fishing grounds for 1.5 to 2 years, one did not. Dissension between clans made consensus on conservation difficult.

2001

- One fishing ground closed to all but line fishing.
 - Another fishing ground completely closed.
- The main purposes of both closures were to stop spearfishing and the use of nets.

Comments: Two new management controls initiated since 1993. Inter-clan disputes over land/reef ownership still in evidence. Community requested assistance in drawing up plans for additional marine conservation measures, especially a marine sanctuary.

NORSUP

1993

- Individual clans had trochus closures on their portions of fishing ground.
- Total fishing ground tabu for one year.
- Some inter-clan disputes made conservation difficult.

2001

- Two 1993 regulations had lapsed. No current tabus, marine resources badly overharvested on their mainland holdings according to local opinion.

Comments: Two previous regulations no longer observed. No current management. The urban nature of this village, so close to the provincial centre of Lakatoro, and with many inhabitants

from other areas not familiar with or bound by local customs and authority, made enforcement difficult.

TAUTU

1993

- Fishing ground closures being disrupted by clan disputes and outside political involvement.

2001

- Serious inter-clan disputes continue to thwart conservation efforts. In addition all reefs have been ciguatoxic since 1997, which further reduces conservation incentives.

Comments: No change in fisheries management due to village disputes and ciguatera, but growing recognition of the need for it.

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