GESTRAD Project

Up-scaling village-based management of reef resources in Vanuatu

Final report

August 2013

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1.0 Abstract

The overall objective of the GESTRAD project is to contribute to develop a national policy for the management of reef fish fisheries, which considers ways of village management in force today. This is to assess the extent to which regulations may be enacted locally and supplemented by management rules to wider geographical and social level, with the support of public authorities. The study focused on the islands of Efate, Malekula and Santo where 28 villages were surveyed. The current organization of fishing practices, the unspoken rules in force, perceptions of current management issues and local ecological knowledge among the issues were analyzed following a comparative and historical approach.

Overall the results challenge the current effectiveness of community-based fisheries management in achieving sustainability of reef fisheries in Vanuatu and highlight the over-reliance on small marine reserves as a management tool. Community initiatives must be strengthened by new specific national regulations governing subsistence and commercial reef fisheries as part of a multi-scale co-management approach.

2.0 Introduction

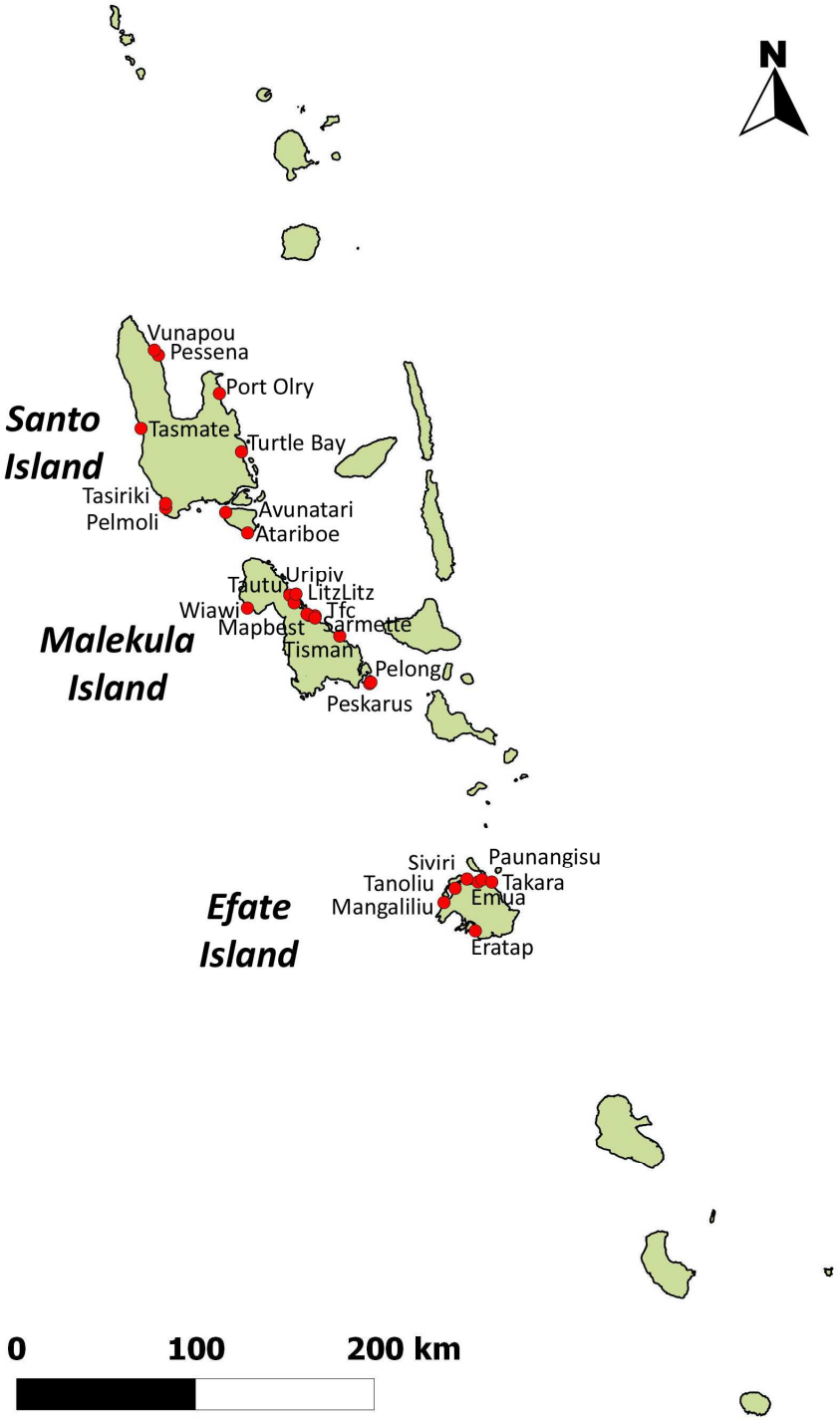
Community based fisheries management (CBFM) is widespread in the Pacific Island Countries (PICs) for the management of near-shore fisheries. With the exception of highly migratory pelagic fish stocks, the narrow natural resource base of many Pacific islands makes them particularly vulnerable to inappropriate development and mismanagement. PICs have introduced management strategies to address the underlying issues of coastal communities, which has resulted in the upsurge of interest in CBFM.

CBFM regimes may include different regulatory measures such as species and gear restrictions, closed seasons, access rights, and marine reserves (tabu areas). Although CBFM has been identified as an approach by PICs to improve the management of their near-shore fisheries, there has been little biological information to verify the effectiveness of CBFM. Additionally, other factor such as long-term socioeconomic needs, social cohesion, financial resources, and linkage with government policies within the local community determines the organization and management of CBFM. These underlying factors may eventually produce disenchantment with CBFM as a viable alternative, if the management measures do not produce any positive impacts.

Marine resource management in Vanuatu is a common practice and is imbedded in the traditional rights of family clans, chiefs or villages that own the land. In the past, rights to fish were obtained from the traditional land and reef owners thus the sustainability of this form of traditional management regime was evident. In the modern times, the traditional system has been weakened by increased pressures from social, cultural, economic, institutional and political factors. Communities have been assisted by the Vanuatu Fisheries Department (VFD) in providing support for CBFM through programs aimed to enhance trochus (*Trochus niloticus*) and deep bottom snapper fisheries. Also, national fisheries regulations were established in 1982, 2005 and 2009 and mainly affected the commercial aspect of fisheries, i.e., high value species (Tuna and tuna-like species, trochus, sea cucumbers, lobsters, aquarium fish…). However, the considerable financial resources invested by the national government through fisheries development programs have had relative impact. Subsistence fishing continues to dominate in terms of fishers and marine product consumption and engages about 50% of Vanuatu's rural population.

This study aims to investigate CBFM and suggest practical management regulations based on community perceptions and governance structures both at the community and the national government levels to address the current near-shore challenges.

Fig 1. Map showing survey areas including 28 villages in Malekula (n=12) and Santo (n=9) Islands. The villages surveyed in Efaté island as part of Léopold et al's (2013) survey are also indicated (n=7).



3.0 Materials and methods

3.1 Study area

In most islands of Vanuatu, the poorly developed transport network within and between the islands of the archipelago strongly restricts seafood marketing and maintains inshore fishing activities to a subsistence level. The study was conducted in twenty one rural coastal villages in Malekula and Santo Islands (twelve and nine villages respectively). Most of the villages were remote and had a population over 200 inhabitants and experienced rapid increase in population. The presence of an ever expanding population along with the increase in flow of fishing gears both passive and active have resulted in the coastal fisheries being exposed to higher risks of overexploitation than other resources around the country.

In five of the twenty one villages in the study area, external agencies (e.g., local and international non-governmental organizations (NGOs), cooperation agencies of foreign governments) intervened during the period 2000-2010 as part of the development projects supported by VFD. Additionally, some of the villages were documented as having some of traditional marine management (Johannes R.E. and Hickey F.R, 2001) (Fig 1).

The foreign funded projects have developed participatory management plans for marine resources at the community level based on local contexts and expectations. Following an ecosystem approach these plans have implemented numerous actions to limit environmental impacts (e.g., mangrove conservation, waste management, land resource management, ecotourism development) and in particular, have imposed restrictions on fishing. These plans were created for a period of four or five years after launching ceremonies meant to mark the communities' strong commitment to implement the projects and comply with the management plans.

3.2 Data collection by focus-group interviews

In order to collect local fisheries management knowledge, semi-structured interviews were conducted using open-ended questions. The survey covered (1) the sociopolitical and economic context, including local governance, structure of chiefdoms, recent history of settlement, and main sources of household income; (2) the characteristics of coastal fisheries (0-100m depth), including the nature and number of fishing gear and boats, target species, catch uses, and spatial data on fishing areas, marine reserves (MR) and villages' maritime boundaries; and (3) the local management system, including the fishing rules in force for the past 20 years, the presence of informal management committees, the possible contributions of external agencies (e.g., NGOs, government, foreign public institutions), and the perceptions of current issues and suggestions for fisheries management. Spatial data were gathered using satellite images (1:20,000 scale) and participatory mapping and incorporated into a geographic information system.

Local knowledge was collected by interviewing focus groups over a period of four to five days in each village between October 2011 and July 2012. These small homogenous groups (3-6 persons) were established, with the help of local leaders, according to common characteristics in age (18-30years and >30 years), gender and social status. Overall eight to nine groups were interviewed in each village; (1)

the council of the traditional leaders and chiefs; (2) the informal management committee representing key informants on issues related to environment and management of marine resources; and (3) three to four groups of active fishers across gender and age categories. In total 145 groups (545 persons) participated in the survey across the two islands (Table 1).

Table 1. Characteristics of the groups of stakeholders interviewed in each of the 21 villages visited in this survey (Malekula and Santo islands, Vanuatu). Characteristics of the groups of stakeholders interviewed in Efaté island as part of Léopold et al's (2013) survey are also indicated.
Chiefs: council of traditional leaders. Management committees: key informants responsible for implementing local management and knowledgeable about issues related to environment conservation and the management of marine resources. Fishers: active fishers according to age and gender categories.

	Villages	Number of survey groups of stakeholders						Total	
		Leader groups		Fisher groups				Survey groups	Respondents
		Chiefs	Management comittees	Men (18-30	Men (>30 yr)	Women (18-30	Women (>30 yr)		
	MALEKULA								
1	Peskarus	4	1	2	2	2	1	12	36
2	Pelongk	1	0	1	2	1	3	8	29
3	Mbangkir (Tisman)	1	1	2	2	1	2	9	33
4	Litzlitz	1	0	2	1	1	3	8	29
5	Wiawi	1	1	1	1	1	1	6	21
6	Uripiv	0	0	2	1	2	2	7	28
7	Tautu	1	0	2	1	0	2	6	24
8	Sarmet	0	1	1	3	0	3	8	34
9	Tevaliaut	1	1	2	1	1	1	7	21
10	Launi	1	1	1	2	2	2	9	30
11	TFC	0	0	1	1	1	1	4	16
12	Mapest	0	0	0	2	2	1	5	20
	Total Malekula	11	6	17	19	14	22	89	321
	SANTO								
1	Atariboe			1	1	1	1	4	16
2	Avunatari			2	2	2	2	8	32
3	Pelmol			2	2	1	1	6	24
4	Port Olry			2	2	1	2	7	28
5	Tasiriki			1	2	2	2	7	28
6	Tasmate			1	1	1	1	4	16
7	Turtle Bay			2	2	2	2	8	32
8	Pesena			1	1	2	2	6	24
9	Vunapou			1	1	2	2	6	24
	Total Santo	0	0	13	14	14	15	56	224
	EFATE								
1	Takara	1	1	2	2	1	1	8	29
2	Paunangisu	1	1	2	2	1	2	9	30
3	Emua	1	1	2	2	1	2	9	46
4	Siviri	1	1	1	3	1	1	8	24
5	Tanoliu	1	2	1	2	1	2	9	40
6	Mangaliliu	1	1	2	2	1	1	8	29
7	Eratap	1	0	2	2	1	2	8	36
	Total Efate	7	7	12	15	7	11	59	234

3.3 Data analysis

It was assumed that a fishing rule (hereinafter termed "local rule") was in force over the village's marine tenure if it was mentioned either in the literature review or by 50% of the surveyed groups of stakeholders, who considered that the transgression of such rules was equivalent to poaching and sanctioned by a community-based or national procedure. Conversely, fishing rules that failed to meet these criteria were considered to not be enforced. The local fisheries regulatory framework was defined as the set of local rules. These included both the community rules set at village level and the national rules implemented by the VFD.

Local regulatory systems were described for four periods (1993, 2001, 2002-2010, 2011) in survey by Johannes and Hickey (2004) and this survey was used to standardize the first two periods across villages. Changes in local regulatory systems over the four periods were investigated in relation to their situation in 1993 following a comparative approach.

In order to assess the degree of consensus and of social acceptability of management systems, the similarity of local perceptions on coastal resource management between stakeholder groups within and among villages was analyzed. Perceptions on local fisheries issues and suggestions for management were previously classified into thematic categories derived from interview data. Six categories of management issues were defined: 1) high fishing pressure, 2) excessive use of gillnets, 3) small or large size of MRs, 4) poaching from within and/or from neighboring ones, 5) environmental disturbances, and 6) within- and/or between village social dispute. Eight categories of management suggestions were defined: 1) no management change, 2) local awareness on sustainable management practices, 3) gillnet restrictions, 4) the development of MRs, 5) the periodic harvests of MRs, 6) the establishment of other fishing rules, 7) higher resources for local patrol operations, and 8) the development of alternative sources of income. For each stakeholder group, these categories were then coded in binary form (presence/absence at the interview) and used as qualitative variables. The value of these variables represented the profile of group's perceptions on local fisheries issues and suggestions for management.

Analysis of the data obtained from the villages in Santo and Malekula were then compared with the results of the data from a previous but similar survey in 2011 in Efate Island by Léopold, M et al (2013) (Figure 1 and Table 1).

3.4 Workshop consultations

Results of interview surveys were presented at two workshops in Port-Vila (half-day) and Luganville (one day) in July 2012 as part of the Wan Smal Bag annual meeting for the Vanua Tai resource monitor network. More than 50 people attended each workshop and originated from Tafea and Shefa provinces (Port-Vila workshop) and Malampa, Torba, Sanma and Penama provinces (Luganville workshop). Management recommendations were discussed to attain feedback and suggestions from the resource monitors.

4.0 Results

4.1 Characteristics of village coastal fisheries

The characteristics of village coastal fisheries varied among villages, with economic aspirations of the community as the main driver for the exploitation of reef fisheries. The use of traditional outrigger canoes for fishing was the most dominant while the use of outboard motor boats was limited to a few villages in Efate and Santo, the latter having the most number of outboard motor boats. The fishing grounds depended on the boundary of the village and had an average area of 2 to 20km^2 and to an extent of 1km offshore. Reef fishing was mainly practiced by the use of active gears such as handline, gillnet and speargun (Table 2). Handline was the most common gear as it is used by both genders of all age groups but most common in women and children, whereas the men preferred speargun and gillnets. Catch from handlines was mainly for daily consumption. Gillnets and speargun as the other two predominant fishing gear were used to obtain fish for communal purposes, customary activities and income generation.

4.2 Current status of local management systems

Resource management within the coastal villages was usually overseen by a committee chosen by the villagers and endorsed by the village chief and smaller chiefs, or a chief and his clan of immediate family members.

The system of management and rules varied among villages, each with a set of fishing rules specific for their reef resource.

It was found that the rules originated from traditional practices as well as outside agencies or the national fisheries regulations.

National fisheries regulations on turtles, trochus and sea cucumbers were relatively identifiable and observed within the surveyed coastal villages.

Small marine reserve was the most widespread in the islands, and was present in 100% of villages in Efate and Malekula and 43% in Santo. Most of the villages zoned their fishing grounds to open access, temporary tabu areas and permanent tabu areas. The temporary areas were opened once or twice in the year for community events (e.g.: traditional events, fundraising for school fees) or after several years of closure.

The main objective of tabu areas was to increase fishing and invertebrate resources. However, the expected benefits varied widely among islands, with some of Efate and Malekula villages opting for their tabu areas as a tourism incentive.

Table 2. Characteristics of fishing capacities and marine reserves (if any) in each of the 21 villages visited in this survey (Malekula and Santo islands, Vanuatu). Characteristics of the villages surveyed in Efaté island as part of Léopold et al's (2013) survey are also indicated.

MALEKULA

Villages	Population	Fishing capacities				Marine reserves	
		Gillnets	Spearguns	Canoes	Motorized boats	Date of creation	Status
Peskarus	524	18	8	50+	0	1998	temporary (annual or pluriannual)
Pelongk	283	12	5	40	0	2001	temporary (pluriannual)
Mbangkir (Tisman)	253	9	11	0	0	2001	temporary (pluriannual)
Litzlitz	369	25	10	20	0	Open	temporary (pluriannual)
Wiawi	28	1	4	0	0	1995	temporary (pluriannual)
Uripiv	384	14	10	10	3	1982	1 permanent
Tautu	249	18	4	6	0	1996	2 x temporary (annual)
Sarmette	38	31	12	6	1	2002	permanent
Tevaliaut	50	5	1	1	0	2002	temporary (pluriannual)
Launi	40	15	0	1	0	2002	temporary (pluriannual)
TFC	44	5	0	0	0	2002	temporary (pluriannual)
Mapest	30	5	0	0	0	2002	temporary (pluriannual)

SANTO

Villages	Population	Fishing capacities				Marine reserves	
		Gillnets	Spearguns	Canoes	Motorized boats	Date of creation	Status
Atariboe	49	4	4	3	1	2008	Permanent
Avunatari	165	7	30+	20+	0	Open	Open
Pelmol	229	4	5	10	2	2005	Permanent
Port Olry	928	50+	100+	50+	10	2006	Permanent
Tasiriki	460	3	9	10	2	Open	Open
Tasmate	65	0	7	10	2	2009	Permanent
Turtle Bay	66	15	3	5	1	2006	Open
Pesena	181	4	5	8	0	Open	Open
Vunapou	73	7	6	7	0	Open	Open

EFATE

Villages	Population	Fishing capacities				Marine reserves	
		Gillnets	Spearguns	Canoes	Motorized boats	Date of creation	Status
Takara	320	19	9	7	0	2008	temporary (pluriannual)
Paunangisu	630	66	15	10	0	2007	permanent
Emua	280	32	9	2	0	2005	permanent
Siviri	110	35	12	9	2	2006	temporary (annual)
Tanoliu	650	46	21	7	1	1998 2002	permanent permanent
Mangaliliu	260	15	23	6	3	1990s	temporary (annual)
Eratap	1350	200	20	50	3	1990s	permanent

4.3 Changes in local rules

Local management rules were found to address the issues and concerns of communities regarding their reef resources. Most of the rules were initiated in the 1990s, and covered concerns such as land and waste management, tabu areas and the restriction on harvest within their fisheries. Table 3 shows the distribution of the rules within the villages surveyed. The most common rules were in regards to tabu areas, gillnets, clamshells, and the temporary closure of trochus fisheries.
However, within the three islands, most of the rules have disappeared over the past 20 years, except a few village communities in Efate and Santo.
Changes that have occurred can be identified by three phases. The first phase was characterized by poor elaborated local frameworks and very few fishing rules. An increase in and a diversification of the local fishing rules occurred in the second phase in the late 1990s or in the 2000s. This was particularly due to two kinds of actions that contributed to this development: (1) the closure of sea cucumber fisheries, which was temporarily implemented in most villages in Efate in 2001 and 2008 in the two other islands through enforced national regulation and (2) the implementation of community management plans that generated local regulatory innovations (e.g., temporary closures of certain species, minimum size limits, restrictions on use of certain types of fishing gear, establishments of MR). The third phase was characterized by an opposite trend marking the continuation of two national rules on sea cucumber and trochus fisheries but the disappearance of 50% to 100% of community fisheries rules, including gear restrictions, species bans, and minimum size limits. Since then however, over 80% of marine reserves have been maintained over time despite some change in their size, location, or both, and 75% of temporary closures of trochus fisheries were extended or renewed. As a result the local regulatory frameworks have become more homogeneous and simper in 2011 and 2012, with the exception of villages whose management plan was launched in that year.

4.4 Workshop consultation outcomes

During the two workshops held in Port-Vila and Luganville, the main outcomes were in regards to strengthening the existing regulation in the trochus fishery, and for the Fisheries Department to introduce regulations on reef fisheries.
Over 60% of resource monitors from both workshops suggested that the government should introduce a national 5 year ban on the commercial harvest of trochus and provide management strategies through a national management plan that would allow a periodic harvest in quota system that would be allocated only after stock assessment is carried out by the fisheries department (Table 3).
Deliberations on reef finfish was more animated as it was identified as the most important source of income and as a source of protein for most coastal communities, therefore some resource monitors were reluctant towards the introduction of national legislations. It was however agreed upon that Vanuatu reef finfish fisheries were susceptible to overfishing since the village marine management plans were incapable of addressing existing issues such as night spearfishing, small mesh sized gillnets and minimum size limits. The decisions made from both workshops indicated the need for a national net size

regulation with the majority or the participants opting for the gillnet specifications of 4 finger mesh size (45 mm square mesh side), 2.5m in height and 50m in length (Table 3).

Table 3. Workshop consultation outcomes: management recommendations of the resource monitor island groups concerning trochus fisheries (a) and reef finfish fisheries (b) in Vanuatu.

(a)

Workshop- Port-Vila

Resource monitor island groups	TROCHUS FISHERIES: IMPLEMENT A NATIONAL MANAGEMENT PLAN	TROCHUS FISHERIES: IMPLEMENT A NATIONAL BAN
Nguna	3yr	5yr
Pele	2yr & 100kg/household	5yr
Efaté (Mainland East)	2yr	5yr
Efaté (Mainland North)	indefinite	5yr
Efaté (Mainland South)	2yr	3yr
Emao	2yr	5yr
Epi	2yr	5yr
TAFEA Province	3yr & 20kg/household	5yr

Workshop-Luganville

Resource monitor island groups	TROCHUS FISHERIES: IMPLEMENT A NATIONAL MANAGEMENT PLAN	TROCHUS FISHERIES: IMPLEMENT A NATIONAL BAN
TORBA Province	3yr	5yr
Santo (Mainland)	yes	5yr
Santo (Malo)	2yr	n/a
Pentecost	yes	5yr
Ambae	yes	5yr
Ambrym	4yr & 120kg/household	5yr
Malekula (Mainland NW)	1yr & 120kg/household	5yr
Malekula (Mainland Central)	yes & 200kg/village	5yr
Malekula (Maskeylenes)	2yr & 1t quota	5yr
Malekula (Avock)	2yr	5yr

(b)

Workshop- Port-Vila

Resource monitor island groups	FINFISH FISHERIES IMPLEMENT NATIONAL NET SIZE REGULATIONS		
	MESH SIZE (fingers)	Maximum HEIGHT	Maximum LENGTH
Nguna	4 to 6	2.5m	50m
Pele	6	2m	50m
Efaté (Mainland East)	4	2m	50m
Efaté (Mainland North)	4	2m	25m
Efaté (Mainland South)	4	4m	50m
Emao	4	2m	50m
Epi	6	1.5m	30m
TAFEA Province	5	1.0m	30m

*Except for Sardines & Manguru nets

Workshop-Luganville

Resource monitor island groups	FINFISH FISHERIES IMPLEMENT NATIONAL NET SIZE REGULATIONS		
	MESH SIZE (fingers)	Maximum HEIGHT	Maximum LENGTH
TORBA Province	3		
Santo (Mainland)	4	2m	25m
Santo (Malo)	3		
Pentecost	5		
Ambae	4	2	50m
Ambrym	4		
Malekula (Mainland NW)	3	4m	
Malekula (Mainland Central)	3	1.5m	25m
Malekula (Maskeylenes)	4		
Malekula (Avock)	4	1.5m	50m

*Except for Mullet & Manguru nets

Mesh size conversion finger/mm (square mesh side)
1/15 1.5/20 2/25 2.5/30 3/35 3.5/40 4/45

5.0 Recommendations

5.1 Strengthening community management plans

The results of the study indicate that coastal communities are not able to maintain the existence of all the management regulations within their management plan over a duration of 10 years.
Therefore community marine management plans should be simple but focused on specific rules. This is so that it can be recognizable and enforced by the local community. Indeed a management plan drafted with simple and clear objectives and performance indicators would be more effective than a complicated management plan that covers all ecosystem aspects and reflects the aspirations of the community on other imminent non-fisheries issues such as waste management.
The local community should also ensure that a marine tabu area typically covers about 20% of the village's total fishing area and extends over a 2 km distance. This is to increase the rate of spawning efficiency and the size of resource biomass within the tabu area.
Community marine management plans should also regulate open access areas by establishing input controls on fishing gears. These controls may include restrictions on night spearfishing because 1) this is currently one of the most efficient harvest methods over Vanuatu reefs, and 2) the catch is mainly for sale. A simple management plan with emphasis on input controls would gain acceptability of marine management and community cohesiveness through the positive results attained from better management of their fishery and coastal ecosystem.

5.2 Strengthening community participation through specific national fisheries regulations

Although community temporary marine tabu area appears to be a promising option for management of reef fisheries in Vanuatu, the results highlight the over-reliance of community-based fisheries management on tabu areas as a management tools given the current small size of community MR and the difficulty for communities to enforce restrictions on fishfish fishing outside MR. Additional fishing restrictions and increased capacity for enforcement must therefore be urgently encouraged at larger scales. Moreover, providing institutional support for rules will enjoy widespread acceptance at the community level and would likely contribute to achieving the effectiveness of community-based management within individual villages and Vanuatu as a whole.
Based on the study on the three islands of Efate, Malekula and Santo, three new regulations could be considered based on the most common community rules. The first measure would establish a regulation on the importation, sale and use of gillnets with less than 45 mm square mesh side (or approximately 4 finger size) due to their high fishing efficiency on small fish. Such restrictions have been implemented in almost all the villages surveyed but are rarely enforced by the communities themselves, although their positive effects on reef fisheries have been established.

The second measure would be to ban night spearfishing in reef areas. The ban in night spearfishing was also common in most community rules but it followed a similar trend to gillnet restriction in that after a few months, the rule disappeared due to lack of enforcement.

The third measure would be to establish village-based temporary closures of trochus fisheries at the national scale to strengthen community control over catches and sales on the long run. This may take the form of a provincial rotational system including open and close fishing seasons, or a national ban. The ban may be in two stages with the first stage as a five year 'no-take' ban and followed by a determined period of harvest based on quota limit system upon advice by the VFD. This approach has been adapted by the VFD to manage sea cucumber fisheries and could be extended to trochus fisheries, which has similar sedentary characteristics. This approach would also facilitate implementing catch quotas for each village in the main production sites.

5.3 Strengthening fisheries enforcement in rural communities through resource monitors network

The results of the study indicate that community-based management through management plans is only effective through community cohesion in the process of creating the plan and through effective enforcement. As observed throughout the study, the lack of enforcement results in the community disregarding the marine management plans and thus resulting in the increased inability of the resource monitors to function.

The recognition of community resource monitors' roles by the VFD would contribute to the effectiveness of community-based management. Resource monitors are important as they have been selected by the community to ensure that the marine management plans are respected. Also as community leaders they can assist the VFD in ensuring compliance to national regulations. The capacity of resource monitors may be strengthened through training and formal recognition of their duties which would be to assist fisheries officers in ensuring that the national regulations are adhered in the community.

6.0 Conclusion

This study suggests the need to move from an idealized conception of CBFM to an operational stage that includes evaluation of the performance of CBFM regimes and of the types of external support that are most appropriate. In particular, providing external assistance for tools of high social acceptability and supporting local needs would very likely proof more effective in achieving sustainability of fisheries than short-lived generic approaches derived from conservation, ecosystem management and participatory approaches.

Although the survey is based on three islands and should be replicated in other islands, results stress the need for proactive engagements of public authorities in managing coastal fisheries. Such an intervention is critical for strengthening the commitment of communities and conversely, for enforcing minimum fishing restrictions in areas where communities have not set up their own rules. Co-management systems between government and local communities are still needed, to optimize the design and the implementation of effective fishing regulations of coastal fisheries in the country over the long term.

7.0 Acknowledgements

This study was funded by the French Ministry of Foreign Affairs (Pacific Fund) and the Government of Vanuatu (Fisheries Department). We thank Ms. Jennifer Beckensteiner for her help in data collection, and the staffs of the Department of Fisheries for critiques on this report.

We thank the chiefs and other stakeholders in the communities for their trust and commitment in sharing their knowledge to improve the management of coastal fisheries in Vanuatu.

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