

# **Review of socio-economic information on the Malekula communities targeted by the IWP Vanuatu project.**

## Table of Contents

Introduction.....	1
The IWP Project Site .....	1
1999 Survey of Households .....	4
1996 CARMAP at Limap.....	8
2004 Participatory Situation Analysis (PSA) .....	11
The socio-economic value of the Crab Bay resources.....	13
Resource ownership and management .....	16
Resource management considerations .....	17
Gaps and Opportunities to be considered by the IWP project.....	19

## Abbreviations

CARMAP	Community Area Resource Management Action Plan
EA	Enumeration Area
PRA	Participatory Rural Appraisal
PSA	Participatory Situation Analysis
REDI	Rural Economic Development Initiative

## **Introduction**

Natural resource management occurs within a social and economic setting and seeks to influence resource use and management. Consequently social and economic factors are important considerations within resource management planning.

Socio-economic information refers to information that includes both social and economic dimensions. The focus of much socio-economic work are the relationships of authority and subordination within a society, and the access to, use of and control over social, economic and environmental resources. This report summarises readily available social and economic information on the Malekula communities targeted by Vanuatu's IWP pilot project, identifies significant gaps in the information held and identifies opportunities for the IWP project.

## **The IWP Project Site**

Crab Bay is on the east Coast of Malekula Island (Map 1 and 2). It falls partly within the Central Malekula and partly within the South East Malekula Area Council area. East Malekula lies on the shipping and air route between Santo and Efate and so is relatively well serviced by shipping and air transport services.

Central Malekula Council Area includes some of the most developed areas of Malampa Province: the Provincial administrative centre at Lakatoro, a commercial centre, the Provincial Hospital at Norsup, Norsup airport and LitzLitz wharf. The Malampa Province offices of the Departments of Education, Health, Forestry, Fisheries, Agriculture and Public Works are all within Central Malekula Council Area. Both the Island Court and the Magistrates Court sit at Lakatoro. As a result the number of salary and wage earners is well above the rural average. There is household electricity connection, and household water reticulation at Lakatoro and Norsup.

Map 1: Location of Crab Bay project area

Map 2: Detail of the Crab Bay project communities

South East Malekula Area Council lies immediately to the south of Central Malekula Council and is more typical of rural Malekula. A government service point is Rensarie. Rensarie Junior Secondary School is a major bilingual Secondary School that draws boarding students from throughout the Province.

Map 3 shows the pattern of landuse intensity within Central and SE Malekula Area Councils and the main villages. The vicinity of Crab Bay, with the exception of particular habitats such as mangroves has a very high level of land use intensity (Map 3). Non-mountainous coastal land has largely been planted to coconut plantations. PRV, Mapbest and Savoie plantations are typical "cattle under coconut" plantations on leased land that have diversified into cocoa, pepper, and vanilla. They provide primarily low skill agricultural employment. Their work force includes ni-Vanuatu from other areas of Malekula or islands (commonly Paama and Ambrym). Workers live in company provided housing, or housing on the plantations. While some workers' families consider themselves as only temporarily living in the area, others have become more settled. Workers families have access to food garden sites within the plantation area or have negotiated garden access from nearby landholders.

Other villages primarily accommodate people of local descent with a few temporary residents in positions such as teachers, nurses, pastors and missionaries. Over the past century villages have shifted location in response to disease, traditional fears and changing land use needs. The position of established villages has stabilised in recent decades. Although new villages have formed as growing communities fragment: sometimes only to return to traditional lands, but sometimes in response to internal disagreements over religious affiliation land or position of chief.

### **1999 Survey of Households**

Household characteristics described in the 1999 Census present a snap shot picture of the communities around Crab Bay (table 1; map1) that illustrates some of the socio-economic differences between villages. It provides a baseline for comparison of recent changes.

When house structure and utility services are considered the census enumeration areas (EAs) can be divided into 3 groups. The EAs of Lakatoro and Rensarie are consistently well serviced. They benefit from high levels of permanent housing, piped water supplies, improved toilet facilities and relatively high access to electricity. At the other end of the scale the EAs of Sopor, Potindir and EA283 have primarily traditional housing, pit toilets, use water directly from natural sources and have no electricity. The EAs of Big Tautu, Litzlitz, Vilavi, Bushman's Bay, Lingarakh, Freddy's Corner, and Tenbimbi fall in between these two extremes with a mix of housing and utility services.

Participation in paid employment also divides the EAs into 3 groups. In Lakatoro and Freddy's Corner over 40% of men participate in paid employment. At the other end of the scale in Litzlitz, Potindor, Lingarakh, EA 283 and Tenbimbi most people participate in subsistence and small scale commercial agriculture. Few men over 15 earn wages or salary, and fewer women. The EAs of Big Tautu, Vilavi, Sopor, Bushman's Bay, and Rensarie fall in between, with 25 to 40% of men receiving some salary or wage income.

There is also considerable variation in participation in primary production for both domestic consumption and sale. Almost all households grow food for domestic consumption. However, market gardening is limited. Only in the EAs of Vilavi and Potindir did over 20% of households produce food for sale at the time of the census. In Sopor, Freddy's Corner and Rensarie there were no sales of food at the time of the census.

Map 3: Land Use Intensity in the area around Crab Bay

In Litzlitz, Vilavi and Bushman's Bay EAs over 80% of households fished for domestic consumption at the time of the census. In Vilavi and Bushman's Bay there was also a high level of commercial fishing. In comparison, in Freddy's Corner and EA 283 less than half the households fished for domestic consumption, although a modest number of households engaged in commercial fishing. In the remaining EAs of Big Tautu, Lakatoro, Sopor, Potindir, Lingarakh, Rensarie, and Tenbimbi 50% to 80% of households fished for domestic consumption. In Tautu, Lakatoro, Litzlitz, Sopor, Lingarakh and Rensarie no commercial fishing was reported.

There was a low level of household cattle ownership in the Crab Bay area compared with the average for Vanuatu rural areas. Only at Bushman's Bay did cattle ownership levels reach the Vanuatu rural average. There was a low level of cattle ownership at Big Tautu, Potindir and EA283, and very low levels or no ownership of cattle reported in the remaining enumeration areas.

Commercial agriculture is a source of cash income for most communities. There are relatively high levels of cocoa production. In Potindir, Bushman's Bay, Lingarakh, EA 283, Rensarie, and Tenbimbi over 80% of households produced cocoa. In comparison Kava production was low. Only at Litzlitz and Rensarie EAs did 30% or more of households produce kava. Over 80% of households produced copra in all but the Lakatoro and Freddy's Corner EAs (where waged employment was high).

Ownership of household capital items reflects access to resources to purchase or make such items. The census asked about radios, telephones, canoes, boats and motor vehicles.

The EAs of Litzlitz, Bushman's Bay and Vilavi, which had high levels of fishing, had high levels of boat and canoe ownership. Big Tautu, Lakatoro, Freddy's Corner and Tenbimbi had low levels of boat and canoe ownership.

Vehicle ownership was generally low. Only in Lakatoro, Bushman's Bay, EA 283, Freddy's Corner and Rensarie did over 5% of households have a private or shared vehicle.

Phone ownership was low. There were no private or shared household phones reported in the EAs of Big Tautu, Litzlitz, Potindir, and Lingarakh.

**Table 1: Summary of household socio economic data from the 1999 census**

	Group 1:	Group 2:	Group 2:
Housing	Above average use of modern permanent materials or a mix of modern and traditional materials. Lakatoro, Rensarie,	Housing a mix of modern, mixed and traditional materials. Big Tautu, Litzlitz, Vilavi, Bushman's Bay, Lingarakh, 283, Freddy's Corner, Tenbimbi	Housing primarily of traditional local materials. Sopor, Potindir
Main household water supply	Over 50% of households have piped supply. Lakatoro, Litzlitz, Bushman's Bay, Rensarie, Tenbimbi	Some piped, tanks, wells. Big Tautu, Lingarakh, 283, Freddy's Corner, Tenbimbi	Most households use wells, rivers, streams, springs, or other natural water sources. Sopor, Potindir, Vilavi, 283
Household toilet facility	Over 50% of households have flush or water sealed toilets. Lakatoro,	A mix of improved toilet types. A low proportion of basic pit latrines Big Tautu, Vilavi, Sopor, Lingarakh, 283, Tenbimbi, Rensarie	Most households have pit latrines or no toilet facility Litzlitz, Potindir, Bushman's Bay, Lingarakh, EA 283, Freddy's Corner
Main form of lighting	Electricity available to many	Kerosene for lighting.	

	households. Lakatoro, Rensarie	Other areas.		
<b>Participation in paid employment</b>				
Opportunity to earn salary or wages.	Over 40% of men over 15 receive salary, wage income. Lakatoro, Freddy's Corner	25 to 40% of men over 15 receive salary, wage income. Big Tautu, Vilavi, Sopor, Bushman's Bay, Rensarie	Mainly subsistence. Litzlitz, Potindir, Lingarakh, EA 283, Tenbimbi	
<b>Primary production</b>				
Commercial food production	Over 20% of households marketed food crops. Vilavi, Potindir	Less than 20% of households marketed food crops. Big Tautu, Lakatoro, Ligzlitz, Bushman's Bay, Lingarakh, 283, Tenbimbi	No food crops marketed. Soporo, Freddy's Corner, Rensarie	
Subsistence fishing	Over 80% of households fished. Litzlitz, Vilavi, Bushman's Bay	50 to 80% of households fished. Big Tautu, Lakatoro, Sopor, Potindir, Lingarakh, Rensarie, Tenbimbi	Less than 50% of households fished. Freddy's Corner, EA 283	
Commercial fishing	19% or more households sold fish. Vilavi, Potindir, Bushman's Bay	1% to 19% of households sold fish. Litzlitz, EA 283, Freddy's Corner, Tenbimbi.	No commercial fishing. Tautu, Lakatoro, Litzlitz, Sopor, Lingarakh, Rensarie	
Household Cattle Ownership	Cattle ownership at or above rural Vanuatu ownership. Bushman's Bay	Low level of cattle ownership. Tautu, Potindir, EA 283	Very low level of cattle ownership. Lakatoro, Litzlitz, Vilavi, Lingarakh, EA 283, Freddy's Corner, Rensarie, Tenbimbi	No cattle owned. Sopor
Cocoa produced	80% or more of households produce cocoa.	50 to 80% of households produce cocoa. Big Tautu, Lakatoro, Freddy's Corner	Less than 50% of households produce cocoa. Litzlitz, Vilavi, Sopor	
Kava produced	30% or more of households produced kava. Litzlitz, Rensarie	10 – 30 % of households produced kava. Sopor, Bushman's Bay, Lingarakh, EA283, Freddy's Corner, Tenbimbi	Less than 10% of households produced kava. Big Tautu, Lakatoro, Vilavi, Potindir	
Produce Coconut	All households produced copra. Sopor, Potindir, EA 283, Tenbimbi	80 – 99% of households produced copra. Litzlitz, Vilavi, Potindir, Lingarakh, Rensarie	Less than 80% of households produced copra. Lakatoro, Freddy's Corner	
<b>Household capital items</b>				
Household had private or shared radio	Over 70% of households had private or shared radios. Lakatoro, Bushman's Bay,	50 - 70% of households had private or shared radios. Big Tautu, Vilavi, Sopor, Lingarakh, EA 283,	Less than 50% of households had private or shared radio. Litzlitz, Potindir, Freddy's Corner, Rensarie, Tenbimbi	
Household had private or shared canoe or boat	Over 40% of the households had private or shared canoes or boats.	5 to 40 % of households had private or shared canoes or boats.	Less than 5% of households had a canoe or boat. Big Tautu, Lakatoro, Freddy's	

	Litzlitz, Vilavi, Bushman's Bay	Sopor, Potindir, Lingarakh, EA 283, Rensarie	Corner, Tenbimbi
Household had private or shared vehicle	Over 5% of households had a private or shared vehicle. Lakatoro, Bushman's Bay, EA 283, Freddy's Corner, Rensarie,	Less than 5% of households had a private or shared vehicle. Big Tautu, Vilavi, Tenbimbi	No vehicle owned. LitzLitz, Sopor, Potindir, Lingarakh,
Household had private or shared telephone	At least one private phone within the EA. Lakatoro, Vilavi, Freddy's Corner, Rensarie	At least one shared phone within the EA. Sopor, Bushman's Bay. EA 283, Tenbimbi	No household phones recorded in the EA. Big Tautu, Litzlitz, Potindir, Lingarakh

### 1996 CARMAP at Limap

The 1996 CARMAP workshop was a participatory appraisal, problem identification and planning workshop run by the Land Use Planning Project in Limap village. The report of the CARMAP does not provide household level social and economic information (Vanuatu Land Use Planning Project, 1996). It provides information on the history of Limap, social institutions at Limap, a detailed transect walk from Limap to the coast and trend analyses. The different approaches taken by the CARMAP and the IWP participatory situation analyses limit its usefulness for comparative purposes, but it supplements the information gained about Limap in 2004.

Limap has seen expansion of social services over the period 1996 to 2004 (Table 2). However, while some of the needs identified in 1996 had been fulfilled by 2004 (e.g. aid post) others had not progressed.

The range of village institutions identified in the 1996 CARMAP was broader and more outward looking than during the 2004 participatory situation analysis (table 3). This could reflect facilitation skills as much as change within the village. In both 1996 and 2004 the Presbyterian Church was the central institution identified (PWMU, Session, Sunday School etc.). It was accorded greater influence than traditional institutions like the Chief. However by 2004 a small SDA Church had been established in the village, so many Church based functions were now divided.

In 1996 Chiefs no longer received full support and cooperation from villagers. The Chief's role was described as being to resolve community problems and disputes, and ensure unity of the village. The Chief's role was described as weakened, due (in part) to a decline in respect for and knowledge of traditional institutions. The frequent and heavy expectation for community work, that prevented people from attending to household economic activities, was another factor contributing to poor cooperation with the Chief's requests.

Table 4 compares the social, economic and socio-economic problems and concerns identified in 1996 and 2004. The Participatory Situation Analysis focused at an early stage on marine resources. As a result the full range of social and economic issues of concern to villagers, and possibly the issues of greatest priority to villagers, was overlooked or understated. It is assumed this weakness extends across the communities included in the 2004 Situation Analysis.

There appears to have been limited progress in addressing the concerns identified in 1996, and many of the initiatives have not been effective. The 1996 concern on depletion of marine resources and especially crabs led into the resource conservation initiative at Crab Bay: however the trend of declining resource stocks has not yet been arrested.

The people of Limap were settled on the coastal area at Crab Bay early in the 20<sup>th</sup> Century. The villagers moved several times in response to environmental situations and as plantations



were established (Land Use Planning, 1996). Bakeo (2004) states that this is so they could be close to their food gardens, but it is unlikely this is the sole reason. People from Limap remain traditional owners of lands at Crab Bay, even though they rely more heavily on riverine resources and also express concern about management of riverine resources.

**Table 2: Services available in Limap 1996 and 2004**

1996	2004
Water Supply & Committee Kindergarten Coop and private store  No vehicle (but had had trucks in the past) Road access – but poor condition Community hall Church Presbyterian Hot air copra drier  Sport field	Water supply – 8 taps and 5 showers, Tanks Kindergarten 2 stores Aid Post 1 vehicle road access Community hall 2 churches (Presbyterian & SDA) 13 Copra and 5 Cocoa drying beds 3 bread ovens Sports Field
<b>Service needs listed by the village CARMAP</b> To have a good football field Have a village primary school class 1 to 3 Have a village telephone Have an Aid Post Better toilets	

**Table 3: Institutional profile Limap 1996 and 2004**

Village organisations discussed 1996	Village organisations discussed 2004
Church, PWMU Presbyterian Session Health Committee Chief Water Supply Committee VNCW Private store  Cooperative store TFC Sunday School Youth Mapbest plantation Province Women's Council Kindergarten	PWMU Youth Chief Men's Fellowship Sunday School Church leaders – Presbyterian and SDA Aid Post Kindergarten Water supply committee "Kauka"

**Table 4: Problems and Needs identified at Limap 1996 and 2004**

Problems and needs discussed 1996	Problems and needs discussed 2004
<ul style="list-style-type: none"> <li>0. Poor road</li> <li>0. Children find it hard to go to school, and the school is distant.</li> <li>0. Decline in respect and custom values.</li> <li>0. Problems affecting small holder agriculture including rats spoiling cocoa fruits, poorly fenced cattle spoiling food gardens, and a desire for new agricultural products and opportunities.</li> <li>0. Poor health.</li> <li>0. Decline in marine resources</li> <li>0. Decline in the mangrove resources.</li> <li>0. Poor village planning.</li> <li>0. Too much community work. There needs to be more time for families to make their own work.</li> <li>0. Increased seasonality of river flow and lake</li> <li>0. Decline in wild life.</li> <li>0. Poor money management.</li> <li>0. Need a football field.</li> <li>0. Fire wood needs to be collected from a long way away.</li> <li>0. Land disputes.</li> </ul>	<ul style="list-style-type: none"> <li>0. Decline in white crab and black crab resources.</li> <li>0. Decline in reef fish</li> <li>0. Heavy use of "serwok"</li> <li>0. Heavy use of strong back.</li> <li>0. Decline in freshwater prawns</li> <li>0. Decline in freshwater eels</li> <li>0. Decline in freshwater fish</li> </ul>

## 2004 Participatory Situation Analysis (PSA)

In April 2004 the IWP project involved Crab Bay villagers and locally based public servants in a participatory situation analysis (IWP-Vanuatu, 2004). This provided demographic information, information on village services and institutions and information on marine resource use, and engaged local people in discussing marine resource management issues. There are inconsistencies in approach between the different villages, and discussion of resource management issues was incomplete for some villages.

Demographic information from the participatory situation analysis is summarised in table 5. Over the 15 year period since the 1989 census there has been relatively rapid population growth in the areas around Crab Bay. The 1989 to 1999 census suggests a growth rate of approximately 3% per annum. As a result young people under 17 years are half the population of several villages.

The resource use maps within the PSA give a very general overview, but may have been manipulated in the “computerisation” process. Comparison of the 2004 resource map for Limap with information generated by a transect during the 1996 CARMAP confirms the lack of detail in the 2004 maps. At a superficial level, the PSA maps imply many communities have a single neat area designated for gardening. This may be a feature of the high level of resource conversion into coconut plantations. However, it is more common in Vanuatu for villages to have old and new gardens; specific garden crops in areas suited to that crop, and a mosaic of gardens interspersed amongst both coconuts and bush regrowth. This typical mosaic is described in the Limap CARMAP but not the Limap PSA.

The PSA led communities to focus on marine resources. One result of this is that marine resource issues are not placed within the overall context of village resource use and village aspirations and concerns. Nor did all villages address key socio-economic concerns such as the relationships of authority and subordination within society, and the access to, use of and control over social, economic and environmental resources

The Participatory Situation Analysis provides information on coastal resource management concerns, with an emphasis on White Crabs. The prioritised resources are listed in table 6. A simple approach to ranking the relative importance of these resources is potentially misleading because of the different fishing frequencies and practices of the different communities and the habitats readily accessible to them. Table 6 compares the frequency with which these resources were mentioned with a composite and average score. There is no basis to effectively contrast the importance of mullet, highly valued in 2 villages with trochus which is ranked more lowly by 6 villages. Never-the-less on the basis of frequency and score White Crab, Reef fish and Mangroves were widely valued. Socio-economic information on these three resources are summarised in the next section of this overview.

Bakeo (2004) reports that all the villages established around Crab Bay have fisheries access rights to the resources of Crab Bay, but presents no details of by whom and when these rights were bestowed. It is hence not clear whether this is a *de facto* right, a right bestowed by custom owners or a right that carries responsibilities and allegiances.

Table 5: Demographic information from the 2004 Participatory Situation Analysis

Village/hamlet	Uri/Uripiv	Portindir	Barick.	Mapbest/ Trevaliaut	Limap	Louni	Niu Bush/ Namburakai	Bushman's Bay	Hatbol	Lingarakh	Tarem/Tembi bi
No of households	119	35	9 brothers & their families. 1 from West Ambrym 1 from LitzLitz		25	15	5	5	35	31	
Village population	542	153	64	172	167	69	17	25	149	172	
Population 1989*	370	63	31	25	77	38	24		114	149	143
Pop'n growth 1989* - 2004	46%	143%	106%	562%	117%	82%	-29%		31%	45%	
Pop'n <= 17 years (2004)	304 (56%)	68 (44%)	34 (53%)			27 (39%)	2 (11%)	13 (52%)	43 (29%)	80 (47%)	
Pop'n >= 18 years<=55 yrs (2004)	191*	72	29			42	15	12	94	72	
Population > 55 years	47	13	1			0	0	0	12	6	
Male : female		84 : 69	27 : 37	93 : 79	97 : 70		8 : 9	9 : 16	88 : 61	93:79	
Temporary residents/workers		8							36	22	
Dominant background					Landholders			plantation workers		landholders	
Religions	Presbyterian, CoC, NTM, LDS, SDA	6	3 – Presbyterian dominant)		Presbyterian (main), SDA	Presbyterian (main), LDS,SDA	SDA		Presbyterian	SDA, Presbyterian	

- PRA used general rather than specific terms that might lead to some inaccuracies.

\* 1989 census data. The census and PSA may have applied different village boundaries, hence the comparison is an approximation only.

Table 6: Marine resources prioritised in the Participatory Situation Analysis

Resource	No of villages with the resource as a ranked 1 to 5	Composite score	Average score	Habitat
White Crab	9	39	4.1	Mangroves/coastal swamps
Reef fish	8	28	3.5	Coral reef
Mangroves	7	20	2.9	Mangroves
Trochus	6	10	1.66	Coral reef
Serwok/banu (Black mangrove shell)	6	10	1.66	Mangroves
Black Crab	5	18	3.6	Mangroves
Shellfish/kokias	4	10	2.5	Reef flat
Freshwater prawns	3	12	4	Rivers
Giant clams	3	6	2	Outer reef
Mud Crab	3	5	1.7	Mangroves & estuaries
Mullet	2	9	4.5	
Lobster	2	9	4.5	Outer reef
Strong Back	2	4	2	Reef
Green Snail	1	4	4	
Freshwater eels	1	2	2	River
Turtle	1	1	1	Reef, sea grass
Hermit Crabs	1	1	1	Coastal areas

### The socio-economic value of the Crab Bay resources

Commercial and subsistence agriculture form 55% of Malampa's gross domestic product (GDP) while fisheries and forestry sectors contribute only 1% of GDP (Malampa Province, undated). As a consequence management and development of agriculture has received greater attention than fisheries resources. Crab Bay's marine and coastal resources were not discussed in the fisheries or environmental policies of Malampa Province (*ibid.*, p.56)

Lal (2003) argues that total economy wide value of mangroves gives the best measure of their economic value. This includes subsistence and commercial use of resources, provision of environmental services and recreation/amenity values. However the models and data to support this are not available. Lal and Esrom (1990) (as cited in Esrom and Vanu, 1997) assigned an economic value to the mangroves of the Port Stanley to Crab Bay area on the basis of subsistence and commercial resource use. Seven years later Esrom and Vanu (1997) collected similar data. Together these authors provide a picture of the value of the mangroves and associated resources. Their results are extrapolated in table 7.

#### Mangrove fuel wood

There is a wide variation in the use of mangrove fuelwood, largely a response to the availability of alternatives and the preferred cooking style<sup>1</sup>. In villages within the mangroves such as Uri people depend almost entirely on the mangroves for fuelwood. However, villages in proximity to the Crab Bay to Port Stanley mangroves do not depend on mangrove fuelwood (Lal and Esrom, 1990, as cited in Esrom and Vanu, 1997) In villages such as

<sup>1</sup> Some woods are preferred for heating stones for baking, whilst other woods are better suited to boiling or flame grilling.

Litzlitz, Potindir, Mollku and Lowni on the landward side of the mangroves households consume on average 8 bundles of mangrove wood per month (range 2 – 20 bundles)<sup>2</sup> equivalent to 160 kgs per month. This compares with typical rural firewood use of 600kg per month (Pacific Energy Programme Mission Report, 1982 as cited by Esrom and Vanu 1997). Villages further from the mangroves make greater use of inland wood. Mangrove wood has clean burning properties and is primarily collected for cooking in wet weather. There is no discussion of preferred species and harvesting practices. Table 8 extrapolates this usage rate for the present number of households in Potindor, Molku and Lowni to estimate the current monetary value for mangrove fuel wood. The value of the use of the mangrove resources for firewood is second only to the value of food resources.

#### Mangrove wood posts for house construction

Mangrove wood is valued in house construction because of its resistance to rot. Reports do not comment on preferred species or age class. There are typically 3 traditional houses per household (Lal and Esrom, 1990), with 20 poles in a house. Use of mangrove poles is greatest in villages such as Uri where there is high dependence on the mangroves. A medium level of use is experienced in villages such as Litzlitz, Potindir, Molku and Lowni on the landward side of the mangroves. Other villages have ready access to land based timber resources and make limited use mangroves. Land Use Planning (1996) identified forest areas as the source of housing materials for Limap. Table 7 extrapolates this usage rate for the present number of households in Potindor, Molku and Lowni to give an estimate of the current monetary value of mangrove posts. The use of mangrove wood in house construction has lower monetary value than food and fuelwood because of the durability of housing.

#### Roof thatch

Natangura, *Metroxylon warburgii*, is widely cultivated in central and northern Vanuatu for thatch. Natangura prefers heavily watered soils and is often found in river flats and swampy areas. Lal and Esrom (1990) observed it on the seaward edge of coconut plantations in the Port Stanley to Crab Bay. However, this is not its only source in the Crab Bay area. Lal and Esrom (1990) report a typical roof averages 150 racks of natangura leaves, with a household having perhaps 3 huts with Natangura roofs. Typical life of a roof is up to 10 years. Table 7 extrapolates this usage rate for the present number of households in Potindor, Molku and Lowni to estimate the value of Natangura thatch. The use of natangura leaves for roof thatch has lower monetary value than food and fuelwood because of the durability of housing.

#### Food resources

A diversity of food resources are harvested from the Crab Bay area. These include the White Crab, the Black Crab, Fin Fish, Shell Fish, gastropods and crustaceans. Lal and Esrom (1990) and Esrom and Vanu (1997) provide information on commercial use of these resources, but limited information on their subsistence use. It is not possible to estimate the subsistence use value of food resources from literature at hand. Food harvested from the mangrove and bay is the resource with greatest resource use value.

#### Environmental service values

Table 8 lists environmental services typically associated with mangroves. No attempt has been made to value environmental services provided by the Crab Bay – Port Stanley mangroves. Lal (2003) summarised estimates of the economic value of service provision by mangroves in several Asian and Pacific countries. The value of fisheries resources is usually greater than the value of forest resources. However estimated values for services such as erosion control, nutrient filtering, carbon sequestration, storm abatement and biodiversity are typically an order of magnitude or two greater. Consequently, the resource use values underestimate the economic value.

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<sup>2</sup> The preferred species is not mentioned.

Table 7: Monetary value of resources from the Crab Bay mangroves.

Resources use	2004 number of households <sup>1</sup>	Estimated price per unit	Nominal Value
<b>Mangrove firewood</b>			
Coastal villages - 8 bundles of wood per household per month (Lal and Esrom, 1990)	Potindir 35 Metaven 11 Bushman's Bay 5 Lowni 15	200VT per bundle	1,267,200 per year
Other villages close to the mangroves –2 bundles of wood per month.	Namburakai 5 Lingharak 31 Hatbol 35 Sarmette 12	200VT per bundle	254,400 per year
<b>Mangrove posts</b>			
Esrom and Vanu (1997) 20 poles per building, 3 buildings per household. Report fails to comment on preferred species, age class etc.	Potindir 35 Metaven 11 Bushman's Bay 5 Lowni 15	300 VT per pole	1,188,000 VT ( over 10 years)
<b>Natangura thatch</b>			
Lal and Esrom note a typical traditional house uses 150 racks of natangura. Census provides details of traditional housing.	Potindir 35 – 81% trad'l Metaven 11 - 81% trad'l Bushman's Bay 5 15% trad Lowni 15 15%	100 VT per rack	558,900 VT ( over 10 years)
<b>Food items</b>			
<i>C. hirtipes</i> subsistence consumption – no estimate available. Assume one bundle per week per house.	66 households	200 VT per bundle	686,400 VT per yr
<i>C. hirtipes</i> commercial - Esrom and Vanu (1997) report 18 women sell an average of 9 bundles of 10 crabs in the Saturday Norsup market. Crabs also sold at Lakatoro on Tuesdays and Thursdays but at a much smaller scale.	Assume 135 bundles of crabs are sold each week	200 VT per bundle	1,404,000 VT per yr
Fin Fish – no estimate on hand			
Shellfish subsistence consumption – no estimate available. Assume one basket per week per house.	66 households	100 VT	343,200 VT per yr
Shell fish Commercial - Esrom & Vanu (1997) Over a month 20 women sell 57 baskets of shells in the Saturday Norsup market.		100 VT	1,368,000 VT per yr
Gastropods subsistence consumption – no estimate available. Assume one basket per week per house.	66 households	100	343,200 VT per yr
Gastropods Commercial - Esrom & Vanu (1997) Over a month 15 women sell 41 baskets of gastropods in the Saturday Norsup market.		100 VT	738,000 VT per yr
<b>Estimated use value per year</b>			<b>6,579,090</b>

<sup>1</sup> Household numbers identified in the 2004 PSA are used where available. Otherwise numbers are taken from the 1999 census with a 3% growth rate to give a 2004 estimate.

**Table 8: Environmental goods and services provided by coral reefs, mangroves and sea grasses (From Cesar, 2000)**

Goods		Services				
Renewable resources	Mining of reefs	Physical structure services	Biotic services	Biogeochemical services	Information services	Social and cultural services
Sea food products	Coral blocks, rubble, sand for building.	Shoreline protection.	Maintenance of habitats.	Nitrogen fixation.	Monitoring and pollution record.	Support recreation.
Raw materials and medicines	Raw materials for lime and cement production	Build up of land.	Maintenance of biodiversity.	CA/CO2 budget control.	Climate record.	Aesthetic values and artistic inspiration.
Other raw materials (e.g. seaweed)		Promoting growth of mangroves and seagrass beds.	Regulation of ecosystem processes and functions.	Waste assimilation.		Sustaining the livelihood of communities.
Curio and jewellery		Generation of coral sand.	Biological maintenance of resilience.			Support of cultural religious and spiritual values.
Live fish and coral collected for aquarium trade			Export organic production etc. to pelagic food webs.			

## Resource ownership and management

At least since 1990, and probably for longer<sup>3</sup>, there has been open access to the food resources of Crab Bay (Lal and Esrom, 1990). Consequently resource management issues typically associated with common property resources would be expected. These include issues such as limited personal economic benefit from management of harvesting; lack of clearly defined responsibility; and limited direct benefit to be had from adhering to imposed management measures<sup>4</sup>. Weaknesses typical of common property resources are observed in trend analyses presented in Vanuatu Land Use Planning (1997).

Vanuatu Land Use Planning (1997) describes a noticeable decline in marine resources since 1975. This decline has been associated with a range of factors (Vanuatu Land Use Planning, 1997; Bakeo et al 2004):

- population increase in the Crab Bay area contributing to increased harvesting levels;
- new fishing techniques leading to increased catch rates and a less discriminating catch than traditional methods;
- in-migration leading to not only more people living in the area, but a mix of cultural groups neither understanding nor bound to respect local custom;
- resources gaining commercial markets and well as subsistence uses in the 1980s;
- a particularly dry season in the 1980s during which many crabs died;

<sup>3</sup> Trend lines in Vanuatu Land Use Planning Project (1996) suggests the issue of “more and mixed people” started to affect resource management in the 1980s, and that “other” people have harvested the crab at significant levels since 1985.

<sup>4</sup> Common property resources are rare in Vanuatu, although shared or group title is common. Landownership implies resource ownership or stewardship rights. Stewardship responsibilities are often exercised as an integral component of custom or to confirm and assert ownership rights (Whyte et al, 1998).



- damage to habitat, especially breeding sites and the mangroves themselves. Loss of mangrove habitat was associated with both high levels of human use and natural events including a cyclone and uplift.

The CARMAP transect activity shows a tendency for Limap villagers to assign responsibility for these problems to “others” or to events beyond their control. This partly reflects geographical position, with other villages now placed closer to the coast, but also implies villagers have an external locus of control. Problems observed and discussed in the coastal area included

- When the river floods food resources are lost
- Other people are cutting the mangroves
- Other people are harvesting the crabs
- Other people are taking shellfish beneath the allowed size limit
- Other people are burning trees along the coast.

Human behaviour is integral to observance of resource management initiatives. In Vanuatu this is often presented as the ability of chiefs to enforce tabu restrictions and the practice of respect and cooperation within the community. Both issues were discussed in Vanuatu Land Use Planning (1997).

The ability of chiefs to impose tabus on the crab resource had begun to decline before 1980 but since 1980 has rapidly fallen. The changing demographic situation around Crab Bay was the main contributing factor discussed: greater population, in-migrants not owing allegiance to local custom grouping etc. It seems possible, but is not stated in the literature, that demographic change is linked with marine resources becoming open access resources.

Loss of customary values and respect for custom were contributing factors (*ibid.*). Custom values declined steadily since the conversion to Christianity. The early missionaries discouraged many custom practices. As older villagers died during the mid 1900s much of their custom knowledge was lost. As one trend line mentions, at this critical stage there was no thought given to teaching custom to young people. The role of teaching young people has gradually passed to formal schooling system with an increasing proportion of children attending school in the decades since 1980.

Respect within and between communities was also perceived to have declined, but to a lesser degree than custom (*ibid.*). This was seen to reflect both the loss of customary values and the introduction of modern influences such as various forms of alcohol, kava, discos, religion, football, and videos which present alternative forms of behaviour.

## **Resource management considerations**

Evans and Birchenough (2001) review academic experience of traditional resource management. They present the range of views from those who view community-based management systems as being explicit marine conservation with an embedded conservation ethic (e.g. Johannes (1982)) through to those who perceive traditional fishing practices as having the primary objective of increasing production, with over-exploitation rare only because technologies were relatively simple and consumer populations rather small (e.g. Lopez, 1985). Purely traditional fisheries management is uncommon in Vanuatu. There have been significant changes in fishing technology (adoption of modern nets, lines and hooks, spear guns, outboard motors etc.); subtle changes to ownership and usufruct rights; changes in people's goals (subsistence consumption, sharing and selling); decline in the passage of traditional knowledge of the resource base; new authorities and regulations imposed from outside (e.g. national constitutions, specific fisheries regulations etc.). A hybrid management system has resulted which maintains some elements of traditional systems, while incorporating some modern aspirations and methods.

Trend lines produced by PRAs suggest that current resource management practices are widely associated with a decline in resource stocks. The response in Vanuatu has been to stress perceived beneficial elements of both traditional and modern practices. This approach is typified by the Trochus management structures promoted by the Department of Fisheries which combine periodic closures of the resource at a local level with size limits determined by national authorities.

Whyte et al (1998) studied 8 participatory resource conservation initiatives throughout Central Vanuatu, one of which was within Central Malekula Council Area. There were many reasons communities protected specific resources or areas, including assertion of land owner/resource owner rights, politics, custom observances to do with chiefly status and rank or death of a chief, preparation for a coming harvest event, stock replenishment and opportunity to participate in a government or NGO programme. Where the underlying reason is divisive (e.g. assertion of land owner rights, chiefly rights or politics point to an underlying inter or intra village division) respect and cooperation during implementation of the decision is unlikely. Whyte et al (1998) report that participation of all stakeholder groups (even passive participation for some groups) can help to heal underlying divisions and nurture cooperation.

Many communities with a protected area did not display a broad conservation ethic in their resource use practices outside the protected area. As a consequence there was continued resource depletion outside the protected area and of non-target resources. Whyte et al (1998) recommended that if resource integrity is to be maintained resource management activities need to be integrated across the spectrum of community resource use activities so as to foster long term development of a stewardship and conservation ethos.

Johannes and Hickey (2004) noted the immediate value of a focus on a single species in raising marine conservation awareness. With this approach there needs to be movement beyond a single species at an appropriate point in time if the full resource base and biological resources are to be managed sustainably.

## **Gaps and Opportunities to be considered by the IWP project**

### Information gaps

0. Socio-economic work includes the relationships of authority and subordination within a society, and the access to, use of and control over social, economic and environmental resources. This information is only partly available for Crab Bay. Information which the IWP project will benefit from includes:
  - Which villagers are in-migrants, temporary workers or long term residents, their existing and emerging links with the land owners of the area and their relative rights as resource user.
  - The comparative wealth and comparative resource use patterns of villagers, to allow better targeting of project initiatives. It is clear from the census not all households engage in fishing activities.
  - Relationships of authority and leadership responsibilities within each of the villages.
  - Recent estimations of the quantity of resources used or harvested on a seasonal and household basis.
0. Table 4 compares the social, economic and socio-economic problems and concerns identified in 1996 and 2004 at Limap village. The PSA led villagers to focus at an early stage on marine resources. As a result the range of social and economic issues of concern to villagers, and possibly many of greater priority to villagers than the decline in marine resources, have been overlooked or understated. It is assumed this weakness applies across the communities included in the 2004 PSA. Community participation is easiest to achieve where initiatives address people's priorities. IWP needs to more broadly identify people's social and economic needs, and place project activities within this context.
0. One concern addressed in the 1996 CARMAP was depletion of marine resources and especially the crabs. A tabu and village by-law to protect the mangroves and crabs were one proposal discussed within the Action Plan. However the PSA shows that the tabu on the crabs has not been an adequate initiative to arrest the trend of declining resource stocks. More work is required to understand factors contributing to this outcome. Has there been insufficient time for stock replenishment? Is inadequate enforcement capacity a weakness? Is under-management a weakness in that perhaps important management needs (perhaps management initiatives to restore habitat quality or removing feral predators) have been neglected? Is lack of resource user commitment a weakness? Or is it perhaps that the Tabu Area is not of itself sufficient to arrest decline of the resource stock, in which case extended or more diverse initiatives will be needed? IWP needs to explore the situation in more detail to avoid propping up a conservation initiative that is inherently unable to meet its goals.

### Considerations for project implementation

0. Broad international experience links a strong incentive to manage the habitat and fish stocks with a good knowledge base of the environment and ownership (whether under traditional or modern tenure systems) (Evans and Birchenough, 2001) or stewardship authority (Biodiversity Conservation Network, 1999). At Crab Bay knowledge of the environment has declined significantly and the fishery is an open access resource base. IWP project strategy will need to consider measures to foster knowledge of the environment and resource base and to build stewardship and a conservation ethic.
0. At Limap there has been limited progress in implementing the 1996 CARMAP plan. Understanding the strengths and weaknesses of the CARMAP plan and implementation strategy will help the IWP project initiatives be more effective.

- Many actions within the CARMAP placed the Limap villagers in the position of asking others to assist them. There was not a direct emphasis on activities the community was able to initiate themselves, or good consideration of the capacity of the external organisations to provide the assistance requested. This situation will have reinforced the community's external locus of control.
- The CARMAP was part of a training activity provided to staff of national and provincial agencies. Organisers expected that staff of the agencies involved would continue to facilitate the community through implementation. There was not significant commitment to this role, and post planning support was limited.
- The community was not sufficiently empowered or committed that they reviewed their experiences or plans and moved into an adaptive management cycle: "that has not worked, why, what might we do now?"

Initiatives by IWP to broadly build the organisational, leadership and resource management capacity of the 11 villages should target weaknesses and strengths apparent from earlier community work.

3. Mangrove wood is economically valuable for housing and fuel purposes, yet trend lines from 1996 suggest current extraction levels are unsustainable, and possibly at odds with crab conservation. Maintenance of the crab habitat could well benefit from both
  - mangrove and swamp regeneration (including propagation and planting of seedlings, regeneration around the swamp area to reduce drying).
  - Establishment of wood lots close to the villages of trees that could help meet village needs and reduce demand for mangrove wood for wet season household fires and construction purposes.
4. The communities exhibit very different socio-economic situations. Only a few communities participate to any degree in commercial fishing. In some villagers subsistence fishing and reef gleaning are everyday practices of most households. In others less than half of the households fish regularly. Conservation activities will need to be tailored to the situation of individual communities. Initiatives with commercial fishers in one village may be totally inappropriate to another village which has limited commercial fishing.
5. The 1996 Carmap suggests villagers at Limap have an external locus of control. This is reinforced by the PSA action plan (Tari, 2004). Locally based resource management is more likely to be successful where there is an internal locus of control. The IWP project initiatives may benefit from nurturing such a shift and building responsibility and capacity among local people. A participatory action learning approach with gradual adaptation of management solutions may help achieve this outcome.
6. It is traditional for government and NGO projects in Vanuatu to liaise with communities through the Chiefs. The IWP project will need to recognise that the Chiefs no longer receive full support and cooperation from villagers. The IWP project will also need to be careful not to place too great an expectation on villagers to the extent that project activities prevent them attending to household priorities. Ideally project activities should be aligned with household priorities. The IWP project might also benefit from identifying and engaging at an early stage natural leaders and champions for conservation within the 11 villagers.

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## APPENDIX 1: Supporting data from the 1989 and 1999 Household Census

This provides a snap shot of the situation in the villages around Crab Bay on census night 1989. Information has been extracted from Statistics Office (2002) and a computer-based GIS developed from the census data. Data is presented by enumeration area, rather than village. For comparative purposes tables include equivalent data for all rural Vanuatu.

Changes in the situation since 1989 are captured in current data collected by the IWP Project. Lack of clarity in how village boundaries were defined present a weakness in the direct comparison of village level data between the census information and the IWP Project.

### **Population and Population Growth 1989 to 1999.**

Enumeration areas	Villages	1989 Population	1999 Population	10 year increase
Enumeration area 271 - 276	Norsup Island, Norsup, Small Tautu, Big Tautu, Mbangalemb, Marybel, Lakatoro	1353		
Enumeration area 277-280	Uripiv Island, Uri Island, Tenmiel, Litzlitz, Molku, Potindir, Metaven/Barik	735	958	30%
Enumeration area 281 - 283	Lingarakh, Hatbol, Bushman's Bay, Namburakai/Niu Bush, Lowni	434	575	32%
Enumeration area 284	Mbormet, Faralo, Sarmette/Mapbest, Rue Bakof, Khimir Tambos, Limap, Freddy's Corner	272	317	17%
Enumeration area 285	Rensarie, Taremb	141	217	54%
	Tenbimbi	57		
	<b>Rural average</b>			

**Note:** There has been rapid population growth of some 3% per year in the project area over the decade 1989 to 1999. It is likely this trend has continued since 1999. A population growth rate of 3% is high. It is indicative of high dependency ratios (adults to children). In 1989 % of the population in the project area were under 20 years of age.

## Housing

Enumeration Area ID	Enumeration Area	No of households	Traditional	Make-shift	Mixed materials	Permanent	Flats	Other
274	Big Tautu	51	55%	2%	33%	10%	0%	0%
276	Lakatoro	72	1%	0%	40%	58%	0%	0%
277	Litzlitz	67	51%	3%	37%	9%	0%	0%
278	Vilavi	73	34%	0%	47%	19%	0%	0%
279	Sopor	9	100%	0%	0%	0%	0%	0%
280	Potindir	21	81%	0%	14%	5%	0%	0%
281	Bushman's Bay	27	15%	0%	56%	22%	7%	0%
282	Lingarakh	41	40%	0%	53%	8%	0%	0%
283	283	38	26%	0%	53%	21%	0%	0%
284	Freddy's Corner	64	44%	3%	39%	14%	0%	0%
285	Rensarie	153	31%	0%	22%	47%	0%	0%
286	Tenbimbi	119	37%	0%	18%	42%	1%	2%
	<b>Rural average</b>	<b>28,157</b>	<b>54.0%</b>	<b>5.8%</b>	<b>22.1%</b>	<b>17.2%</b>	<b>0.4%</b>	<b>0.4%</b>

Source: 1999 National Census

Notes: Two enumeration areas, Sopor and Potindir, rely upon traditional housing. However, for most census enumeration areas in the Crab Bay area, the reliance on traditional houses is below the rural average. Rather housing includes permanent components such as cement, or iron roofing. Even villages like Lingarakh are well above the rural average for use of some permanent materials within the housing. Rensarie, Lakatoro and Tenbimbi Census enumeration areas have a high proportion of permanent dwellings, reflecting the provision of housing to staff of Malampa Province and Rensarie Secondary School. Use of permanent materials above the rural average suggests the communities have above average ability to purchase permanent materials. Use of permanent materials below the rural average suggests limited capacity to purchase permanent materials.

Number of people per house

Check rural average as possibly a mistake somewhere. Insert table



### **Main Household Water Supply**

Enumeration Area ID	Enumeration Area	No of households	Piped water (private) %	Piped water (shared) %	Village standpipe %	Household tank %	Community tank %	River %	Well %	Spring %	Other %
274	Big Tautu	51	0	0	0	11.8	58.8	0	25.5	0	3.9
276	Lakatoro	72	66.7	15.3	5.6	5.6	2.8	0	4.2	0	0
277	Litzlitz	67	0	0	59.7	14.9	25.4	0	0	0	0
278	Vilavi	73	0	0	1.4	41.1	4.1	1.4	43.8	1.4	6.8
279	Sopor	9	0	0	0	33.3	0	0	22.2	0	44.4
280	Potindir	21	0	0	0	0	0	0	95.2	4.8	0
281	Bushman's Bay	27	22.2	40.7	0	11.1	3.7	0	22.2	0	0
282	Lingarakh	40	0	2.5	7.5	15	2.5	7.5	17.5	47.5	0
283		38	7.9	26.3	0	5.3	0	60.5	0	0	0
284	Freddy's Corner	64	14.1	34.4	0	12.5	12.5	6.3	20.3	0	0
285	Rensarie	47	27.7	46.8	0	0	0	10.6	14.9	0	0
286	Tenbimbi	44	15.9	54.5	6.8	0	2.3	18.2	0	2.3	0
	Rural average	28,157	8%	19%	7%	16%	18%	10%	9%	7%	5%

Source: National Statistics Office

The census areas of Lakatoro and Rensarie and Tenbimbi, and Bushman's Bay have a high proportion of households served by piped water. The large census enumeration area of LitzLitz has village standpipes from which people can collect water, supplemented by rainwater tanks: an old piped water supply system is no longer fully operational. However these communities contrast with the Enumeration Areas of Vilavi, Sopor, Potindir and Lingarakh which had limited modern water supply services at the time of the census. In Vilavi there was a reliance on wells and rainwater tanks. In Potindir communities relied on wells. In Lingarakh, almost half the number of households identified a spring as their main water source. Others used wells or rainwater tanks.

### Toilet type

Enumeration Area ID	Enumeration Area	No of households	Flush toilet (private) %	Flush toilet (shared) %	Water seal (private) %	Water seal (shared) %	VIP (private) %	VIP (shared) %	Pit Latrine (private) %	Pit Latrine (shared) %	No toilet facility %
274	Big Tautu	51	0	0	41.2	3.9	5.9	0	45.1	3.9	0
276	Lakatoro	72	50	0	15.3	0	0	0	34.7	0	0
277	Litzlitz	67	3	0	7.5	0	0	0	88.1	0	1.5
278	Vilavi	73	0	0	17.8	0	71.2	1.4	9.6	0	0
279	Sopor	9	22.2	0	0	0	77.8	0	0	0	0
280	Potindir	21	0	0	0	0	0	0	100	0	0
281	Bushman's Bay	27	3.7	0	0	7.4	7.4	0	81.5	0	0
282	Lingarakh	40	0	0	2.5	0	2.5	0	77.5	2.5	15
283	283	38	0	0	0	0	0	0	100	0	0
284	Freddy's Corner	64	1.6	0	0	0	0	0	98.4	0	0
285	Rensarie	47	25.5	2.1	0	0	4.3	0	66	2.1	0
286	Tenbimbi	44	0	0	2.3	0	20.5	2.3	68.2	6.8	0
	<b>Rural average</b>	<b>28157</b>	<b>3.6%</b>	<b>0.9%</b>	<b>7.1%</b>	<b>0.9%</b>	<b>27.1%</b>	<b>2.4%</b>	<b>48.3%</b>	<b>4.4%</b>	<b>5.2%</b>

Source: National Statistics Office

Most households in the Crab Bay area have their own private toilet. Lakatoro, Rensarie and Soror have a high proportion of households with a flush toilet or water seal toilet. Vilavi and Sopor and to a lesser extent Tenbimbi have a high proportion of VIP toilets. The remaining villages primarily use basic pit latrines. Lingarakh has a relatively high proportion of households with no toilet facility.

## Main form of lighting

Enumeration Area ID	Enumeration Area	Total	Electricity %	Gas %	Kerosine %	Wood/ Coconut Shell %	Candles %
274	Big Tautu	51	2	0	98	0	0
276	Lakatoro	72	62.5	0	34.7	2.8	0
277	Litzlitz	67	1.5	0	98.5	0	0
278	Vilavi	73	2.7	0	94.5	1.4	1.4
279	Sopor	9	0	0	100	0	0
280	Potindir	21	0	0	95.2	4.8	0
281	Bushman's Bay	27	0	0	77.8	22.2	0
282	Lingarakh	40	0	0	100	0	0
283	283	38	0	0	100	0	0
284	Freddy's Corner	64	0	0	96.9	1.6	0
285	Rensarie	47	19.1	2.1	76.6	2.1	0
286	Tenbimbi	44	0	2.3	97.7	0	0
	<b>Rural average</b>	<b>28,157</b>	<b>6.8%</b>	<b>0.3%</b>	<b>85.1%</b>	<b>5.8%</b>	<b>0.2%</b>
Source: National Statistics Office							

Notes: Lakatoro and Rensarie have above average access to household electricity for lighting and other purposes. At Lakatoro there is a reticulated supply, at Rensarie a generator is run to provide electricity to the school for evening lighting and other purposes. Most households in the Crab Bay area use kerosene lamps (hurricane lights) as their main form of lighting. Few households rely on wood or coconut shell for lighting, however, in Bushman's Bay almost a quarter of households rely on wood and coconut shell for lighting purposes.

**Household capital items**    Insert rural averages

EA ID	Enumeration Area	No. of households	Private radio %	Shared Radio %	Does Not Use Radio %	Private Canoe or Boat %	Shared Canoe or Boat %	No Canoe or Boat %	Private Motor boat %	Shared Motor boat %	No Motor Boat %
274	Big Tautu	51	52.9	0	47.1	0	0	100	0	0	100
276	Lakatoro	72	81.9	0	18.1	4.2	0	95.8	2.8	0	97.2
277	Litzlitz	67	46.3	0	53.7	50.7	0	49.3	3	0	97
278	Vilavi	73	64.4	0	35.6	50.7	0	49.3	21.9	0	78.1
279	Sopor	9	66.7	0	33.3	22.2	0	77.8	11.1	22.2	66.7
280	Potindir	21	42.9	0	57.1	23.8	0	76.2	0	0	100
281	Bushman's Bay	27	70.4	3.7	25.9	25.9	14.8	59.3	0	3.7	96.3
282	Lingarakh	40	57.5	0	42.5	7.5	2.5	90	0	0	100
283	283	38	55.3	5.3	39.5	5.3	0	94.7	0	0	100
284	Freddy's Corner	64	42.2	1.6	54.7	3.1	0	95.3	1.6	0	96.9
285	Rensarie	47	40.4	0	59.6	8.5	0	91.5	0	0	100
286	Tenbimbi	44	43.2	0	56.8	4.5	0	95.5	0	0	100
	<b>Rural average</b>	<b>28,157</b>							<b>0</b>	<b>0</b>	<b>100</b>

EA ID	Enumeration Area	No. of households	Private Vehicles %	Shared Vehicles %	No Vehicle %	Private Phone%	Shared Phone %	No Phone %
274	Big Tautu	51	3.9	0	96.1	0	0	100
276	Lakatoro	72	4.2	2.8	93.1	1.4	0	98.6
277	Litzlitz	67	0	0	100	0	0	100
278	Vilavi	73	1.4	0	98.6	1.4	0	98.6
279	Sopor	9	0	0	100	0	55.6	44.4
280	Potindir	21	0	0	100	0	0	100
281	Bushman's Bay	27	3.7	18.5	77.8	0	3.7	96.3
282	Lingarakh	40	0	0	100	0	0	100
283	283	38	10.5	0	89.5	0	5.3	94.7
284	Freddy's Corner	64	6.3	0	92.2	1.6	0	96.9
285	Rensarie	47	8.5	0	91.5	2.1	0	97.9
286	Tenbimbi	44	2.3	0	97.7	0	2.3	97.7

	Rural average	28,157	0	0	100		0	1.4	98.6
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Lakatoro has high ownership rates of radios. However, in most of the other villages, half the households did not use a radio in the week of the census.

Litz litz and Vilavi enumeration area has high ownership of canoes or boats. The island based Uri and Uripiv villagers need canoes or boats to cross to their mainland garden areas. The coastal areas of Sopor, Potindir and Bushman's Bay also have relatively high ownership of canoes or boats. In contrast the inland enumeration areas such as Lingarakh, and the southern villages of Freddy's Corner, EN 283 or Rensarie have low use of canoes or boats.

There are low levels of ownership of vehicles at a household level throughout the Crab Bay area. There are several vehicles in EA 283 and Bushman's Bay.

Most households throughout the Crab Bay area do not have a private or shared phone. Although public village phones are available at Rensarie and within the SOPR Enumeration Area.

### Subsistence and commercial gardening

Enumeration Area ID	Enumeration Area	No of households	Subsistence Only %	Subsistence and Sale %	Sale only %	No food garden %
274	Big Tautu	51	98	2	0	0
276	Lakatoro	72	91.7	5.6	0	2.8
277	Litzlitz	67	92.5	7.5	0	0
278	Vilavi	73	78.1	21.9	0	0
279	Sopor	9	100	0	0	0
280	Potindir	21	33.3	61.9	4.8	0
281	Bushman's Bay	27	88.9	11.1	0	0
282	Lingarakh	40	95	5	0	0
283	283	38	89.5	10.5	0	0
284	Freddy's Corner	64	96.9	1.6	0	0
285	Rensarie	47	100	0	0	0
286	Tenbimbi	44	86.4	13.6	0	0

Note: Only in the Provincial administrative centre of Lakatoro were there 2 households which did not cultivate food. All other households in the Crab Bay area cultivated food. Mostly gardening was for household subsistence purposes. However, at the time of the census a proportion of households were also cultivating food for sale. The proportion of households engaged in commercial gardening was low at Rensarie, Sopor, Big Tautu and Lingarakh. It was highest in Potindir and Vilavi.

**Household Fishing Practices during the time of the census**

Enumeration Area ID	Enumeration Area	No of households	Subsistence Only %	Subsistence and Sale %	Sale only %	Don't Fish %
274	Big Tautu	51	58.8	0	0	41.2
276	Lakatoro	72	65.3	0	0	34.7
277	Litzlitz	67	85.1	9	0	6
278	Vilavi	73	60.3	27.4	0	12.3
279	Sopor	9	66.7	0	0	33.3
280	Potindir	21	23.8	38.1	0	38.1
281	Bushman's Bay	27	81.5	18.5	0	0
282	Lingarakh	40	72.5	0	0	27.5
283	283	38	31.6	2.6	0	65.8
284	Freddy's Corner	64	35.9	1.6	0	60.9
285	Rensarie	47	53.2	0	0	46.8
286	Tenbimbi	44	88.6	2.3	0	9.1

In Bushman's Bay all households fished for subsistence purposes and almost one fifth of households also engaged in commercial fishing. The numbers of households engaged in commercial fishing were also significant in LitzLitz, and Vilavi. These three enumeration areas had the highest rates of canoe and boat ownership. Tenbimbi enumeration area also had a high level of subsistence fishing although only one household undertook commercial fishing. In the other enumeration areas around Crab Bay a third or more of the population did not fish at the time of the census, and only a few households fished for commercial sale.

### Cattle ownership

Enumeration Area ID	Enumeration Area	No of households	Own Cattle %	No Cattle %
274	Big Tautu	51	35.3	64.7
276	Lakatoro	72	19.4	80.6
277	Litzlitz	67	10.4	89.6
278	Vilavi	73	6.8	93.2
279	Sopor	9	0	100
280	Potindir	21	38.1	61.9
281	Bushman's Bay	27	48.1	51.9
282	Lingarakh	40	15	85
283	283	38	15.8	84.2
284	Freddy's Corner	64	23.4	75
285	Rensarie	47	6.4	93.6
286	Tenbimbi	44	15.9	84.1
	<b>Rural Average</b>	<b>28,157</b>	<b>46%</b>	<b>53%</b>

Notes: The rate of cattle ownership varies through the Crab Bay area, but is relatively low compared with rural Vanuatu as a whole. Bushman's Bay has the highest rate of cattle ownership with 48% of households owning cattle. This rate is about the rural Vanuatu average. Cattle ownership is locally high in Potindir and Bit Tautu enumeration areas, but elsewhere is relatively low. No cattle were owned in Sopor. Vilavi and Rensarie only had a couple of households owning cattle.



### Commercial crops

Enumeration Area ID	Enumeration Area	No of households	Cocoa_Yes %	Kava_Yes %	Coffee_Yes %	Coconut_Yes %
274	Big Tautu	51	78.4	2	0	90.2
276	Lakatoro	72	51.4	6.9	2.8	77.8
277	Litzlitz	67	49.3	31.3	0	80.6
278	Vilavi	73	24.7	2.7	2.7	86.3
279	Sopor	9	44.4	11.1	0	100
280	Potindir	21	81	4.8	0	95.2
281	Bushman's Bay	27	88.9	25.9	0	100
282	Lingarakh	40	90	17.5	0	95
283	283	38	100	21.1	0	100
284	Freddy's Corner	64	68.8	10.9	3.1	70.3
285	Rensarie	47	80.9	31.9	4.3	95.7
286	Tenbimbi	44	93.2	18.2	4.5	100
	<b>Rural Average</b>	<b>28157</b>	<b>29%</b>	<b>59%</b>		<b>79%</b>
	<b>Malekula aver</b>					
	<b>Malekula absol</b>		<b>2857</b>	<b>1503</b>		<b>3382</b>

Notes: With the exception of Vilavi enumeration area the participation in commercial cocoa production was high. This is expected as Malekula is a major cocoa producing island within Vanuatu. The number of households participating in kava production was relatively low. The participation in coca farming was least in Vilavi. The proportion of households producing copra for sale was also high throughout much of the Crab Bay area, only following beneath the national average in Freddy's Corner and the Provincial administrative area of Lakatoro.. In the Sopor, Bushman's Bay , Tenbimbi and Enumeration Area 283 all households produced copra for sale.

## Work Status

EA ID	Enumeration Area	Working for pay, salary or profit		Working in a family business for no pay		Other work for no pay		Looking for work		Subsistence farmers	
		Men %	Women %	Men %	Women %	Men %	Women %	Men %	Women %	Men %	Women %
274	Big Tautu	26.5	10.4	5.9	2.6	2	2.6	0	0	55.9	32.5
276	Lakatoro	52.2	20.8	0	1	2	1	0	0	30	3.1
277	Litzlitz	20	9.3	1	0	9	1	0	0	67.6	32
278	Vilavi	35.6	8.2	2	1	1	0	1	0	50.5	15.5
279	Sopor	33.3	25	0	0	0	0	0	0	58.3	41.7
280	Potindir	14.7	0	0	0	2	0	0	0	76.5	15.2
281	Bushman's Bay	25.7	20.5	0	7.7	1	2.6	0	0	57.1	43.6
282	Lingarakh	18.6	6.1	1.7	0	3	25.8	0	0	54.2	34.8
283	283	12.7	5.9	0	0	0	0	0	0	61.8	19.6
284	Freddy's Corner	41	29.9	0	0	1	1.3	1	0	56	61
285	Rensarie	25.5	13	3.6	0	0	1.9	0	0	65.5	61.1
286	Tenbimbi	3.2	1.8	3.2	0	0	0	35.5	16.4	56.5	0

Source: National Statistics Office

**Notes:** The highest proportion of men working for pay, salary or profit was within the enumeration area of Lakatoro which includes the Provincial Headquarters. Over half of the men living in this enumeration area were employed. Freddy's Corner had 41% of men in paid or profitable work. Over a quarter of men were employed within Big Tautu, Vilavi, Sopor, Bushman's Bay and Rensarie enumeration areas. Women's participation in paid work was everywhere below the participation of men but was 30% of women at Freddy's Corner and 20% of women at Lakatoro and Bushman's Bay enumeration areas. A significant proportion of women at Lingarakh engaged in work for no pay – but the census does not provide information on what activity they participated in. Elsewhere the number of people working for no pay was small, Only in Tenbimbi did a significant proportion of both men and women report that they were looking for work. Subsistence farming was with the exception of the Lakatoro enumeration area, the most common form of employment.

Appendix 2: Supporting data from the 2004 Participatory Situation Analysis

Village/hamlet	Portindir	Barick.	Mapbest/ Trevaliaut	Uri/Uripiv	Tarem/Te mbibi	Limap	Louni	New Bush	Bushman' s Bay	Hatbol	Lingarak	
Village services			Kindergart en, Primary School					Water supply, SDA Church, Copra bed, Cocoa drier	None			
Tansport to Lakatoro ( Province, telephone)	15 mins (300 VT)	20 mins (100 VT)	70 mins (2000 VT)			60 mins (600 vt)	30 mins (400 VT return)	30 mins ( 400VT return)	20 – 25 mins (300VT return)	60 mins (300VT)		
Transport to Norsup (Hospital)	30 mins (600 VT)		75 mins (3,000VT)			80 mins (800 vT)	45 mins (600VT return)	45 mins (600VT return)	35 mins (400VT return)	1 hour ( 400 VT)		
Transport to LitzLitz wharf	10 mins (200 VT)		60mins (400VT)  200VT per bag copra			60 mins/200V T per bag copra	30 mins (400 VT return)	30 mins (400VT)	20 mins (200VT return)	½ hour ( 200VT)		
Transport to Rensarie			1 hour walk			2 hour walk	1½ hrs walk	1½ hrs walk		1 hour (100 VT)		



		Prawns 5. Mud Crab	4. Serwok 5. Trochus / Banu	5. Mangroves, Trochus / Turtle	Freshwater eels 5. Hermit crabs / Serwok / Strong Back	5. Kokias		5. Mangroves / trochus	5. Kokias 6. Reef fish	4. Mud crab 5. Trochus / Giant Clam
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