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Socioeconomic study of the Crab Bay villages of Central Malekula, Vanuatu, Volume II: Detailed findings

By the Vanuatu Environment Unit

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Contents

Preface

This technical report presents the detailed findings of five related surveys undertaken by the Vanuatu International Waters Project (IWP) in support of the Vanuatu International Waters Project Demonstration Project (IWPDP).[1] The findings of these surveys have been summarised in a separate IWP technical report;[2] publication of these detailed results is being undertaken to ensure communities, resource managers and researchers have access to as much original data relating to the Crab Bay project as possible.

The five surveys include the following:

- A household survey administered to 132 households in the Crab Bay project area (presented in Part I);
- A survey of use of mangrove wood, administered to 105 villagers from 12 villages in the project area (Part II);
- A reef fish survey, administered to 90 villagers from 23 villages and hamlets (Part III);
- A fish marketing survey given to seven retail fish outlets and one restaurant operating in the Lakatoro to Norsup area (Part IV); and
- A crab marketing survey given to 27 women selling *Cardiosoma* at Malampa market (Part V).

Readers are encouraged to consult the summary report, which was prepared by the Vanuatu Environment Unit, as well as two additional reports written by Francis Hickey relating to the management and resources of the Amal/Crab Bay Tabu Eria.[3]

Part 1: Household survey

The Vanuatu IWP administered written questionnaires to 132 households in the Crab Bay Project area to gain information about a range of resource management and socio-economic issues. The survey was conducted simultaneously with mangrove and reef fish surveys (presented in Parts 2 and 3).

The survey provides a range of information on subsistence and commercial *Cardiosoma hirtipes* harvesting including:

- local vernacular names for *Cardiosoma*;
- household harvesting practices and frequencies;
- common harvesting sites and habitats;
- the number of crabs typically caught and consumed;
- alternative sources of meat in the local diet; and

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[1] On behalf of the Vanuatu IWPDP, a survey team consisting of Primrose Malosu (IWP Project Assistant), Russell Nari (Deputy Director, Environment Unit) and Anzel Kali (Hatbol Village) visited villages around the IWPDP project area to gather information on harvesting, use and marketing of *Cardiosoma* crabs, fish, and mangrove wood, and gather information on social structure of the villages.

[2] See Vanuatu Environment Unit 2007. Socioeconomic study of the Crab Bay villages of Central Malekula, Vanuatu, Volume 1: Overview. IWP-Pacific Technical Report No. 46. Apia, Samoa: Secretariat of the Pacific Regional Environment Programme.

[3] See Hickey, F. 2006. Amal/Crab Bay Tabu Eria review, Malekula Island, Vanuatu. IWP-Pacific Technical Report No. 34. Apia, Samoa: Secretariat of the Pacific Regional Environment Programme; and Hickey, F. 2007. Marine ecological baseline report for Amal/Crab Bay Tabu Eria, Malekula Island, Vanuatu. IWP-Pacific Technical Report No. 45. Apia, Samoa: Secretariat of the Pacific Regional Environment Programme

- the range of local resources commonly used to generate cash income.

Part 2: Survey of mangrove use

The IWP project conducted a survey of 105 villagers from 12 villages within the project area between Wednesday 1 December and Friday 10 December 2004. Fifty-eight of the 105 respondents (55%) reported using mangrove wood. No use of mangrove wood was reported by respondents from the villages of Bushman's Bay, New Bush and Tarem/Tembibi. Only one respondent from Lingarakh reported use of mangrove wood: green mangrove wood used for fence posts.

Part 3: Reef fish survey

Fish are both a subsistence and commercial resource to the villages in the Vanuatu. Information on local fishing practices was gathered to inform the community conservation activities of Vanuatu's IWPDP project. The survey was administered to 76 men and 14 women from 23 villages and hamlets in the IWPDP project area. Fifty-nine per cent of respondent were aged between 25 and 60 years old, 18% of respondents were less than 24 years of age, and 6% were over 61 years of age.

Part 4: Fish marketing survey

Written surveys were administered to 7 retail fish outlets and one restaurant operating in the Lakatoro to Norsup area. The surveys asked the store owners to estimate the quantity and varieties of fish they bought on a weekly or monthly basis and their pricing policy for each kind of fish. Responses were anecdotal and the survey team did not have a ready means of confirming the responses given.

Part 5: Crab marketing survey

Written questionnaires were administered to women selling *Cardiosoma* at the Malampa market over a ten day period. The 27 women selling *Cardiosoma* at Malampa market during the survey period came from five villages: Barrick (4), Louni (8), Pinalum (1), Port Indir (13) and Tevaliaut (1).

Part I: Household survey

1 Overview

This chapter provides an overall summary of the survey and responses received. It is followed by a more detailed presentation of the survey data (Section 2) and a discussion about the survey (Section 3).

1.1 Introduction

The team surveyed 132 households in the Crab Bay IWPDP area to gain information about resource management and socioeconomic issues. The survey was conducted simultaneously with mangrove and reef fish surveys. Written questionnaires were administered by a team of volunteer facilitators in their own villages, under leadership from staff of the Environment Unit.

1.1.1 Survey weaknesses

Where the survey posed similar questions in different contexts. inconsistent responses were common. For example when questioned specifically 25% of respondents reported household sales of *Cardiosoma*. However, when discussing the range of income sources, 35% of respondents reported household sales of the crabs. Similarly in one context respondents report harvesting and eating crabs 1 to 2 times a week; while in another they report eating crabs only a few times a month.

A number of factors are believed to have contributed to inconsistent responses. These include:

- There were different interpretations of what was meant by the term "season". Some respondents referred to the **breeding season** while others referred to a **season of peak availability**. Respondents who referred to the breeding season described this as a time of reduced harvesting to protect the population (note, however that IWPDP (2004) recorded that some communities harvest heavily when the female crabs are greasy with plenty of eggs). Respondents who referred to the season of peak availability commonly described the season as the time of greatest harvest.
- There was a variable rate of response across some questions. Typically more respondents answered the first part of a question then answered subsequent parts. This trend was compounded by a failure to distinguish adequately between no response and a negative response. Data has been analysed as a proportion of people interviewed. A downward trend often reflects a reduced response rate rather than a significant change in behaviour.
- It appears that not all survey facilitators administered and recorded the questionnaire consistently.

Where possible IWP project experience or other supporting information is used to clarify the responses received.

Data from questions referring to *Cardiosoma* use "in season" and "out of season" is presented but it is considered unreliable and not precise information on seasonal differences.

1.2 Survey sample

Surveys were conducted with 100 women and 31 men from 18 villages or hamlets. With the exception of Uripiv Island, over a quarter of households in each village were surveyed, with the proportion exceeding 50% in Louni, New Bush and Bushman's Bay.

1.2.1 Island or origin

77% of respondents stated they were from Malekula. Whether they were from the project area or other parts of Malekula was not recorded.

- All respondents interviewed from Barrick, Lingarakh, Hatbol, Port Nabe, Taremb, Tenbimbi, Tevri, Uri Island and Vilavi (Uripiv Island) stated they were from Malekula.
- Respondents from Louni, Limap, Portindir, Ginenarong and New Bush were partly from Malekula and partly from other islands.
- All but one respondent from Tevaliaut were from the nearby island of Paama as was the sole respondent from MapBest Plantation.
- Respondents from Bushman's Bay and Robako were from several different islands, but stated they were from Malekula.

A household would normally report the father's island of origin: the survey did not provide for recording of households of mixed origin.

1.2.2 Household size and structure

Villages had a highly variable household size, with the mean varying between four persons per household and eight persons per household.

1.2.3Religious affiliation

Eighty per cent of respondents were affiliated with the Presbyterian Church. In Hatbol, Taremb, Tenbimbi and Uri Island all respondents were Presbyterian. In Louni half the respondents were Mormons, while in New Bush and Port Nabe a significant number of respondents were SDA. It is possible the practice of conducting surveys after the Sunday Church Service led to some churches being under represented in the socioeconomic survey sample.

1.3 Information on the use of *Cardiosoma* crabs

1.3.1 Vernacular names for Cardiosoma

Three groups of vernacular names were used by people from Malekula:

- Villagers from Hatbol, Taremb and Tenbimbi used one group of names, recorded as **Nefri**.
- Villagers from Louni, Portindir and Uripiv consistently use a second group of names, recorded as **Neuwrisal**.
- Villagers from Limap and Lingarakh consistently use a third name, recorded as **Niraghum**.

Additional vernacular names were used by respondents from Ambrym, Pentecost and Paama.

1.3.2 Places and habitats where Cardiosoma crabs are caught

Each village uses a small number of accessible crab harvesting areas. The IWP project is particularly interested in harvesting in and around the Crab Bay Marine Protected Area (MPA).

- Respondents from Taremb and Tenbimbi mainly reported harvesting *Cardiosoma* within the MPA area.
- Two respondents from Louni and one from Barrick were the only other respondents to report harvesting *Cardiosoma* from within the MPA.
- A significant proportion of respondents from Hatbol, Limap and Lingarakh reported harvesting *Cardiosoma* from areas close to the MPA.

A total of 78% of respondents reported collecting *Cardiosoma* from mangrove habitats, 55%

of respondents mentioned primary forest habitats, 22% of respondents mentioned plantations and 21% mentioned beaches.

1.3.3 How often Cardiosoma are harvested

How often *Cardiosoma* are harvested depended on the season: 74% of respondents reported catching *Cardiosoma* 1 to 2 times per week "outside the *Cardiosoma* season"; and further 32% of respondents reported catching crabs 2 to 4 times per week. During the season 39% of respondents reported catching *Cardiosoma* 1 to 2 times per week while 36% of respondents reported catching *Cardiosoma* 2 to 4 times per week. The difference reflects fewer responses to the question on harvesting in the season rather than a clear shift in harvesting frequency.

More detailed comparisons of data across the two seasons has been made but is considered unreliable.

1.3.4 Household members who harvest Cardiosoma

Gender participation in *Cardiosoma* harvesting varied. There was only one response to this question from Mapbest, Robako and New Bush. All indicated that women over 20 collected *Cardiosoma*. Respondents from Barrick, Louni and Hatbol indicated *Cardiosoma* was collected mainly by women. In all other villages respondents mentioned that both men and women harvested *Cardiosoma*. It was uncommon for children to be engaged in harvesting *Cardiosoma*.

1.3.5 Quantity of Cardiosoma caught on each harvesting trip

The number of *Cardiosoma* caught was reported empirically as:

- A rope — 10 to 20 crabs tied together by a local rope.
- A bag rice — a recycled rice bag that typically holds 30 to 50 crabs.
- Bag flour — a recycled flour bag that typically holds 100 or more crabs.

Two thirds of respondents reported that women regardless of age and men over 20 typically collect a rice bag of crabs each harvesting trip. The remaining third collected either a flour bag or a rope of crabs. However, men under 20 years of age more commonly collected a rope of crabs.

Quantities harvested were also analysed by village. Respondents from Bushman's Bay and New Bush reported that over 80% of harvesting trips were for a rope or two of crabs. However, respondents from Barrick, Ginenarong, Hatbol, Limap, Lingarakh, Louni, Port Nabe, Tarem, Tenbimbi, and Uri Island reported that over 80% of harvesting trips were for quantities of a rice bag or greater.

No trend was apparent when harvesting quantities were compared with family size.

1.3.6 How Cardiosoma are caught

Almost all (92%) of respondents reported that their household looked for *Cardiosoma* during the day, with 46% reporting that their households used a light to catch *Cardiosoma* at night; 18% reported that their households dug *Cardiosoma* from holes, and 5% mentioned the use of bait to attract crabs.

Data received on harvesting frequency and volumes across the season is inconsistent with earlier responses. IWP field observations support the earlier data of 1–2 or 3–4 crab harvesting trips a week with a rice bag being the most common harvesting quantity.

1.3.7 Duration of Cardiosoma harvesting trips

A majority (64%) of respondents reported a typical crab harvesting trip during the *Cardiosoma*

season lasted 3–5 hours. *Cardiosoma* gathering trips out of season were reported to be of slightly longer duration.

1.3.8 Cardiosoma use and consumption

Almost all (95%) of respondents reported that their households caught *Cardiosoma* for domestic consumption, while 40% of respondents stated that their households caught *Cardiosoma* for sale. No respondents mentioned *Cardiosoma* being caught as bait. Seven respondents mentioned catching *Cardiosoma* to share/exchange with their relatives. This use is possibly understated because it was not specifically listed.

1.3.9 Commercial sales

Thirty-eight per cent of respondents reported that their households caught *Cardiosoma* for sale. Only 7% of respondents reported harvesting *Cardiosoma* for sale once or twice a month, 16% reported harvesting crabs for sale two to four times per month, and 15% reported harvesting crabs more than 5 times a month (the equivalent of harvesting for sale once or twice per week).

No commercial harvesting was reported from Bushman's Bay, Hatbol, Limap, Lingarakh, Mapbest, Robako, Taremb, Tevaliaut. Greatest frequency of harvesting trips was reported from Ginenarong and Portindir, and from Barrick and Port Nabe. The greatest volume of crab sales was reported from Portindir, which had two households that reported sales, out of season, of 300 and 400 crabs per week respectively. The hamlet of Ginenarong had high participation in commercial *Cardiosoma* trade, with 4 of the 5 households reporting crab sales, but the volumes reported were lesser.

1.3.10 Share and exchange

Respondents who mentioned catching *Cardiosoma* for share/exchange mentioned doing this once or twice a month.

1.3.11 Number of Cardiosoma eaten by a household at a meal

Out of season almost three quarters of respondents reported consumption of 1–10 crabs at a meal (Table 31). In season the consumption reported was higher with almost half of respondents reporting consumption of 11–20 (or more) crabs at a meal. There is no trend in the data between the number of *Cardiosoma* consumed and household size, although several respondents mentioned how many they ate depended on how many people were at the meal. Separate observations of the IWPDP suggest that one adult can eat 4 to 7 crabs at a meal, and children would eat several (Malosu, personal communication).

1.3.12 Other meats in the household diet

Villages differ in the frequency with which they eat different meats, and not all villages regularly eat all these meats.

***Cardiosoma* —** 83% of respondents reported eating crab meat, although this was not listed in the question.

Chicken — 68% of respondents reported chicken was eaten 1 or 2 times a month. Less than 10% of respondents reported chicken being eaten more frequently.

Fish — 42% of respondents reported fish was eaten 1 or 2 times a month, while 29% of respondents reported it being eaten more frequently.

Beef — 40% of respondents reported beef was eaten 1 or 2 times a month, while 19 % reported it was eaten more frequently.

Pork — 37% of respondents reported pork was eaten 1 or 2 times a month, while 19% reported it was eaten more frequently.

Shell Fish — 37% of respondents reported shell fish were eaten once or twice a month while 7% reported they were eaten more frequently.

Prawns — 11% of respondents reported prawns are eaten once or twice a month while a further 10% reported they were eaten more frequently.

Lobster — 31% of respondents reported lobster was eaten once or twice a month, with a further 11% reporting it was eaten more frequently.

1.3.13 Other incomes sources

A wide variety of products are sold to generate income.:97% of respondents' households sell copra; 74% of respondents' households sell cocoa; 56% sell garden produce; 43% sell chickens, 41% pigs, 35% report selling fish and a similar proportion crabs (this is a lower proportion selling crabs than reported in response to the previous question). Other sources of income include shellfish, pandanus handicrafts, timber, beef, firewood, thatch, bread, vanilla, kava and octopus. One respondent reported salary as a principal source of income.

On average a household had four sources of cash income, with several households having up to eight income sources. The amount of income derived from each source tended to be small (<$100), with only copra and cocoa providing a consistent source of income over $100. Absolute incomes were not determined.

- Particularly low income earning potential was reported from Bushman's Bay, Tembibi and New Bush.
- Mid-range income earning ability was reported from Barrick, Hatbol, Limap, Port Nabe, Taremb, Tevaliaut, Tevri and Uri Island.
- Higher potential income levels were recorded in 3 villages: Lingarakh, Portindir and Ginenarong.
- Three households did not report any cash income, and one household at Tevri reported minimal income from sales of *Cardiosoma* only.

1.4 Management of *Cardiosoma*

While most people interviewed were aware of one or more resource management taboos, there was wide variation in their knowledge and understanding. In the case of the Crab Bay Protected Area there was a diversity of opinions as to who established the area, who had responsibility and specifically what the area protected.

Respondents held a diversity of opinions as to whether resource management taboos had been effective (Table 39). Those believing resource management taboos were effective emphasised three factors:

a) respect for the taboo and/or protected area itself. Supporting the concept of respect for the initiative were comments relating to concern for the environment, concern about resource depletion, awareness of the situation and a desire for resources to be more plentiful;

b) respect for the chief/chiefs who initiated the taboo; and

c) fear of the penalties. Supporting this issue, two respondents mentioned good enforcement.

Those respondents who felt resource management taboos had been ineffective largely presented an opposite set of views:

d) people did not respect the taboo;

e) people, chiefs and other leaders did not cooperate well; and

f) other claims (income, meat, rights) were more pressing than concerns about the penalties.

2 Methods

The IWP project team developed a written survey questionnaire in November 2004. Primrose Malosu (IWP Project Assistant) and Russell Nari (Deputy Director, Environment Unit) introduced the survey to volunteer facilitators who had earlier participated in preparation for and conduct of a Participatory Situation Analysis (Table 1). The survey team took the survey forms to their villages and conducted interviews during the first weeks of December 2004. The survey was conducted simultaneously with the mangrove and reef fish survey.

The IWP project decided that all villages within the project area should take part in the survey. All communities were notified in advance, commonly by a notice after the Saturday or Sunday church service.

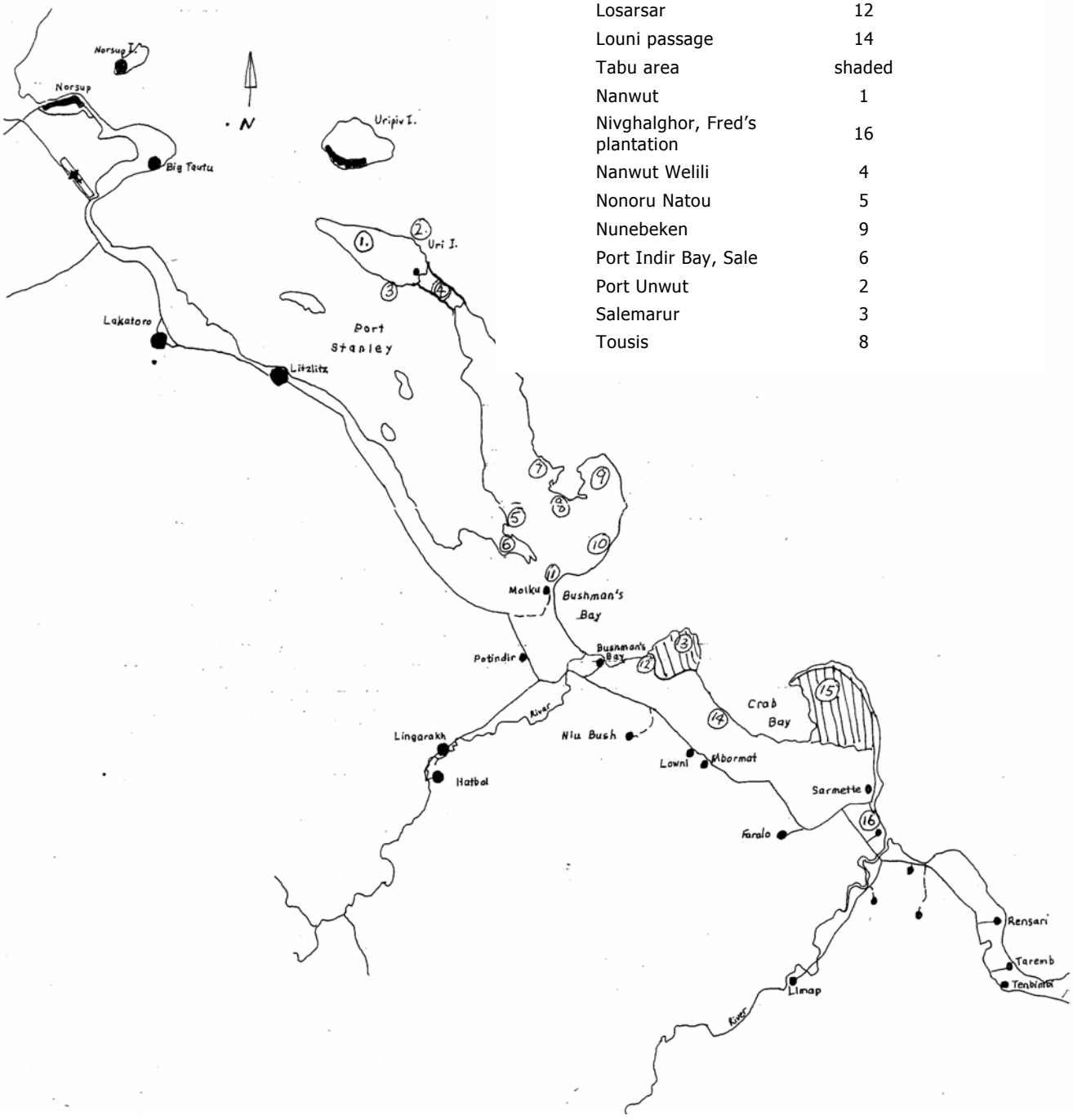
Sample selection was not random, selective nor representative of social groups. The facilitators were asked to conduct between 5–10 surveys per village depending on time available, with the exception of Uripiv Island, from which 15 households were surveyed. The facilitators selected the households themselves, interviewing villagers whom it was convenient and easy to approach. The resultant sample may not be fully representative of the residents of the villages.[4]

Table 1: Facilitators conducting the household survey

Name	Village
Anzel Kali	Hatbol
Kalen Api	Lingarakh
Kalmari Noel	Barrick
Saline Song	Port Indir
John Kensi	Bushman Bay
John Kensi	New Bush
Liency Kaun	Louni
Roy. L.	Louni
* Primrose Malosu	Port Indir, Tevaliaut & MAPBEST
* Russell Nari	Port Indir, Tevaliaut & MAPBEST
Davis	Tevaliaut & MAPBEST
Shella Philip	Uripiv
Mary Banga	Uripiv
Chief Fetnet	Uri
Mary Kernis	Tembibi
Kenery	Tembibi
Elder Singh	Tarem

[4]More appropriate sampling methods would have been random selection of 25% of households or a structured sample of 25% of disadvantaged households, average households and advantaged households within each village

Site Name	Number
Amal, Amal point	13
Bare area	7
Ginenarong	11
Loloburbur	10
Losarsar	12
Louni passage	14
Tabu area	shaded
Nanwut	1
Nivghalghor, Fred's plantation	16
Nanwut Welili	4
Nonoru Natou	5
Nunebeken	9
Port Indir Bay, Sale	6
Port Unwut	2
Salemarur	3
Tousis	8



Map 1: The Vanuatu IWPDP Project Area

The surveys were conducted at a convenient time, often after church services. The visiting IWP and Environment Unit coordinators found it difficult to fit the survey around family and subsistence responsibilities. Where villagers were not present at the pre-arranged time, the surveyors interviewed people at convenient locations.

Table 2: Household survey sample

Village	Male	Female	Gender not stated	No of interviewees
Barrick	2	3		5
Bushman Bay	3			3
Ginanarong	1	3	1	5
Hatbol		13		13
Limap	7	3		10
Lingarakh	2	11		13
Louni		10		10
Mapbest/Sarmette		1		1
New Bush	2	2		4
Port Nabe	2	5		7
Portindir	1	8		9
Robako	1	1		2
Taremb	2	7		9
Tembibi	2	8		10
Tevaliaut	5	9		14
Uri Island		4		4
Uripiv Island	1	12		13
TOTAL	**31**	**100**	**1**	**132**

2.1 Sample structure

2.1.1 Village and gender

132 household surveys were completed from 18 villages or hamlets (Table 2). This has been compared with the number of households in each village as determined by the Participatory Situation Analysis (Table 3).

100 women were surveyed compared with only 31 men. This gender disparity may not be significant given that all people interviewed spoke on behalf of their household. However gender parity within each village sample would have been preferable. Over a quarter of households in each village were surveyed with the exception of the villages on Uripiv Island, on which only 13% of households were interviewed. In several smaller villages such as New Bush most households (80%) were surveyed.

Because of the non-standard coverage of the different villages and the small samples in each village, direct comparisons between the villages are difficult. To facilitate comparison the responses to some questions are presented as a proportion of the households surveyed. It is also difficult to generalise on overall trends because overall results are skewed towards villages such as Tarem/Tenbimbi, which provided a disproportionate number of survey resposes.

Table 3: Proportion of households surveyed by village

Village/ hamlet	Uri / Uripiv (Tevri & Vilavi)	Portindir	Barrick	Mapbest/ Trevaliaut /Sarmette	Limap	Louni	Niu Bush/ Namburakai	Bushman's Bay	Hatbol	Lingarakh	Tarem/ Tembibi
No of households (IWP 2004, PSA)	119	35	11		25	15	5	5	35	31	56
No of households surveyed	16	9	5	15	10	10	4	3	13	13	19
% surveyed	13%	26%	45%		40%	67%	80%	60%	37%	42%	34%

2.1.2 Home island

The survey asked respondents to identify the home island affiliation of the household (Table 4). Island affiliation is commonly associated with traditional knowledge of the local environment, resource access rights and social affiliations. It is customary in Vanuatu to mention father's island when asked about island affiliation, and it is assumed that this is the information presented. In a sample of 132 households it is likely a number of households had parents from different islands: this situation was not recorded, possibly because of the way the question was asked and responses recorded. A further limitation to interpretation of the data is that the survey did not confirm that the households were affiliated with the project area - "manples" - or from other parts of Malekula.

Table 4: Home island of the respondents

	Men				Women					Overall
Village	Malekula	Ambrym	Paama	other	Malekula	Ambrym	Paama	other	Not stated	
Barrick	2				3					5
Bushman Bay		1	2							3
Ginanarong	1				1		1	1		4
Hatbol					13					13
Limap	5		2		3					10
Lingarakh	2				11					13
Louni					7		1	1	1	10
Mapbest							1			1
New Bush	1			1	1		1			4
Port Nabe	2				5					7
Portindir	1				6		1	1		9
Robako				1			1			2
Taremb	2				7					9
Tembibi	2				8					10
Tevaliaut	1		4				9			14
Tevri	1				11					12
Uri Island					4					4
Vilavi					1					1
TOTAL	20	1	8	2	81	0	15	3	1	131

Over three-fourths (77%) of households surveyed were from Malekula, however, there were distinct differences between the villages.

- All households sampled from Barrick, Lingarakh, Hatbol, Port Nabe, Taremb, Tenbimbi,

Tevri, Uri Island and Vilavi (Uripiv Island) were from Malekula.

- All but one household sampled at Tevaliaut were from the nearby island of Paama.
- The households surveyed in the small hamlets of Bushman's Bay and Robako were from several different islands, but none of the surveyed households were from Malekula.
- Households surveyed in Louni and Portindir were mainly from Malekula, but a few households were from other islands.
- The households surveyed at Ginenarong and Niu Bush were partly from Malekula and partly from other islands.
- The only household surveyed at MapBest Plantation was from Paama..

2.1.3 Household size and structure

Respondents were asked about their household size and structure. Table 5 provides the minimum, maximum and mean household size for each of the villages sampled. Most villages had a highly variable household size, with the mean varying between four persons per household and eight persons per household.

Table 5: Household size

Village	No of households surveyed	Minimum size	Average size	Maximum size
Barrick	5	4	7.8	12
Bushman Bay	3	5	6.0	7
Ginanarong	5	2	5.0	7
Hatbol	13	3	6.1	8
Limap	10	3	5.3	8
Lingarakh	13	3	6.5	10
Louni	10	2	5.5	9
Mapbest	1	8	8.0	8
New Bush	4	1	4.0	6
Port Nabe	7	3	4.9	10
Portindir	9	3	5.7	8
Robako	2	5	6.0	7
Taremb	9	2	5.2	9
Tembibi	10	4	5.6	7
Tevaliaut	14	2	6.1	9
Tevri	12	2	6.5	11
Uri Island	4	0	5.3	9
Vilavi	1	7	7.0	7

2.1.4 Religious affiliation

Respondents were asked to identify their religious affiliation (Table 6). Religious affiliation can be an important influence on coastal resource management and use. The Seventh Day Adventist Church (SDA) in particular enforces Old Testament food restrictions. As a result of these restrictions SDA affiliates would not normally eat crabs or other crustraceans. Further, a large number of churches within a small community can be a sign that the community is not cohesive.

Most (80%) of respondents were affiliated with the Presbyterian Church. In Hatbol, Taremb, Tenbimbi and Uri Island all respondents were Presbyterian. In Louni half the respondents were

Mormons, while in New Bush and Port Nabe a significant number of respondents were SDA. Other Churches had a small congregation within the survey sample.

Table 6 compares the survey sample with the churches identified for each village by the IWP 2004 Participatory Situation Analysis. The practice of conducting surveys after the Sunday church service might have led to under-representation of some churches in the socioeconomic survey sample.

Table 6: Religious affiliation of households

Village	Presbyterian	Morman	Seventh Day Adventist	Neil Thomas Ministry	Catholic	Jehovah's Witness	Church of Christ	Not stated	Churches noted in the 2004 PSA
Barrick	4			1					3 not stated
Bushman Bay	2				1				Not stated
Ginanarong	3					1		1	Not stated
Hatbol	13								Presbyterian
Limap	9						1		Presb'n, SDA
Lingarakh	13								SDA , Presb'n
Louni	4	5						1	Presb'n, SDA Mormon
Mapbest	1								Not stated
New Bush	1		3						SDA
Port Nabe	3		3	1					Not stated
Portindir	7			2					6, not stated
Robako	1				1				Not stated
Taremb	9								Not stated
Tembibi	10								Not stated
Tevaliaut	13			1					Not stated
Tevri	8	4							Presbn, Church of Christ, NTM, Mormon SDA
Uri Island	4								
Vilavi	1								
TOTAL	**106**	**9**	**6**	**5**	**2**	**1**	**1**	**2**	

3 Information on *Cardiosoma*

3.1 Vernacular names for *Cardiosoma*

Cardiosoma hirtipes is the focus of the IWP project. Respondents were asked their vernacular name for the crab. These have been analysed by village and island affiliation.

Given the open nature of the question and the limited linguistic guidance given to the survey facilitators vernacular names were recorded in an ad-hoc fashion. Table 7 groups similar names. The IWPDP has separately confirmed vernacular names for *Cardiosoma hirtipes* and other crabs. The spelling believed most correct is shown in bold in Table 7.

There are three groupings of names used by people whose island is Malekula:

- Respondents from Barrick, Hatbol, Taremb and Tenbimbi use one group of names, Nefri.
- Villagers from Louni, Portindir and Uripiv consistently use a second group of names, Neuwrisal.

- Villagers from Limap and Lingarkh consistently use a third name recorded as Niraghum.

In addition other names were used by respondents from Ambrym, Paama and Pentecost.

3.2 Where crabs are caught

Respondents were asked where their household commonly caught crabs. Responses were analysed by village (Table 8) and the places mentioned have been mapped in map 1.

The villages predominantly use a small number of local crab harvesting areas and these are listed in table 9. As a result the number of overall responses for a particular location is not meaningful as it reflects the variable sample size of different villages.

- Respondents from Taremb and Tenbimbi mainly harvest crabs within the MPA area.
- 2 respondents from Louni and one from Barrick were the only other respondents to specifically mention harvesting crabs from within the MPA.
- A significant proportion of respondents from Hatbol, Limap and Lingarakhh reported harvesting crabs from areas close to the MPA.
- The high number of other unspecified at Tevaliaut is possibly a result of facilitators not prompting for or recording the specific locations.

Table 7: Vernacular names recorded for *Cardiosoma* crabs

Village	**Nefri**, Evefri	**Neuwrisal,** Neuwri, Nerwrires	**Niraghum**	**Krakra rau** (Ambrym)	**Laum Taoh**; Aoum, Rakaoum (Paama, one Malekula)	**Labta** (Pentecost)	None given
Barrick	5						
Bushman Bay				1	2		
Ginanarong	1	4					
Hatbol	13						
Limap			9		1	1	
Lingarakh			13				
Louni		9			1		
Mapbest		1					
New Bush		1			2		1
Port Nabe		7					
Portindir		10					
Robako					1		1
Taremb	9						
Tembibi	10						
Tevaliaut					13		
Tevri		11					1
Uri Island		3					1
Vilavi		1					

(Spellings in bold are believed to be correct).

Table 8: Where the households catch crabs

	Barrick	B Bay	Ginanarong	Hatbol	Limap	Lingarakh	Louni	Mapbest	New Bush	Port Nabe	Port Indir	Robako	Taremb	Tembibi	Tevaliaut	Tevri	Uri Island	Vilavi	Total
No of respondents	5	3	5	13	10	13	10	1	4	7	9	2	9	10	14	12	4	1	132
MPA area	1				2								8	10					21
Near MPA	1			6	6	13	1						1		1				29
Nunebeken			1							2	8					7			18
Bare area										4						5	3	1	13
Louni, Louni passage							9		1						1				11
Bushman's Bay			1	6									1						8
Mapbest															5				5
Nanwut										1						3			4
Nivghalghor, Fred's Plantation					3			1											4
Near Amal, Crab Bay	3																		3
Losarsar		3																	3
Loloburbur			2																2
Tousis			1								1								2
Port Indir Bay, Sale											2						1		3
Other Crab Bay															1				1
Nonoru Natou																	1		1
Nanwut Wilili																	1		1
Ginenarong			1																1
Other unspecified												1			6				7

Table 9: Crab harvesting areas by village

Village		Main Crab Harvesting Areas	Places mentioned by < 20% of respondents
Barrick	5	Crab Bay, Near Amal	Near MPA, MPA
Bushman Bay	3	Losarsar	
Ginanarong	5	Loloburbur	Nunebeken, Bushman's Bay, Ginenarong
Hatbol	13	Near MPA, Bushman's Bay	
Limap	10	Near MPA, Nivghalghor	MPA area
Lingarakh	13	Near MPA	
Louni	10	Louni, Louni Passage	Near MPA
Mapbest	1	Fred's Plantation	
New Bush	4	Louni	
Port Nabe	7	Bare, Nunebeken	Nanwut
Portindir	9	Nunebeken	Tousis, Port Indir Bay
Robako	2		
Taremb	9	MPA area	
Tembibi	10	MPA area	Near MPA, Bushman's Bay
Tevaliaut	14	Mapbest, Other	Near MPA, Louni, Other Crab Bay
Tevri	12	Nunebeken, Bare, Nanwut	
Uri Island	4	Bare area, Port Indir Bay, Nonoru Natou, Nonwat Wilili	
Vilavi	1	Bare area	

3.3 Habitats where *Cardiosoma* are caught

Respondents were asked to describe the habitats from which their household commonly caught *Cardiosoma* crabs. The responses reflect the habitats in the local crab harvesting sites named in response to the previous question.

Some 78% of people interviewed mentioned collecting crabs from mangrove habitats, 55% of people interviewed mentioned forest habitats, 22% of respondents mentioned plantations and 21% mentioned beaches.

3.4 Frequency of *Cardiosoma* harvesting

Respondents were asked how often they harvested *Cardiosoma* from these habitats, both in and out of the *Cardiosoma* season. The responses presented in Table 11. Inconsistency in the responses is believed to reflect variable presentation of the question and recording of responses, or variation in the way the question was interpreted by respondents. The distinction between the two seasons seems to be a point of confusion, compounded by the emphasis on habitats. Some respondents refer to a breeding season as a time when fewer crabs should be collected to protect the population. Other respondents refer to a season when crabs are particularly plentiful and readily caught.

Outside of the *Cardiosoma* season the largest proportion of respondents reported catching *Cardiosoma* 1–2 times per week; less than half as many reported catching crabs 2–4 times per week. During the season there were a similar number of respondents reported catching *Cardiosoma* 1–2 times per week 2–4 times per week. However, as there were fewer responses

recorded the overall harvesting frequency appears less. Consideration of overall data would suggest that:

- there is reduced harvesting in plantations, gardens and beaches in the *Cardiosoma* season; and
- there is more frequent harvesting from mangroves and forests in the *Cardiosoma* season.

To clarify the situation responses for mangroves and forest, the most commonly mentioned habitats were analysed by village. The results are presented in Tables 12 and 13.

3.4.1 Mangroves

A consistent trend is not apparent. In some villages e.g. Port Nabe there appears to be a shift to more frequent harvesting from mangroves in the season, but this trend is not apparent in the replies from other villages e.g. Louni. The overall result is influenced by more respondents from Ginenarong, Tevaliaut and Port Indir giving a response for "out of season" than for "in season".

3.4.2 Forest

While the data set is smaller the data is similar. In Ginenarong, Tevaliaut and Port Indir more respondents replied for "out of season" than "in season" harvesting, influencing the overall result. From Bushman's Bay and Hatbol there is a suggestion of more frequent harvesting of *Cardiosoma* from forest areas in the season. But for other villages such as Limap, Lingarakh and Louni there is no such trend.

Box 1: Notes on season

IWPDP (2004) prepared seasonal calendars with some villages. These help explain why questions on season have been interpreted ambiguously. Three definitions of season could be applied:

Abundance: In general the *Cardiosoma* population is less conspicuous or abundant during the colder months of June to August and is more conspicuous or abundant during other months.

Breeding: Different villages reported that *Cardiosoma* were with egg in the periods November -December or in April – June

Level of Harvest: Some villages report that the level of harvest is consistent throughout the year. Others report a period of peak harvesting. The latter is quite variable. Some villages record peak harvesting around July and August, others in the period October to March.

Reference: Vanuatu IWPDP. 2004. Amal/Krab Bei Community /Village Resource Management Profiles, 21 – 23 April 2004. Unpublished report.

Table 10: Habitats where *Cardiosoma* crabs are caught

Village	Mangroves	Forest	Plantation	Beach	Other	Garden	Reef, sea	Mudflat	Interviewed
Barrick	5	5							5
Bushman Bay	3	3							3
Ginanarong	4	5	1	3	5	1	2		5
Hatbol	3	9			1	1			13
Limap	8	9	5	2					10
Lingarakh	13	12							13
Louni	10	8							10
Mapbest			1	1					1
New Bush	1	1							4
Port Nabe									7
Portindir	12	8	2	7	2	4			9
Robako	3		1						2
Taremb	9	3	1	1					9
Tembibi	10	3	2	3		1			10
Tevaliaut	5	2	12	7	4		1	1	14
Tevri	12	2		1					12
Uri Island	4	2	3	4	1	2			4
Vilavi	1								1
Count of responses	**103**	**72**	**28**	**29**	**13**	**9**			

Table 11 : Frequency of *Cardiosoma* catches, in different habitats by season

	Out of the *Cardiosoma* season				**In the *Cardiosoma* season**			
	0	1-2 times/week	2 - 4 times/week	>4 times	0	1-2 times/week	2 - 4 times/week	> 4 times
Mangrove	2	62	23	2	1	33	38	4
Forest	1	47	15		1	27	28	3
Plantation	1	15	7		1	9	2	1
Garden	1	5	1		1	2	3	1
Beach		14	8		1	7	4	1
Other habitat	1	2	3		0		1	

Table 12: Frequency of *Cardiosoma* harvesting from mangroves by village

		Out of the *Cardiosoma* season				In the *Cardiosoma* season			
		Frequency per week							
Village	Sample	0	1-2	2 - 4	>4	0	1-2	2 - 4	> 4
Barrick	5	1	2	2				2	2
Bushman Bay	3		1				1	2	
Ginanarong	5		1	2	1			1	
Hatbol	13		3					2	
Limap	10		7	1			5	3	
Lingarakh	13		10		1		9	4	
Louni	10		6	4			8	2	
Mapbest	1								
New Bush	4								
Port Nabe	7		5	1			1	5	
Portindir	9		3	5			1	2	1
Robako	2								
Taremb	9		8				2	5	
Tembibi	10	1	7	1			1	4	1
Tevaliaut	14	1	2	3		1			
Tevri	12		6	2			4	4	
Uri Island	4		1	2			1	1	
Vilavi	1							1	
Count of responses	132	4	62	23	2	1	33	38	4

Table 13: Frequency of *Cardiosoma* harvesting from forest by village

		Out of the *Cardiosoma* season				In the *Cardiosoma* season			
		Frequency per week							
Village	Sample	0	1-2	2 - 4	>4	0	1-2	2 - 4	> 4
Barrick	5		3	2				4	1
Bushman Bay	3		1				1	2	
Ginanarong	5		2	3				2	
Hatbol	13		8	1			3	6	
Limap	10		8				8	1	
Lingarakh	13		11				10	1	
Louni	10		2	6			2	6	
Mapbest	1								
New Bush	4		1				1		
Port Nabe	7								
Portindir	9		4	2		1		2	1
Robako	2								
Taremb	9						1	2	
Tembibi	10		3					1	1
Tevaliaut	14	1	2						
Tevri	12		1						
Uri Island	4		1	1			1	1	
Vilavi	1								
Count of responses	132	1	47	15	0	1	27	28	3

3.4.3 Travel modes used when harvesting Cardiosoma

Respondents were asked how their household usually traveled to the places they caught *Cardiosoma* crabs. The questionnaire mentioned walking and vehicle. Most villagers who lived in coastal areas walked (Table 14). A variable proportion of respondents from more distant villages mentioned using vehicles: Limap, Lingarakh, Taremb and Tembibi. Canoe transport was important for people from Port Nabe and Uripiv Island (Tevri and Vilavi).

Table 14: Travel modes used when harvesting *Cardiosoma*

Village	Walk	Truck	Canoe	Other (unstated)
Barrick	5			
Bushman Bay	3			
Ginanarong	5			
Hatbol	13			
Limap	10	4		
Lingarakh	13	6		
Louni	10	1		
Mapbest	1			
New Bush	1			
Port Nabe	1		7	
Portindir	6			
Robako	3			
Taremb	1	8		
Tembibi	9	9		
Tevaliaut	10			
Tevri	14		10	
Uri Island	1	1		3
Vilavi	4		1	

3.5 Family members who harvest *Cardiosoma*

Respondents were asked which family members harvested crabs. Responses were grouped into gender and age classes. Responses are presented in table 15.

- There was only one response to the question from Mapbest, Robako and New Bush, all indicated a woman over 20 collected *Cardiosoma*.
- Barrick, Louni and Hatbol responses indicated women mainly collected *Cardiosoma*.
- In all other villages respondents mentioned that both men and women harvested *Cardiosoma*.
- Only 5 respondents from 4 different villages mentioned children harvesting *Cardiosoma*.

Table 15: Family members who harvest *Cardiosoma*

Village	Sample	male >20	male < 19	Women > 20	Women < 19	Children < 7
Barrick	5			5	3	
Bushman Bay	3	2	2	2	3	
Ginanarong	5	2	2	4	1	
Hatbol	13	1	1	12	4	
Limap	10	6		8	2	
Lingarakh	13	4		9	2	
Louni	10	1		10		
Mapbest	1			1		
New Bush	4			1		
Port Nabe	7	4	3	7	1	
Portindir	9	6	6	9	3	1
Robako	2			1		
Taremb	9	4	2	8	6	1
Tembibi	10	5	5	8	10	2
Tevaliaut	14	6	3	10	9	
Tevri	12	8	5	12	5	
Uri Island	4	3	2	4	4	1
Vilavi	1			1		
Overall		52	31	112	53	5

3.5.1 Frequency of harvest by different family members

The questionnaire asked respondents how often each age-gender group harvested *Cardiosoma* in and out of the "season". The question encountered problems already discussed relating to inconsistent interpretation of the word season, and more responses to the "out of season" part of the question than to the "in season" part. Despite the data weaknesses data was processed and analysed (Tables 15–17).

Women > 20 years

Women over 20 years commonly harvested *Cardiosoma* one or two times a week, irrespective of season (Table 16). A few villages reported more frequent harvesting in the *Cardiosoma* season. However, but this is not consistent across villages (e.g. Louni and Ginenarong suggest a decrease) and may be influenced by the different response rates.

Women < 20 years

Women less than 20 years commonly harvested *Cardiosoma* one or two times a week, irrespective of season (Table 17). No overall trend is apparent across the two seasons because of the smaller data set for the *Cardiosoma* season. One village with a consistent sample was Hatbol. Hatbol respondents suggest an increase in frequency with women harvesting 1 to 2 times each week out of season and 3 to 4 times each week in season. Similar trends are not apparent for other villages.

Men > 20 years

Men over 20 years commonly harvested *Cardiosoma* one or two times a week, regardless of season (Table 18). Unlike the two classes of women there is a fairly consistent response rate across the two seasons: 36 respondents to out of season harvesting and 32 respondents to in-season harvesting. No trend is apparent across the two seasons.

Table 16: Frequency of harvest of *Cardiosoma* by women under 20 years old

		Women > 20 Out of season				Women > 20 In season			
Village	Sample	0 times	1-2 times	2-4 times	>4 times	0 times	1-2 times	2-4 times	>4 times
Barrick	5		3	2			2	3	
Bushman Bay	3		2				2		
Ginanarong	5		3		1		2		
Hatbol	13		12				6	5	
Limap	10		8				7		
Lingarakh	13		8				8	1	
Louni	10		4	6			6	4	
Mapbest	1		1						
New Bush	4		1				1		
Port Nabe	7		6				3	2	
Portindir	9		7	2			4		1
Robako	2		1						
Taremb	9		5				3	4	
Tembibi	10		4				3		1
Tevaliaut	14					1			
Uripiv Island	13		11				8	2	
Uri Island	4		2	1			1	1	
Overall	132	0	78	11	1	1	56	22	2

Table 17: Frequency of harvest of *Cardiosoma* by women over 20 years old

		Women < 20 Out of season				Women < 20 In season			
Village	Sample	0 times	1-2 times	2-4 times	>4 times	0 times	1-2 times	2-4 times	>4 times
Barrick	5		1	2			1	2	
Bushman Bay	3		2				3		
Ginanarong	5		1						
Hatbol	13		3					4	
Limap	10		2				1		
Lingarakh	13		2				2		
Louni	10								
Mapbest	1								
New Bush	4								
Port Nabe	7		1				1		
Portindir	9		3				1		
Robako	2								
Taremb	9		4				2		
Tembibi	10		5				4		1
Tevaliaut	14		9						
Tevri	12		4				3		
Uri Island	4		2				2		
Vallavi	0								
Overall	132	0	39	2	0	0	20	6	1

Table 18: Frequency Men > 20 years harvest *Cardiosoma* in season

		Men > 20 Out of season				Men > 20 In season			
Village	Sample	0 times	1-2 times	2-4 times	>4 times	0 times	1-2 times	2-4 times	>4 times
Barrick	5								
Bushman Bay	13		1				2		
Ginanarong	10				1				
Hatbol	13		1					1	
Limap	10		6				5		
Lingarakh	1		3				4		
Louni	4		1				1		
Mapbest	7								
New Bush	9								
Port Nabe	2		3				3	1	
Portindir	9		5	1			3	1	
Robako	10								
Taremb	14		3				2		
Tembibi	12		3				2	1	
Tevaliaut	4								
Tevri	0		5	1			2	2	
Uri Island	0		1	1			2		
Vallavi	0								
Overall	132	0	32	3	1	0	26	6	0

3.6 The quantity of *Cardiosoma* harvested on each trip

Respondents were asked about the quantity of *Cardiosoma* members of their household typically caught when harvesting *Cardiosoma* in and out of the *Cardiosoma* season. Three empirical measures of volume were used:

- A rope — 10 to 20 crabs tied together by a local rope.
- A bag rice — a recycled rice bag that typically holds 30 to 50 crabs.
- Bag flour — a recycled flour bag that typically would hold 100 or more crabs,

As with earlier questions, there were inconsistencies in the data that prevented useful comparison of the quantity harvested in season and out of season. Only the data on crab harvesting during the *Cardiosoma* season is presented in table 17, 18 and 19.

Of the 85 women over 20 years whose harvesting volumes were estimated two thirds (66%) typically collected a rice bag of crabs each harvesting trip, 18% collected a flour bag of crabs and 14% collected a rope of crabs. Of the 29 women under 20 years of age whose harvesting volumes were estimated just under two thirds (62%) typically collected a rice bag of crabs each harvesting trip. A quarter (25%) collected a rope of crabs and 10% collected a flour bag of crabs. Of the 35 men over 20 years of age whose harvesting volumes were estimated two thirds (66%) typically collected a rice bag of crabs each harvesting trip. A fifth (20%) collected a rope of crabs and 14% typically collected a flour bag of crabs. Of the 23 men under 20 years of age whose harvesting volumes were estimated 16 typically collected a rope of crabs while 6 typically collected a rice bag of crabs.

Responses were further analysed by village.

- Bushman's Bay and New Bush over 80% of harvesting trips were for a rope or two of crabs.

- Barrick, Ginenarong, Hatbol, Limap, Lingarakh, Louni, Port Nabe, Tarem, Tenbimbi, and Uri Island over 80% of harvesting trips were for quantities of a rice bag or greater.

Lastly responses were compared with family size to consider the possibility that the larger the family, the greater the number of crabs caught (Table 20). No trend was apparent.

Table 19: Quantity of crabs caught by women over 20 years of age

		Women > 20 during the Crab Season					
Village	Sample	1 rope	2-3 ropes	> 4 ropes	bag rice	bag flour	1 bag rice & 1 bag flour
Barrick	5				3	2	
Bushman Bay	3	2					
Ginanarong	5				2	1	
Hatbol	13				11		
Limap	10	1			7		
Lingarakh	13				8	1	
Louni	10				6	4	
Mapbest	1						
New Bush	4		1				
Port Nabe	7	1			4		
Portindir	9	2			1	2	
Robako	2						
Taremb	9				5	2	
Tembibi	10				1		1
Tevaliaut	14	2			2		
Uripiv island	13	4			7	3	
Uri Island	4				3	1	
Overall	132	12	1	0	57	15	1

Table 20: Quantity of crabs caught by women under 20 years

		Women < 20 During the Crab Season					
Village	Sample	1 rope	2 - 3 rope	> 4 rope	bag rice	bag flour	1 bag rice & a bag flour
Barrick	13				2	1	
Bushman Bay	10	3					
Ginanarong	13				1		
Hatbol	10				3		
Limap	1				2		
Lingarakh	4				1		
Louni	7						
Mapbest	9						
New Bush	2						
Port Nabe	9				1		
Portindir	10				1		
Robako	14						
Taremb	12				1	1	
Tembibi	4				3	1	
Tevaliaut	0	1			2		
Tevri	0	3					
Uri Island	0	1			1		
Vilavi	0						
Overall	132	8	0	0	18	3	

Table 21: Quantity of crabs caught by men over 20 years

		Men > 19 Season					
Village	Sample	1 rope	2 - 3 rope	> 4 rope	bag rice	bag flour	1 bag rice & a bag flour
Barrick	10						
Bushman Bay	1	2					
Ginanarong	4					1	
Hatbol	7						
Limap	9	1			5		
Lingarakh	2				4		
Louni	9				1		
Mapbest	10						
New Bush	14						
Port Nabe	12	1			3		
Portindir	4	1			2	1	
Robako	0						
Taremb	0					1	
Tembibi	0				1	1	
Tevaliaut	0	1			1		
Tevri	0	1			4		
Uri Island	0				2	1	
Vilavi	Sample						
Overall	132	7	0	0	23	5	0

Table 22: Quantity of crabs caught by family size

No in family	1 rope	2 - 3 rope	> 4 rope	bag rice	bag flour	1 bag rice & a bag flour
1						
2	1			2	1	
3	2			8	1	
4	4	1		14	2	
5	9			24	3	
6	10			16	6	
7	9			17	1	1
8	4			16	1	
9	3			3	5	
10				2		
11	6			2		
12					2	

3.7 How *Cardiosoma* are caught

Respondents were asked to describe the ways they caught crabs. Responses were placed into 5 groups (Table 23): 92% of households surveyed looked for *Cardiosoma* during the day, 46% of households used a light to catch *Cardiosoma* at night, 18% of respondents reported that their households dug *Cardiosoma* from holes, and 5% of households used bait to attract the crabs. No respondents reported members of their households looking under logs.

Table 23: Ways *Cardiosoma* are caught

Village	Sample	Look for in day time	Light @ night	Dig from hole	Use bait
		5	5		
Barrick	5	3	3		
Bushman Bay	3	5	4		
Ginanarong	5	13			
Hatbol	13	10			
Limap	10	13	1		
Lingarakh	13	10	6		
Louni	10	1			
Mapbest	1	1	1		
New Bush	4	7			
Port Nabe	7	6	4		
Portindir	9	3	8	6	
Robako	2	1			
Taremb	9	6	7	5	
Tembibi	10	9	8	8	4
Tevaliaut	14	12	4	1	3
Uripiv Island	13	13	6		
Uri Island	4	4	4	4	
Count of responses		122	61	24	7
Percent of sample		92%	46%	18%	5%

The questionnaire then asked respondents how many crabs they caught using the different techniques, in and out of the crab season. Responses demonstrated weaknesses consistent with earlier questions. The composite response is presented in Table 24. The data suggests that regardless of technique used, larger numbers of crabs (30–100) are typically caught in season whereas small numbers of (10–20) are more commonly caught out of season.

Table 24: Number of *Cardiosoma* caught by season

		No of responses		
		Oct-20	30 - 100	>100
Look for in day time	Season	17	68	10
	Out of season	78	28	6
Light @ night	Season	6	23	7
	Out of season	25	18	8
Dig from hole	Season	3	10	1
	Out of season	16	3	
Use bait	Season	1	1	
	Out of season	1		

A third set of questions added a further complexity. Respondents were asked on how many crab harvesting trips they used the nominated crab harvesting techniques both in the *Cardiosoma* season and out of season. The codified structure in which responses to this question were recorded on the questionnaire added a further constraint to data collection. Responses are presented in Table 25.

For the nominated *Cardiosoma* harvesting techniques, respondents reported a smaller number of trips using the technique (1 to 2 times per month) out of the *Cardiosoma* season, while a larger number of trips using the technique (3 to 5 times) was more common in the *Cardiosoma* season.

Table 25: Number of *Cardiosoma* harvesting trips by season

		No of responses	
	No of trips	in season	out of season
Look for in day time	0	1	1
	1 to 2	38	82
	3 to 5	47	20
	> 5	12	12
Light @ night	0		1
	1 to 2	14	26
	3 to 5	12	16
	> 5	6	7
Dig from hole	0	1	
	1 to 2	4	15
	3 to 5	11	3
	> 5	1	
Use bait	0	1	1
	1 to 2		2
	3 to 5	2	
	> 5		

3.8 Duration of *Cardiosoma* harvesting trips

Respondents were asked the typical duration of a crab harvesting trip both in the *Cardiosoma* season and out of the *Cardiosoma* season. Responses are presented in Table 26.

In the *Cardiosoma* season 64% of respondents reported a typical 3 to 5 hour crab harvesting season. In comparison *Cardiosoma* gathering trips out of the *Cardiosoma* season were more likely to be of longer duration. Only a fifth of trips were 3 to 5 hours in duration, a quarter were of a full days duration and almost half were of approximately 6 hours duration (half a day or night is presumably about 6 hours).

However, this trend is not consistently apparent, especially where there were fewer responses to the "in season" part of the question compared with the "out of season" part of the question.

3.9 Cardiosoma harvesting & use

Respondents were asked about their household's use of the *Cardiosoma* crabs that they caught; 95% of respondents stated that their households caught *Cardiosoma* for household food consumption and 40% of respondents stated that their households caught *Cardiosoma* for sale. No respondents mentioned catching *Cardiosoma* for use as bait. Seven respondents further mentioned that they also caught *Cardiosoma* to share/exchange with their relatives. This use could be understated because it was not specifically included.

The questionnaire then asked how many *Cardiosoma* gathering trips were made each month for each of these uses. Responses are presented in Tables 27 and 28.

Table 26: Duration of *Cardiosoma* harvesting trips by season

		NOT SEASON					IN SEASON				
Village	Sample	3- 5hr	6 hr	½ day	½ night	whole day	3- 5hr	6 hr	½ day	½ night	whole day
Barrick	5	2		1		2	3	1	1		
Bushman Bay	3	1	2						2		1
Ginanarong	5	1		1	1	2	3				
Hatbol	13		2	8		3	13				
Limap	10	3	2	1	1	3	7	1	2		
Lingarakh	13	1	3	6		1	11	1	1		
Louni	10		10				9	1			
Mapbest	1	1									
New Bush	4		1				1				
Port Nabe	7	2		2	1	2	5		1	1	
Portindir	9	1	2	1	2	2	1				1
Robako	2			1							
Taremb	9		2			7	9				
Tembibi	10					10	8			1	1
Tevaliaut	14	8	6				6				
Tevri	12	6	2				6		3	3	
Uri Island	4		1	1			2				1
Vilavi	1	1						1			
Overall count	132	27	33	22	5	32	84	5	10	5	4
% of respondents		20%	25%	17%	4%	24%	64%	4%	8%	4%	3%

Table 27: No of harvesting trips to *Cardisoma* for food

		No of times per month harvest *Cardiosoma* for food (# and %)									
Village	**No interviewed**	**0**	**1 to 2**		**2 to 4**		**5 to 10**		**>10**	
Barrick	5		1	20%	2	40%	1	20%	1	20%
Bushman Bay	3		3	100%						
Ginanarong	5				2	40%	2	40%		
Hatbol	13		3	23%	10	77%				
Limap	10		7	70%	2	20%				
Lingarakh	13		7	54%	3	23%	2	15%		
Louni	10		5	50%	3	30%			1	10%
Mapbest	1				1	100%				
New Bush	4		1	25%						
Port Nabe	7		7	100%						
Portindir	9		1	11%	3	33%	5	56%		
Robako	2		1	50%						
Taremb	9		8	89%	1	11%				
Tembibi	10		9	90%	1	10%				
Tevaliaut	14		6	43%	5	36%				
Tevri	12		11	92%			1	8%		
Uri Island	4						2	50%		
Vilavi	1		1	100%						
Count of responses	132	0	71	54%	33	25%	13	10%	2	2%

Table 28: No of harvesting trips per month to collect *Cardiosoma* for sale

		No of times per month *Cardiosoma* harvested - food (# and %)									
Village	**No interviewed**	**0**		**1 to 2**		**2 to 4**		**5 to 10**		**>10**	
Barrick	5					1	20%	1	20%	1	20%
Bushman Bay	3										
Ginanarong	5							3	60%		
Hatbol	13										
Limap	10										
Lingarakh	13										
Louni	10			1	10%	4	40%	4	40%		
Mapbest	1										
New Bush	4			1	25%						
Port Nabe	7			3	43%	1	14%	2	29%	1	14%
Portindir	9					3	33%	6	67%		
Robako	2										
Taremb	9										
Tembibi	10			2	20%	1	10%				
Tevaliaut	14										
Tevri	12			2	17%	10	83%				
Uri Island	4					1	25%	1	25%		
Vilavi	1	1									
Count of responses	132	1		9	7%	21	16%	17	13%	2	2%

Ninety per cent of people interviewed responded to this part of the question, all reporting that their household caught crabs for household consumption. The frequencies reported (a few times a month) are inconsistent with earlier questions. IWP Project field observations of households eating crabs on a weekly or daily basis suggest that the data for this question is flawed.

A total of 38% of respondents reported that their households caught crabs for sale. Only 7% of respondents reported harvesting crabs for sale once or twice a month; 16% reported harvesting crabs for sale two to four times per month, and 15% reported harvesting crabs more than 5 times a month, corresponding with a regular havesting for sale once or twice per week.

No commercial harvesting trips were reported from the villages of Bushman's Bay, Hatbol, Limap, Lingarakh, Mapbest, Robako, Taremb, Tevaliaut. Greatest frequency of harvesting trips were reported from Ginenarong and Port Indir, and from Barrick and Port Nabe.

Respondents who reported catching *Cardiosoma* for share/exchange mentioned doing this once or twice a month.

3.10 Frequency of eating *Cardiosoma*

Respondents were asked how frequently their households ate *Cardiosoma* both in the *Cardiosoma* season and outside the *Cardiosoma* season.

The responses received are presented in Table 29, but the data are inconsistent with the previous question. In response to the previous question 95% of households reported eating crabs, whereas with this question almost half of respondents did not report their household eating *Cardiosoma*. Within the data there are six reports of over 50 meals a month of *Cardiosoma,* which is possibly exaggerated.

Consumption of *Cardiosoma* at over 5 meals a month was frequently reported from Bushman's Bay (100% of respondents), Limap (80% of respondents) and Uri Island (75% of respondents).

Table 29: Number of *Cardiosoma* meals each month

		***Cardiosoma* season**				**Outside the *Cardiosoma* season**			
Village	No interviewed	0	1 to 5	6 to 10	>10	0	1 to 5	6 to 10	>10
Barrick	5	1	3	1	1		4	0	1
Bushman Bay	3				3			1	2
Ginanarong	5	2	1		2	3	1		1
Hatbol	13	13				13			
Limap	10			5	3	0	1	7	1
Lingarakh	13		3	7	3	2	2	9	
Louni	10	1	3	6		1	3	6	
Mapbest	1	1				1			
New Bush	4	3	1			3			
Port Nabe	7	2	4	1		2	5		
Portindir	9	7	1		1	9			
Robako	2	2				2			
Taremb	9	8			1	9			
Tembibi	10	7	1	1	1	7	1		1
Tevaliaut	14	13				13			
Tevri	12	3	4	4	1	4	4	3	1
Uri Island	4		1		3		1	1	2
Vilavi	1		1			1			
Count of responses	132	63	23	25	19	70	22	27	9

3.11 Number of *Cardiosoma* eaten each meal

Respondents were asked how many crabs their household typically ate at a single meal, both in season and out season. Data from Uri Island and Tenbimbi has been excluded because of flaws apparent in the field recording of responses. Responses were initially analysed by household size and then by village.

Out of season almost three quarters of people interviewed reported consumption of 1–10 crabs at a meal (Table 30). In season the consumption tended to increase with almost half of respondents reporting consumption of 11–20 crabs at a meal or more. There is no apparent trend linking the number of crabs consumed with household size.

When responses are considered by village (Table 31) villages fall within three groupings:

- Villages where consumption numbers increase in the *Cardiosoma* season (Barrick, Bushman's Bay, Limap, Lingarakh, Port Nabe, Taremb, and Tevri);
- Village that recorded decrease in consumption over the *Cardiosoma* season (Ginenarong, Mapbest, Portindir, , Robako, Tevaliaut); and
- Villages with no change noted (Louni, New Bush, Vilavi).

The most significant increase in consumption was recorded for Port Nabe.

Respondents were asked to make any general comments the wished. Comments received are presented in Table 32. The issues listed have been already discussed.

Table 30: No of crabs eaten at a meal by household size

	No of respondents						Percent of respondents of each household size				
	Crabs per meal out of season		Crabs per meal in season				Crabs per meal out of season		Crabs per meal in season		
Household size	1 to 10	11 to 20	1 to 10	11 to 20	20 - 50		1 to 10	11 to 20	1 to 10	11 to 20	20 - 50
2	5		3	1		5	100%	0%	60%	20%	0%
3	8	1	2	5	1	10	80%	10%	20%	50%	10%
4	14	2	5	6	2	16	88%	13%	31%	38%	13%
5	16	3	4	10	3	23	70%	13%	17%	43%	13%
6	20	3	8	13	1	26	77%	12%	31%	50%	4%
7	14	7	6	11	2	22	64%	32%	27%	50%	9%
8	11	3	4	9		15	73%	20%	27%	60%	0%
9	3	3		4	1	6	50%	50%	0%	67%	17%
10	3		1	2		3	100%	0%	33%	67%	0%
11	1	1	1	1		2	50%	50%	50%	50%	0%
12	1		1			1	100%	0%	100%	0%	0%
Count of all	**96**	**23**	**35**	**62**	**10**		**73%**	**17%**	**27%**	**47%**	**8%**

Table 31: No of crabs eaten at a meal by village

		No of respondents					Percentage of respondents from each village				
		Crabs per meal out of season		Crabs per meal in season			Crabs per meal out of season		Crabs per meal in season		
Village	No interviewed	1 to 10	11 to 20	1 to 10	11 to 20	20 - 50	1 to 10	11 to 20	1 to 10	11 to 20	20 - 50
Barrick	5	5		1	4		100%	0%	20%	80%	0%
Bushman Bay	3	3			3		100%	0%	0%	100%	0%
Ginanarong	5	3	1	1	2		60%	20%	20%	40%	0%
Hatbol	13	13		3	10		100%	0%	0%	0%	0%
Limap	10	7	2	3	6		70%	20%	30%	60%	0%
Lingarakh	13	7	4	4	9		54%	31%	31%	69%	0%
Louni	10	4	6	4	6		40%	60%	40%	60%	0%
Mapbest	1	1					100%	0%	0%	0%	0%
New Bush	4	1		1			25%	0%	25%	0%	0%
Port Nabe	7	6		1	4	1	86%	0%	14%	57%	14%
Portindir	9	5	3	2	1	1	56%	33%	22%	11%	11%
Robako	2	1					50%	0%	0%	0%	0%
Taremb	9	9		3	1	6	100%	0%	33%	11%	66%
Tembibi	10	9	1	1	7	1	90%	10%	10%	70%	10%
Tevaliaut	14	7	5	4	2		50%	36%	29%	14%	0%
Tevri	12	11	1	4	8		92%	8%	33%	67%	0%
Uri Island	4	3		1		2	75%	0%	25%	0%	50%
Vilavi	1	1		1			100%	0%	100%	0%	0%
Count of responses	132	96	23	34	63	11	73%	17%	26%	48%	8%

Table 32: General comments on household Crab consumption

Village	Comments
Bushman's Bay	Men, women and children collect crabs for food because they are easy to find close to home.
Bushman's Bay	We eat many crabs each meal because each crab only has a little meat.
Bushman's Bay	Everybody depend on crabs.
Bushman's Bay	It is more difficult to find crabs than in the past due to the increase in local population.
Ginanarong	When crabs are plentiful we eat them every day.
Ginanarong	Crab is the meat when there is no other alternative
Hatbol	Because there are a lot of children and they eat a lot of crabs
Hatbol	Crabs are harvested as a food but not for sale.
Hatbol	Crabs have to be eaten soon after they are caught. They do not keep.
Limap	The meals and trips of crabs in and not in season do not change
Limap	We have alternate meat sources, do not depend on crabs.
Limap	When there are other activities in the village the number of crab meals increases.
Lingarakh	The number of crabs in a meal varies with the number of people staying in the house.
Lingarakh	Harvest crabs every month
Louni	Eat crabs two times a week.
Louni	We collect crabs for friends and family who want them, or our friends collect for themselves.
Port Nabe	If there are crabs then I collect them to eat
Portindir	Depending on availability - all 3 meals a day include crabs
Portindir	In crab season the family eats at least one meal per week.
Portindir	The family seems to eat more crabs out of season and less crabs in season.
Tembibi	The place we collect crabs is distant, that affects how often we eat them.
Tembibi	People collect less [in season] to respect the taboo - so the crabs breed
Tevri	I can catch crabs if I have a canoe with me.
Tevri	I sell crabs to earn a little money.
Uri Island	When there are more crabs the harvest is plentiful: less crabs means a smaller harvest.
Uri Island	If crabs are caught more than five times a year the population will be depleted and it will be more difficult to catch crabs.
Uri Island	Households should reduce their number of harvesting trips during its season.
Uri Island	Sometimes there are crabs but sometimes there are no crabs.
Vilavi	We collect crabs 3 times a week when we want them to eat.

3.12 Other meats in the household diet

Respondents were asked to nominate which meats were regularly eaten within their household. Check boxes on the form prompted for more common meats. Eels, flying fox and pigeons were mentioned as additional meats by several respondents. It is likely consumption of these in understated because they were not listed on the form. Crab was not listed as the question was to focus on "other meats". However, 109 respondents added crab to the list.

Fish, Chicken and Crabs were mentioned by the largest number of respondents, followed by beef and pork, shellfish and lobsters (Table 33).

Respondents were then asked to nominate how frequently they consumed other meats, both in and out of the crab season. There were a higher number of respondents to the question on meat eaten outside the season, which was asked first, than for meat eaten inside the *Cardiosoma* season which was asked second. This difference in response rate affects the ability to compare

answers. It is not clear whether the meats were not eaten, or the question was not answered. There must also be doubts about some of the answers. For example, given the customary and monetary value of pigs, it is hard to imagine a household where pork is consumed 5 to 10 times a month.

The following discussion draws upon the "out of season" data set which had the better response rate: 68% of respondents reported chicken was eaten 1 or 2 times a month; less than 10% of respondents report chicken being eaten more often; 42% of respondents reported fish was eaten 1 or 2 times a month, while 29% of respondents reported it being eaten more frequently; 40% of respondents reported beef was eaten 1 or 2 times a month, while 19 % reported it was eaten more frequently; 37% of respondents reported pork was eaten 1 or 2 times a month, while 19% reported it was eaten more frequently; 37% of respondents reported shell fish were eaten once or twice a month while 7% reported they were eaten more frequently; 11% of respondents reported prawns are eaten once or twice a month while a further 10% reported they were eaten more frequently; 31% of respondents reported lobster was eaten once or twice a month, with a further 11% reporting it was eaten more frequently.

Given the lower number of responses to the question relating to in season consumption of meat comparisons can not be drawn.

Tables 34 further presents data on meat consumption by village. Chicken is consumed throughout the area at similar consumption levels. While it might have been expected that coastal villages consumed fish and shell fish more frequently than inland villages, a consistent trend is not apparent. Lingharakh for example has relatively high fish consumption despite being inland. Curiously no shell fish consumption is reported.

Table 33: Other meats in the household diet

	No of respondents			**Percent of people interviewed**							
				Out of season				**In season**			
	To Q c) meats eaten	To Q d) Eaten out of season	To Q d) Eaten in season	1–2 times per month	3–5 times per month	5–10 times per month	>10 times per month	1–2 times per month	3–5 times per month	5–10 times per month	>10 times per month
Chicken	110	101	51	68%	7%	1%	1%	34%	4%	1%	0%
Fish	111	94	52	42%	14%	15%	0%	25%	8%	6%	0%
Crabs	109										
Beef	90	77	52	40%	17%	2%	0%	19%	19%	2%	0%
Pork	89	74	46	37%	17%	2%	0%	16%	17%	2%	0%
Shell fish	77	57	23	37%	5%	2%	0%	11%	5%	2%	0%
Prawns	33	29	24	11%	8%	2%	0%	7%	8%	3%	0%
Lobster	67	55	26	31%	10%	1%	0%	8%	9%	2%	0%

Table 34: Consumption of meat in the household diet disaggregated by village

Village	No interviewed	1 to 2	3 to 5	5 to 10	>10	1 to 2	3 to 5	5 to 10	>10
CHICKEN		**Out of Season**				**In season**			
Barrick	5	5				4	1		
Bushman Bay	3	3				2	1		
Ginanarong	5	2				2			
Hatbol	13	9				6			
Limap	10	8			1	7			
Lingarakh	13	9	2			9	2		
Louni	10	7				3			
Mapbest	1		1						
New Bush	4	2	2			1		1	
Port Nabe	7	3	1						
Portindir	9	8				2			
Robako	2	2							
Taremb	9	6		1		2			
Tembibi	10	8	1			2	1		
Tevaliaut	14	9	1						
Tevri	12	7				2			
Uri Island	4	2	1			2			
Vallavi	1					1			
Count of responses	132	90	9	1	1	45	5	1	0
Percent of respondents		**68%**	**7%**	**1%**	**1%**	**34%**	**4%**	**1%**	**0%**
FISH		**Out of Season**				**In season**			
Barrick	5	2	3			2	2	1	
Bushman Bay	3	2				1			
Ginanarong	5			4				1	
Hatbol	13	7				5			
Limap	10	6				6			
Lingarakh	13	7	2			8	2		
Louni	10	2	3	4		2	1	3	
Mapbest	1		1						
New Bush	4	1	2	1		1		1	
Port Nabe	7	1	2	2		1			
Portindir	9	4	4	1		2	1	1	
Robako	2			1					
Taremb	9	6				1	1		
Tembibi	10	6	2			2	1		
Tevaliaut	14	5		1					
Tevri	12	4		4		2	1		
Uri Island	4			2			2	1	
Vallavi	1	2							
Count of responses	132	55	19	20	0	33	11	8	0
Percent of people interviewed		**42%**	**14%**	**15%**	**0%**	**25%**	**8%**	**6%**	**0%**

Village	No interviewed	1 to 2	3 to 5	5 to 10	>10	1 to 2	3 to 5	5 to 10	>10
SHELL FISH		**Out of Season**				**In season**			
Village	No interviewed	1 to 2	2 to 4	5 to 10	>10	1 to 2	2 to 4	5 to 10	>10
Barrick	5	4				3	1		
Bushman Bay	3								
Ginanarong	5	2		2				2	
Hatbol	13	2				1			
Limap	10	2				2			
Lingarakh	13								
Louni	10	6	1			2	1		
Mapbest	1	1							
New Bush	4	1							
Port Nabe	7	5				1			
Portindir	9	6	2			3			
Robako	2								
Taremb	9	5					2		
Tembibi	10	3				1	1		
Tevaliaut	14	4							
Tevri	12	7	1			1			
Uri Island	4	1	2				1	1	
Vilavi	1								
Count of responses	132	49	6	2	0	14	6	3	0
Percent of people interviewed		**37%**	**5%**	**2%**	**0%**	**11%**	**5%**	**2%**	**0%**
PORK		**Out of Season**				**In season**			
Barrick	5			1				1	
Bushman Bay	3	1				1			
Ginanarong	5	2				2			
Hatbol	13	9	3			10			
Limap	10		8	1			8	1	
Lingarakh	13	2	11			1	12		
Louni	10	6	1			3	1		
Mapbest	1	1							
New Bush	4	1							
Port Nabe	7	1							
Portindir	9	8				2			
Robako	2	2							
Taremb	9	1							
Tembibi	10	2				2	1		
Tevaliaut	14	9							
Tevri	12	2							
Uri Island	4	2					1		
Vallavi	1								
Count of responses	132	49	23	2	0	21	23	2	0
Percent of people interviewed		**37%**	**17%**	**2%**	**0%**	**16%**	**17%**	**2%**	**0%**

Village	No interviewed	1 to 2	3 to 5	5 to 10	>10	1 to 2	3 to 5	5 to 10	>10
BEEF		**Out of Season**				**In season**			
Barrick	5	3	1			2	2		
Bushman Bay	3	3				3			
Ginanarong	5	2				2			
Hatbol	13	7	2			8			
Limap	10	2	7			1	8		
Lingarakh	13	3	9	1		2	10	1	
Louni	10	8	1			5	1		
Mapbest	1			1					
New Bush	4	1							
Port Nabe	7	2							
Portindir	9	6				1			
Robako	2	1							
Taremb	9								
Tembibi	10	1	1			1	2	1	
Tevaliaut	14	8	1						
Tevri	12	4							
Uri Island	4	2					2		
Vallavi	1								
Count of responses	132	53	22	2	0	25	25	2	0
Percent of people interviewed		**40%**	**17%**	**2%**	**0%**	**19%**	**19%**	**2%**	**0%**
Prawns		**Out of Season**				**In season**			
Barrick	5		1				1		
Bushman Bay	3								
Ginanarong	5								
Hatbol	13	1							
Limap	10	1	5	2		2	5	2	
Lingarakh	13	5	3	1		4	5		
Louni	10		1			1			
Mapbest	1	1							
New Bush	4								
Port Nabe	7								
Portindir	9	1				1			
Robako	2	1							
Taremb	9					1			
Tembibi	10		1					1	
Tevaliaut	14	4							
Tevri	12								
Uri Island	4	1						1	
Vallavi	1								
Count of responses	132	15	11	3	0	9	11	4	0
Percent of people interviewed		**11%**	**8%**	**2%**	**0%**	**7%**	**8%**	**3%**	**0%**

Village	No interviewed	1 to 2	3 to 5	5 to 10	>10	1 to 2	3 to 5	5 to 10	>10
Naura		**Out of Season**				**In season**			
Barrick	5	2				1	1		
Bushman Bay	3								
Ginanarong	5	2				2			
Hatbol	13	3	8	1		3	7		
Limap	10								
Lingarakh	13		1				1		
Louni	10								
Mapbest	1	1							
New Bush	4	1							
Port Nabe	7								
Portindir	9	5				3			
Robako	2	1							
Taremb	9	8					2	1	
Tembibi	10	8	2			1	1	2	
Tevaliaut	14	7	2						
Tevri	12	1							
Uri Island	4	2				1			
Vallavi	1								
Count of responses	132	41	13	1	0	11	12	3	0
Percent of people interviewed		**31%**	**10%**	**1%**	**0%**	**8%**	**9%**	**2%**	**0%**

3.13 Sales of *Cardiosoma*

Respondents were asked how many crabs they sold per week in the *Cardiosoma* season and outside the *Cardiosoma* season. Responses are presented by village in Table 35. As with other questions seeking to draw comparison across the seasons there is doubt about the integrity of information: 25% of respondents reported selling *Cardiosoma* out of season while only 15% of respondents reported sales of *Cardiosoma* in the *Cardiosoma* season.

Respondents from Bushman's Bay, Hatbol, Limap, Lingarakh, Mapbest, New Bush, Robako, Taremb and Tevaliaut did not report sales of crabs by their households. Households which engaged in *Cardiosoma* sales were in Ginenarong, Louni, Port Nabe, Portindir, Tembibi, Uri Island and Uripiv Island. The greatest volume of crab sales was reported from Portindir which had two households that reported sales, out of season, of 300 and 400 crabs per week respectively. The hamlet of Ginenarong had high participation in commercial *Cardiosoma* trade, with 4 of the 5 households reporting crab sales, but the volumes reported were lesser.

There were 19 respondents who made additional comments. Most of these simply stressed that the respondents households did not sell crabs. Two respondents from Bushman's Bay indicated that working in the plantation and making copra was their main source of income and that they did not have time to look for crabs. Two households from Ginenarong sold crabs twice per week. One respondent from Portindir stated that if it wasn't the crab season, the family would not earn enough money to meet their household needs. Respondents from Tevri reported they sold *Cardiosoma* when there were plenty of them. A respondent from Vilavi mentioned that their household caught crabs for sale when they had a need for money.

Table 35: Household sales of *Cardiosoma* per week by village

Crab sales		**Out of Season**			**In season**		
Village	No interviewed	1 to 49	50 to 99	>=100	1 to 49	50 to 99	>=100
Barrick	5		2			1	1
Bushman Bay	3						
Ginanarong	5	1	2	1	1		1
Hatbol	13						
Limap	10						
Lingarakh	13						
Louni	10		2			3	
Mapbest	1						
New Bush	4						
Port Nabe	7	4		1	1	1	1
Portindir	9	3		2		2	
Robako	2						
Taremb	9						
Tembibi	10	1				1	
Tevaliaut	14						
Tevri	12	5	4			2	
Uri Island	4	3		1		2	1
Vallavi	1						1
Count of responses	**132**	**17**	**10**	**5**	**2**	**12**	**5**
Percent of people interviewed		**13%**	**8%**	**4%**	**2%**	**9%**	**4%**

3.14 Other sources of income

The questionnaire asked respondents to mention their sources of income, and then to indicate how much they earned from this commodity. Responses are presented in Table 36.

Twenty-eight income generating sources were mentioned. Most are of low value, generating under USD100 for a small proportion of households. Copra and cocoa are the two most common income generating and are the only sources that generate over USD 100 for a significant proportion of households. No income source was reported to generate more than USD 500.

Forty-seven households mentioned earning income from *Cardiosoma* crabs. The monetary income from crabs was reported to be of similar value in and out of season. Eight per cent of households interviewed earned over USD 100 from *Cardiosoma* and 22% of households interviewed earned less than USD 100 from *Cardiosoma*. It was perhaps the sixth most common income source mentioned and had similar value to fin fish.

To allow a qualitative comparison of village income a ranking scheme was applied:

- Rank 1 — income stated to lie between 1 and 4,000 VUV
- Rank 2 — income stated to lie between 5,000 and 10,000 VUV
- Rank 3 — income stated to lie between 11,000VT and 100,000 VUV
- Rank 4 — income stated to be over 100,000 VUV

These rankings, along with the number of income sources and the total rank realised by each respondent are presented in Table 37. This illustrates the range of incomes earned by households within the villages. The widest range was recorded for Tevaliaut, where there was one respondent who stated the household earned no income, while another household reported

high income generating potential from 8 different sources (beef, chickens, pigs, fish, copra, cocoa, vanilla, and food crops). The narrowest range was at Bushman's Bay where there was little difference between the lowest and highest ranking respondents.

The total rank allows the villages to be classified according to their income earning potential.

- Particularly low income ranks were reported from Bushman's Bay, Tembibi and New Bush.
- Typical income ranks were in a range between rank 5 and 8 – including Barrick, Hatbol, Limap, Port Nabe, Taremb, Tevaliaut, Tevri and Uri Island.
- Higher income ranks greater than rank 8 were recorded in 3 villages – Lingarakh, Portindir and Ginenarong.
- The highest household potential income earning potentials was reported from Tevaliaut, Portindir and Ginenarong.
- The lowest income ranks were 3 households which reported no cash income, and one household at Tevri, which reported minimal income from sales of *Cardiosoma*.

Table 36: Other sources of household income

	Households that earn income from this source	**No of respondents**		**Out of Season (percent of people interviewed)**			**In season (percent of people interviewed)**		
Income source	No. of households that earn income from this source	Out of season	Season	1000 to 4000 VUV	5,000 to 10,000VT	11,000 to 50,000 VUV	1000 to 4000 VUV	5,000 to 10,000VT	11,000 to 50,000 VUV
Copra	128	113	117	17%	21%	48%	16%	24%	48%
Cocoa	97	83	88	23%	14%	27%	19%	13%	35%
Garden crops	74	60	69	24%	17%	4%	27%	20%	5%
Chicken	57	32	25	20%	3%	1%	15%	3%	1%
Pigs	54	37	36	11%	14%	3%	10%	14%	3%
Crabs	47	41	40	12%	11%	8%	11%	11%	8%
Fish	46	32	32	11%	5%	9%	10%	4%	11%
Shellfish	26	23	21	14%	2%	1%	12%	3%	1%
Mats, baskets, etc	16			XX	X				
Timber	8	8	8	1%	1%	5%	1%	1%	5%
Trochus	4	4	3	2%	1%		1%	2%	
Thatch	3								
Bread, Gateau	3					X			
Kava	1				X				
Salary,	1								
Vanilla	2	2	2		1%	1%		1%	1%
Octopus	2								
Firewood	4								
Fundraisings	1								
Beef	1					X			

Table 37: Minimum, mean and maximum income ranks

		Minimum		Mean		Maximum	
Village	Sample size	rank	No of income sources	rank	No of income sources	rank	No of income sources
Barrick	5	4	4	8	5	12	6
Bushman Bay	3	3	3			4	4
Ginanarong	5	4	2	12.6	5.6	18	7
Hatbol	13	3	2	5.3	3.1	7	5
Limap	10	3	1	7	2.8	7	5
Lingarakh	13	6	2	8.3	3.2	11	4
Louni	10	3	2	7.9	3.3	11	4
Mapbest	1					7	3
New Bush	4	2	2	4.8	3.3	8	4
Port Nabe	7	6	3	7	4.5	11	7
Portindir	9	5	2	10.7	5.2	20	8
Robako	2	0	0			7	3
Taremb	9	3	2	5.3	2.9	8	4
Tembibi	10	0	0	3.6	2.3	7	4
Tevaliaut	14	0	0	7.6	3.4	24	8
Tevri	12	1	1	6.4	4.3	13	8
Uri Island	4	3	3	5.8	4.5	8	5
Vallavi	1	4	3				

Rank 1 — income stated to lie between 1 and 4,000 VUV
Rank 2 — income stated to lie between 5,000 and 10,000 VUV
Rank 3 — income stated to lie between 11,000VT and 100,000 VUV
Rank 4 — income stated to be over 100,000 VUV

Table 38: Comprehensive listing of household income sources and their rank

Village	copra	Food crops	Cocoa	Pigs	Chicken	Crabs	Fish	Trocha	Vanilla	Shells fish	timber	Other if given	RANK	No of income sources	other notes
Barrick	3		3	2	1						3		12	5	
Barrick	1	1	1			1							4	4	
Barrick	2	1	1		1	1	1						7	6	
Barrick	2	1	2		1	2	2						10	6	
Barrick	2	2	1		2								7	4	
Bushman Bay	1		1				1						3	3	
Bushman Bay	1		1	1			1						4	4	
Ginanarong	3		1										4	2	
Ginanarong	3	2		1		3	1			2			12	6	
Ginanarong	3	2		1		3	3			1			13	6	
Ginanarong	3	2	3	3		3	3			1			18	7	

Village	copra	Food crops	Cocoa	Pigs	Chicken	Crabs	Fish	Trocha	Vanilla	Shells fish	timber	Other if given	RANK	No of income sources	other notes
Ginanarong	3	2	2	1		3	3			2			16	7	
Hatbol	2		1										3	2	
Hatbol	2		1										3	2	Pineapple
Hatbol	2		1		1								4	3	Mat
Hatbol	3		1	1									5	3	Gateau
Hatbol	3		1	1	1								6	4	Bread
Hatbol	2		1	1	1						1		6	5	
Hatbol	3		1	3									7	3	Mat Thatch
Hatbol	3		1	2	1								7	4	Bread, mat, thatch
Hatbol	2		1	2	1								6	4	
Hatbol	3		2										5	2	
Hatbol	3		2										5	2	Leaf Thatches for housing
Hatbol	3		2	2									7	3	
Limap	3												3	1	
Limap	3		3										6	2	
Limap	3		3									2	8	3	Kava; 5,000-10,000vt in and not in season
Limap	3		3	2							3		11	4	
Limap	3		3	2						3		1	12	5	Mats; 1000-4000vt in and not in season
Limap	3		3	2	1						3		12	5	
Limap	3		3	2	1						2		11	5	
Lingarakh	3		3										6	2	
Lingarakh	3		3										6	2	He works in the plantation
Lingarakh	3		3								3		9	3	
Lingarakh	3		3								3	1	10	4	Mats 1,000-4,000 vt in and not in season
Lingarakh	3		3		1								7	3	
Lingarakh	3		3		2								8	3	
Lingarakh	3		3		2							2	10	4	Mats 5,000-10,000vt both in season and not in season

Village	copra	Food crops	Cocoa	Pigs	Chicken	Crabs	Fish	Trocha	Vanilla	Shells fish	timber	Other if given	RANK	No of income sources	other notes
Lingarakh	3		3	2									8	3	
Lingarakh	3		3	2								3	11	4	Bakes bread >10,000vt from bread in and not in the crab season
Lingarakh	3	1	3		1								8	4	
Louni		2				1							3	2	
Louni	3	2				3							8	3	
Louni	3	2				2							7	3	
Louni	2	2				2							6	3	
Louni	3	2	3				3						11	4	
Louni	3	2	3			2							10	4	
Louni	3	2	3	2									10	4	
Mapbest	2		3	2									7	3	
New Bush	1		1										2	2	
New Bush	1	1	1		1								4	4	
New Bush	2	1	2										5	3	
New Bush	3	2				1	2						8	4	
Port Nabe	3					1						2	6	3	Mats and baskets
Port Nabe	1	1				1	1			1		2	7	6	Octopus, Mats
Port Nabe	2	1			1	1	2			1			8	6	
Port Nabe	1	1		1		2	2			1			8	6	
Port Nabe	2	1		1	1	1				1			7	6	
Port Nabe	3	2				1	2			1			9	5	
Port Nabe	1	2		1	1	2	3			1			11	7	
Portindir	3		2										5	2	
Portindir	1	1	1	2		1	1			1			8	7	
Portindir		3				3				2			8	3	
Portindir	3	3				1							7	3	
Portindir		3	3	2	1	2		1		1			13	7	
Portindir	2	2	2	2	1	3	1			1			14	8	
Portindir		1				3	3						7	3	
Portindir	3	3	3	3	1	3	3			1			20	8	
Portindir	3	3	3	2	1	2							14	6	
Robako													0	0	
Robako	3	1	3										7	3	
Taremb	3		3										6	2	
Taremb	2		2										4	2	
Taremb	2	1											3	2	
Taremb	4	1	1										6	3	
Taremb	1	1	1										3	3	

Village	copra	Food crops	Cocoa	Pigs	Chicken	Crabs	Fish	Trocha	Vanilla	Shells fish	timber	Other if given	RANK	No of income sources	other notes
Taremb	3	1	2									2	8	4	Mats, Fire wood
Taremb	2	1	2										5	3	
Taremb	2	1	2									2	7	4	Mats
Tembibi													0	0	
Tembibi		1										2	3	2	Mats & fire wood
Tembibi	2	1											3	2	Fundraisings
Tembibi	2	1	1										4	3	
Tembibi	2	1	1									2	6	4	Mats & Firewood
Tembibi	2	1	2									2	7	4	Mats and Fire wood
Tembibi		2											2	1	
Tevaliaut													0		
Tevaliaut	3		3										6	2	
Tevaliaut	3		3	2	1								9	4	
Tevaliaut	3		2										5	2	
Tevaliaut	2		2										4	2	
Tevaliaut	3		2	1	1								7	4	
Tevaliaut	3	1		1									5	3	
Tevaliaut	3	1	2										6	3	
Tevaliaut	3	1	2	1	1				2				10	6	
Tevaliaut	3	3	3	3	3		3		3			3	24	8	Beef; 11,000-50,000 vt
Tevri							1					2	3	2	Mats and baskets
Tevri						1							1	1	
Tevri						1						2	3	2	Mats, fans, baskets.
Tevri	1					1	1					2	5	4	Octopus and mats
Tevri	1					2	1					2	6	4	Mats and rolls of leaf Pandanas
Tevri	1	1					1						3	3	
Tevri		1			1	1	1					2	6	5	Mats
Tevri	1	1			1	3	3			1			10	6	
Tevri	1	1			1	2	3			1			9	6	
Tevri	1	1		1	1	3	3	2		1			13	8	
Tevri	2	2					3			1			8	4	
Tevri	1	2		1		2	3			1			10	6	

Village	copra	Food crops	Cocoa	Pigs	Chicken	Crabs	Fish	Trocha	Vanilla	Shells fish	timber	Other if given	RANK	No of income sources	other notes
Uri Island	1	1				1	1			1			5	5	Natongtong, oyster, octopus, clam shell(Natalai)
Uri Island		1			1					1			3	3	
Uri Island	3	1	1				1			1			7	5	
Uri Island		2			1	2	2	1					8	5	
Vallavi	1							1				2	4	3	Mats and Baskets

3.16 Management of *Cardiosoma*

Respondents were asked if they were aware of a taboo on *Cardiosoma* for their village or at Crab Bay. Those that were aware of a taboo were asked to describe it. They were further asked their opinions as to whether the taboo was working, giving their reasons.

Table 39 presents the range of responses received to a general question on awareness of a taboo on *Cardiosoma* for their village or at Crab Bay. While most respondents were aware of one or more resource management tabus, there was wide variation in the knowledge and understanding held. In the case of the Crab Bay Protected Area there was a diversity of opinions as to who established the area, who held responsibility and specifically what it protected.

Table39: Awareness of resource management tabus

Taboo notes	Overall	Barrick	Bushman's Bay	Ginenarong	Hatbol	Limap	Lingarakh	Louni	Mapbest	New Bush	Port Nabe	Portindir	Robako	Taremb	Tenbibi	Tevaliaut	Tevri	Uri Island	Vilavi
No Tabu																			
Not aware of a taboo	6			1	1			1				1	1			1			
There used to be a taboo but it does not exist any more	2	1		1															
Limited awareness																			
Aware of a taboo, no details	4	1				1	1											1	
Taboo on marine and land resources	1		1																
Taboo on marine resources	1		1																
A taboo on crabs.	1			1															
There is a taboo on the reef resources and mangroves - but don't know what kind of	2						2												

Taboo notes	Overall	Barrick	Bushman's Bay	Ginenarong	Hatbol	Limap	Lingarakh	Louni	Mapbest	New Bush	Port Nabe	Portindir	Robako	Taremb	Tenbibi	Tevaliaut	Tevri	Uri Island	Vilavi
taboo/which resources.																			
Not in our area but at Crab Bay.	5							4		1									
There is a taboo but only a flexible one	1					1													
CRAB BAY PROTECTED AREA																			
Crab Bay Area Resource committee & chiefs put a taboo on fish, trocha and turtle.	1																1		
The Marine Protected Area Committee put a taboo on the crabs.	3				3														
The committee has placed a taboo on the resources at Crab Bay	3														3				
The Amal Crab Bay committee had put a taboo on the crabs and shells in the area	3													1	2				
The MPA committee placed a taboo on reef resources and crabs.	4						2	2											
The Crab Bay Protected Area Committee put a taboo on reef resources & mangrove.	4				1	2	1												
Crab Bay committee has placed a tabu on land and marine resources in the area	4						1			1				2					
The Resource Committee put a taboo on every resource at Crab Bay. It didn't work because of no respect & because the Committee didn't perform their duties.	1											1							
The resource committee and Fisheries Officers put a taboo on the reef resources and crabs.	1						1												

Taboo notes	Overall	Barrick	Bushman's Bay	Ginenarong	Hatbol	Limap	Lingarakh	Louni	Mapbest	New Bush	Port Nabe	Portindir	Robako	Taremb	Tenbibi	Tevaliaut	Tevri	Uri Island	Vilavi
The resources committee and the Fisheries Officer placed a taboo on the marine resources and mangroves.	3	2					1												
Fisheries Department has placed a taboo on marine resources in the area.	1													1					
The chiefs and the Fisheries Officer put a taboo on the reef resources and crabs in the mangroves.	2						2												
The Chiefs and Fisheries Department have placed a taboo on the reef resources and the mangroves.	6	1				4	1												
The Chiefs and the Fisheries Department placed a taboo, but not certain whether it applies to marine resources or mangroves	0																		
The chiefs and tha MPA committee have put a long term taboo on the Marine and land resources	1						1												
Landowners have placed a taboo on the crabs and shells in the mangroves at Crab Bay	0																		
The Chief has placed a taboo on Crab Bay, but people didn't respect it. It didn't work.	1											1							
Taboo on shells in the mangroves at Crab Bay	1														1				
Taboo on the Crab Bay environment	1													1					
Taboo was put on Crab Bay on marine and land resources.	1											1							
Taboo on marine	1	1																	

Taboo notes	Overall	Barrick	Bushman's Bay	Ginenarong	Hatbol	Limap	Lingarakh	Louni	Mapbest	New Bush	Port Nabe	Portindir	Robako	Taremb	Tenbibi	Tevaliaut	Tevri	Uri Island	Vilavi
resources and the mangroves in Crab Bay Amal																			
OTHER LOCAL TABOOS	0																		
The Committee placed a taboo on lobsters	10			2	8														
The Chiefs placed taboos on lobsters at Hatbol and Crab Bay.	1				1														
Taboo on Lowni Village resource	1							1											
Taboo on crabs, the sea and plantation also.	1								1										
There was a taboo on marine resources for a short time.	1									1									
Taboo put by the Community.It didn't work cause people had no respect for the village community.	3											3							
There has been a taboo for 2 yrs- put by Chief and Village committee	1											1							
A namele was put to stop people from collecting crabs & shells	0																		
The Landowner has put a taboo on the land and marine resources especially crabs.	0																		
A taboo put by the plantation committee (on crabs and shells)	4													4					
The chief and landowner have put on a taboo.	1														1				
The manager has put a taboo on crabs and other marine resources	3															3			
Chief placed a taboo on the marine resources.	17										5						11		1
Taboo on the marine resources of the village	4										3							1	
Taboo on the following resources;	1																	1	

Taboo notes	Overall	Barrick	Bushman's Bay	Ginenarong	Hatbol	Limap	Lingarakh	Louni	Mapbest	New Bush	Port Nabe	Portindir	Robako	Taremb	Tenbibi	Tevaliaut	Tevri	Uri Island	Vilavi
natongtong, oyster, fish, clam shell, crab and shell fish within Narong Marine Park.																			
Taboo on fish & crab	1																	1	

Similarly respondents held a diversity of opinions as to whether resource management taboos had been effective (Table 40). Those believing resource management taboos emphasised three factors:

a) respect for the taboo/protected area itself. Supporting the concept of respect for the initiative were comments relating to concern for the environment, concern about resource depletion, awareness of the situation and a desire for resources to be more plentiful;

b) respect for the chief/chiefs who initiated the taboo; and

c) fear of the penalties. Supporting this issue two respondents mentioned good enforcement.

Those respondents who felt resource management taboos had been ineffective largely presented an opposite set of views:

g) people did not respect the taboo;

h) people, chiefs and other leaders did not cooperate well; and

i) other claims (income, meat, rights) were more pressing than concerns about the penalties.

Table 40: Opinions on resource management results

Have the resource management taboos worked?	No. of respondents
YES	
no comment	22
Because people respect the taboo/protected area.	30
Because the people had respect for the chief/chiefs.	19
Because of fear of the penalties	15
Because people were concerned that the number of crabs (or the resources) are decreasing	7
Because people held concern for the environment and the future generations.	5
Because people want resources to increase	3
Stict enforcement by fines.	2
The workers have earned respect	1
Because people wanted to protect their land and marine resources	1
Because the chiefs, MPA committee and the fisheries extension officer raised awareness about the situation.	1
Because the people respected the department of fisheries.	1
DON"T KNOW	
Sometimes yes & sometimes no.	1
Don't know if it worked out or no.	1
NO IT DIDN"T WORK	
No comment	26
Didn't work - people didn't respect it.	11
Because the chiefs (& other leaders) and the people didn't cooperate well.	6
People wanted more meat to eat therefore they kept collecting naura.	1
Because some people have put claims that the river belongs to them and therefore they can do what ever they want.	1
Women who have nothing else to sell to earn money tend to collect crabs in the restricted area.	1

4 Discussion

While the survey data had a number of weaknesses, overall the survey provided useful lessons and insights into the IWP target communities and their management of *Cardiosoma* crabs. For ease of discussion, important issues have been grouped into 4 themes: methodological issues, insights into the target communities, and insights into *Cardiosoma* use and management.

4.1 Methodological lessons

The results from this survey provide some important methodological insights for the IWP project team.

- Full involvement of local people in the conduct of project work, including these surveys, is important to the IWP project. However, the involvement of a large team of relatively inexperienced survey facilitators led to variability in how the survey was conducted and data was recorded. Attention to training, pre-testing and standardising volunteer activities may help to overcome these problems in the future.
- Where sections of the survey were superficially repetitive — for example, a set of questions asked for in season data followed by the same questions for out of season — response rates for the second set of questions were consistently lower. It is not clear whether this is due to how the facilitator posed the questions, how the respondents understood them, or both. Care

with design of future questions, with different ordering and structuring of questionnaires, or more careful choice as to which questions to include, could help overcome this weakness.

- The IWP project has a diverse target group. The survey repeatedly used terms such as "season" without specifying what was meant. The term was interpreted in different ways by different individuals. In communicating with the target group, project staff should be careful to avoid ambiguity, and to cross check what people understand and assume from particular terms. In this case the survey might have included a question extracting people's definition of season, or it might have clarified the term season to ensure a consistent understanding.
- There is considerable variation in the knowledge and understanding held by individuals in the project area about the Crab Bay Marine Protected Area, about *Cardiosoma* management initiatives and by inference the IWPDP itself. While the IWPDP has devoted time and effort to building awareness, there is still a need for further work before the target communities are adequately informed and have a consistent understanding.

There were also a range of methodological weaknesses within the survey that imply limited pre-testing, limited attention to sample selection and a range of design issues.

4.2 Lessons about the target communities

The survey provides a number of insights that will help the IWP project better focus its activities within the targeted villages.

- **Who collects crabs?** In Barrick, Louni and Hatbol, primarily women collect crabs and could be specifically targeted by the project. However in Lingarakh, Port Nabe, Taremb, Tenbimbi, Tevri, Uri Island and Vilavi both men and women collect crabs and will need to be equally included in project activities.
- **Who gathers *Cardiosoma* in the vicinity of the MPA?** Only the distant villages of Taremb and Tenbimbi reported collecting *Cardiosoma* from the MPA area itself. Villagers from Hatbol, Limap and Lingarakh report collecting crabs close to the MPA.
- **Who collects crabs commercially?** No commercial harvesting was reported from Bushman's Bay, Hatbol, Limap, Lingarakh, Mapbest, Robako, Taremb, Tevaliaut. The greatest frequency of commercial harvesting trips was reported from Ginenarong and Portindir, and from Barrick and Port Nabe. The greatest volume of crab sales was reported from Portindir, which had two households that reported sales (out of season) of 300 and 400 crabs per week respectively. The hamlet of Ginenarong had high participation in commercial *Cardiosoma* trade, with 4 of the 5 households reporting crab sales, but lesser volumes were reported.
- **Who collects crabs for households consumption?** Within the surveyed villages 95% of households collect and consume *Cardiosoma* crabs.

4.3 Insights into *Cardiosoma* use

Cardiosoma crabs are one of the common meats eaten by villagers in the project area. However, while most meats are eaten a few times a month, *Cardiosoma* are typically gathered 1–4 times a week by 95% of the local households. Harvesting levels were reported to be lower for Bushman's Bay and New Bush, and less frequent for more distant villages such as Taremb and Tenbimbi.

Villagers typically gather a rice bag of crabs each time they go collecting. These may be eaten over several meals. How many crabs are eaten at a single meal will depend on the number of people at the meal and the availability of crabs. On average consumption of up to 20 crabs per meal is common. At times *Cardiosoma* are eaten daily.

Villagers might take 3–5 hours to gather a rice bag of crabs, although the time taken may be longer when the crabs are harder to find. Over 90% of households gather crabs during the day. Just under half of households also use a light to collect crabs at night, while 20% also dig them from their holes. Baits are not yet commonly used.

40% of households also sell *Cardiosoma*. 40% of these households collect crabs for sale more than 5 times a month. A similar proportion collects crabs for sale 2–4 times per month.

Households will also collect *Cardiosoma* to share or exchange with their relatives, or allow their relatives and friends to collect their own crabs. Respondents reporting on this practice mention typically doing so a few times a month.

4.4 Insights into village incomes

A wide variety of products are sold to generate income. Each household had on average four sources of cash income, with several households having up to eight sources of income. The amount of income derived from each source tended to be small (<$100), with only copra and cocoa providing a consistent source of income over $100. Absolute incomes were not determined. However Lingarakh, Portindir and Ginenarong respondents indicated better income levels than the other villages. Particularly low income levels and few income earning opportunities were reported from Bushman's Bay, Tembibi and New Bush.

4.5 Management of *Cardiosoma*

While most people interviewed were aware of one or more resource management tabus, there was wide variation in their knowledge and understanding. In the case of the Crab Bay Protected Area there was a diversity of opinions as to who established the area, who held responsibility and specifically what it protected.

Respondents held a diversity of opinions as to whether resource management taboos had been effective. Those believing resource management taboos were effective emphasised three factors: (i) respect for the taboo/protected area itself; (ii) respect for the chief/chiefs who initiated the taboo; and (iii) fear of the penalties. Supporting this issue two respondents mentioned good enforcement. Those respondents who felt resource management taboos had been ineffective largely presented an opposite set of views, suggesting that (i) people did not respect the taboo; (ii) people, chiefs and other leaders did not cooperate well; and (iii) other claims (income, meat, rights) were more pressing than concerns about the penalties.

Part II: Survey of mangrove use

5 Overview

The mangroves of the Crab Bay to Port Stanley area of Malekula are among the best developed in Vanuatu. They are a significant economic resource with direct use values as well as habitat and ecosystem function values. The mangroves of Crab Bay are a key habitat for the crab *Cardiosoma hirtipes,* the species targeted by the Vanuatu IWPDP. Greater understanding of the local use of mangroves was sought to inform the community conservation initiatives of this project.

5.1 Information on the use of mangroves

5.1.1 Firewood

Firewood was mainly gathered dry. All respondents from Hatbol and Uripiv reported the use of dry mangrove wood as firewood. Seventy-five per cent of Uri Island respondents and 40% of respondents from Uripiv Island reported using mangrove wood as firewood one or more times a weekly. At Barrick and Port Indir respondents reported use of mangrove wood as firewood once or twice a month. No information on the quantities used was obtained.

A variety of mangroves are used for firewood, with limited specialisation. All 20 respondents from Uripiv Island, all of whom used mangrove wood as firewood, identified at least 5 different mangroves commonly used for firewood. Six survey respondents said they used any kind of mangroves as firewood.

A wide variety of trees were used as alternate sources of firewood. Five species were mentioned by over half of the survey respondents and across the range of villages surveyed: Namatal, Navenue, Burao, Kassis and Stinkwood. Most respondents reported that they used these woods regularly, between 1 and 5 times a week.

5.1.2 House posts

Respondents from four villages did not report use of mangrove wood as house posts: Bushman's Bay, Lingarakh, New Bush, and Tarem/Tenbibi.

Wood for house posts was primarily gathered green. All respondents from Uripiv and all but one respondent from each of Louni, Port Indir, Tevaliaut and Uri Island reported use of mangrove wood for house posts. Three respondents (30% of respondents) from Limap reported use of mangrove wood as house posts.

Most respondents who reported use of mangrove wood as house posts used it occasionally, or a few times a year or less, reflecting the durability of housing. More frequent use (more than once a month) was reported from over half the respondents of Uripiv Island, Barick, Uri Island and Louni.

A limited range of mangroves are used as house posts, with a preference for *Ceriops tagal* and *Rhizophora mucronata*.

A wide range of trees were named as alternate sources of house posts. The most frequently reported species were Burao, Kasis, Namalaus, Natora. Two additional species (Navenue and Burao blong solwora (or Jeli) were reported frequently by respondents from Uripiv Island.

5.1.3 Fence posts

Wood for fence posts is gathered green. All respondents from Uripiv Island, all but one respondent from each of Louni, Port Indir, and Uri Island, and two thirds of respondents from

Tevaliaut reported the use of mangrove fence posts. Only one respondent from both Limap and Lingarakh reported use of mangrove fence posts. Use of mangroves as fence posts was not reported from Bushman's Bay, Hatbol, New Bush and Tarem/Tenbimbi.

Eighteen respondents from Uripiv Island (90% of Uripiv respondents) reported monthly or weekly use of mangrove wood as fence posts. This compares with two respondents from Uri Island (50% of respondents), four respondents from Louni (40% of respondents) and two respondents from Port Indir (25% of respondents) who reported use of mangrove wood on a monthly basis.

A limited range of mangroves were reported to be used as fence posts, with a preference for *Ceriops tagal* and *Rhizophora mucronata*.

5.1.4 Other

Other uses were limited. Reported uses included poles in gardens, place markers, bows, arrows and spears, an axe handle and house rafters.

5.2 Collection of mangrove timber

Villagers of Uripiv Island mainly harvested mangrove wood from Uri Island, Nanwut, Port Unwut and the Bare area. Villagers from Port Indir harvested wood from the Sale, Port Indir area, Jinenarong and Salamara. Villagers from Louni harvested in the vicinity of their village.

Villagers from Barrick, Hatbol, Limap, and Tevaliaut reported use of mangroves from the Amal Crab Bay area. Only 3 respondents from Limap and one from Uripiv specifically mentioned that they harvested mangrove wood from within the Marine Protected Area (MPA). It is possible that harvesting from this area was understated by respondents.

Uripiv Island, Uri island and Port Indir (which used mangrove wood regularly as firewood as well as for house poles and posts) reported women, men, youth and children all collected mangrove wood, although males were reported more frequently than females. Respondents from Barrick, Limap, Lingarakh and Tevaliaut (where use of mangrove wood is mainly as house or fence posts) reported that men and male youths collected mangrove wood.

5.3 Survey methods

The survey team administered prepared written questionnaires to 105 villagers over the ten days between Wednesday 1 December and Friday 10 December 2004. Responses were recorded on site and entered onto computer following the team's return to Port Vila.

Data is presented by village, as the accessibility of mangroves and other species is influenced by village location. To allow for simple comparisons between differently sized village samples, village data is presented as a percentage of respondents from that village. As many of the samples were small (< 10 people per village) statistical analysis and interpretation by village is limited.

The respondents and their villages are listed in Table 41 and mapped in Map 1. The survey was dominated by respondents from Uripiv Island, Tarem/Tembibi and the villages of Louni, Limap and Lingarakh.

Table 41: Respondents to the mangrove use survey by village

Village name	No of respondents	Percent of sample
Barrick	4	4%
Bushmans Bay	3	3%
Hatbol	4	4%
Limap	10	10%
Lingarakh	14	13%
Louni	10	10%
New Bush	3	3%
Port Indir	8	8%
Tarem/Tembibi	19	18%
Tevaliaut	6	6%
Uri Island	4	4%
Uripiv Island	20	19%
TOTAL	105	

6 Data Gathered

6.1 Use of mangrove wood

Respondents were asked whether they used mangrove wood for firewood, house posts, fence posts, markers and other uses. The questionnaire distinguished between the use of dry and green wood. Dry wood might be gathered opportunistically from fallen wood, or the wood may be cut and left to dry before use. Green wood would be specifically cut for the use.

Fifty-eight of the 105 respondents (55% of respondents) reported use of mangrove wood.

It is assumed the remainder did not use mangrove wood. In general discussions at the end of the survey one respondent from Bushman's Bay stated that he/she never used mangrove wood. Two respondents from Hatbol mentioned that they no longer used mangrove wood, with the implication that they did in the past. Two respondents from Limap mentioned mangroves were mainly used occasionally, not even every year. Four respondents from Limap mentioned that mangrove wood was only harvested before the taboo was put in place.

No use of mangrove wood was reported by respondents from the villages of Bushman's Bay, New Bush and Tarem/Tembibi. One respondent from Lingarakh reported use of green mangrove wood for fence posts. This was the only use reported from Lingarakh.

Firewood was primarily gathered dry. All respondents from Hatbol and Uripiv reported the use of dry mangrove wood as firewood. Three respondents (75% of respondents) from Uri island and Barrick reported use of dry mangrove wood as firewood. Six respondents (75% of respondents) from Port Indir reported use of mangrove as firewood, although one respondent was recorded as using green wood. No information on the quantities used was obtained.

Wood for house posts was primarily gathered green. All respondents from Uripiv reported use of mangrove wood for house posts. All but one respondent from Louni, Port Indir, Tevaliaut and Uri Island reported use of mangrove wood for house posts. Three respondents (30%) from Limap reported use of mangrove wood as house posts.

Wood for fence posts is also gathered green. All respondents from Uripiv Island reported the use of mangrove fence posts. In Louni, Port Indir, and Uri Island, all but one respondent in each village reported the use of mangrove fence posts. Two thirds of respondents from Tevaliaut used mangrove fence posts. In Limap and Lingarakh only one respondent reported using mangrove fence posts.

Respondents from three villages reported using mangrove poles in their gardens: one respondent from Barrick (25%), two respondents from Uri Island (50%) and three respondents from Uripiv Island (15%).

Green mangrove wood has several additional uses reported from Uri and Uripiv Islands. Two respondents (50%) from Uri Island and one respondent from Uripiv Island (5%) reported using mangroves to mark places. One respondent (25%) from Uri Island and one respondent from Uripiv Island (5%) reported mangrove wood being used to make bows, arrows and spears. One respondent from Uripiv Island reported using mangrove wood to make an axe handle, another reported the use of mangrove wood as house rafters as distinct from poles. One respondent from Uri Island mentioned such diverse uses as making fish hooks, combs, hair paint and fuelling the copra drier. In response to another question a respondent from Louni also referred to the use of mangrove wood to fuel the copra drier.

Table 42: Use of mangrove wood by village (percent of respondents by village)

		Firewood		House post		Fence post		Garden poles	
Village name	Sample size	green	dry	green	dry	green	dry	green	dry
Barrick	4	0%	75%	75%	25%	25%	0%	25%	25%
Bushmans Bay	3	0%	0%	0%	0%	0%	0%	0%	0%
Hatbol	4	0%	100%	100%	0%	0%	0%	0%	0%
Limap	10	0%	0%	30%	0%	10%	0%	0%	0%
Lingarakh	14	0%	0%	0%	0%	7%	0%	0%	0%
Louni	10	0%	0%	90%	0%	90%	0%	0%	0%
New Bush	3	0%	0%	0%	0%	0%	0%	0%	0%
Port Indir	8	13%	63%	100%	0%	88%	0%	0%	0%
Tarem/Tembibi	19	0%	0%	0%	0%	0%	0%	0%	0%
Tevaliaut	6	0%	0%	83%	17%	67%	0%	0%	0%
Uri Island	4	0%	75%	75%	0%	75%	0%	50%	0%
Uripiv Island	20	0%	100%	100%	5%	100%	15%	15%	0%
TOTAL	105								

6.2 Frequency of use

Use of mangrove wood is reported to be infrequent with the exception of Uri and Uripiv Islands.

6.2.1 Use as firewood

Respondents from seven of the villages surveyed did not report the use of mangrove wood as firewood: Bushman's Bay, Limap, Lingarakh, Louni, New Bush, Tarem/Tenbibi and Tavaliaut.

Mangrove wood was used as firewood in the villages of Uri Island, Uripiv Island, Port Indir and Barick. In the villages of Uri Island three respondents (75%) and eight respondents from Uripiv Island (40%) reported using mangrove wood as firewood on a weekly basis. At Barrick 3 respondents (75%) and 3 Port Indir respondents (27%) reported use of mangrove wood as fire wood once or twice a month.

Table 43 : Frequency with which mangrove wood is used as firewood

	Barick	Port Indir	Tevaliaut	Uri Island	Uripiv Island
Survey sample	4	8	6	4	20
occasionally			2		
1 or 2 times a month	3	3		1	3
once or twice a week		1		2	6
3 or 4 times a week				1	2

6.2.2 Use as house posts

Respondents from four of the villages surveyed did not report the use of mangrove wood as house posts: Bushman's Bay, Lingarakh, New Bush, and Tarem/Tenbibi.

Most respondents who reported use of mangrove wood as house posts used it occasionally, or a few times a year or less, reflecting the durability of housing.

Use was more frequent at:

- Uripiv Island — 17 of the 20 respondents (85%) reported use of wood as house posts on a monthly or weekly basis.
- Barick — 3 of the 4 respondents (75 %) reported use of wood as house posts on a monthly basis,
- Uri Island — 2 of the 4 respondents (50%) reported use of wood as house posts on a monthly basis.
- Louni — 3 of 10 respondents (30%) reported using wood as house posts on a monthly basis.

Table 44: Frequency with which mangrove wood is used as house posts

	Barick	Hatbol	Limap	Louni	Port Indir	Tevaliaut	Uri Island	Uripiv Island
No of respondents	4	3	10	10	8	6	4	20
once or twice a year			1	5	3			2
3-5 times a year				2				
occasionally					1	1		
1 or 2 times a month	3		1	3			2	13
once or twice a week						1		4
3 or 4 times a week					1			

6.2.3 Use as fence posts

Respondents from four of the villages surveyed did not report the use of mangrove wood as fence posts: Bushman's Bay, Hatbol, New Bush and Tarem/Tenbimbi. One respondent form

Barrick (25% of Barick respondents), Limap (10% of respondants) and Lingarakh (7% of respondents) reported use of mangrove wood as house posts, but did not provide information on the frequency of their use.

Information on the frequency with which mangrove wood was used as fence posts came from five locations: Uripiv Island, Uri Island, Tevaliaut, Port Indir and Louni. Eighteen respondents from Uripiv Island (90 % of Uripiv respondents) reported monthly or weekly use of mangrove wood as fence posts. This compares with two respondents from Uri Island (half the respondants from Uri), four respondents from Louni (40% of respondents from Louni) and two respondents from Port Indir (25% of Port Indir respondents) who used mangrove wood on a monthly basis.

Table 45: Frequency with which mangrove wood is used as fence posts

	Louni	Port Indir	Tevaliaut	Uri Island	Uripiv Island
No of respondents	10	8	6	4	20
once or twice a year	5	1			1
occaisionally		1	1		
1 or 2 times a month	4	1		2	11
once or twice a week		1			7

6.3 Mangrove species used

The surveyors asked respondents which species of mangroves they used for a variety of purposes. Responses were gained in a mix of English, Bislama and vernacular names. Table 46 provides information on the mangroves of Crab Bay with their Uripiv vernacular name to allow interpretation of the responses received. However, there are several vernacular languages used within the surveyed villages, of which the Uripiv language is only one. Some terms recorded by the survey match names that have been previously recorded. Other terms recorded such as "those with roots" are not sufficiently specific to allow further identification.[5]

Table 46: Mangroves and their associates found in Crab Bay with their Uripiv vernacular names.

Species	English Common Name	Vernacular term (Uripiv)	Translation & Uses
Rhizophora stylosa	red mangrove	Narong neves	"Bow Mangrove"
R. mucronata		Narong minmin	"Drinking Mangrove"
*R. apiculata**	tall stilted mangrove	Ndrongrat	"Indicator Mangrove"
Ceriops tagal	yellow mangrove	Narong naim (Rongress)	"Post Mangrove"/Straight Growing Mangrove
Sonneratia caseolaris/alba	mangrove apple	Namur	Not known
Avicennia marina	white mangrove, grey mangrove	Niviv	"Dislikes other Mangroves"

[5] Mangrove trees demonstrate a range of root or pneumatophore structures. There are prop roots (as in *Rhizophora* spp.), pencil roots (as in *Avicennia* spp.), and peg roots (as in *Sonneratia* spp.).

Excoecaria agallocha		Natot	?
Heritiera littoralis		Nisas	?
Xylocarpus granatum	cannon ball mangrove	Noar	Tree similar to 'Nur' (that bears an edible fruit)
X. molucensis		Naelaslas	"Large testicles"
Acrostichum aureum		Nimbiri	?
Derris trifoliata		Natu	"Bitter Vine"

Source: Francis Hickey, pers. Comm.; www.aims.gov.au

6.3.1 Mangroves used for firewood

Responses to the question suggest a variety of mangroves are used for firewood, with limited specialization. Uripiv which had a sample of 20 respondents with all respondents using mangrove wood as firewood identified at least 5 different mangroves commonly used for firewood (Table 47).

Table 47: Mangroves used for firewood

Village name	Type of mangrove commonly used for firewood	No of respondents	Likely identity
Barrick	Any species of mangrove	1	
Hatbol	Those with roots	3	Unclear
Port Indir	Any species of mangrove	1	
Port Indir	Straight wood mangrove	1	Possibly *Ceriops tagal*
Uri Island	Any species of mangrove	2	
Uri Island	Narong minmin	1	*Rhizophora mucronata*
Uri Island	Niviv, Narong Drominmin	1	*Avicennia marina*, *Rhizophora mucronata*
Uripiv Island	Long natongtong		Possibly *Ceriops tagal*
Uripiv Island	Mangroves of deeper waters		Unclear
Uripiv Island	Red Natongtong	2	*Rhizophora stylosa*
Uripiv Island	Short Natongtong	2	Unclear
Uripiv Island	White Natongtong	2	*Avicennia marina*

6.3.2 Mangroves used as house posts

Responses to the question suggest a smaller range of mangroves are used as house posts, with a preference for *Ceriops tagal* and *Rhizophora mucronata* (Table 48).

Table 48: Mangroves used as house posts

Village name	Kind for House Post	No of respondents	Likely identity
Barrick	Straight ones		*Ceriops tagal*
Hatbol	Those with no roots	3	unclear

Village name	Kind for House Post	No of respondents	Likely identity
Limap	Straight ones		*Ceriops tagal*
Louni	Drong minmin		*Rhizophora mucronata*
Port Indir	Straight mangrove	6	*Ceriops tagal*
Tevaliaut	Straight Mangrove	5	*Ceriops tagal*
Uri Island	Drominmin	3	*Rhizophora mucronata*
Uri Island	Narong Minmin		*Rhizophora mucronata*
Uripiv Island	Long natongtong, long palm natongtong	6	*Ceriops tagal*
Uripiv Island	Coastal Mangroves		unclear
Uripiv Island	White Natongtong	2	*Avicennia marina*
Uripiv Island	Red Natongtong	2	*Rhizophora stylosa*

6.3.3 Mangroves used as fence posts

Responses to the question suggest a similar range of mangroves are used as fence posts, as for house posts. Preference appears to lie with *Ceriops tagal* and *Rhizophora mucronata* (Table 49).

Table 49: Mangroves used as fence posts

Village name	Kind for Fence Post	No of respondents	Likely identity
Louni	Drong Minmin		*Rhizophora mucronata*
Port Indir	small mangrove		unclear
Port Indir	straight Mangrove	2	*Ceriops tagal*
Tevaliaut	straght mangroves	4	*Ceriops tagal*
Uri Island	Drominmin		*Rhizophora mucronata*
Uri Island	Narong Minmin		*Rhizophora mucronata*
Uri Island	Drong Rath		*Rhizophora apiculata*
Uripiv Island	Coastal Mangroves		Not clear
Uripiv Island	Long Natongtong		*Ceriops tagal*
Uripiv Island	Red Natongtong		*Rhizophora stylosa*

6.3.4 Mangroves used for other purposes

Only a small sample of respondents from Uri and Uripiv Islands provided information on mangroves used for other purposes. Narong minmin or drong minmin, thought to be *Rhizophora mucronata*, was mentioned by three respondents who referred to the use of mangroves as a place marker. The same species was also mentioned by one respondent who used mangrove wood to make bows and arrows and by three respondents who used mangrove wood as poles in gardens.

6.4 Where mangrove wood is gathered

The survey asked respondents where they gathered mangrove wood. Responses are summarised by village in Table 50. Villages that do not use mangrove wood have been excluded. Of the 58 respondents who reported use of mangrove wood 57 answered this

question. Several respondents mentioned more than one location.

Collection localities varied by village. Villagers of Uripiv Island, to the north of Crab Bay, harvested mangrove wood from areas such as Uri Island, Nanwut, Port Unwut and the Bare Area. Villagers from Port Indir harvested wood from the Sale, Port Indir area, Jinenarong and Salamara. Villagers from Louni harvested in the vicinity of their village. Villagers from Barrick, Hatbol, Limap, and Tevaliaut were the main respondents reporting use of mangroves from the Amal Crab Bay area. Only three respondents from Limap and one from Uripiv specifically mentioned that they harvested mangrove wood from within the Marine Protected Area (MPA). It is possible that harvesting from this area is understated by respondants.

Table 50: Where mangrove wood is gathered by number and % of respondents

	Barick	Hatbol	Limap	Lingarakh	Louni	Port Indir	Tevaliaut	Uri Island	Uripiv Island	Total
No of respondents	4	3	10	14	10	8	6	4	20	
MPA area			3 (30%)						1 (5%)	4
Near Amal, Crab Bay	3 (75%)	3 (100%)	1 (10%)	1 (7%)			4 (67%)	1 (25%)	1 (5%)	13
Other areas	1 (25%)							4 (100%)		5
Louni, Louni passage					10 (100%)					10
Sale, Port Indir area						6 (75%)				6
Jinenarong						1 (25%)				1
Salemarur						1 (25%)				1
Bare area									8 (40%)	8
Nanwut									7 (35%)	7
Port Unwut									5 (25%)	5
Uri Island									1 (5%)	1

6.6 Tools used to cut mangrove wood

Of the 45 respondents who reported the use of mangrove wood as firewood two reported using both a knife and a chainsaw to cut the wood, 27 reported use of a knife only and four reported use of a chainsaw only. Of the 56 respondents who reported the use of mangrove wood as house posts five respondents reported using both a knife and a chainsaw to cut the wood, 23 reported use of a knife to cut the wood and eight reported use of only a chainsaw. Of the 46 respondents who reported the use of mangrove wood as fence posts five respondents reported use of both a knife and a chainsaw to cut the wood, 21 reported use of a knife to cut the wood and one reported use of only a chainsaw.

It is possible access to a chainsaw influences the choice of tool used. Only three respondents used a chainsaw for one purpose without also using it for another purposes. The same five respondents reported use of both a chainsaw and a knife to cut fence posts and mangrove wood.

In addition to the formal responses to this question eight respondents mentioned that they mainly used an axe to cut wood for house and fence posts. One respondent mentioned using a bushman's saw. It is possible these tools have been under-reported compared with knives and

chainsaws because they were not explicitly mentioned in the survey.

6.7 Who collects mangrove wood

The survey asked respondents who gathered mangrove wood. The question was asked generally and did not differentiate between the different uses of mangrove wood, and the gender of respondents was not recorded.[6]

Respondents from three locations, Uripiv Island, Uri Island and Port Indir, reported women, men, youth and children all being involved in collecting mangrove wood, although males appeared to have greater involvement than females. These are three of the four villages whose respondents reported regular use of mangrove wood as fire wood.

Respondents from Barrick, Limap, Lingarakh and Tevaliaut reported men and male youths collecting mangrove wood. Respondents from the latter three of these villages had reported limited use of mangrove wood as firewood, but mangrove wood was used as house or fence posts. See Table 52.

Table 52: Which family members collect mangrove wood

Village name	No of respondents	women	men	Youth girls	Youths male	Children
Barrick	4		4		2	1
Bushmans Bay	3					
Hatbol	4					
Limap	10		4			
Lingarakh	14		1			
Louni	10					
New Bush	3					
Port Indir	8	4	8		4	1
Tarem/Tembibi	19					
Tevaliaut	6		3		3	
Uri Island	4	2	4	2	3	2
Uripiv Island	20	1	17		8	3
TOTAL	**105**					

6.8 Alternative wood sources

Respondents were asked which other trees they used as firewood and house posts, and how often they used these alternatives. Errors may have arisen from the way the data was recorded. Responses have been analysed as recorded and so information presented is indicative only. A particular problem at the analysis stage arose from subtle differences in Bislama terms. As an example the term natora refers to *Intsia bijuga* . The names natora blong burao, natora-burao, burao (natora) or natora burao were taken to refer to the heartwood of burao, *Hibsicus tileaceus*. It is possible separate records of natora and burao, written without a comma in the field or during data processing, have been misinterpreted.

The survey team also failed to standardise the names recorded. Jelly, jeli and chery have all been treated as local names for burao blong solwota. However burao blong solwota could refer to either *Cordia subcordata* or *Thespesia populnea*. One respondent specifically mentioned use of *Cordia* sp. for posts.

[6] In rural Vanuatu there are often gender differences between those gathering firewood, wood for houses and fenceposts.

6.8.1 Alternative fire wood sources

A wide variety of trees were used as sources of firewood. However five species were mentioned by over half of the survey respondents and across the range of villages surveyed:

- namatal
- navenue
- burao
- kassis
- stinkwood

Most respondents reported that they used these woods regularly, between 1–5 times a week.

Table 53: Other sources of firewood

	Barick	Bushman's Bay	Hatbol	Limap	Lingarakh	Louni	New Bush	Port Indir	Tarem/ Tembibi	Tevaliaut	Uri Island	Uripiv Island	Total
Sample size	4	3	4	10	14	10	3	8	19	6	4	20	105
Namatal *(Kleinhovia hospita)*	4	3	4	10	14	8	3	8	15	6	3	5	83
Navenue *(Macaranga spp).*	4	3		9	12	8		7	9	5	4	19	80
Burao *(Hibiscus tileaceus)*	1	2	4	10	14	1	3	6	10	5	2	15	73
Kassis (*Leucaeuna leucocephala)*	4		4	4	8	8	3	4	1	5	3	12	56
Stink wood *(Dysoxylum spp.)*	4	3	3	8	10	6	3	3	8	3	1	2	54
Mango *(Mangifera indica)*			3									14	17
Namambe *(Inocarpus edulis)*								4	7		2	1	14
Citrus trees (various spp.)			3									8	11
Natapoa *(Terminalia catappa)*												7	7
other		3	4			1		3	5		5	11	32

6.8.2 Alternative house post sources

Respondents were asked to name other trees they used as house posts (Table 54). A wide range of trees were named. Widely reported species include Burao, Kasis, Namalaus, Natora. Navenue and Burao blong Solwora (or Jeli) were reported frequently by respondents from Uripiv Island. Respondents were not asked how often they used these trees as house posts.

Table 54: Other sources of house posts

	Barick	Bushman's Bay	Hatbol	Limap	Lingarakh	Louni	New Bush	Port Indir	Tarem/ Tembibi	Tevaliaut	Uri Island	Uripiv Island	Total
Sample	4	3	4	10	14	10	3	8	19	6	4	20	105
Burao *(Hibiscus tileaceus)*	3	3	3	6	6	7	3	6	19	5	1	4	66
Kasis *(Leucaeuna leucocephala)*	3	3		3	4				11	1	3	14	42
Namalaus (*Glochidon sp.)*	3		3	4	5	7	2		10	1			35
Natora *(Intsia bijuga)*				7	10		2	2		3	3	4	31
Navenue *(Macaranga sp.)*							2			2	1	5	10
Jeli (burao blong solwota) Uncertain*: Cordia subcordata* or *Thespesia populnea*								5			2	5	12
Red natora *(Kleinhovia hospita)*									7				7
Blue water *(Macaranga spp.)*			3			1		3		2			9
Namariu *(Dysoxylum spp.)*											1	10	0
Other		3	3	1	1	4	6	7		2	10	5	42

Note: Natora blong burao identification is uncertain, possibly heart wood of *Hibiscus tileaceus*

7 Discussion

7.1 Comments on the methodology

Analysis of this survey would have benefited from tools to:

- ensure precise answers regardless of language differences; and
- consistency in the ways responses were received.

One common strategy for this purpose is the use of picture cards. The surveyors could, for example, have carried a card with colour pictures of the mangroves present to establish the identity of mangroves.

Consistency of answers could have been improved by respondents carrying lists of names for species of mangrove and other trees showing the name to be recorded for analysis purposes. Basic introductory training in linguistics might also have increased the likelihood of consistent written recording of language terms.

Lastly the survey would have benefited from an initial pilot to help improve the question structure and content. A pilot would have picked up simple omissions such as “axe” from the list of tools used to harvest mangrove wood. A pilot would have also revealed the opportunity to remove questions such as the set of questions on the use of wood as markers.

7.2 Comments on the information gathered

The use of mangrove wood varies throughout the villages surveyed, and this provides an opportunity for the IWP project to market mangrove conservation selectively across the project area.

Villagers from Bushman’s Bay, New Bush, Tarem/Tembibi did not report use of mangrove

wood. Only one respondent from Lingarakh reported use of mangrove wood, the use of green mangrove poles for fence posts.

The villagers from Hatbol, Uripiv, Uri Island, use dry mangrove wood on a weekly basis as firewood, as well as using green mangrove wood on a monthly basis for posts. As a result both males and females (and youth and older adults) are involved in collecting and directly using mangrove wood. Project initiatives to address mangrove conservation in these villages will need to be broadly directed at the whole community, and help provide alternatives. In Uri and Uripiv Island where there are limited land resources, replanting and farming mangroves may be a useful strategy. Promoting planting of alternatives species may be appropriate where there is greater land area available.

In Louni, Port Indir, Tevaliaut and Limap mangrove wood is used mainly for posts. This use is less frequent, often only once or twice a year, but uses freshly cut green timber with *Ceriops tagal* and *Rhizophora mucronata* preferred. In these villages the IWP project initiatives may benefit from focusing on men and promoting use of alternative posts.

Part III: Reef fish survey

8 Introduction

Fish are both a subsistence and commercial resource to the villages in the Vanuatu IWPDP area at Crab Bay. Information on local fishing practices was gathered to inform the community conservation activities of Vanuatu's IWPDP project.

8.1 Methods

The IWP project team developed a written survey questionnaire in November 2004. Primrose Malosu (IWP Project Assistant) and Russell Nari (Deputy Director, Environment Unit) introduced the survey to volunteer facilitators (Table 55). The facilitators took the survey forms to their villages and conducted interviews with convenient villagers during the first weeks of December 2004. The survey was conducted simultaneously with the mangrove and household survey.

Table 55: Facilitators conducting the finfish survey

Name	Village
Anzel Kali	Hatbol
Kalen Api	Lingarakh
Kalmari Noel	Barrick
Saline Song	Port Indir
John Kensi	Bushman Bay
John Kensi	New Bush
Liency Kaun	Louni
Roy. L.	Louni
* Primrose Malosu	Port Indir, Tevaliaut & MAPBEST
* Russell Nari	Port Indir, Tevaliaut & MAPBEST
Davis	Tevaliaut & MAPBEST
Shella Philip	Uripiv
Mary Banga	Uripiv
Chief Fetnet	Uri
Mary Kernis	Tembibi
Kenery	Tembibi
Elder Singh	Tarem

8.2 Survey sample

The survey was administered to 76 men and 14 women from 23 villages and hamlets in the IWPDP project area (Table 56); 59% of respondent were aged between 25 and 60; 18% were under 24; and 6% were over 61 (Table 57).

Table 56: Survey sample by gender and village

Village	Men	Women	Not stated	Sample
Barrick	2	2		4
Bushman Bay	3			3
Ginenarong	1	1		2
Hatbol	4			4
Limap	4			4
Lingarakh	3	1		4
Louni	10			10
Mapbest		1		1
Meltapol	1			1
New Bush	3			3
Port Nabe	6			6
Port Tun	1			1
Portindir	6	2		8
Robako	1			1
Sopor	1			1
Taremb	5	2	1	8
Taremb Lele	2			2
Tembibi	9			9
Tevaliaut	4	1		5
Tevri	5	2	1	8
Uri Island	3		1	4
Uripiv Island	1	1		2
Villavi	1	1		2
No of respondents	**76**	**14**	**3**	**93**

Table 57: Survey sample by village and age group

Village	7 - 24 years	25-60 years	>61 years	not stated	Total sample
Barrick	1	3			4
Bushman Bay		3			3
Ginenarong		2			2
Hatbol		4			4
Limap	1	3			4
Lingarakh	3	1			4
Louni				10	10
Mapbest		1			1
Meltapol		1			1
New Bush		2	1		3
Port Nabe	2	4			6
Port Tun	1				1
Portindir		7	1		8
Robako		1			1
Sopor		1			1
Taremb	3	4	1		8
Taremb Lele		2			2
Tembibi	1	7	1		9
Tevaliaut		3	2		5
Tevri	4	3		1	8
Uri Island		4			4
Uripiv Island	1	1			2
Villavi		2			2
Total	**17**	**59**	**6**	**11**	**93**
Percent of sample	18%	63%	6%	12%	

9 Data gathered

9.1 Fish species caught by survey respondents

The survey gave an open question asking respondents to name fish species they caught. Up to nine names were received from individual respondents. This method often understates the range of fish collected and it is likely that many more fish are caught. Table 58 lists all fish mentioned by respondents by Bislama and language name. There was some variation in spelling of fish names with both language and Bislama names recorded in several spellings. Obvious spelling differences have been corrected. However it is quite likely some names are duplicates: for example whiskered fish and moustache fish. As it is not possible to confirm with respondents both names have been included here.

There is considerable variation in the fish mentioned by village and in the relative frequency with which fish are mentioned.

Table 58: Fish commonly caught, by village

Village	Bislama name	Language name	No of times mentioned
BARRICK	Pico	Deck	4
4 households	Big bell	Nearaku	4
	Mullet	Nanes	4
	Red Mouth, Red Mullet	Mengaa	4
	Red Fish	Betiwawal	3
	Blue fish	Meligh	3
	Mangru	Chellel, chelleh	3
	Karong	Mejun	1
BUSHMAN'S BAY	Los, Los (Black & red)	Fatumau, Whiri	3
3 households	Red Mouth	Hushotahilihili	3
	Strong Skin	Loholu	2
	White & Red Poulet	Bule	1
	Sus	Malo	1
	Sand fish	Arum	1
	Karong	Kalil	1
	Long Mouth	Anmaril	1
	Saw Fish	Sasar	1
GINENARONG	Red Mouth	Mengaa	2
2 households	Blue Fish	Meligh	1
	Red fish	Betiwaiwal	1
	Pico	Deck	1
	Mullet	Nanes/Nambor	1
	Blue bone	Bun Bun bwerum	1

Village	Bislama name	Language name	No of times mentioned
	Big bell	Nearaku	1
	-	Nanurum Bibi	1
	Mangru	Chellel/Rewon	1
HATBOL	Yellow bell	Takari	2
4 households	Stone Fish	Vinya Vat	2
		Vinyek yalyal	1
	Yellow bell	Takarik	1
	Strong Skin fish	Ikey Nontinon	1
	Blue Fish	Ikey Malie	1
	Flying Fish	Finyak Yalyal	1
	Red Fish	Vinya Meyal	1
LIMAP	Big bell		3
4 households	Blue fish		3
	Mullet	Gane	3
	Red Mouth	Whosita	3
	Whiskered fish		2
	Karong		2
	Shark		1
	Saw fish		1
	Rainbow fish		1
	Napoleon		1
LINGARAKH	Strong Skin		2
4 households	Red Mouth	Movat	2
	Green bone	Bil Bil weri	1
	Sardin		1
	Rainbow fish		1
	Pico		1
	Karong		1
	Blue fish		1
	Blue bone	Bil Bil weri	1
	Big bell		1
	Whiskered Fish		1
	Mullet		1
LOUNI	Mullet	Nanes	10

Village	Bislama name	Language name	No of times mentioned
10 households	Pico	Deck	8
	Mangru	chellel	7
	Moustache fish	Merlat	1
	Red Mouth	Mengaa	1
MAPBEST	Mullet	Nanes/Gerong	1
1 household	Pico	Deck	1
	Blue fish	Nufalo	1
	Big bell	Nareaku	1
	Red Mouth	Nimbwe	1
MELTAPOL	Big Bell	Nearaku	1
1 household	Parrot fish	Meluich	1
	Rainbow fish	Newriling	1
NEW BUSH	Pocket fish		1
3 households	Red Mouth		1
	Strong skin	Loholu	1
	Karong	Kalil	1
	Los		1
	Long Mouth	Anmaril	1
	Red Mouth	Hoshotahilihili	1
	Los	Fathman	1
PORT NABE	Mullet	Nambor	5
6 households	Red Mouth	Mengaa	4
	Pico	Miser, Deck	5
	Sorry fish	Mowit	1
	Rainbow fish	Newrilen	1
	Moustache fish	Surliv	1
	Karong	Mechun	1
	Blue fish	Mellij, Mellag	2
	Black Fish	Bolwei	1
	White fish	Marie	1
Port TUN	Red Mouth	Mengaa	1
1 household	Strong Skin	Nasum	1
	Tuna	Niwon	1
	Long Mouth	Niserser	1
	Mullet	Nambor	1

Village	Bislama name	Language name	No of times mentioned
	Pico	Miser	1
PORT INDIR	Pico	Mengaa, Miser ,Deman, Deck, deckmot, demas	9
8 households	Mullet	Nanes, Nambor	8
	Mangru	Chellel, Gaell, Chellel/Rewon	6
	Red Mouth	Mengaa, Menga	6
	Moustache fish	Merlak, Surellef, Surulin, Jemun	6
	Blue fish	Melaet, Nulif, Meligh, Namau	4
	Los	Betti	2
	Big Bell	Nearaku	2
	Karong	Mechun	1
	Green Bone	Bil Bil weroume	1
	Fie	Doame	1
	Wasket fish	Meilat	1
	Long mouth	Dewarabun	1
ROBAKO	Mullet		1
1 household	Mangru		1
	Moustache fish		1
	Pico		1
	White fish		1
SOPOR	Mangru	Chellel	1
1 household	Wasket fish	Melat	1
	Mullet	Nanes	1
	Pico		1
	Red Mouth	Mengaa	1
TAREMB	Mullet		8
8 households	Blue fish		6
	Karong		6
	Movet		5
	Pico		3
	Wisket fish		3
	Red Mouth		3
	Red Fish		4
	White fish		1

Village	Bislama name	Language name	No of times mentioned
TAREMB LELE	Blue fish		3
2 households	Pico		2
	Wisket fish		2
	Red Mouth		2
	Mullet		2
	Big bell		1
	Karong		1
	Mangru		1
TEMBIBI	Blue fish		9
8 households	Mullet		7
	Wisket fish		7
	Karong		6
	Red Mouth		3
	Movet		3
	White fish		2
	Shark		2
	Pico		2
	Strong skin		1
	Rainbow fish		1
	Napoleon		1
	Los		1
	Kingfish		1
	Cat fish		1
	Bone fish		1
	Big bell		1
	Red Fish		1
TEVALIAUT	Pico		3
5 households	Red Mouth	Unghilihili, Hingoilili	3
	Mullet	Anas, Hingoilili	3
	Blue Fish	Imeas	2
	Sword fish	Kulindo	1
	Small Mangru	Yekon	1
	Sand Paper	Kulido	1
	White fish		1
	Karong		1

Village	Bislama name	Language name	No of times mentioned
	Big bell	Akuk	1
	Moustache fish	Sisihoai	1
TEVRI	Red Mouth	Mengaa	6
8 households	Rainbow fish	Newriling	4
	Pico	Miser	4
	Mullet	Nambor	4
	Strong Skin	Nasum	3
	Sorry fish	Mowit	3
	Blue Fish	Melaich	1
	Big Bell	Nearaku	1
	Sardine	Daniv	1
	Blue Fish	Mellaj	1
	Black pocket knife	Bolwe	1
	Shine fish	Marri	1
	Big Eye	Nimetelep	1
	Karong	Mechun	1
	Black fish	Bollwe	1
	Moustache fish	Gun rul	1
	Black fish	Bolwe	1
	Los	Beti	1
	Long Mouth	Niserser	1
	Tuna	Niwoa	1
URI ISLAND	Red Mouth	Mengaa	4
4 households	Karong	Mechun	4
	Long Mouth	Neserser	4
	Pico	Deck	3
	Mullet	Nambor, Nanes	3
	Tuna	Newon	1
	Yellow mouth	Nubih	1
	Thick Lips	Revun, Rewun	2
	Saw fish	Nul	1
	Sardine	Danleve	1
	Wild Mangru	Chellel	1
	Moustache Fish	Jungrul	1
	Mangru	Rewun, Revenu	2

Village	Bislama name	Language name	No of times mentioned
URIPIV ISLAND	Red mouth	Mengaa	2
2 households	Moustache fish	Surilw	1
	Mangru	Rewun	1
	Mullet	Nambor	1
	Blue fish	Mellaj	1
	Pico	Miser	1
VILAVI	Tuna	Niwun, Megun	2
2 households	Mullet	Nambor, Wabot	2
	Blue fish	Mellaj	1
	Mangru	Revun	1
	Pico	Mesir	1
	Rainbow fish	Bolwe	1
	Red Mouth	Mengaa	1

9.2 Ways fish are caught

Respondents were asked whether they used any of a list of methods to catch fish. Results are presented by village in Table 59. The options presented were not exclusive. For example someone using a canoe to go fishing will normally use a fishing line, net or other tool to catch the fish.

The term spear fishing was used in two contexts: use of a traditional spear and use of a modern spear gun. Where fishing with a spear was mentioned it is assumed to mean use of a traditional spear.

Use of a reef net, canoe and spear gun were the three most common fishing techniques used used by 40% of respondents or more. Cast nets were used by just over 20% of respondents and fishing lines by 10% of respondents. Use of other techniques was uncommon. Use of a fishing line was omitted from the list and so is probably understated compared with other techniques that were listed.

9.3 Weight of fish caught

Respondents were asked the weight of fish they typically caught using different methods. Responses are presented in Table 60. Respondents typically caught a small weight of fish between 1 and 5 kg in weight. The only technique used by a significant proportion of respondents to catch in excess of 5 kg fish was a reef net.

Use of a reef net was further analysed by village. Data are presented in Table 61. Because of the small sample size from most villages no trend was apparent. However Tembibi, Port Indir and Louni had a high proportion of respondents reporting catches in excess of 6 kg from use of a reef net.

Table 59: Fishing methods used by village

Village	No of surveys	Reef net	Use canoe	Dive with speargun	Cast net	Fishing line	Boat with engine	Light at nightt	Spear fishing	Fishing on reef	Rishing at reef edge
Barrick	4	1	4	3	2						
Bushman Bay	3		3				1		1		
Ginenarong	2	1	1			1					
Hatbol	4			4							
Limap	4	3	1	4	2						
Lingarakh	4	1	1	1	1			1		2	
Louni	10	10	5								
Mapbest	1			1	1	1		1			
Meltapol	1	1		1							
New Bush	3	2	1	1							
Port Nabe	6	4		3							1
Port Tun	1		4								
Portindir	8	6	1	1	1	3			1		
Robako	1	1	4	1	1						
Sopor	1		1	1							
Taremb	8	5	6	3	4	4		1			
Taremb Lele	2	2	1	1	2						
Tembibi	9	9	6	8	8	1	1	1			
Tevaliaut	5	2	3	1	1	1					
Tevri	8	6	6	3			1				1
Uri Island	4	4	4	4	1	1			1		
Uripiv Island	2	2	2	1			1				
Villavi	2	1	1	1							
Overall count	93	**61**	**55**	**43**	**24**	**12**	**4**	**4**	**3**	**2**	**2**

Table 60: Weight of fish caught using typical methods

Fishing technique	1 - 3 kilo	1-5 kilo	6-15 kilo	15-30 kilo	< 30 kilo
Fishing from a canoe		37	4	2	
Diving with a spear gun	1	30	6	1	
Cast net		16	6		
Reef net		28	23	7	1
Fishing from a boat with engine		1		1	
Fishing line	1	5			
Fishing on reef		1			
Light at night		1			
Spear, bow & arrow		1			

Table 61: Weight of fish caught using a reef net (by village)

Village	No of surveys	1-5 kilo	6-15 kilo	15-30 kilo	< 30 kilo	1 - 3 kilo
Barrick	4		1			
Ginenarong	2		1			
Limap	4	1	2			
Lingarakh	4		1			
Louni	10	1	5	3		
Mapbest	1	1				
Meltapol	1	1				
New Bush	3	2				
Port Nabe	6	2	1	1		
Portindir	8		5		1	
Robako	1	1				
Taremb	8	4				
Taremb Lele	2	1	1			
Tembibi	9	1	9			
Tevaliaut	5	1	1			
Tevri	8	1	4	1		
Uri Island	4	3		1		
Uripiv Island	2			1		
Villavi	2		1			
Count of respondents		**20**	**31**	**7**	**1**	**0**

9.4 Fish caught during a typical fishing trip

The survey repeated the initial question but requested additional detail about the proportional composition of the catch. While the questionnaire asked for respondents to nominate the species as a percent of the overall catch responses have been recorded as the weight of each fish caught. Responses are presented in Table 62.

Data is considered a rough estimate rather than precise, as fish would not commonly be weighed. Shark or sword fish, for example, would commonly be more than 3 kg in weight.

While a wide range of fish are, caught a small number of species dominate the villagers' harvest: mullet, red mouth, pico, karong blue fish and whiskered fish, big bell, movat, red fish, and mangru.

Table 62: Weight of inidvidual fish caught during a typical fishing trip

Common name	<30 kg	1-3 kg	4-10 kg	11-15 kg	16-30 kg
Mullet		27	23	9	2
Red mouth		25	7	1	
Pico		19	10	3	1
Karong		17	1		
Blue fish		11	1	3	
Wiskered fish		11	1	1	
Big bell		9	3		
Movat		8			
Red fish		7			
Mangru		4	3	1	
Rainbow fish		4			1
Strong skin		4			
Tuna		3	2		
Los	1	3			
Moustache fish	1	2	1		
White fish		2			
2 kinds of fish		2	1		
Napoleon		2			
Saw fish		2			
Shine fish		2			1
Shark		2			
Black fish		1			
Bun bun bwerum		1			
Long mouth		1			
Sorry fish		1	1		

Common name	<30 kg	1-3 kg	4-10 kg	11-15 kg	16-30 kg
Sus		1			
Big eye		1			
Blue bone	1				
King fish		1			
Mengaa		1			
Cat fish		1			
Nojil		1			
Pocket fish		1			
Thick lips		1			
Betiwaiwal		1			
Long mouth		1	1		
Sardine		1			
Red mullet		1			
Count of respondents	**3**	**182**	**55**	**18**	**5**

9.5 Purpose for which fish are caught

Respondents were asked whether they caught fish for domestic consumption, sale or other uses. Responses are summarised in Table 63.

Three uses were reported: household consumption, sale and gifting or sharing. No fish were harvested solely for sale. There was a demarcation between villages that caught fish for household consumption and those that caught fish for both consumption and sale. Respondents from Bushman's Bay, Hatbol, Limap, Lingarakh, Mapbest, New Bush, Robako, Taremb, and Tembibi primarily reported fishing for consumption only.

Table 63: Purpose for which fish are caught

Village	No of surveys	Household consumption	Consumption and sale	Share
Barrick	4	1	3	
Bushman Bay	3	3		1
Ginenarong	2		2	
Hatbol	4	4		
Limap	4	4		
Lingarakh	4	4		
Louni	10		9	
Mapbest	1	1		
Meltapol	1		1	

Village	No of surveys	Household consumption	Consumption and sale	Share
New Bush	3	2		
Port Nabe	6	1	5	
Port Tun	1		1	
Portindir	8		8	1
Robako	1	1		1
Sopor	1		1	
Taremb	8	8		
Taremb Lele	2	2		
Tembibi	9	9		
Tevaliaut	5	1		
Tevri	8		8	
Uri Island	4		4	1
Uripiv Island	2		2	
Villavi	2		2	
Overall count	**93**	**41**	**46**	**4**

9.6 Where fish are sold

Respondents who sold fish were asked who their buyers were. Responses are summarised in Table 64.

Village stores and stores in the Lakatoro area were the most common buyers of fish. Eight respondents reported selling fish in the Malampa market, four to local villagers and three to local buyers or middle men. One reported selling fish to Lakatoro residents and one reported selling direct to restaurants in Port Vila.

Table 64: Fish buyers

Village	Local villagers	Market	Stores	Local buyers	Lakatoro residents	Vila restaurants
Barrick	1		3			
Ginenarong		1	1			
Ginenarong		1				
Louni			6			
Meltapol				1		
Port Nabe		1	2	1		
Port Tun			1			
Portindir	2	2	6			
Sopor		1				

Village	Local villagers	Market	Stores	Local buyers	Lakatoro residents	Vila restaurants
Tevri	1	1	2	1		
Uri Island			4		1	
Uripiv Island		1	1			
Villavi			1			1
Count of responses	4	8	27	3	1	1

9.7 Type and value of fish sold

Respondents were asked to nominate the fish species they commonly sold by weight and the price received. Up to six responses were received from each respondent. Responses are presented in Tables 65 and 66.

A much smaller list of species was generated than with question 1. Mullet, Red Mouth, Big Bell, Mangru, Pico and Blue Fish were commonly sold in quanitities between 1 and 20 kg.

Price estimates are not clear. Many respondents appear to have cited the price received for the entire catch. However, others cited a price that is likely to be the price per kilogramme.

Table 65: Weight of fish sold

Fish type 1	1-5 kg	6-10 kg	11-15 kg	16-20 kg	>20 kg
Mullet	8	6	5	1	2
Red Mouth	11	5	1		
Big bell	5	1	3		
Mangru	3	3	3	2	
Pico	5	5	2		
Blue fish	1	3	4		1
Long Mouth	2	1			
Red fish	2				
Tuna		3			
White Pico	1				
Moustache fish	3	1			
Shine Fish	2				
Karong		1			
Big Eye	1				

Table 66: Price of fish sold

Fish type	<500 VUV	501-1000 VUV	1001-1500 VUV	1501 – 2000 VUV	>2000 VUV
Big bell	1	5	2	1	
Blue fish	1		3	1	4
Long Mouth	1	1	1		
Mullet	11	4	4	2	6
Pico	6	3	2	2	2

Fish type	<500 VUV	501-1000 VUV	1001-1500 VUV	1501 – 2000 VUV	>2000 VUV
Red Mouth	5	6	3	3	1
Big Eye	1				
Mangru	1			2	6
Red fish	2				
Tuna			1		2
White Pico	1				
Moustache fish	1	2	1		
Shine Fish	1	1			
Karong		1			

Part IV: Fish marketing survey

10 Introduction and method

Fish are a commercial resource to the villages in the IWP project area at Crab Bay. Greater understanding of the local marketing of fish was sought to inform the community conservation activities of Vanuatu's IWP project.

On behalf of the IWP project Russell Nari (Deputy Director, Environment Unit) administered written surveys to 7 retail fish outlets and one restaurant operating in the Lakatoro to Norsup area. All surveys were conducted on Wednesday 1 December 2004. The outlets interviewed were

- Rina Store
- Malekula Consumers Association
- KCCO-Lakatoro
- LTC
- Norsup Hospital Canteen
- Lakatoro Consumer Cooperative
- MSM
- Navar Store

The surveys asked the store owners to estimate the quantity and varieties of fish they bought on a weekly or monthly basis and their pricing policy for each kind of fish. Responses are anecdotal and the survey team did not have a ready means of confirming the responses given.

11 Fish marketing data

None of the retail outlets interviewed catch their own fish. Instead, stores purchase fish directly from villages suppliers (in both nearby and more distant villages). The locations where their fish are sourced are presented in Table 67. LTC had the most significant trade and purchases from the Norsup to Lingarakh area, which includes the IWP project area. Four outlets purchase from the Port Indir villagers.

Table 68 presents the data obtained on the type and estimated volume of fin fish purchased weekly by retail outlets and the outlets typical pricing policies. This data has been used to prepare Tables 69, 70 and 71; Table 69 compares the estimated weights of the different fish purchased by the surveyed retail outlets; Table 70 calculates the value in vatu of fish purchased by retail outlets, which doubles as an estimate of the gross income received by the fishers who caught them; Table 71 calculates the net income in vatu (gross income less cost of sales) of the retail outlets.

If commercial fin fish sales are considered by estimated weight the four most significant species in order are piko, mullet, snapper and poulet. If commercial fish sales are considered by gross income to fisherfolk the same four species remain significant, although more gross income is generated from poulet than snapper. If commercial fish sales are considered by net income to retailers the same four species remain important but poulet moves into second position. The net earnings to retailers from fish are modest (less than USD 40), with the exception of LTC store which has total net earnings of some 22,000 VUV per week (USD 200). At times LTC buys up to 120 kilos of snapper, tuna and poulet a week, although usually a smaller quanity is purchased.

Table 67: Source of fish purchased for sale

Store	Source of reef fish	Source of deep water fish
Rina Store	*Louni*, Lakatoro & Uri	
MCA	Tautu, Norsup & Bethel	Atchin, Mark Fred (Lakatoro)
KCCO-Lakatoro	*Port Indir*, Rano	Mark Fred
LTC	Lakatoro Area (Norsup to *Lingarakh*)	Archin only if there is surplus
Norsup Hospital Canteen	Tautu, VRP, Tisman	
Lakatoro Consumer Cooperative	Uri, Leoni, *Port Indir*	Mark Fred (Lakatora), John Temar (Lakatora)
MSM	*Louni, Port Indir, Uri, Uripiv*, Norsup, NW area, Tisman	*Louni, Port Indir*, Uri, Norsup, NW Area, Tisman
Navar Store	*Port Indir*	

(Locations within the IWP project area are in italics)

Table 68: Fish market estimated weight and pricing by store

	Mullet			Piko			Snapper			Poulet			Other (Mangarou, rabbit fish, reef fish, garong)		
Retail outlet	kilo per week	PP	SP	kilo per week	PP	SP	kilo per week	PP	SP	kilo per week	PP	SP	kilo per week	PP	SP
Rina Store	5	205	260	5	205	260	0	0	0	0	0	0	15	205	260
MCA	5	200	250	5	200	250	13.75	250	300	13.75	250	300			
KCCO-Lakatoro	2.8	220	0	2.8	220	0	3.5	220	0	3.5	220	0	7	220	0
LTC	40	200	280	40	200	280	40	200	280	40	250	400	40	200	280
Norsup Hospital Canteen	15	200	250	37	200	250	0	0	0	0	0	0			
Lakatoro Consumer Coop	15	180		15	180	250	15	200	270	15	200				
MSM	8	200	270	8	200	270	0	0	0	0	0	0	3.75	200	270
Navar Store	10	200	260	10	200	260	0	0	0	0	0	0			
Total quantity	**100.8**			**122.8**			**72.25**			**72.25**			**50.75**		

PP = purchase price; SP = selling price

Table 68: Fish market estimated weight and pricing by store (cont.)

	Red mouth			Blue fish			Other products traded
Retail outlet	kilo per week	PP	SP	kilo per week	PP	SP	
Rina Store	5	185	250	2.5	200	270	Mud Crabs
MCA				12.5	200	250	Lobsters, mud crabs (sometimes)
KCCO-Lakatoro							
LTC				40	200	280	Lobsters, coconut crabs, Prawns
Norsup Hospital Canteen	2	200	250	5	200	250	
Lakatoro Consumer Coop	15	200					
MSM	3.75	200	270				
Navar Store	12.5	200	260				
Total quantity	**38.25**			**60**			

PP = purchase price; SP = selling price

Table 69: Estimated weight of fish (kg) sold by retail outlets (weekly)

Store	Piko	Mullet	Snapper	Poulet	Blue fish	other	Red mouth	Other products traded
Rina Store	5	5	0	0	2.5	15	5	Mud Crabs
MCA	5	5	13.75	13.75	12.5			Lobsters, mud crabs (sometimes)
KCCO-Lakatoro	2.8	2.8	3.5	3.5		7		
LTC	40	40	40	40	40	40		Lobsters, coconut crabs, Prawns
Norsup Hospital Canteen	37	15	0	0	5		2	
Lakatoro Consumer Coop	15	15	15	15			15	
MSM	8	8	0	0		3.75	3.75	
Navar Store	10	10	0	0			12.5	
Total quantity	**122.8**	**100.8**	**72.25**	**72.25**	**60**	**50.75**	**38.25**	

Table 70: Estimated Value in Vatu of fish purchased weekly by retail outlets

Store	Piko	Mullet	Poulet	Snapper	other	Blue fish	Red mouth
Rina Store	1,025	1,025	-	-	3,075	500	925
MCA	1,000	1,000	3,438	3,438	-	2,500	-
KCCO-Lakatoro	616	616	770	770	1,540	-	-
LTC	8,000	8,000	10,000	8,000	8,000	8,000	-
Norsup Hospital Canteen	7,400	3,000	-	-	-	1,000	400
Lakatoro Consumer Coop	2,700	2,700	3,000	3,000	-	-	3,000
MSM	1,600	1,600	-	-	750	-	750
Navar Store	2,000	2,000	-	-	-	-	2,500
Total quantity	**24,341**	**19,941**	**17,208**	**15,208**	**13,365**	**12,000**	**7,575**

Table 71: Estimated weekly net income in Vatu of retailers

Store	Piko	Poulet	Mullet	Snapper	other	Blue fish	Red mouth	Total
Rina Store	275	0	275	0	825	175	325	1,875
MCA	250	687.5	250	687.5	0	625		2,500
KCCO-Lakatoro		Purchases fish for sale in their restaurant. Records of sale price not kept.						
LTC	3200	6000	3200	3200	3200	3200		22,000
Norsup Hospital Canteen	1850	0	750	0	0	250	2	2,852
Lakatoro Consumer Coop	1050	1050	1050	1050	0	0	15	4,215
MSM	560	0	560	0	262.5	0	3.75	1,386
Navar Store	600	0	600	0	0	0	12.5	1,213
Total	**7785**	**7737.5**	**6685**	**4937.5**	**4287.5**	**4250**	**358.25**	**36,041**

Note: Income = quantity x (retail price – purchase price)

Retailers were asked why they thought some fish sold more readily than others. Several outlets gave more than one reason. Responses are collated in Table 72. The most significant reason is believed to be that customers buy particualar fish because they prefer the taste.

Table 72: Why some fish sell more readily

Reason	Taste / like	price	availability	Safety	Demand	Easy catch	other
No of responses	6	1	1	1	2	2	1

A few non-finfish species are sold on an opportunistic basis when available, including mud crabs, freshwater prawns and freshwater fish, coconut crabs and lobsters. MCA store sells mud crabs and lobsters for 500 VUV each, but no other pricing details were provided. LTC store representatives noted that these products are not actively marketed, and prices vary depending on when they are purchased.

Part V: Crab marketing data

12 Crab marketing overview

The Vanuatu IWPDP gathered information on the local marketing of *Cardiosoma hirtipes* by administering written questionnaires to women selling *Cardiosoma* at the Malampa market over the ten days between Wednesday 1 December and Friday 10 December 2004.

The 27 women selling *Cardiosoma* at Malampa market during the survey period came from five villages: Barrick (4), Louni (8), Pinalum (1), Port Indir (13) and Tevaliaut (1). Women from Barrick attended the market on average 2.5 times during the survey period, Port Indir 1.3 times and all others less frequently; 70% of vendors only attended the market once during the survey period. The number of vendors attending the market was six or less on all but Friday 3 December, a government pay day, when 16 vendors attended the market.

The number of vendors attending the market is less than the number of women engaged in commercial crab harvesting and sales. One vendor at the market commonly sells crabs on consignment from several other villagers (Malosu, pers. comm.). This practice is convenient and cost effective for the women concerned. Those consigning their crabs to a friend are able to attend to a variety of commitments instead of spending the full day at the market, and avoid incurring transport and market costs. While the vendors of *Cardiosoma* were all women, men and children are also involved in crab harvesting to a limited extent.

Cardiosoma are presented for sale in bundles of 10 crabs priced at 200VT. The number of crabs presented for sale varied from 50 crabs on Monday 6 December to 1,634 crabs on Friday 3 December. On average *Cardiosoma* vendors offered 100 crabs for sale. Port Indir was the village with the greatest number of vendors and the greatest number of crabs offered for sale: 1790 during the survey period, significantly more than Lowni (968 crabs) and Barrick (838 crabs).

None of the vendors reported that the *Cardiosoma* on sale had been caught inside the MPA area. Five women from villages relatively close to the MPA were marketing crabs collected from locations close to the MPA. The commercial harvesting locations from which most crabs were harvested were Nunebeken and nearby areas; Losarsar and nearby areas; and Louni. Together these three locations accounted for 70% of the *Cardiosoma* offered for sale during the survey period.

On average the vendors offered four other commodities for sale. The mean total value of the goods (including *Cardiosoma*) that they offered for sale was 3,090 VUV. For 30 of the 39 vendors (77% of women), the market value of *Cardiosoma* was greater than 50% of the total value of the goods they offered for sale. For 13 of these women (33%), the market value of *Cardiosoma* was greater than 75% of the total value of the goods they offered for sale.

Of the products vendors sold *Cardiosoma* was the only product consistently mentioned as being readily sold, although several women had success marketing corn (both fresh and cooked), green coconuts and tomatoes.

The vendors typically experienced three costs in attending the market: transport to the market with their produce, transport back to their village and a market stall fee that contributed toward management of the market house. For women from Barrick and Port Indir these costs amounted to 350 VUV. For women from Louni, Pimalum and Tevaliaut the costs were 450 VUV.

It is rare that all goods are sold. Unsold goods are typically taken back home, or shared with relatives and families. In some instances they are exchanged with other women.

13 Introduction

Cardiosoma hirtipes is an important commercial resource to the villages in the Vanuatu IWPDP area at Crab Bay. Greater understanding of the local marketing of *Cardiosoma was* sought to inform the community conservation activities of Vanuatu's IWP project.

13.1 Methods

On behalf of the Vanuatu IWPDP project a survey team consisting of Primrose Malosu (IWP Project Assistant), Russell Nari (Deputy Director, Environment Unit) and Anzel Kali (Hatbol Village) visited the Malampa and Norsup market to survey women selling *Cardiosoma* crabs.

The surveyors administered prepared written questionnaires to the women selling crabs at the Malampa market over the ten days between 1 and 10 December 2004. Women were interviewed each time they attended the market during this period to provide full information on the quantities and values of crabs and other products presented for sale. A total of 39 surveys were completed. Of the 27 women surveyed five were administered the survey twice, two were administered the survey three times and one was administered the survey four times (Table 73).

The responses of women who were interviewed more than once have been cross checked for consistency. Where women have been surveyed on more than one day the following practice has been used in analysing data:

- for questions relating to goods at the market on a particular day all surveys have been considered. For clarity the sample group has been referred to as the vendors or sellers interviewed.

- for questions relating to general practices such as frequency of attending the market, only the data from the first survey administered has been included. For clarity the sample group is referred to as the number of women interviewed.

Data on the quantity and price of commodities offered for sale was calculated by the vendor with the surveyor and is considered accurate. Questions on general practices and crab harvesting sites are more subjective, and the survey team did not have a means of corroborating the responses given.

13.2 The Malampa Market

The Malampa Market at Lakatoro is the main market in Malekula and the main market for small holder food produce from the IWPDP project area. The market is open Monday through Friday each week. On Saturday there is a market a further 15 minutes further north at Norsup. At the time of the survey the vendors at Norsup market were not selling *Cardiosoma* (Malosu, pers. comm.). Consequently the survey focuses on the Malampa Market.

Out of concern that the harvesting rates of *Cardiosoma* were unsustainable staff of the Fisheries Department discussed with village chiefs a commercial catch limit. The limit agreed to by the chiefs is 50 crabs per woman: 5 sets of 10 crabs. Standard presentation of *Cardiosoma* in bundles of 10 crabs and standard pricing (200 VUV per bundle) was also encouraged by staff of the Fisheries Department. Surveyors believe these agreements are mostly adhered to, but several exceptions were noted. A few women were observed with more than 10 crabs in their bundles: no doubt a marketing strategy to attract consumers. As one

vendor at the market often sold crabs on behalf of several other village women, it could not be confirmed they adhered to the 50 crab limit.

This report describes the number of *Cardiosoma* crabs and other food produce **offered for sale** at the market. This is not the quantity sold. Women were observed taking unsold produce, including *Cardiosoma* crabs, back to their villages. It is assumed surplus produce was subsequently consumed by the women's families. The survey did not account for unsold produce.

14 Data gathered

14.1 Women selling *Cardiosoma*.

The 27 women surveyed came from five villages: Barrick, Louni, Pinalum, Potindir and Tevaliaut (Table 73). Thirteen women, or just under half, came from Port Indir village. Eight women came from Louni Village, four from Barrick and one each from the villages of Pinalum and Tevaliaut. Women from Barrick had a high rate of repeat participation in the market. While only four women from Barrick were interviewed over the ten days (15% of the total) they attended the market on average 2.5 times during the survey period, and so made up 26% of the vendors selling *Cardiosoma* at the market over the period. In comparison Louni village had twice as many women interviewed, but only one attended the market more than once during the survey period. Consequently the 8 women from Louni only represented 23% of the vendors selling crabs at the market. Port Indir village had the most significant participation in local marketing of *Cardiosoma*, with just under half the number of women interviewed and just under half of the vendors selling *Cardiosoma* at the market.

Table 73: Number of women interviewed by village

Village	No. of women interviewed		No. of *Cardiosoma* vendors at market	
Port Indir	13	48%	18	46%
Louni	8	30%	9	23%
Barrick	4	15%	10	26%
Pinalum	1	4%	1	3%
Tevaliaut	1	4%	1	3%
Total	27	100%	39	100%

Table 74 further summarises the frequency with which vendors attended the market during the survey period. Nineteen of the *Cardiosoma* vendors attended the market only once between 1 and 10 December 2004. However, five vendors attended the market twice, two vendors attended the market three times and one attended the market four times.

Table 74: Frequency with which women interviewed attended the market by village

Frequency	Barrick	Louni	Pinalum	Port Indir	Tevaliaut	Total
1 time	1	7	1	9	1	19
2 times	1	1		3		5
3 times	1			1		2
4 times	1					1

The number of vendors attending the market is less than the number of women engaged in commercial crab sales. The surveyors established that Port Indir has three or four informally constituted groups of women who take turns attending the market on behalf of the group. As a consequence one woman at the market may be selling crabs on behalf of several other village women (Malosu, pers. comm.). Similar arrangements are thought to exist in the other villagers. This practice is convenient for the women concerned. Those consigning their crabs to a friend are able to attend to a variety of commitments instead of spending the full day at the market.

The number of *Cardiosoma* vendors at the market varied from one on Monday 6 December up to 16 on Friday 3 December (Table 75). On all but two of the market days there were less than five vendors selling *Cardiosoma*. On Wednesday 1 December six vendors offered *Cardiosoma* for sale. On Friday 3 December, there were 16 vendors selling *Cardiosoma*. Friday 3 December was a government pay day. It is probable this was a key factor in the larger number of women presenting crabs, and other produce, for sale on this day.

Table 75: Number of *Cardiosoma* vendors interviewed by day and village

Date		Barrick	Louni	Pinalum	Port Indir	Tevaliaut	Total for day
Wednesday	01-Dec-04	3			3		6
Thursday	02-Dec-04		1		2		3
Friday	03-Dec-04	3	6		6	1	16
Monday	06-Dec-04			1			1
Tuesday	07-Dec-04	2			2		4
Wednesday	08-Dec-04		1		1		2
Thursday	09-Dec-04	1			3		4
Friday	10-Dec-04	1	1		1		3
Vendors from each village		10	9	1	18	1	

The survey asked the women interviewed to estimate the frequency with which they offered crabs for sale at the market. Responses are presented in Table 76 as the number of times a month the women offer *Cardiosoma* for sale. Selling crabs four times a month roughly corresponds with attending the market once a week; eight times a month corresponds with twice a week. This response has been compared with observed participation during the survey period (Table 74) in Table 77. Estimated frequency of selling *Cardiosoma* exceeds that observed during the survey period. It is not possible to confirm whether there was below normal participation in *Cardiosoma* marketing during the survey period or whether the estimated frequency is exaggerated.

When women come to the market they frequently spend the entire day there. Of the 39 vendors interviewed only one stayed for less than the full day, staying for only half the morning.

Table 76: Frequency with which women offered *Cardiosoma* for sale

	Village					
Frequency	**Barrick**	**Louni**	**Pinalum**	**Port Indir**	**Tevaliaut**	**Overall**
< 4 times a month			1			1
4 times a month		4		7	1	12
8 times a month	4	3		6		13
12 times a month	2					2
16 times a month		1				1

Note: Crab sellers interviewed more than one time have only had their first answer included in this analysis. Of the eight crab sellers who gave multiple answers all but two gave consistent answers.

Table 77: Comparison of reported frequency with observed practice

Observed over 10 days			**Stated frequency per month from Q**		
Frequency	**No of respondents**	**Percent**	**Frequency**	**No of respondents**	**Percent**
			< 4 times a month	1	4%
1 time	19	70%	4 times a month	12	44%
2 times	5	19%	8 times a month	13	48%
3 times	2	7%	12 times a month	2	7%
4 times	1	4%	16 times a month	1	4%

14.2 Number of *Cardiosoma* offered for sale

The surveyors identified the number of *Cardiosoma* offered for sale by each vendor at the market during the survey period. The information gathered is summarised in Table 78. A total of 3768 *Cardiosoma* were offered for sale over the 8 market days of the survey. The number of *Cardiosoma* on sale varied between 50 crabs on Monday 6 December to 1,634 crabs on Friday 3 December, a government pay day that fell during the survey period. On average *Cardiosoma* vendors offered 100 crabs for sale. There is a locally set maximum limit of 50 *Cardiosoma* per person per market. Women selling more than this number typically sold crabs on behalf of several villagers.

Crabs were offered for sale in bundles of 10 crabs at the consistent price of 200 VUV per bundle.

Table 79 further analyses the number of crabs offered for sale by village. Aggregate data is not presented for Pinalum and Tevaliaut Villages as only one vendor from these villages was interviewed. The average number of *Cardiosoma* offered for sale was similar regardless of village. Port Indir was the village with the greatest number of vendors and the greatest number of crabs on sale, with each vendor presenting on average 100 crabs for sale. Louni Village with nine vendors presented 968 crabs for sale, with each vendor presenting on average 108 crabs. Barrick Village with eight vendors presented a total of 838 crabs for sale, with each vendor presenting on average 84 crabs for sale.

Table 78: Number of crabs offered for sale by date

		No of crab vendors present at the market	Mean number of crabs offered for sale	Maximum number of crabs a vendor offered for sale	Minimum number of crabs a vendor offered for sale	Total number of crabs offered for sale
Wednesday	01-Dec-04	6	72.0	150	40	432
Thursday	02-Dec-04	3	73.3	130	30	220
Friday	03-Dec-04	16	102.1	200	70	1634
Monday	06-Dec-04	1	50.0	50	50	50
Tuesday	07-Dec-04	4	112.5	170	40	450
Wednesday	08-Dec-04	2	100.0	150	50	200
Thursday	09-Dec-04	4	63.0	70	50	252
Friday	10-Dec-04	3	176.7	300	110	530
Aggregate number of *Cardiosoma* offered for sale over the 10 day period (8 market days)		39	99.62	300	30	3768

Table 79: Number of *Cardiosoma* offered for sale by village of the crab seller

Village	No of crab vendors interviewed	Average number of crabs vendors offered for sale	Maximum number of crabs a vendor offered for sale	Minimum number of crabs a vendor offered for sale	Total number of crabs offered for sale
Barrick	10	83.8	168	40	838
Louni	9	107.6	200	60	968
Pinalum	1				50
Port Indir	18	99.4	300	30	1790
Tevaliaut	1				122

14.3 Who caught the *Cardiosoma* presented for sale

The vendors of *Cardiosoma* were all women. Each vendor was asked about the people who had caught the *Cardiosoma* they offerred for sale. Responses are summarised in Tables 80 and 81. Women are most involved in commercial *Cardiosoma* harvesting, but men and children are also involved to a limited extent. The involvement of men and children in crab havesting shows no statistical trend with the number of crabs offered for sale.

Table 80: Who caught the crabs on sale (by village)

	No of responses					
Who caught the crabs on sale	**Overall**	**Barrick**	**Louni**	**Pinalum**	**Port Indir**	**Tevaliut**
Only women	25	9	7		8	1
Women and men	7	1	2			
Only men	3			1	2	
Women with children	1				1	
Men with children	1				1	
Children	1				1	
Other	1					
Sample size	39	10	9	1	13	1

Table 81: Who caught the crabs on sale (by number of crabs offered for sale)

	No of crabs offered for sale by a vendor				
Who catches crabs	**< 50 for sale**	**50 - 99 on sale**	**100 - 149 on sale**	**> 150 on sale**	**Overall**
Only women	1	13	5	6	25
Women and men		4	3		7
Only men	2	1			3
Children		1			1
Men with children		1			1
Women with children				1	1
other	1				1
No of responses	4	20	8	7	39

14.4 Where *Cardiosoma* were caught

The women selling *Cardiosoma* were asked where the crabs they were offering for sale had been collected. Responses are summarised in Table 82. None of the *Cardiosoma* offered for sale had been caught inside the MPA area. Five women from villages relatively close to the MPA were marketing crabs collected from locations close to the MPA. However, most of the *Cardiosoma* had been caught from other locations around Crab Bay (Map 1).

Table 83 lists the specific locations from which the *Cardiosoma* were collected grouped by the vendors' village. Table 84 correlates location from which crabs were collected with the number of crabs offered for sale during the survey period. The commercial harvesting locations from which most crabs were harvested were Nunebeken and nearby areas; Losarsar and nearby areas; and Louni. Together these three locations accounted for 70% of the *Cardiosoma* offered for sale during the survey period.

Table 82: Where the crabs offered for sale had been collected

Location relative to the MPA		**Barrick**	**Louni**	**Pinalum**	**Port Indir**	**Tevaliut**
Inside the MPA	0					
Close to MPA	5	2	1		2	
Other Crab Bay	1		1			
Other	33	8	7	1	16	1

Table 83: Locations from which crabs were collected (by village)

Village	**Where the crabs were caught**	**Number of respondents**
Barrick	Bushman Bay & Losarsar	5
Barrick	Losarsar	2
Barrick	Barrick	2
Barrick	Bushmans Bay	1
Louni	Louni	3
Louni	Louni at the bush	3
Louni	Other Crab Bay	1
Louni	Borment	2
Pinalum	Pinalum - Port Indir	1
Port Indir	Nunebeken	6
Port Indir	Tousis	4
Port Indir	Nunebeken & Port Indir	2
Port Indir	Port Indir-close to Nunebeken	2

Village	Where the crabs were caught	Number of respondents
Port Indir	Salamarur -close to Nunebeken	1
Port Indir	Salemarur & Nunbeken	1
Port Indir	Ginenarong	1
Port Indir	Port Indir close to Bush	1
Tevaliaut	Louni at the bush	1
Total number of respondents		39

Table 84: Location from which *Cardiosoma* were collected (by number of crabs offered for sale)

Place name	No of crabs for sale	%
Nunebeken	850	23%
Port Indir - close to Nunebeken	258	7%
Salemarur & Nunebeken	150	4%
Salemarur close to Nunebeken	40	1%
Bushman Bay & Losarsar	474	13%
Losarsar	150	4%
Louni	370	10%
Louni at the bush	350	9%
Tousis	312	8%
Borment	280	7%
Barrick	154	4%
Ginenarong	100	3%
Other Crab Bay	90	2%
Port Indir close to bush	80	2%
Bushmans Bay	60	2%
Pinalum & Port Indir	50	1%
Total number of crabs on sale	3768	

14.5 Price of *Cardiosoma*

Cardiosoma were consistently offered for sale at 200 VUV for 10 crabs. No variation from this price was recorded.

14.6 Other food items offered for sale

The surveyors recorded the quantity and price of other food items being sold by the vendors of *Cardiosoma* crabs. Quantities were recorded in colloquial terms that imprecisely describe the way in which the goods were sold: in bundles, baskets or individual units. The analysis below has focused on the monetary value of the goods at the market price at which they were offered.

On average *Cardiosoma* vendors offered four other food items for sale. The full range of produce *Cardiosoma* vendors offered for sale and its market value is summarised in Table 85. There was variation in the produce offered on any individual market day. The range and quantity of produce offered for sale was significantly greater on the Friday 3 December, the day on which the most number of crabs were offered for sale, and the greatest number of vendors were present at the market.

On average the vendors offered four other commodities for sale, and the mean total value of the goods (including *Cardiosoma*) which they offered for sale was 3,090 VUV. For 30 of the 39 vendors (77% of women) the market value of *Cardiosoma* was greater than 50% of the total

Table 85: Range of produce offered for sale by *Cardiosoma* vendors

Produce	Wed 1 December		Thurs 2 December		Friday 3 December		Mon 6 December		Tues 7 December		Wed 8 December		Thurs 9 December		Fri 10 December	
	No of vendors	Value of produce offered (VUV)	No of vendors	Value of produce offered (VUV)	No of vendors	Value of produce offered (VUV)	No of vendors	Value of produce offered (VUV)	No of vendors	Value of produce offered (VUV)	No of vendors	Value of produce offered (VUV)	No of vendors	Value of produce offered (VUV)	No of vendors	Value of produce offered
Kumala			1	1000	1	3000					1	1000				
Banana	1	500			1	500							1	1000	1	200
Island Cabbage	4	2000	1	100	2	500			2	500	1	400	1	300	1	100
Kokias	1	100			1	100										
Pineapple	1	200			1	540							1	100		
Peanuts					1	600										
Watermelon					1	600										
Green Coconuts	4	120			2	400			3	860	1	420	1	100	2	400
Water Cress	1	600			1	600			1	500					1	600
Lemon	1	100							1	300						
Local chicken									1	100						
Beans	1	200	2	500	6	1600			1	50	2	600	1	400		
Cooked food			1	400	1	500							2	960		
Corn	1	1000	2	700	3	1700							1	2300		
Tomatoes			1	500	5	2300					1	50	1	600		
Spring onions					1	400										
Pumpkin	X	1600			1	1600										
Round Cabbage																
Navele Nuts					1	100			1	600					1	100
Nasisa					2	800										
Crabs													1	1600		
Serwok					1	300										
Other shells					1	520										
Mango					1	360					1	400				
Dry Coconuts															1	200
Capsicum					1	200										
Breadfruit			1	350												
Chinese cabbage			1	200												

Produce	Wed 1 December		Thurs 2 December		Friday 3 December		Mon 6 December		Tues 7 December		Wed 8 December		Thurs 9 December		Fri 10 December	
	No of vendors	Value of produce offered (VUV)	No of vendors	Value of produce offered (VUV)	No of vendors	Value of produce offered (VUV)	No of vendors	Value of produce offered (VUV)	No of vendors	Value of produce offered (VUV)	No of vendors	Value of produce offered (VUV)	No of vendors	Value of produce offered (VUV)	No of vendors	Value of produce offered
Pawpaw					1	100							1	250		
Oranges											1	1000				
Carrots					1	200							1	200		
TOTAL	6	7,420	3	3,750	16	17,520	1	0	4	2910	2	3870	4	7870	3	1600

value of the goods they offered for sale. For 13 of these women (33% of women), the market value was greater than 75% of the total value of the goods they offered for sale (Table 86).

Table 86: Relative value of crabs and other produce sold at the market

Village	Value of crabs sold	Total value of items for sale	Value of crabs as a percentage of items for sale	No commodities on sale		
Wednesday 1 December						
Barrick	1200	2200	55%	3	mean value of crabs	1440
Barrick	1000	1400	71%	2	median value of crabs	1100
Barrick	1680	2880	58%	4	mean value of all produce offered	2677
Port Indir	800	4260	19%	6	median value of all produce offered	2550
Port Indir	960	2220	43%	5		
Port Indir	3000	3100	97%	2		
Thursday 2 December						
Port Indir	600	1450	41%	4	mean value of crabs	1467
Port Indir	2600	4700	55%	6	median value of crabs	1200
Louni	1200	2000	60%	3	mean value of all produce offered	2717
					median value of all produce offered	2000
Friday 3 December						
Barrick	1920	2920	66%	4		
Barrick	1600	1800	89%	2	mean value of crabs	2043
Barrick	3360	3360	100%	1	median value of crabs	1860
Louni	1600	1600	100%	1	mean value of all produce offered	3138
Louni	2000	2920	68%	3	median value of all produce offered	2920
Louni	1680	3980	42%	5		
Louni	1800	2600	69%	3		
Louni	4000	4000	100%	1		
Louni	1680	2940	57%	4		
Port Indir	2000	2000	100%	1		
Port Indir	1600	2900	55%	5		
Port Indir	1600	3900	41%	6		
Port Indir	2000	6500	31%	7		
Port Indir	2000	2400	83%	2		
Port Indir	1400	2500	56%	4		
Tevaliaut	2440	3880	63%	4		
Monday 6 December						
Pinalum	1000	1000	100%	1		
Tuesday 7 December						
Barrick	1600	2800	57%	5	mean value of crabs	2250
Port Indir	3400	3950	86%	4	median value of crabs	2400
Barrick	800	800	100%	1	mean value of all produce offered	2978
Port Indir	3200	4360	73%	4	median value of all produce offered	3375
Wednesday 8 December						

Louni	3000	4550	66%	5		
Port Indir	1000	3320	30%	5		
Thursday 9 December						
Barrick	1400	2140	65%	2	mean value of crabs	1260
Port Indir	1400	6810	21%	11	median value of crabs	1320
Port Indir	1000	2600	38%	2	mean value of all produce offered	3278
Port Indir	1240	1560	79%	3	median value of all produce offered	2370
Friday 10 December						
Louni	2400	2400	100%	1	mean value of crabs	3533
Port Indir	6000	6500	92%	5	median value of crabs	2400
Barrick	2200	3300	67%	4	mean value of all produce offered	4067
					median value of all produce offered	3300

Not withstanding the limited range and quantity of produce offered for sale, not all produce was readily sold. Table 87 presents the vendors' views on which products sold readily and which were slow to sell. *Cardiosoma* was the only product consistently mentioned as being readily sold (Table 87). Eighteen of the 39 vendors mentioned *Cardiosoma*. Some success was had with corn (both fresh and cooked) green coconuts and tomatoes. Two women felt nothing they offered for sale sold well. Another facetiously mentioned imported rice, which is not sold at the market.

Table 87: Produce vendors sold easily

Commodity selling readily	No. of times mentioned
Crabs	18
Green coconut	2
Corn	4
Breadfruit	1
Kumala	1
Chinese cabbage	1
Cooked food	1
Tomato	3
Beans	1
Nothing	2
Navele	1
Rice	1
Island Cabbage	1
Gateau	1

14.7 Costs incurred in attending the market

The vendors typically experienced three costs in attending the market: transport to the market with their produce, transport back to their village and a market stall fee that contributed toward management of the market house. These costs are summarised in Table 88. The main cost was

transport, which varied according to the village the woman traveled from. Given that on average women offered for sale goods worth 3000 VUV, when costs are considered, women could anticipate earning 2, 550–2,650 VUV. This was the compensation they received for their full day spent at the market and the time producing and harvesting the goods on sale. It is understandable that women tend to group their products for sale to reduce the costs.

Table 88: Costs of selling at maket

Village	inward transport	return transport	market rent	Total costs
Barrick	150	150	50	350
Louni	200	200	50	450
Pinalum	200	200	50	450
Port Indir	150	150	50	350
Tevaliaut	200	200	50	450

Note: one vendor from Port Indir reported an inward travel cost of 100VT and return fare of 250VT. All others reported 150VT for both directions.

14.8 Perceived problems

A final question on the survey asked women if they perceived any problems with their marketing of produce. Three women interviewed said there were no problems. The rest responded with variations on a single issue. Depending on the number and type of buyers at the market, sometimes sales are good. However, sometimes not all goods can be sold. Unsold goods are taken back home, or shared with relatives and families. In some instances they are swapped with other women.

Appendix 1: Detailed presentation of data on household income

Village	No interviewed	1000 - 4000 VUV	5000 - 10,000 VUV	11,000 - 50,000 VUV	1000 - 4000 VUV	5000 - 10,000 VUV	11,000 - 50,000 VUV
Income from food crop sales		**Out of season**			**In season**		
Barrick	5	3	1		2	2	
Bushman Bay	3						
Ginanarong	5		4			4	
Hatbol	13						
Limap	10						
Lingarakh	13	1			1		
Louni	10		10		1	9	
Mapbest	1						
New Bush	4	2	1		1	2	
Port Nabe	7	4	2		4	2	
Portindir	9	2	1	5	1	3	4
Robako	2	1			1		
Taremb	9				8		
Tembibi	10	8	1		6		1
Tevaliaut	14	3	1		3		1
Tevri	12	5	1		6	2	
Uri Island	4	3	1		1	2	1
Vallavi	1				1		
Count of responses	132	32	23	5	36	26	7
Percent of people interviewed		24%	17%	4%	27%	20%	5%
Income from cocoa		**Out of season**			**In season**		
Barrick	5	3	1	1	3	1	1
Bushman Bay	3	3					3
Ginanarong	5	1	1	1	1	1	1
Hatbol	13	10	3		11	2	
Limap	10			8			8
Lingarakh	13			13			13
Louni	10			3			7
Mapbest	1			1			1
New Bush	4	2	1			2	2
Port Nabe	7						
Portindir	9	1	2	3	2	2	2

Village	No interviewed	1000 - 4000 VUV	5000 - 10,000 VUV	11,000 - 50,000 VUV	1000 - 4000 VUV	5000 - 10,000 VUV	11,000 - 50,000 VUV
Robako	2			1			1
Taremb	9	4	4		3	3	2
Tembibi	10	5	1		5	1	
Tevaliaut	14		5	4		5	4
Tevri	12						
Uri Island	4	1					1
Vallavi	1						
Count of responses	132	30	18	35	25	17	46
Percent of people interviewed		23%	14%	27%	19%	13%	35%
Income from vanilla		**Out of season**			**In season**		
Barrick	5						
Bushman Bay	3						
Ginanarong	5						
Hatbol	13						
Limap	10						
Lingarakh	13						
Louni	10						
Mapbest	1						
New Bush	4						
Port Nabe	7						
Portindir	9						
Robako	2						
Taremb	9						
Tembibi	10						
Tevaliaut	14		1	1		1	1
Tevri	12						
Uri Island	4						
Vallavi	1						
Count of responses	132	0	1	1	0	1	1
Percent of people interviewed		0%	1%	1%	0%	1%	1%
Income from pigs		**Out of season**			**In season**		
Barrick	5		1			1	
Bushman Bay	3	1				1	
Ginanarong	5	3		1	2		1
Hatbol	13	3	3	1	3	3	1
Limap	10		5			5	

Village	No interviewed	1000 - 4000 VUV	5000 - 10,000 VUV	11,000 - 50,000 VUV	1000 - 4000 VUV	5000 - 10,000 VUV	11,000 - 50,000 VUV
Lingarakh	13		2			2	
Louni	10		1			2	
Mapbest	1		1			1	
New Bush	4						
Port Nabe	7	3			3		
Portindir	9		4	1		3	1
Robako	2						
Taremb	9						
Tembibi	10						
Tevaliaut	14	3	1	1	3	1	1
Tevri	12	2			2		
Uri Island	4						
Vallavi	1						
Count of responses	132	15	18	4	13	19	4
Percent of people interviewed		11%	14%	3%	10%	14%	3%
Income from chickens		**Out of season**			**In season**		
Barrick	5	3	1		3	1	
Bushman Bay	3						
Ginanarong	5						
Hatbol	13	2			2		
Limap	10	3			3		
Lingarakh	13	2	3		2	3	
Louni	10						
Mapbest	1						
New Bush	4	1			1		
Port Nabe	7	3			2		
Portindir	9	4			3		
Robako	2						
Taremb	9						
Tembibi	10						
Tevaliaut	14	3		1			1
Tevri	12	4			4		
Uri Island	4	2					
Vallavi	1						
Count of responses	132	27	4	1	20	4	1
Percent of people interviewed		20%	3%	1%	15%	3%	1%

Village	No interviewed	1000 - 4000 VUV	5000 - 10,000 VUV	11,000 - 50,000 VUV	1000 - 4000 VUV	5000 - 10,000 VUV	11,000 - 50,000 VUV
Income from copra		**Out of season**			**In season**		
Barrick	5	1	3	1	1	3	1
Bushman Bay	3	3					3
Ginanarong	5			5		1	4
Hatbol	13		6	7		6	7
Limap	10			9		1	8
Lingarakh	13			13			12
Louni	10		1	8		1	9
Mapbest	1		1			1	
New Bush	4	2	1	1		1	3
Port Nabe	7	3	2	2	3	2	2
Portindir	9	1	1	4	1	2	4
Robako	2			1			1
Taremb	9	3	4	2	5	3	2
Tembibi	10		7			7	
Tevaliaut	14		1	9		2	8
Tevri	12	7	1		9	1	
Uri Island	4	1		1	1	1	
Vallavi	1	1			1		
Count of responses	132	22	28	63	21	32	64
Percent of people interviewed		17%	21%	48%	16%	24%	48%
Income from *Cardiosoma*		**Out of season**			**In season**		
Barrick	5	2	1		2	1	
Bushman Bay	3						
Ginanarong	5			4			4
Hatbol	13						
Limap	10						
Lingarakh	13						
Louni	10	1	6	1	1	6	1
Mapbest	1						
New Bush	4	1			1		
Port Nabe	7	5	2		5	2	
Portindir	9	2	1	4	2	1	4
Robako	2						
Taremb	9						
Tembibi	10						

Village	No interviewed	1000 - 4000 VUV	5000 - 10,000 VUV	11,000 - 50,000 VUV	1000 - 4000 VUV	5000 - 10,000 VUV	11,000 - 50,000 VUV
Tevaliaut	14						
Tevri	12	4	3	2	3	3	2
Uri Island	4	1	1		1	1	
Vallavi	1						
Count of responses	132	16	14	11	15	14	11
Percent of people interviewed		12%	11%	8%	11%	11%	8%
Income from Fish		**Out of season**			**In season**		
Barrick	5	1	1		2	1	
Bushman Bay	3	3			3		
Ginanarong	5	1		3	1		3
Hatbol	13						
Limap	10						
Lingarakh	13						
Louni	10			1			1
Mapbest	1						
New Bush	4		1			1	
Port Nabe	7		3			2	1
Portindir	9	2		2	2		2
Robako	2						
Taremb	9						
Tembibi	10						
Tevaliaut	14			1			1
Tevri	12	5		5	4		5
Uri Island	4	2	1		1	1	1
Vallavi	1						
Count of responses	132	14	6	12	13	5	14
Percent of people interviewed		11%	5%	9%	10%	4%	11%
Income from Trochus		**Out of season**			**In season**		
Barrick	5						
Bushman Bay	3						
Ginanarong	5						
Hatbol	13						
Limap	10						
Lingarakh	13						
Louni	10						
Mapbest	1						

Village	No interviewed	1000 - 4000 VUV	5000 - 10,000 VUV	11,000 - 50,000 VUV	1000 - 4000 VUV	5000 - 10,000 VUV	11,000 - 50,000 VUV
New Bush	4						
Port Nabe	7						
Portindir	9	1					
Robako	2						
Taremb	9						
Tembibi	10						
Tevaliaut	14						
Tevri	12		1			1	
Uri Island	4	1				1	
Vallavi	1	1			1		
Count of responses	132	3	1	0	1	2	0
Percent of people interviewed		2%	1%	0%	1%	2%	0%
Income from Shellfish		**Out of season**			**In season**		
Barrick	5						
Bushman Bay	3						
Ginanarong	5	2	2		2	2	
Hatbol	13						
Limap	10			1			1
Lingarakh	13						
Louni	10						
Mapbest	1						
New Bush	4						
Port Nabe	7	5			5		
Portindir	9	4	1		3	1	
Robako	2						
Taremb	9						
Tembibi	10						
Tevaliaut	14						
Tevri	12	5			5		
Uri Island	4	3			1	1	
Vallavi	1						
Count of responses	132	19	3	1	16	4	1
Percent of people interviewed		14%	2%	1%	12%	3%	1%
Income from timber		**Out of season**			**In season**		
Barrick	5			1			1
Bushman Bay	3						

Village	No interviewed	1000 - 4000 VUV	5000 - 10,000 VUV	11,000 - 50,000 VUV	1000 - 4000 VUV	5000 - 10,000 VUV	11,000 - 50,000 VUV
Ginanarong	5						
Hatbol	13	1			1		
Limap	10		1	3		1	3
Lingarakh	13			2			2
Louni	10						
Mapbest	1						
New Bush	4						
Port Nabe	7						
Portindir	9						
Robako	2						
Taremb	9						
Tembibi	10						
Tevaliaut	14						
Tevri	12						
Uri Island	4						
Vallavi	1						
Count of responses	132	1	1	6	1	1	6
Percent of people interviewed		1%	1%	5%	1%	1%	5%