MALEKULA CRAB SURVEY

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Introduction

Literature reviews by the National Biodiversity Strategy and Action Plan Project (NBSAP) revieled a gap in information on land crabs of Vanuatu despite their widespread subsistance and commercial use. This assessment is part of a baseline study of crabs conducted in selected islands of Vanuatu. Initial work on the species in 1999 excluded work on Malekula therefore this paper focuses on the island and attempts to identify different species of land crabs and their distribution, describe their habitats, local use, harvesting, impacts and management tools applied.

Background

Malekula which lies along latitude 15^{o} 53 and 16^{o} 50 and longitude 167^{o} 08 and 167^{o} 50 is the second largest island by surface area (approximatly 2100 square kilometers) after Santo and is situated between the island of Santo in the north and Efate to the South and next to the volcanic islands of Ambrym and Lopevi.

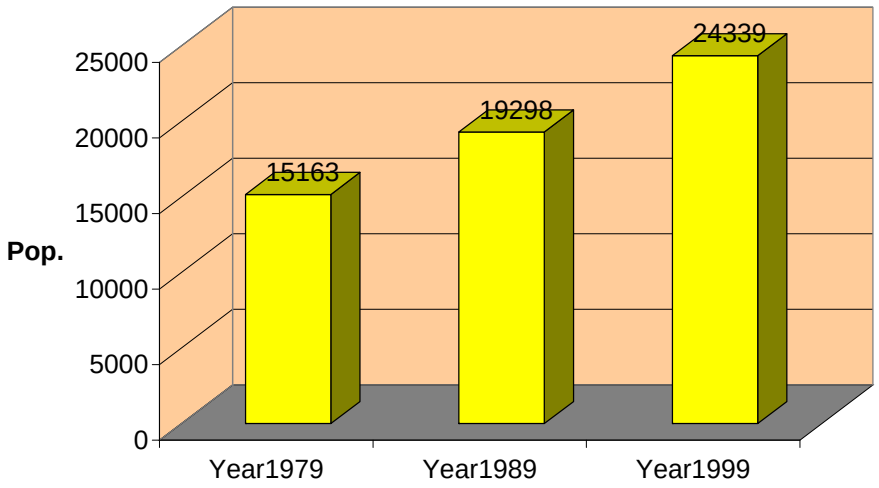
Vegetation dominating the island is mainly thickets, low forests and mid-height forests (Fig:). Thickets include mixed and uniform stands of H. tiliaceus, Leucaena sp, Acacia sp, Veitchia palms and other poorly formed trees and arborescent life forms 3-8 meters tall. Low forests include Klenhovia hospita, Pterocarpus indicus, Disoxylum gillespianum, Dracontomelum vitiense, Gyrocarpus americanus and Dendrocnide latifolia. The low forests grow to a maximum height of 20 meters. The mid-height forests which have a predominant height of between 20-30 meters include, Dendrocnide latifolia, Inocarpus fagiferus, Castanospermum australe, Macaranga megacarpa and Dysoxylum sp. Areas not forested and not subject to significant landuse include grassland, thickets and secondary forests.

The largest occurance of mangroves in Vanuatu are found on eastern and southern Malekula hosting 75% of the countries mangrove cover.

Typical of most islands in the archepalago the coastal area has a significant landuse intensity. With the general population distributed along the coast largely to access services, plantations and garden areas cover supstantial areas of the flat and relativly flat coastal land.

The total population of Malekula stands at 24339 as of July 1999 according to prliminary 1999 census reports. In comparison with the 2 previous census results, 19298 and 15163 in 1989 and 1979 respectively, the islands population has undergone a relatively gentle climbe over the last 20 years (Fig:).

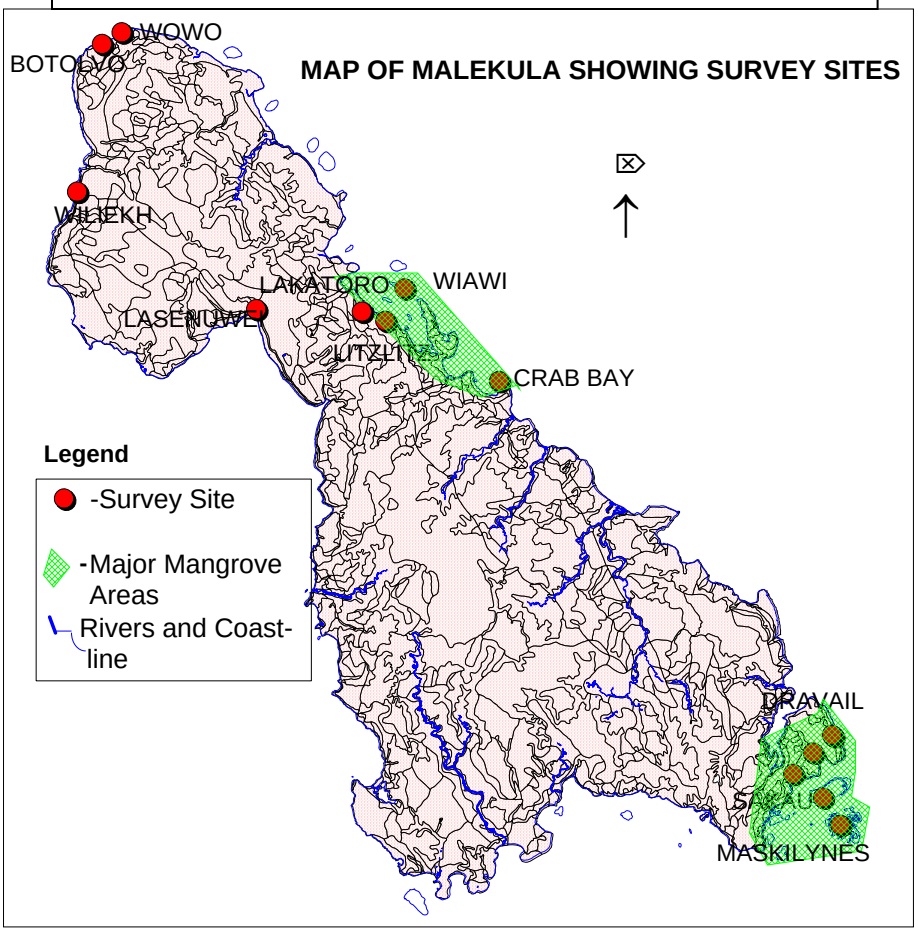
Population Growth of Malekula from 1979-99



Survey Outline.

Date	**Survey Site**	**Activity**
18/04/2000	Uri Island	Day and night surveys
20/04/2000	Potindir	Day and night surveys
21/04/2000	Crab Bay	Day and night surveys
23/04/2000	Losinue	Day and night surveys
24/04/2000	Wowo	Day and night surveys
25/04/2000-	Litslits	Day and night surveys
27-29/04/2000	Lamap	Day and night surveys
30/04/2000	West Lamap	Day survey
30-01/04/2000	Maskilynes	Day and night surveys

Fig:? MAP OF MALEKULA SHOWING SURVEY SITES



Methodology.

The crab survey involved two weeks of fieldwork in selected sites (Fig:) which include day and night transect walks and species counts mostly from the coast inland to give a general distribution pattern of the different crab species and a population estimate. Since most of the species were nocturnally active a lot of the transect walks and species count was done at night from 7:00pm or 7:30pm to 9:00pm or10:00pm. Walks during the day were done in the mornigs sometimes involving a drive through tracks in the survey sites. Observations of the reef, mudflats and mangrove flats at low-tide were also done and where possible night dives were included. Furthermore, unstructured interviews were held with chieves and knowlwdgeable locals at the different sites. Data was also collected from the Lakatoro market during the week-long survey of northern and central Malekula.

Results.

Key: *** Abundunt >20, ** Common <20, * Rare <5, R- reported but not sighted

	S P E C I E S											
SITE	B. latro	G. lalandi	C. carnifex	Geocrapus grayi	G. crinipes	O. ceratopphthalma	S. erythrodactyla	Uca sp1	Uca sp2	S. paramamosain	T. crenata	E. sebana
Uri			**			***	***	***	***	**	**	**
Potindir		*	***		*	***	**	***	***	R	**	**
Crab Bay			***			***	***	***	***	R	**	**
Losinue	**	***	***	**	**	***				R	**	**
Botolvo		*				***				R	**	**
Wowo	*		***	**		***				R	**	**
Litslits			***			***	**	***	***	R	**	**
Lamap		*	***			***	***	***	***	R	**	**
W. Lamap			***			***	**	*	*	R	**	**
Uleveo			***			***	***	***	***	*	**	**
Sakao			***			***	***	***	***	R	**	**

Cal rock

Reef Species

	S P E C I E S		
SI T E	Carpilius maculatus	Estisus dentatus	Estisus sp.
Uri	R	R	R
Potindir	R	R	R
Crab Bay	R	R	R
Losinue	R	R	R
Botolvo	R	R	R
Wowo	R	R	R
Litslits	R	R	R
Lamap	*	*	*
W. Lamap	R	R	R
Uleveo	R	R	R
Sakao	R	R	R

Species Discription, Ecology, Use and Threats.

Scientific name: Birgus latro
Common name: Coconut crab
Vernacular names: Ndriwo, Nartot teven, Gratrat, Natopni, Na ndeau, Drio
Habitat: Coastal forested areas with limestone areas, crevices, caves and hollow tree stumps
Diet: Scavengers - fruit, rotting leaves and other animals including other coconut crabs
Activiy: Nocturnal when populations are low, diurnal when populations are high
Size: 9-16cm
Colour: Dark blue to brownish blue
Differences in sex: Females usually smaller, <10
Use: Subsistance and largly commercial
Threats: Distruction of habitat, over harvesting and consumption by feral dogs and pigs

Scientific name: Gecarcoidea lalandi
Common name: Red or Flat crab
Vernacular names: Navir telembel, Rakum pare, Neseu, Hukrabru
Habitat: Coastal forest with rocks, crevices and tree hollows
Diet:
Activiy: Nocturnal, increase in activity after light showers
Size: Carapace width:, length:5cm. Very little hair on legs
Colour: dark maroon to purpulish black carapace, claws and legs purple, underside yellowish white, no hair on legs, eye cavities separate and circular in shape.
Differences in sex:
Use: Subsistance and commercial
Threats: Overharvesting

Scientific name: Carnifex sp (red)
Common name: Red Crab
Habitat: Coastal forest to mudflats
Diet:
Activiy: Nocturnal and diurnal, extra activity after light showers
Burrowing: Hides in burrows
Size:
Colour: Red carapace, underside white
Differences in sex:
Use: Subsistance and commercial
Threats: Distruction of habitat areas, over harvesting and consimption by feral dogs and pigs

Scientific name: Cardisoma carnifex
Common name: White crab
Habitat: mangrove and mudflats
Diet: Herbivorous
Activiy: Nocturnal/semi diurnal and more active during high tide and after light showers
Burrower: Hides in burrows
Size: Carapace width:10-12cm
Colour: Brownish pink to brown carapace, underside white, legs hairy, sicissors white
Differences in sex:
Use: Subsistance and commercial
Threats: Habitat distruction, over harvesting and consumption by feral dogs and pigs

Scientific name: Geograpus greyi
Common name:
Vernacular names: Nakav romo
Habitat: Coastal forests with limestone rocks, crevices and tree hollows
Burrower: Burrows in rock crevices, tree hollows, roots and under rocks
Diet:
Activiy: Nocturnal
Size:
Colour: Bright purple carapace, underside purpelish white, presence of hair on legs, underside margine of claw serrated, tip of eys yellow
Differences in sex:
Use: None
Threats: Distruction of habitat

Scientific name: Geograpus crinipes
Common name:
Vernacular names: Nakav nen not taut
Habitat: Coastal forests with limestone rocks, crevices and tree hollows
Diet:
Activiy: Nocturnal
Size:
Colour: Carapace greenish yellow, legs bright yellow,claws are small and whitish yellow, underside yellow, presence of hair on legs, underside margine of first joint of claw serrated, tip of eyes brown
Differences in sex:
Use: None
Threats: habitat distruction

Scientific name: Grapsus tenuicrustatus
Common name:
Vernacular names: Nakav, Nevravar
Habitat: Exposed rocky shores near the sea
Diet: Algae on rocks
Activiy: Diurnal
Size:
Colour: Carapace and legs green with irregular black spots or markings, claws purplish white
Differences in sex:

Scientific name: Ocypode ceratophthalma
Common name: Ghost crab
Vernacular names: Nawoluwolu, Nakiok, Nauloulo
Habitat: Sandy beaches
Burrower: Burrows in sand
Diet: Carnivorous
Activiy: Diurnal and nocturnal
Size: Carapace width,
Colour: carapace whitish yellow to brown, underside whiteish yellow to brown, legs brown with two last joints yellowis brown. Claws white and rough.
Differences in sex:
Use: Consumed only occasionally
Threats:

Scientific name: Sesarma erythrodactyla
Common name:
Vernacular: Neuri minmin, Nevir minmin, Na kondong, Kadrong
Habitat: mangrove swamps

Diet:
Activiy: Nocturnal and diurnal active at high tide and burrows at lowtide
Burrower: Builds a hollow cylindrical mud structure on the surface as entrace to its burrow.
Size:
Colour: Carapace and legs black and claws red to redish orange. Carapace rough and dentured.
Differences in sex:
Uses: Consumed ony ocasionally
Threats: Distruction of habitat?????

Scientific name: Metopograpus messor
Common name:
Habitat: Mangroves and mudflats
Diet:
Activiy: Diurnal and nocturnal
Size:
Colour: Carapace and legs black. Carapace rough and dentured.
Differences in sex:
Uses: Consumed only ocasionally
Threats: Distruction of habitat?????

Scientific name: Uca chlorophthalmus chlorophthalamus
Common name: Fidler crab
Vernacular names: Navir nen lavlav, Nuvri nen lembelem, Melwau, Mewatas, Liliou
Habitat: Mangroves and mudflats
Diet: Detritivorous
Activiy: Active during low-tide and burrows at high-tide
Size:
Colour: Black carapace with blueish green spots and bright redish orange claw.
Differences in sex: Females lack the large claw, legs are bright orange and front of carapace above eyes has redish orange spot
Use: In the past the bright coloured claws of the male were used as hair ornaments by women. This is nolonger practised. However locals use the species as an indicator for the commenment of high-tide. Just before hightide the fidlers stand outside their burrows facing the sea and wave their claws. Locals percieve this as a signal for the onset of high-tide.
Threats:

Scientific name: Uca urvillei
Common name: Fidler crab
Vernacular names: Navir nen lavlav, Nuvri nen lembelem, Melwau, Mewatas, Liliou
Habitat: Mangroves and mudflats

Diet: Detritivorous
Activiy: Active during low-tide and burrows at high-tide
Size:
Colour: Carapace and legs black, large claw yellow
Differences in sex: Female lacks large claw
Uses: In the past the bright coloured claws of the male were used as hair ornaments by women. This is nolonger practised. However locals use the species as an indicator for the commenment of high-tide. Just before hightide the fidlers stand outside their burrows facing the sea and wave their claws. Locals percieve this as a signal for the onset of high-tide.
Threats:

Scientific name: Scylla paramamosain
Common name: Caledonie crab, Mud crab, Green mangrove crab
Vernacular names: Mbasu, Baksu, Melkamp
Habitat: Mangroves and mudflats
Diet: Carnivorous
Activiy: Nocturnal
Burrowing: Burrows in mud
Size: Carapace length:20cm, width: 15cm
Colour: Carapace dark brownish green, claw tips brown, legs dark brownish green with small green spots, fine line of brown hair lining upper and lower edges of third and fourth joint of legs. Fourth leg flattened and paddle-like at last joint.
Differences in sex:
Uses: Subsistance and commercial
Threats: Overharvesting and distruction of habitat

Scientific name: Thalamita crenata
Common name: Swimmer crab, Caledonie crab (small)
Vernacular name: Mekamp burong
Habitat: Reef-flat, mudflat and mangrove areas
Diet:
Activiy: Diurnal and nocturnal
Size:
Colour: Carapace and legs green, inner side of claw blue and sicissor tips brownish black. Underside greenish white. Carapace margin serrated on left and right sides, front margin between eyes bluntly serrated and occurance of spikes on claws. Fourth leg flattened and paddle-like at last two joints.
Differences in sex:
Use: Consumed only ocasionally
Threats:

Scientific name: Eriphia sebana
Common name: Red eye
Vernacular name: Meteli, Brambis, Narur metambis
Habitat: Reef-flat
Diet: Detritivorous
Activity: Diurnal and nocturnal
Size:
Colour: Carapace, claws and legs grey, tip of eyes blood red, underside white with black markings on face. Sicissor tips brwon and presence of hair on legs.
Differences in sex:
Use: Consumed only occasionally
Threats:

Scientific name: spp 2
Common name:
Vernacular name: Navius, Namel ravrav
Habitat: Mangroves
Diet:
Activity: Diurnal
Size:
Colour: Carapace black with whitish green marking on both sides, underside white, claw purple to blue, presence of hair on legs
Differences in sex: The whitish green marking is larger in females
Use:
Threats:

Scientific name: Carpilius maculatus
Common name: Tree spot reef crab
Vernacular name: Niave
Habitat: Reef 5-8 meters in depth
Diet:
Activity: Nocturnal
Size: carapace width: 14cm, length: 13cm
Colour: Light greyish brown and smooth carapace with brown spots arranged symetrically, legs light brown with no hair, underside yellow
Differences in sex:
Use: Consumed only occasionally
Threats:

Scientific name: Estsus dentatus
Common name: Red reef crab
Vernacular name: Tetehambe
Habitat: Reef 5-8 meters depth
Diet:
Activity: Nocturnal
Size: Carapace length: 16cm, width: 10.4cm
Colour: carapace red and serrated at margin, claws and legs red, thick hair on legs and underside
Differences in sex:
Use: Consumed only occasionally
Threats:

Scientific name: spp 3
Common name:
Vernacular name: Loussrasar
Habitat: Mangrove roots
Diet:
Activity:
Size:
Colour: Carapace and legs smooth dark glossy brown, underside white and spotted with brown, thick claws, carapace width 4cm.
Differences in sex:
Use: None
Threats: Distruction of habitat

Scientific name:
Common name:
Vernacular name:
Habitat:
Diet:
Activity:
Size:
Colour:
Differences in sex:
Use:
Threats:

Scientific name:
Common name:
Vernacular name:
Habitat:

Diet:
Activity:
Size:
Colour:
Differences in sex:
Use:
Threats:

Scientific name:
Common name:
Vernacular name:
Habitat:
Diet:
Activity:
Size:
Colour:
Differences in sex:
Use:
Threats:

Discussion.

Crabs have and still play an important social role on Malekula. In the past when the interiors accomodated savage settlements, a system of trade existed between these inland settlements and those nearer to the coast. Among other coastal resources, crabs were vigourously battered by the coastal people for food crops and other items from the interiors. The occasional battering may not have only diversified the diets of both parties but may have also served as a medium for improving and maintaining amicable relationships in the face of tribal warfare. The practice is still maintained but now involves areas rich in crabs and those not where crabs are exchanged for root crops and fruits especially.

Crabs are an important food source especially in the areas adjacent to major mangrove cover. The crustaceans are an uncommon protien suppliment of the local diet and may be consumed 3 - 4 times a week. In a year, crabs alone generate 3'240'000 vatu (Esrom and Vanu 1997) in the island excluding those species exported to Vila. Crabs are a signifigant subsistance and income generating resource and because they are relatively easy to harvest in large numbers, certain species are heavely exploited.

Distribution and Abundance.

The abundance and diversity of crabs differ throughtout the island because of specific habitat preferences. Certain species are more common in different parts of the island

compared to others due to the availability of ideal habitat conditions. The intensity of use, distruction of habitat and impacts of feral animals also influence the abundace and distribution of crabs.

The White crab, C. carnifex is strongly associated with mangroves and mud flats where it is common to abundant. The species were recorded in abundance especially in sites adjacent to major mangrove areas on the eastern and southern part of the island (fig:). Fewer crabs of this species are found in non-mangrove areas. C. carnifex is generally distributed from the coast to 400-800 meters inland or more. The white crab is frequently harvested for both subsistance and commercial purposes.

Spp 1 is also associated with mudflats however its distribution extends further inland into the coastal forest. The species is not restricted to certain areas but common throughout and was recorded or reported on most of the survey sites. Spp 1 is among the species actively sought for sale at the markets in central Malekula.

The four species, G. lalandi, B. latro, G. grayi and G. crinipes are associated with rocky coastal forests that have limestone cliffs and abundunt boulders that provide crevices and holes for the crabs to hide in. Rotton logs, trees and the different root types also provide shelter for the species. These crabs are common in rocky coastal forests and further inland but can also be found on the beach at night often singly. All four species were recorded on Losinue, north west of Malekula where the three species G. greyi, G. crinipes and B. latro were common while G. lalandi was more numerous and abundant in the area. The four crabs were rare, reported or not recorded in other areas. The northern most part of Malekula is geologically composed mostly of reef limestone (fig).

The ghost crab O. ceratophthalma is only found around sandy beaches. The species is abundant throughout the island where there are either long streteches or smal patches of sandy beaches.

The red eye, E. sebana and the swimmer crab, T. crenata are common between the reef, mudflats and the beach and can be observed during lowtide. The red eye is more active at night. Both species are common throughout the island.

The Uca species, spp 2, S. erythrodactyla and M. messor are all associated with mangroves and mud flats. They were all common to abundant in mangrove areas and mudflats. These crabs are among the most abundant species on the island as they have a very low use intensity. The Uca species and M. messor are active during low tide and burrow during high tide while S. erythrodactyla is more active noctunally and during high tide. All species are common in mangrove areas and mud flats. Though spp 3 was also found in the mangrove it was rare compared to the others.

The Caledonie crab is rarer and is found within mangrove areas and river estuaries. They were reported from all sites but were only recorded on Uri and Uleveo both within major mangrove areas. According to locals the species have recently become scarce presumably

because of intensive commercial use of the species. Nowadays only a few skilled individuals or families harvest the crab largly for commercial purposes.

The reef species including the threespot reef crab, C. maculatus, red reef crab, E. dentatus and E. sp are all found within the reef in depths of 6-10 meters and are all nocturnally active. E dentatus and E. sp were more common compared to C. maculatus which was rarer. All these reef species were reported from all survey sites however they were only recorded and collected on Lamap, south east of Malekula.

Fig:? Diagram of General Distribution of Crabs

Use.

Most of the crabs recorded on Malekula are utilised, however this occur at different rates. Generally C. carnifex, spp 1, Gecarcoidea lalandii, B. latro and the Caledonie crab S. paramamosia are the popular species most frequently exploited by the locals for both subsitance and commercial purposes. The harvesting of the species, especially C. carnifex, spp 1 and G. lalandii peak during the months or the period November to February when great numbers of crabs in berry journey down to the sea to release their eggs.

C. carnifex and spp 1 are the most heavely utilized species compared with the other species recorded on Malekula. They play an important role in the local diet mostly in the areas adjacent to extensive areas of mangrove forests like Potindir, Uri, Louni, Lamap and the Maskelynes. The two species may make up the protien part of a houshold dish 3 to 4 times a week.

Both crabs are intensivly used to generate income especially in the Port Stanley - Uri - Crab Bay area. Women are the most active in this sector and sell the crabs and other garden items 6 days a week from Monday to Saterday at Lakatoro. The crabs are sold 10 per bundle at 150 vatu a bundle at the Lakatoro market. However quite a lot of the vendors are now increasing the number of crabs per bundle to 12 as an incentive to potential buyers. On the otherhand the crabs are sold once a week for 200 vatu at the Norsup market which only operates on Saterdays. Over the last 4 years the operations of the Lakatoro market have incresed significantly. The Lakatoro market now operates 6 days a week compared to 2 days a week around 1997 (Esrom and Vanu 1997).

In the week long survey of northern and central Malekula a total of 1'972 crabs were sold at the Lakatoro market. The largest sale in one day was 81 bundles with 12 crabs per bundle, totaling 972 crabs. In that week 26'700 vatu was generated from the sale of crabs.

The flat crab, G. lalandii a delicacy among the locals is also sold at the markets however it's sale is restricted to the months of December to January when they come out to release their eggs. Further more the crab only occurs in high numbers in specific sites especially the Losinue area north west of Malekula.

Coconut crabs occure only in coastal forests with extensive rocky surfaces and are harvested for both subsitance and commercial use. Only 2 were observed at the Lakatoro market during the survey up north. The coconut crab was more common in the Losinue-Larvat area compared to other survey sites.

The "Caledonie" crab S. paramamosain is also harvested for both subsistance and commercial use, but largly commercial. The crabs are occasionally caught on order from hotels and restaurants in Vila (Esrom and Vanu 1997). During the survey 16 crabs from Uri island were observed being packaged in Lakatoro for a restaurant in Vila. The crabs were again observed on Uluveo where 6 were caught for subsistance use. Nowadays only a few skilled individuals or families from the different areas harvest the crabs as it has become scarce.

The other species of crabs recorded on the island are either not used at all such as the G. grayi and G. crinipes or are rarely used to very occassionally used. The later includes O. ceratophthalma, E. dentatus, C. maculatus, S. erythrodactyla, T. crenata and M. messor. These species are mostly used during picnics and outing on the beach. According to locals the mangrove crab S. erythrodactyla is sometimes used to spice up an ingredient. It is said to give an effect similar to curry.

The Ucu species are not consumed but were once in the savage eeror caught by women for their brightly coloured claws to be used as hair ornaments, however the practice has ceased but the fidlers are still used by locals as an indicator for the approach of high-tide. Just before high-tide the fidlers usually crouch outside their burrows facing seaward waving their claws from side to side. This to the locals is an indication of the onset of high-tide.

Species	**Harvest Frequency**	**Use**	**General Abundunce**
B. latro	High	Subsistance & commercial	Common in the north west, rare elsewhere.
G. lalandi	Moderate	Subsistance & commercial	Abundant in the north west, rare elsewhere.
G. greyi	None	None	Common in the north west, rare elsewhere
G. crinipes	None	None	Common in the north west, rare elsewhere
Spp 1	Very High	Subsistance & commercial	Common
C. carnifex	Very High	Subsitance & commercial	Abundant only in major mangrove areas, rare elsewhere
O. ceratophthalma	Low	Subsistance	Abundant
G. tenuicrustatus	Low	Subsitance	Abundant
U.	None	None	Abundant

chlorophthalamus			
U. urvillei	None	None	Abundant
Spp 4	None	None	Abundant
Spp 3	None	None	Rare
S. erythrodactyla	Low	Subsitance	Abundant
M. messor	Low	Subsitance	Abundant
S. papamamosain	Moderate	Subsistance & commercial	Rare
T. crenata	Low	Subsistance	Common
E. sebana	Low	Subsistance	Common
C. maculatus	Low	Subsistance	Rare
E. dentatus	Low	Subsistance	Common
E. sp.	Low	Subsistance	Common

Impacts/Threats

Throughout the survey sites, interviewees always reffered to a time some 20 years or so ago when crabs were super-abundant. A majority of interviewees indicate that the number or abundance of crabs has fallen throughout their lifetime. It seems the clearance of habitat areas for the establishment of large scale plantations, the movement of locals from the small islands to settle permanantly on the mainland and moreover population increase and pressure on crabs as a subsistance and commercial resource may have resulted in a fall in crab abundance.

Current threats to the crabs include;

- Ineffective and short term management tools
- Uncontrolled harvesting
- Increased demand for commercial purposes
- Population pressure
- Habitat distruction (human and naturally induced)
- Consunption by ferral pigs and dogs

Current management tools are mostly short term which may provide a lot of room for over harvesting. Furthermore with the increasing trend in population growth, the demand on the species for both subsistance and commercial use is high and is likely to increase if proper regulatory measures are not established.

Feral pigs and dogs are a threat to crabs and consume the species including G. lalandi, C. carnifex and the large coconut crab. In the north interviewees also claim goats consume crabs. Feral pigs wreck havoc in gardens and have begun to force locals to move subsitance gardens from higer elaevated areas to the relatively flat coastal areas where cultivation destroys the coastal crab habitat areas. Further more the distructon of large

patches of mangrove forests from cyclones and tectonic uplift are a threat to those species associated with mangroves.

Traditional Management Tools.

Traditional management tools specifically for crabs exist and have come about due to concerns on the rate at which the species are being harvested and furthermore the recent intensive commercial use of the species. Management tools exist in all survey sites however they are all very short term or not effective and do not allow ample time for the species to restolk. Furthermore these management tools are applied on an adhoc basis. Almost all survey sites or areas rich in crabs currently or at one time banned the harvest of crabs throughout the year. Generally the "tabu" is set for a period of 1-3 months followed by a month or an unspecified period of harvesting depending on the chief or leader of a community.

On the island of Uri for instance a "tabu" or ban is set on crabs especially the commercial species for 3 months and the following fourth month is an open season when the crabs are harvested for both subsitance and commercial purposes. This goes on throughout the year. The chief sets a "tabu" by erecting a stick or pole with a "namele" leaf, Cyathea spp, attached to it on a particular site. Usually a pig killing ceremony follows the erection of the pole and "namele" leaf. On the otherhand if a land owner decides to set a "tabu" on an area , he either uses the "namele" leaf method or a selected number of the cuttings (usually branches) of a specific plant that signifies his clan is errected on the site. This traditional management tool is very powereful and effective with heavy fines associated.

Uri island is an area active in the sale of crabs due to it's proximity to Lakatoro. Because of the intensive harvesting of crabs for sale, limitations have also been set on the number of crab bundles per woman. Each vendor is only allowed 8 bundles of crabs, 10 per bundle to sell at the market. Other areas such as Potindir also attempted to limit bundle numbers per women, however they were'nt effective. It seems that such management tools are more effective within small communities such as Uri where the chief has more control over his people compared with a larger and scattered community like Potindir and Lowuni.

The establishment of parks or conservation areas such as the Uri marine park and the Wiawi conservation area are obviously going to help the restolk of crabs since both areas prohibit the harvesting of resources within he protected areas. However, proper management plans for the protected areas are lacking, furthermore both areas are yet to be legally protected (Esrom and Vanu 1997).

Generally the idea, concern and the recognition for the need to manage crabs exist within the comunities with crab resources on Malekula as all areas have commented on the super-abundance of crabs 20 years ago compared to their present scarcity. However there has been little to no effort at all to apply such tools to resources in a lot of the survey sites. This basically is due to overlooking the impotance of protecting the species, little to no undestanding of the life-cycle of crabs and land disbutes. The later is definatly a barrer

in certain areas attemting to protect crabs. The Lowuni area at one time attempted to protect their coastal areas for their crabs however this did not work as people from Urpiv also claimed ownership of the area and entered at their own will to harvest.

Conclusion.

Anecdotal records indicate a general decrease in the abundance of crabs over the last 20 years or so, especially those species utilised for both subsistance and commercial purposes.

The Caledonie crab for instance is scarce now adays and the few locals skilled enough to find them spend a lot more time searching for the species whereas 10 - 20 years ago the crabs were relatively common. The crab was reported from all survey sites however it was only sited on Uleveo. Coconut crabs were common in the north west compared to other sites where they were rare however, none were recorded during the day time in the north which generally indicates a low population. Though the "white crab", C. carnifex and spp 1 are common to abundant especially in the mangrove areas and G. lalandi in the north, the chieves and knowledgabe locals consider the curent rate at which they are being harvested as unsustainable. On the other hand the species with low use to no use at all are always common to abundant.

Current management tools are mostly short term and may not allow adequate time for the crabs especially those species frequently exploited to maintaine their natural recovery rates.

Recommendations.

- Awareness workshops on crab biology and distribution
- Encourage long term traditional management of crabs through awareness and workshops
- Carry out a separate assessment on the status of the caledonie crab, S. paramamosain because of it's scarcity.
- Develop regulations in close collaboration with province and chieves to cator for harvesting of crabs
- Expand or widen the jurisdiction of the provincial physical planner outside Lakatoro and Norsup to ensure proper zoneing of development areas so crab habitats are protected

Refferences.

Esrom and Vanu 1997 Socio-economic Benefits of Mangrove Resources in the Port Stanley - Crab Bay Area on the Island of Malekula Republic of Vanuatu

Vanuatu National Population Census Preliminary Report 1999, Statistics Ofice, Port Vila

Peter Greenway, crab identification emails, 2000