INSTITUTE OF APPLIED SCIENCES

THE UNIVERSITY OF THE SOUTH PACIFIC

Baseline Biological Survey Report of the Votua Marine Protected Area (Namahara) (English Version)

Maroroi sia ni kua hauju I qwata project

Tikina Korolevu-I-wai, Nadroga

IAS ENVIRONMENTAL STUDIES REPORT 127

by

Akuila Cakacaka
Ron Vave
Semisi Meo

May, 2003

Votua Marine Protected Area (*Namahara*) Baseline Biological Survey Report by Akuila Cakacaka, Ron D. Vave and Semisi Meo.

Introduction

Votua is one of the villages along the coral coast in the district of Korolevu-i-wai and is the center of as many tourist development arena and interventions. The village comprises of thirty five households and a populations of two hundred and sixty, majority of which are employed in hotels in the coral coast. The village co-manages a dive shop in the village vicinity with a businessman from the US operating as Mikes Dive Shop. Most of the hotels and resorts along the coral coast utilize the dive operation center to allow tourists an adventure into the underwater world. At least half a mile from the village is the renowned Vilisite's Restaurant which is directly in front of the village marine protected area (mpa). The mpa site is locally referred to as Namahara (~Namasara).

The Votua biological survey was undertaken on two alternate days on Wednesday the 23rd of April and on Thursday the 29th of May, 2003. Votua had set up a taboo area in early April 2003. The village headman or *Turaga ni Koro* (T/K) who is employed at the dive shop together with the dive instructor had the impression that the mpa was to assist them in coordinating internship programs for various institutions abroad that are interested in studying marine conservation and pertinent avenues. Apart from benefiting from employment opportunities, share of profits and the internship program, the communities are beginning to reap initial benefits from spill over effect. This comes in so early after the imposition of the mpa.

The mpa extends from the beach front right to the reef crest.. The boundaries are demarcated with buoys extending in line towards the reef crest. The dive shop is not separated but towards the east end of the village, the closest to Suva out of the villages in the Tikina.

The area that will be available for harvesting/fishing is the adjacent sides of the taboo area.

Survey area

The mpa area covers an estimated 2 square kilometers and is situated east of the village. Directly opposite the mpa site is the Vilisite's restaurant and Mike's Dive from close range across.

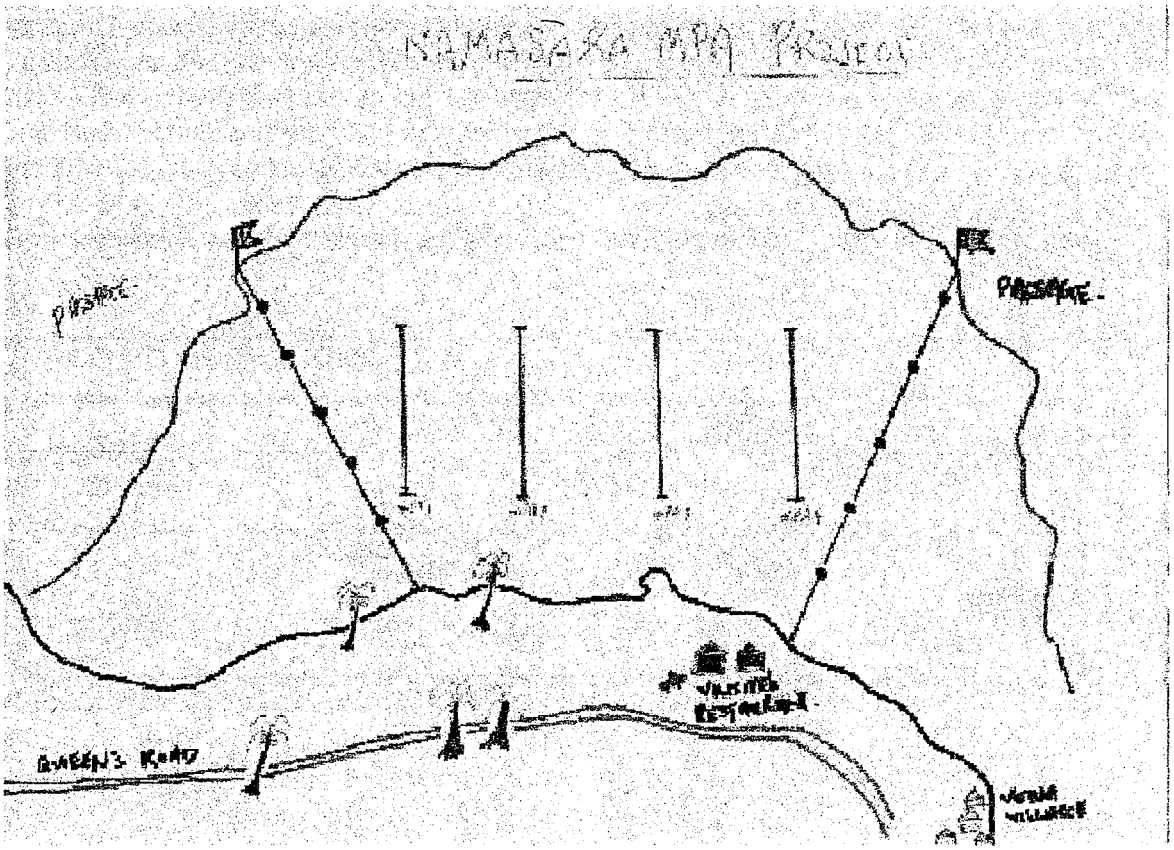
The left side of the mpa (towards the Suva end) is largely comprised of live corals and rocks (rubble), in addition to the moderate macroalgae cover. The right side of the mpa (Nadi side) is sandier and rubbles with low coral cover. Some Crown of Thorns (COTs) starfish were observed in the mpa area. There were few large *Acropora* species less than 2m across.

Ten buoys that had been provided by the Fiji Locally Managed Marine Area (FLMMA) network were used to demarcate the proposed taboo area, with five buoys on each boundary.

The control site or harvested area surveyed is located directly in front of the village. The area composed mainly of rocks, rubbles and some live corals but not only the brain corals and

hardly any branching ones. There were different species of fishes observed (refer to appendix) around the area. The control site was surveyed focusing on the indicator species but other observed common species were recorded as this was the baseline data for the community.

Fig 1.0: Map of taboo area



Indicator species

The indicators chosen by the Votua community were the *ulavi* (scaridae), and the *lahe* (*coral*). As this was the baseline survey for the series of data collection to be conducted other well known important marine resources were recorded.

Monitoring method

Two survey methods were employed for monitoring of the indicators chosen.

First is the 100m x 5m belt transect which can be used not only for *ulavi* but for other fishes. Transects were positioned perpendicular to the reef crest instead of parallel so as to:
(a) cover large, representative areas of the fishing ground and

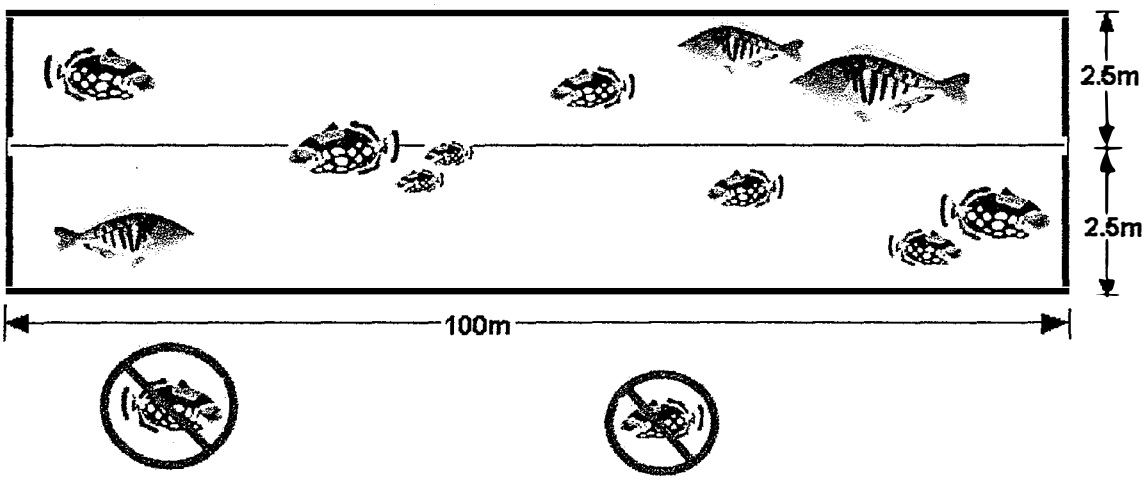
(b) to determine variation (if one exists) in marine resource resources abundance especially for the indicators from shore to reef crest (*see* Fig 1.0).

All *ulavi* and food-fishes and rare fishes observed within the belt transect were counted, with one person counting and another recording.

The second method is the line-quadrat method and can be used to determine benthic cover including corals, algae, sponges, abiotics, in addition to benthic fauna. In this case, it is used to determine the area covered by living coral. The same 100m tape for the fish counts was used. The only difference is that quadrats (1m x 1m in size) were placed at every 10m, beginning at 0m and finishing at 90m, totaling 10 samples (see map). The area within the quadrat is seen as 100%, and surveyors estimate only the percentage covered by living corals.

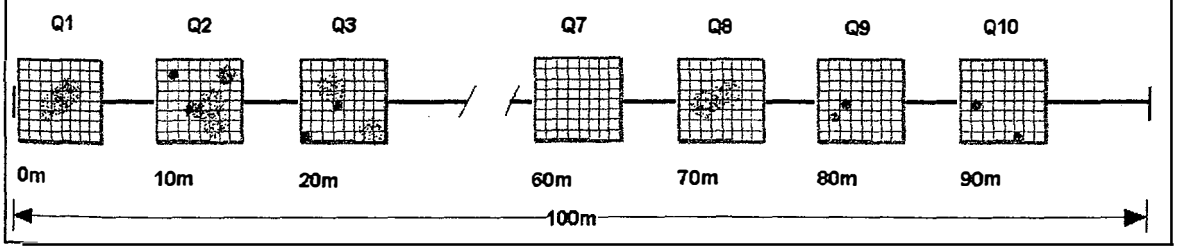
Both the above methods, though different were still undertaken on the same 100m tape.

Fig 2.0(a): Belt transect method



Fish observed outside the 100m x 5m belt transect are not counted. In Fig 2.0(a) above, all the fish within the belt are counted, but not the two outside.

Figure 2.0(b): Line-Quadrat transect



Monitoring Results

Taboo area

Taboo area monitoring was conducted in April starting at around 11am and finished around 3:30pm. No boat was used for the survey so the entire distance between transects had to be walked. A briefing on the implementing of both methods and hints on data recording techniques was conducted prior to the actual on survey.

Weather
Weather was fine, with cloud cover of about 6 okta. Low tide was around 5.53am and high tide at 11.57am.

Indicator fish counts

	MPA 1	MPA 2	MPA 3	MPA 4	Average
Parrotfishes	32	25	30	31	30

Live coral cover: 19.4 %

The collated results are summarized in Appendix A.

Control site area

Control area monitoring was conducted in May starting at around 2.30pm and finished around 6:00pm. No boat was used for the survey so the entire distance between transects had to be walked. A briefing on the implementing of both methods and hints on data recording techniques was conducted prior to the actual on survey for the benefit of new monitoring team.

Weather
Weather was fine, with cloud cover of about 5 okta. Low tide was around 11.39am and high tide at 5.38pm.

Indicator fish counts

Target species	Transect 1	Transect 2	Transect 3	Transect 4	Average
Ulavi (Scaridae)	40	74	45	17	44.0

Live coral cover: 41.8 %

Collated results from the control site are summarized in Appendix B.

Discussions

The survey indicates that an average of thirty parrotfish counts in the mpa compared to forty four from the control site. There is not much significant difference between these values and could be attributed to the duration of the mpa. The mpa is less than 2 months old after the entire survey.

The estimate of live coral cover is relatively high in the control site (46%) compared to the mpa (19.4%) and is significantly different. The location of the mpa and the control site defines the intensity of anthropogenic factors which may account for the elevated difference in coral cover. Directly opposite the mpa is the Vilisite Restaurant and supposedly a major contributing factor of nutrients to the immediate area. Interesting to note the invasive turf algae which rapidly colonize bases of branching corals and proliferate further towards the branch tips killing them in the process. A passage is present in the control site and as a common sight corals dominate these areas.

Conclusion and Recommendation

This survey marks the first biological monitoring be conducted in Votua fishing ground after the imposition of the protected area. The implementation of the survey was delineated towards community in learning new skills and empowering capacity in their conservation efforts. The baseline data collected would assist them in conducting future surveys and to compare their respective findings.

A recovering status of the fringing reef is evident by the marine resources observed especially with the indicators chosen. The rare fish species spotted highlights how well the ecological environment is to these different species.

There seems to be lack of invertebrates in the area and a quick action has to be planned for transplanting and culturing of edible sea cucumbers and giant clams. Commercial sea cucumber species needs to be ban for harvest until there is another monitoring to confirm the abundance. Another problem that needs to be closely monitored is the rapidly colonizing *Sargassum* sp which has dominated the fore reef and mid reef flat. An awareness campaign needs to be organized for the villages along the coral coast, hotels and inland settlements on deforestation, poor farming practices and dumping on rivers. It would be encourage having water quality tests in this site to determine what triggers the growth of *Sargassum* and turf algae.

There is also a suggestion to make the monitoring during high tide and a complete survey of the taboo and the control site needs to be conducted in at least two consecutive days and be much better if done on the same day.

Appendix A

Project Namasara One
Date: 23 April 2003 Time: 11.46am Tide: High/rising Status- Tabu
Condition: Clear/sunny Indicator: Parrotfish, live coral

	MPA 1	MPA 2	MPA 3	MPA 4	
10	30	65	40	35	
20	15	5	2	18	
30	17	35	13	18	
40	10	8	8	13	
50	13	4	4	10	
60	8	2	4	40	
70	9	10	65	70	
80	40	16	2	70	
90	18	8	13	5	
100	13	2	3	13	
	17.3	15.5	15.4	29.2	19.4

Parrotfishes	32	25	30	31	30

Live coral cover 19%
Parrotfish 0.0197
0.019/m2

Monitors: Epeli Barage, Pita Aminio, Pita Waqe, Milika Nautiga Erami Seavula, Wainikiti Seavula, Courtney Jamison, Semisi Meo

Workshop Reports

1. Fong, P. S. and Tawake, A. Summary Report on the Navukailagi Village, Gau, Community Marine Resource Management Plan Workshop (Fijian Version). July 19, 2003, pp. 1-15.
2. Fong, P. S. and Tawake, A. Summary Report on the Qarani Village, Gau, Community Marine Resource Management Plan Workshop (Fijian Version). July 20, 2003, pp. 1-17.
3. Fong, P. S. and Tawake, A. Summary Report on the Vione Village, Gau, Community Marine Resource Management Plan Workshop (Fijian Version). July 21, 2003, pp. 1-18.
4. Tawake, A.; Fong, P. S.; Veitayaki, J. Summary Report on the Vanuaso District, Gau Marine Resource Management and Monitoring Planning Workshop (Fijian Version). September 2001, pp. 1-55.
5. Tawake, A. Summary Report on the Votua Village, Ba, Community Marine Resource Management and Monitoring (Fijian Version). September 2000, pp. 1-42.
6. Tawake, A.; Fong, P. S.; Meo, S.; Vave, R.; Sauni, S. "Bai kei Votua"- Ba Workshop Summary Report on Votua Community Monitoring Training and Preliminary Biological Survey Findings. February 2002, pp. 1-62.
7. Tawake, A.; Rupeni, E.; Tabunakawai, K. Fiji Locally Managed Marine Areas (FLMMA) Network 2002 Annual Report. *Kedra Sasalu Tawa Mudu na noda Kawa.* January 2003, pp. 1-60.
8. Communications Training Manual, 2003 Radio Communications Training Workshop. Suva, Fiji. April 24-25, 2003, pp. 1-27.
9. Tawake, A.; Rika, L. Summary Report of Tuatua Village, Mudu, Koro, Lomaiviti Community Marine Resource Management Workshop (*Fijian Version*). November 2002, pp. 1-30.
10. Meo, S.; Fong, S.; Tawake, A. "Vueti Navakavu Project" Summary Report on the Yavusa Navakavu Community Marine Resource Management Workshop (*Fijian Version*). September 3-5, 2002, pp. 1-52.
11. Korovulavula, I. Tavua Community Marine Resource Management Plan Workshop Report (*Fijian Version*). March 2003.

Journal Articles:

1. Veitayaki, Joeli, Alifereti Tawake, William Aalbersberg, Etika Rupeni and Kesaia Tabunakawai. Mainstreaming Resource Conservation: The Fiji Locally-Managed Marine Area Network and National Policy Development, book chapter in "Innovative Governance, Indigenous People, Local Communities and Protected Areas," Hanna Jaireth and Dermot Smyth, eds., IUCN (2003). pp 105-124

2. Gell, F.R and Tawake, Alifereti (2002) "Community-based closed areas in Fiji." A case study In: Gell, F.R and Roberts, C.M (in press) *The Fishery Effects of Marine Reserves and Fishery Closures*. University of York, York. UK. pp 60 – 63. Available on website at: www.worldwildlife.org/oceans/fishery_effects.pdf.

Appendix B

Venue- Votua village Time- 3.15pm Tide- High Date- 29 May 2003
Recorder- Meo Target species- ulavi (all scaridae)

Target species		Transect 1	Transect 2	Transect 3	Transect 4	Average
Ulavi (Scaridae)		4	33	53	25	28.8
Other major species						
Ba (Fistularia commersonii)		1	2	1	2	
Ujimate (speckled sandperch)		1	0	2	6	
Kawakawa (Epinephelus sp.)		0	0	2	4	
ohe (Parupeneus sp.)		0	4	2	1	
dridri (Ctenochaetus sp.)		0	8	2	2	
balagi (Acanthurus sp.)		0	60	3	5	
Tabace (Acanthurus triostegas)		3	110	140	2	
Dere						
Chaetodon semion		10	8	7	10	
C. vagabundus		3	0	2	3	
C. trifasciatus		0	3	0	0	
hekeheke (Canthigaster benneti)		3	1	0	0	
bu (Scolopsis bilineatus)		0	2	1	1	
Samu ni tulali (Cheilio inermis)		0	0	1	1	
dradravi (Cheilinus sp.)		0	1	2	0	
cumu (Rhinecanthus sp.)		9	0	2	0	
Zanclus comutus		0	3	2	0	
Amphiprion sp.		0	0	9	2	
Invertebrates						
vulawalu (A. plankii)		3	1	1	0	
Bohadschia graeffei		0	8	0	1	
S. chloronotus		2	0	3	0	
Holothuria sp.		0	5	2	0	
Live coral cover (%)						
10m		1	2	1	4	
20m		0	1	10	0	
30m		9	5	2	0	
40m		0	5	4	18	
50m		0	2	5	1	
60m		3	2	1	0	
70m		0	10	0	15	
80m		0	3	2	23	
90m		0	5	30	0	
100m		0	0	3	0	
						41.8