
Frontier Fiji Marine Environmental Research

TECHNICAL REPORT 3

A preliminary assessment of the Lomani-Gau Initiative, a community-based resource management programme, Gau Island, Fiji

Severn, K., Corbett, P., Belle, E.M.S., and Fanning, F. (eds)

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LIST OF ACRONYMS

FAB	Fijian Affairs Board
FAD	Fish Aggregation Device(s)
FLMMA	Fijian Local Marine Management Area [Network]
GEF	Global Environment Facility
IOI-PI	International Ocean Institute – Pacific Islands
JICA	Japan International Cooperation Agency
LGI	Lomani Gau Initiative
MPI	Marine Principal Investigator
NFWF	National Fish and Wildlife Foundation
USP	University of the South Pacific

1. INTRODUCTION

The Mositi Vanuaso Project is a community-based initiative that encourages and coordinates the sustainable use of natural resources on the Fijian island of Gau (Figure 1). The project seeks to ensure the viability of the island's resources by integrating resource management practices as well as promoting alternative sources of income and integrating these and other initiatives into appropriate locally-produced management plans. The project is one of the key outcomes of the 'Participation Learning and Action' workshop, conducted in September 2001 on the island by members of relevant governmental departments and non-government organisations (NGOs), with the support of the University of the South Pacific (USP) and the International Ocean Institute Pacific Islands (IOI-PI). The workshop resulted in the creation of five Locally Managed Marine Areas (LMMAs) around the island, with numerous management activities also initiated, including the training and licensing of fish wardens and the training of local villagers in monitoring (Veitayaki *et al.*, 2005a). The Mostiti Vanuaso Project seeks to ensure that the marine areas now in place remain protected and that environmental damage is minimised, by ensuring that the management agreements are appropriate and understood by local people in and around the areas.

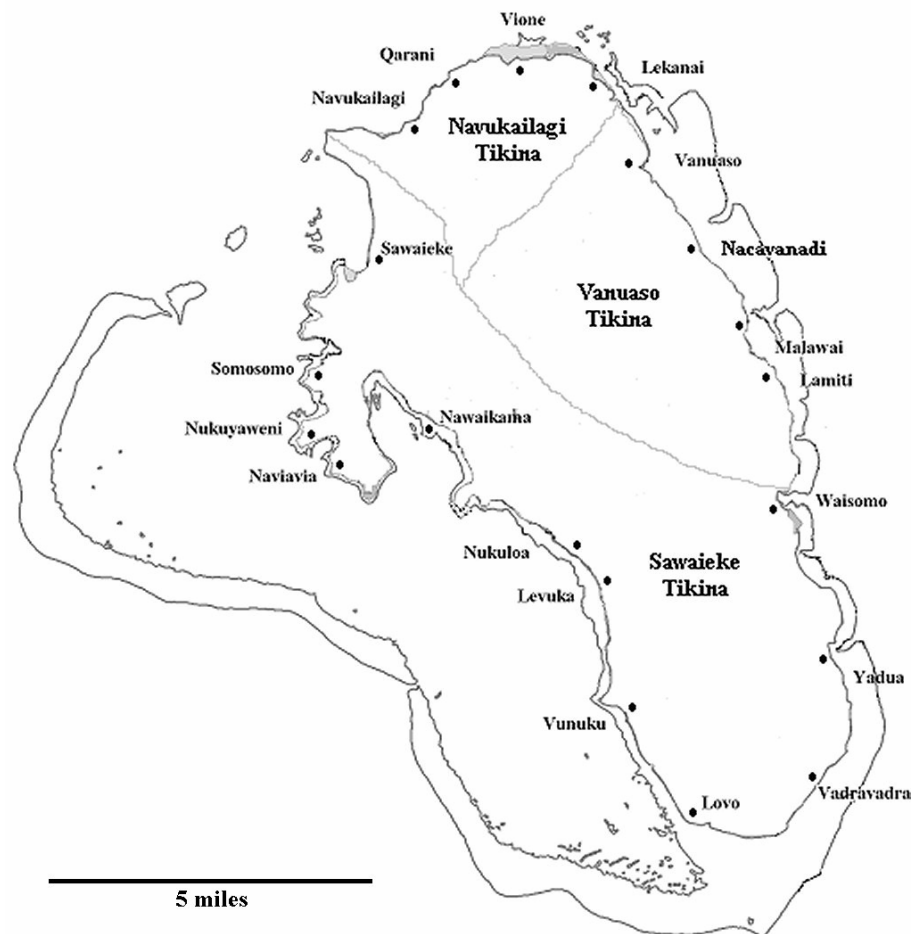


Figure 1: Gau Island, Fiji. The three *tikinas* (districts): Vanuaso Tikina, Sawaieke Tikina and Navukailagi Tikina are shown. The Mositi Vanuaso Initiative concerns the Vanuaso Tikina.

Project development plans integrate both coastal and land resource use elements in identifying several key target outputs, namely the protection and rehabilitation of mangrove forests and other coastal vegetation, the promotion of sustainable land use (such as sustainable agricultural practices), protection methods to combat deforestation and wild fire creation, the promotion of proper drainage use and the protection of water supply, proper disposal of domestic waste and treatment of waste water, and the use of appropriate infrastructure to enclose domesticated animals, allowing neighbouring villagers to cultivate adjacent lowland areas (Veitayaki *et al.*, 2005b).

Community training workshops were carried out in 2002 with further social and economic surveying implemented in 2003. Coastal Rehabilitation Planning Workshops were conducted throughout the Vanuaso Tikina, in the north-east of the island in 2003 by members of the USP and a follow-up three-day workshop for community group leaders coordinated in July 2004 (Veitayaki *et al.*, 2005a).

With much support and expertise brought to this collaborative partnership and a high level of engagement shown by the local community members, effective community-based resource management is considered to have been achieved. Since 2001, funding for the project has been provided by numerous sources, including the National Fish and Wildlife Foundation (NFWF), the Fiji Locally Managed Marine Area Network (FLMMA), the Japan International Cooperation Agency (JICA), USP-IOI and the Fijian Affairs Board (FAB) and Fisheries Division; whilst survey work, training and monitoring expertise have been provided by the USP, FLMMA, FAB and Fisheries Division. Veitayaki and Murai (2005) have identified some of the greatest achievements of the project, including:

- Adherence to long term no-take zones by occupants of all six neighbouring villages;
- The creation of a stone breakwater, built to protect the coastal area of Naovuka;
- Reforestation and management of coastal forests using native hardwood species in all villages as a form of environmental protection and as a source of income for future generations;
- The protection and replanting of mangrove forests in response to their realized importance to fishery resources and as a form of coastal defense;
- A response to the problems of village waste and effluent through the creation of digging pits and drains and the promotion of improved waste management practices such as sorting and composting;
- The planting of *Pandanus* plants, used for making mats and buildings, is now being promoted and encouraged in those areas where the plants can supply a major source of income for local people. Mats sold in Suva can bring up to around 1000 USD per month into the district.
- The creation of a village 'taro garden' in Lamiti (taro is an edible tropical plant and a staple in many Oceanic countries), as a means of income and food supply for the village;
- The creation of a cattle farm by the Malawai Village Youth Council who provided the land, labour and the site. Funding for the necessary infrastructure

and animals was sought from the French Embassy. The project has been in operation since 2003 and the villagers now keep their income in a unit trust account.

One of the principle objectives of the project has been to provide assistance to local communities to facilitate the adoption of integrated resource management tools, which allow for improvement in community livelihood and the promotion of sustainable development of natural resources and associated land use practices (Veitayaki and Murai, 2005). Since 2001, members of the Vanuas Tikina have worked closely with USP and IOI to ensure these aims are adhered to as closely as possible. Having run for around eight years, the project is considered to have been well received by the local communities and is now run almost entirely by local villagers with occasional external support.

In this paper, the results and outcomes of the project are discussed in more detail: the first section describes the Lomani Gau Initiative (LGI) and how it developed from the success of the Mositi Vanuaso project; the second section summarizes the management plans for four villages (used as examples) and their current status after the 2005 workshop; the third section highlights the results from the socio-economic survey work led by Frontier-Fiji which assesses the effectiveness of the Lomani Gau Initiative to date; while the fourth and final section examines the future of the project.

This paper provides what can be viewed as a case-study of the advantages and difficulties in implementing a locally managed marine management scheme, whilst providing some important recommendations for the future of community-based activities on Gau.

2. THE LOMANI GAU INITIATIVE

2.1 Background information

In October 2005, the Japan International Cooperation Agency (JICA), International Ocean Institute- Pacific Islands (IOI-PI) and the University of the South Pacific (USP) organised, funded and ran a four day workshop on Fisheries Management in Lovu, Gau. Topics discussed include:

- Resource management;
- Fisheries development;
- Resource survey monitoring;
- New products;
- Coral reef rehabilitation;
- Sustainable aquaculture;
- Aquarium fish trade;
- Offshore fishing and the role of fish aggregation devices (FADs);
- Post-harvest;
- Rural development issues;
- Implementation issues;
- Gau Development Action Plan.

Approximately 70 community members attended the four day workshop, with feedback from villagers reported to be generally very positive (Veitayaki, pers. comm.). Some of those who attended commented on a feeling of empowerment due to the knowledge and support made available to them, and acknowledged the usefulness of sustainable practices in ensuring the viability of Gau's natural resources for future generations (Veitayaki and Murai, 2005).

The workshop lead Dr Joeli Veitayaki, a marine studies associate professor of the USP, to propose that the Mositi Vanuaso Initiative be administered across the island, with an independent committee and representatives created for each village (Veitayaki, pers. comm.). This would be called the Lomani ('care for') Gau Committee and a local representative, Samisoni Seru from Levuka, was nominated by the people as Leader of the Initiative. No funding or monetary donations were granted to Mr Seru for his contribution to the project and only the development plan created during the meeting was provided as a source of information. Strong leadership and self-motivated communities are vital to the success of a project such as this, where long-term community support can only be achieved where leadership is fair, transparent and inspirational (Veitayaki et al 2005b). However, rumours of Mr Seru taking cash cuts in return for a relaxation of restrictions have created disappointment in him as a leader and threatened the effectiveness of the Initiative. The Lomani Gau Development Committee members are listed in Table 1.

Table 1: The names, roles and locations of all members of the Lomani Gau Development Committee.

	Role	Name	Village
1	Vice President	Rt Viliame Kamikamica	Sawaieke
2		Ilisoni Tavaga	Nawaikama
3		Kalivati Sotia	Somosomo
4	Secretary	Kelevasi Baledrokadroka	Nukuloa
5	President	Samisoni Seru	Levuka-i-Gau
6		Apakuki Koroi	Vadravadra
7		Eroni Raibaleti	Lovu
8		Joseva Natewa	Yadua
9	Vice President	Nacanieli Yavala	Navukailagi
10		Morua Bulimaibau	Qarani
11		Samisoni Delai	Vione
12		Inia Tuni	Vanuaso
13		Josaia Leqavuni	Lekanai
14	Asst. Secretary	Timoci Serevi	Lamiti
15		Naibuka Koroi	Naovuka
16	Vice President	Josese Rogo	Malawai
17		Sitino Keteilagi	Nacavanadi
18		Mele Fepaki	Qarani
19		Venina Qalituigau	Malawai
20	Treasurer	Anaseini Togaca	Nawaikama

The workshop also granted local villagers the opportunity to express concerns over the need for improving local living conditions through the use of rural development which does not damage local marine resources. Development plans to achieve these aims were

then created for each village, four of which are discussed in this paper: Somo Somo, Nawaikama, Nukuloa and Levuka, all located along the western coast of the island (Figure 1).

2.2 The role of Frontier-Fiji

Frontier-Fiji, a collaboration between IOI and the Society for Environmental Exploration (Frontier), was invited to Gau in 2006 to lead biological, social and economic monitoring of the island's reef systems and associated land and marine use activities. Frontier-Fiji has since become involved in the Lomani Gau Initiative through conducting socio-economic surveys of locals from each village involved in the initiative.

The results of the socio-economic surveys of Levuka, Nukuloa, Nawaikama and Somo Somo (sections 4.1, 4.2, 4.3 and 4.4 of this report, respectively), used here as example villages, suggest that misunderstanding and/or a genuine lack of awareness of the objectives of the initiative, and of the benefits of sustainable management practices in general, are common. Lisca (2008) suggests that local villagers are not included in major decisions and instead comply with traditional authority, with the main decisions being made by senior community figures (Lisca, 2008). The Lomani Gau Committee, however, does not operate under the traditional hierarchy of the Paramount Chief of each village and thus, as it lacks the considerable respect for chiefly authority, it may also lack the authority with which to ensure full compliance.

Currently, changes in traditional lifestyles have been observed that may have lead to detrimental effects on the island's natural resources, such as coastal pollution, exploitation of fish stocks, changes in farming practices and animal stock management. However, since the initial 2005 workshop, no follow-up activities have taken place in the local communities by any external collaborators, unlike the subsequent activities which were carried out for the Mositi Vanuaso Programme between 2001 and 2005. Perhaps, more external support and/or policing of Lomani Gau activities would help ensure the effectiveness of the project (Muehlig-Hofmann, 2005). The socio-economic questionnaire in both English and Fijian can be found in Appendices 1 and 2, respectively.

Given the lack of organized follow-up meetings, attempts have been made by committee members to organize subsequent meetings themselves, with limited success. Interviews with two local villagers from Somo Somo suggest that some locals have lost faith in the effectiveness of the programme (Appendices 3 and 4). The quality of information disseminated is unknown and the effectiveness of committee members has also not been identified. The most recent workshop to date was held in February 2008 in Sawaieke and included a presentation by the Frontier-Fiji team on their role and the findings of their ecological and socio-economic surveys on Gau.

3. PROJECT PLANNING AND DESIGN

Following the 2005 workshop, representatives from each village created a development plan to highlight the needs and practical applications of alternative sources of income for local people. Those of the four example villages are shown in Table 2.

Table 2: Development plans for each of the four example villages: Somo Somo, Nukuloa, Nawaikama and Levuka.

Village	Aim(s)	Problems	Plan	Support	When to implement
Somo Somo	Healthy living; Pig fence; Rubbish dump; Construction of drain.	Not adhering to the advice given; Estimated cost.	Begin with individual family, clubs/groups, and village members.	Work together towards this project with villagers; Fence post.	Straight after workshop. Form a committee to look after and survey the project.
	Surface FAD Marine Seafood (Source of income).	Ideas to be raised during village council meeting.	To discuss with the villagers the main activities as planned.	Bamboos are available; Anchor boat is available to tow the FAD to the offshore reef; The Market for seafood (secondary schools, hotels, government department).	Beginning one week after workshop. Implement by: Village Development Committee
	Honey Making Venture (Source of income).	Lack of funds to initiate project.	Seek advice; Training on honey bee keeping; Funding; Build a cage for honey.	All work together for the project; Hotel as market; Land is already there but need to ask the land owners; Villagers to work on these issues.	To conduct training in the month following the workshop; To have a follow-up visit late this year and next year; To check and see until the work is finished. Implement by: Village committee
Nawaikama	Development of healthy living.	No fencing of domesticated animals; Low standard of living; School children's lives at risk; Restricted areas spoiled by pigs.	Through the village council meeting; Fenced; Better place for fencing.	Villagers should do the work necessary to fence their animals; Fence post; Time.	As soon as possible
	To dispose of rubbish safely.	Villagers are dumping rubbish carelessly.	Already raised funds for and waiting for 20 restrooms.	To dig the rubbish dump (burnt); Toilet to be clean.	As soon as possible.
	Good governance in the village.	Chief is not respected.	Fijian Affairs Department.	Villagers should have installed their chief in a traditional way.	As soon as possible.
Nukuloa	Planting of	There is no plan	To raise in the	Planting	After it is raised

	coconut trees for the future generation of Nukuloa.	as yet for establishing the work and its management.	village meeting for the work to begin.	materials and labour are secured.	in the village meeting.
	Piggery to cater for the occasions in the village and individuals (source of income).	No piggery fence; Financial difficulties.	If there is any assistance.	Land, labour, post to be used for the project.	After it is raised in the village meeting.
	Farming – it assists in financing activities in the village, school and church	Marketing products. No dalo plant – to see tausala.	To work together for two weeks in a month.	Land; Planting yaqona; Labour.	Planting of yaqona and dalo is ongoing
Levuka	Footpath to help village members with travelling since their village is in a wet condition	Financial problems; Assistance; Reported to not have been created to the required standard		Land; Materials - gravel, stone, sand; Labour.	When equipment is ready.
	Piggery fence to keep the pigs an enclosed space so that villagers can farm nearby		Source of income. To farm nearby the village	Village members; Fence post; Land; Labour.	Funds are available; Awaiting assistance from donors
	Flush toilet – to complete installation of a flush toilet in every household	Financial problems.		Land; Materials - gravel, stone, sand; Labour; Village members to work together	When materials are supplied from donors; Number of villagers

In an interview with Samisoni Seru, the leader of the Lomani Gau Development Project, Mr Seru indicated a distinct lack of knowledge of the current status of the project objectives for any of the villages other than his own (Lekuva) and its nearest neighbours. At the time of the interview, Levuka had plans to build a footpath, a piggery fence and have a flush toilet in each household. The footpath was reported to be incomplete due to a lack of cement, while the construction of the piggery fence was on hold as the builders waited for 10 coils of wire and roofing iron to arrive to complete the last four restrooms. Nukuloa were, at the time of the interview, still to plant the coconut trees planned, no reason has yet been given as to why more have not been planted. Each of the villages have pigs but no fences have been erected to keep them enclosed and prevent them roaming to other areas. Those who conducted the interview noticed that Mr Seru did not seem to agree with the notion of villagers finding their own materials to make fencing since labour can be found in the village and many local materials are free of charge. Lekuva is currently attempting to grow taro to sell in Suva which is planted every eight months to take to the market using a cargo vessel, which is a cheaper transportation than using a fibre. Mr Seru would like each village to produce five tonnes to sell in Suva, but again no

definitive plans as to how this would be made possible were presented. Further details of the interview with Mr Seru can be found in Appendix 5. The proposed costs involved for each project, as outlined by each village, is shown in Table 3.

Table 3. Project Proposal and associated cost for each of the four example villages.

Village	Project	Particulars	Estimated Cost (USD)
Nawaikama	Cattle Farming	Fence [100 coil] for cows	6,000
		U-nails[50kg]	200
	Piggery Farming	Fence [50 coil] for pigs	5,500
		U-nails [25kg]	100
	Surface Fish Aggregation Devices (FADs)	Rope [Surface FAD]	600
		Cement [2 bags]	24
Total		12,424	
Nukuloa	Piggery	Fence – 10 coils	1,100
		U-Nails [10 kg]	40
		Cement [2 tonnes]	480
		Male Pigs [2]	140
		Female Pigs [8]	560
		Total	2,320
Levuka	Footpath	Cement [6 tons]	5,184
		Boxing timber	500
		Wheelbarrow [2]	400
		Spade [4]	100
	Piggery	U-nails [10kg]	40
		Roofing iron [10ft][10]	300
		Cement [1tonne]	240
	Flush Toilet	PVC pipes [12]	100
		Toilet cistern & suite	600
		Roofing iron 24 [10ft]	720
		Timber	500
		Nails	100
		Total	8,784
Somosomo	Honey Making Venture	20 cages	6,000
		Total	6,000

To date the Lomani Gau programme has been successful in obtaining a 50 000 USD grant from the Global Environment Facility (GEF); however, the money is currently locked in transit. Proposals have been put forward by each village for grants to purchase goods. It is Dr Veitayaki's responsibility to allocate the funds to each village and, according to him, it would be safest and easiest to purchase goods directly for the villagers. Dr Veitayaki's work on the funding of Mositi Vanuaso played an essential role in supporting alternative sources of income on the island (Veitayaki and Liwaiono, 2007); although local resource management initiatives which lack monetary incentives have, on occasion, been shown to be successful (Appendix 3).

4. ACTIVITIES, ACHIEVEMENTS AND IMPACTS

Frontier's role in the Lomani Gau Initiative is to carry out biological, social and economic monitoring to monitor management effectiveness and carry out workshops to enhance

capacity building and provide an opportunity to share and explain any results with local people. Three reports have been produced for the Frontier-Fiji Environmental Research Series in 2006, 2008 and 2009, with the 2008 report summarising the background behind Frontier's involvement in the Lomani Gau Initiative. A series of workshops were recently designed to assess the current levels of resource use and management. Topics covered included fishing practices, agriculture, mangroves, conservation and management issues, and the Lomani Gau outputs.

From initial conversations with Dr Veitayaki, the most effective way to set up a series of workshops over a three month phase was considered to be to initiate meetings with the *Turago ni Koro*, the Village Administrator, of which there is one per village. Engagement practices are important and should be followed correctly, as there is a high risk of being culturally insensitive by 'asking the wrong person'. Contact should also be made together with Mr Seru. In January 2009, Frontier staff members drove to Lekuva to meet with Josevata Bola, the *Turaga ni Koro* of Levuka and Amanai from the National Trust of Fiji, after attempts to speak with Mr Seru directly proved unsuccessful. Frontier-Fiji provided both with an itinerary of a proposed workshop to be conducted at a later date. The team were requested to return with a schedule and sample socio-economic questionnaire for the *Turaga ni Koro* to show community members at the next village meeting to ascertain community feedback.

The proposed schedule, content and questionnaire were translated for Frontier-Fiji by the family of Noa Ledua based in Somo Somo. Paul Tora, a relative of Noa Ledua, has very good English and agreed to translate the presentation into Fijian so that all those present at any workshop would fully understand the presentation. The Frontier-Fiji staff team returned later in the month for a second meeting in Levuka and a date for the workshop was decided. Frontier-Fiji were to bring copies of the presentation in Fijian for distribution and kava root to present at a *Sevu Sevu* (an official Fijian ceremony for meeting and greeting visitors), where Noa Ledua would speak in Fijian on the team's behalf.

As Nukuloa is the neighbouring village to Levuka, Frontier-Fiji presented the schedule to the Chief of the Village Epeni the same day. After a short summary of what Frontier-Fiji were attempting to achieve in Levuka, the Chief agreed to present the proposal to the village and would grant the team consent when attending the workshop in Levuka. The workshop in Nukuloa was permitted to be conducted later that week, with Noa Ledua again attending and taking part in the *Sevu Sevu*. Following the success of the workshops in Levuka and Nukuloa, the presentations were then also given in Nawaikama and Somo Somo, the latter of which was not given until early March due to unforeseen circumstances. The presentation given during each of the workshops can be found in Appendix 6; Plates 1 and 2 show the visual aids used during the workshops to assist in the explanation of underwater survey methods and a simple representation of a healthy and unhealthy environment. Plates 3 and 4 provide photos taken during the workshop in Nukuloa.

Plate 1. Visual Aid used to demonstrate the Baseline Survey Protocol methodology during village workshops, 2009.

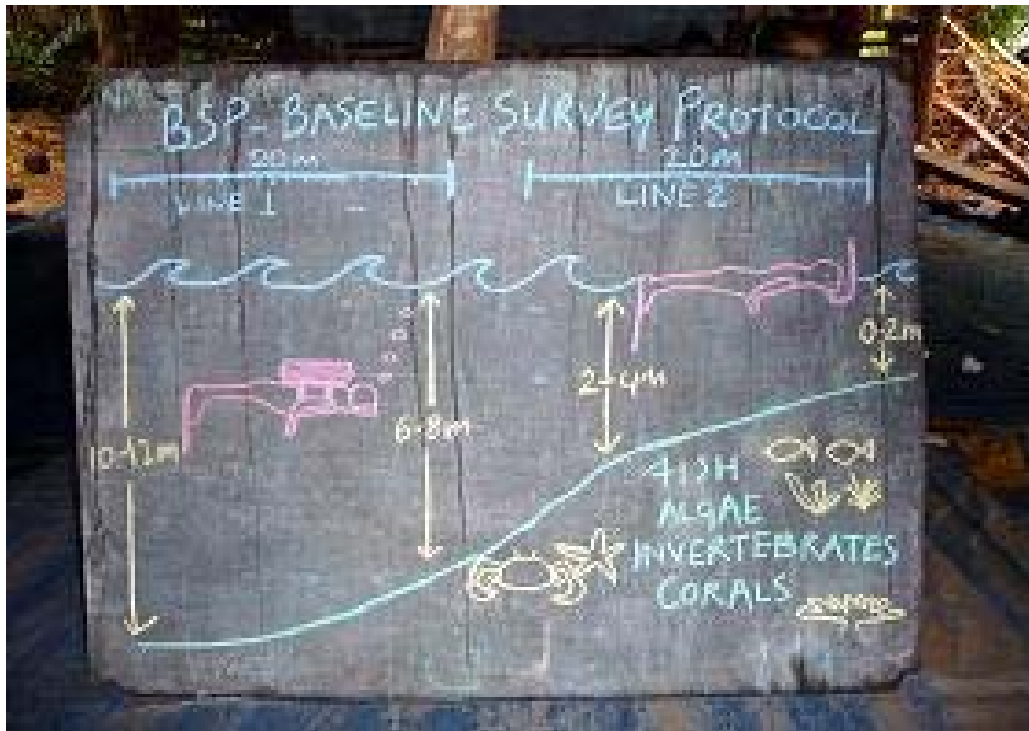


Plate 2. Visual Aid used to demonstrate healthy and unhealthy reef environments during village workshops, 2009.



Plate 3: Presentation given by Frontier-Fiji's Marine Principal Investigator (MPI), Dr Emma Wells during the Nukuloa workshop, 2009.



Plate 4. Discussion session with Assistant Marine Research Officer Huygen van Steen during the Nukuloa workshop, 2009.



During each workshop, small groups were initially asked to form with both men and women present, with one Frontier-Fiji staff member and one volunteer assigned to each group. However, after the first meeting it became apparent that the females in each group were more responsive when grouped together. The setting was designed to be informal with tea, cake or kava usually available in order to create the most appropriate environment for local people to ask questions and voice concerns and opinions. Socio-economic questionnaires were distributed in Fijian and each question asked and notes taken to ensure maximum understanding of questionnaire responses. Having the questionnaires available in Fijian helped considerably with Noa Ledua available for translation. There were usually one or two people from each village whose English was more than adequate to ask for help if necessary.

Within the presentation, the reasons for Frontier's presence on Gau was explained, the aims and objectives of the Frontier-Fiji project were outlined and an explanation was given as to why the team wished to know the information being requested on the questionnaire forms and how the information would be useful to helping achieve the aims of the Lomani Gau Initiative. The most important reasons for Frontier's presence at the meetings were:

- To introduce ourselves and open the channels of communication between local people and the Frontier-Fiji team;
- To provide a forum through which Frontier-Fiji can share knowledge and understanding of the marine system and associated uses, including regular updates on the status of seagrass, mangrove and coral reef health, and in return learn more about the local activities and culture of the people of Gau;
- To build relationships and work more closely with the locals in the development of resource management programmes.

The content of the presentation is closely linked to the outputs of Lomani Gau with the aim of reiterating what information has already been provided during other workshops and to emphasise what Frontier-Fiji consider to be the most important goals. The socio-economic questions generated much discussion and were useful in gaining a broad understanding of practices carried out. The four villages also present useful case studies, as their accessibility from the Frontier-Fiji base camp ensures that replicate visits are feasible.

To assess if community members are acting in accordance with the objectives of the Lomani Gau Initiative, the following issues are now being investigated:

- Surveying of all communities and their resources;
- Proper use of land use guidelines;
- Planting and management of coastal forests and special habitats;
- Protection of valuable coastal habitats;
- Reduction in the uncontrolled cutting of trees, burning and farming on hill slopes;
- Protection of water catchments to avoid contamination of drinking water;
- Improvement of fishing areas;
- Establishment of an appropriate level of fishing effort and increasing fisheries management activities;

- Creation of ecotourism operations.

The preliminary results of the socio-economic surveys from each of the four villages are provided below.

4.1 Socio-economic questionnaire: Levuka, 2nd February, 2009

Interviewees: Six elderly men, six middle-aged men, four young men and two middle-aged women

Village Structure

There are 124 people in the village of Levuka consisting of 27 family groups. There are 36 children residing in the village with 27 attending primary school at Nukuloa and nine attending Nawaikama secondary school. All children must attend school, however, it must also be paid for. There is a kindergarten in Levuka open to those too young for primary school.

Fishing

The villagers fish alone and in groups using several methods: line, spear gun and weighted nets. Men fish around three times a week and take over a hundred fish each time. Any large fish will be taken to Suva to be sold. Most widely caught fish are Wahoo, Parrotfish, Ta, Trevally, Barracuda and Snapper. The women fish most days catching various species and sizes of fish most common being Kawakawa and Barracuda. Most used fishing lines with additional use of nets to catch shrimp for bait and this is conducted at various locations inside the lagoon including directly in front of the village on the fringing reef with a weekly trip outside the barrier reef. Most of the fish are retained but some of the larger catch such as the Barracuda and Wahoo are exported to Suva once a week via a gentleman from Lovu who sells them at the market. Every fish caught is used.

Agriculture

In Levuka, all the villagers own an area of land growing mainly taro, kasava and yams, with other crops including dalo, cassava, kava, yams, bananas, papaya, cucumber and chilli. Some of the harvest is thought to be exported to Suva, however, some villagers denied that this occurs, stating that all crops are only used locally. Farms are managed manually, with additional use of crop spray due to problems of insect infestations. Fertiliser is sometimes used as well as pesticides, but compost is not used and all farming is done by hand. Agricultural areas are cleared by wedging, cutting, drying and then burning. The crops experience rapidly changing environmental conditions which significantly affect the success of the harvest. Heavy rains destroy the crops very quickly, exacerbated by the flat nature of the land, although some farms are located on hill slopes which provide better drainage.

Mangroves

Levuka has a 200m stretch of mangrove forest location next to the village. The size of the forest has reportedly not changed in years. Villagers do not use the mangroves and thus there has been no replanting of damaged areas over the last ten years. Other villagers

stated that currently no mangroves exist around Levuka, but there some seagrass beds are present. There is also little stable seawall present with concerns of land erosion being expressed by some villagers. This problem is being tackled through a mangrove replanting scheme to be conducted by the local youth group and lead by Josepha Mua.

Conservation Issues

Samisoni Seru first informed the villagers about the no-take zone at the last meeting last year. There was a general positive feedback about the presence of no-take zones outside the village, although to what degree the restrictions are adhered to remains unclear. Villagers appeared to approve of the work carried out by Frontier-Fiji and were grateful for the communication.

4.2 Socio-economic questionnaire: Nukuloa, 5th February, 2009

Interviewees: Five middle-aged men, two young women and two elderly women

Village Structure

The village of Nukuloa consists of 130 people of which 80 are adults. They are divided over five clans and 37 families. The children and young adolescents attend either the primary school (age 6-13) situated between Nukuloa and Levuka or the secondary school in Nawaikama (age 14-17). At the moment there is no pre-school in Nukuloa due to a lack of teachers; 26 children attend the local primary school and four children attend the highschool in Nawaikama.

Fishing

The women of Nukuloa fish independently every day for subsistence purposes and generally only fish directly in front of the village. The two principal fishing methods used are lines with hooks from bamboo rafts called bilibilis (90%), and nets for catching bait (10%). On occasion, bog groups of approximately ten women will go out to fish using big nets for big catches. The catch mainly consists of small reef fish. There is also a group of ten spear fishermen who fish, on average, about five times a week on the fringing reefs and once a week out on the barrier reef. The bulk of the catch again consists mainly of small reef fish, however they also catch about 100 to 200 bigger fish (approx. 20-40 lbs) which are usually sold to people in Lovu who then export it to Suva. The fishermen generally receive \$10 for three fish but this only occurs if they have excess catch.

Agriculture

Farming is the primary occupation for the majority of men in the village. 'Slash and burn' methods are the only way villagers are able to clear patches of land to grow crops. The main crops grown are casava, dalo, kava, banana, pineapple, yams and kumala (sweet potato). None of the crops are sold to Suva or the other villages around Gau. All the villagers farm and each family has its own area of land growing taro, kasava, papaya and yams which are usually planted and harvested by the men. There are no designated areas for fruit; trees are distributed throughout the village and are usually shared as opposed to being owned individually. Pesticides are occasionally used to control weed species. Most of the farm land is located on the hill slopes, as crop growth tends to be better on the

slopes due to improved water drainage. This is the matter of some controversy as the Lomani Gau Initiative aims to reduce hill slope farming. This problem is likely to be exacerbated if the village continues to expand where flat land is scarce.

Mangroves

There are several patches of mangrove forest around Nukuloa. According to the males who took part in the survey, the mangrove areas are situated at Nawaikama, Yardi (a beach located between Nawaikama and Nukuloa), in front of the Nukuloa primary school and in Levuka. The people of Nukuloa do not use the mangroves and say they understand the importance of conserving healthy mangrove forests. There are projects currently being initiated for the youth of Nukuloa to replant areas where mangroves have been lost in previous years. There is growing concern over the levels of coastal erosion around Nukuloa and the women of the village are keen to replant area of mangroves for increased protection and sediment accretion. The village is also intending to fill in some of the shallow areas of water as a means of reclaiming some of the land.

Conservation issues

All interviewees reported to be aware of the presence of Frontier-Fiji at Naviavia and responded that the workshop helped in the understanding of Frontier's purpose and work. The existence of no-take zones in front of each village is also well known and all villagers interviewed reported that the restrictions put in place are adhered to, even though there are no clear visual markers in the water. They say the Nukuloa no-take zone starts at a buoy in front of the seawall and extends to the start of the Levuka fishing zone, which is in front of the primary school. During this discussion it became apparent that fishing does occasionally occur in the no-take zone, particularly in times of celebration when the villagers have many guests to cater for. The women were very aware of some of the issues currently being addressed by the Lomani Gau Initiative and agreed with the fishing restrictions and the no-take zones outside the village. They agreed that there was a need for some form of conservation and were generally pleased to have the opportunity to hear about the work being conducted by Frontier-Fiji, and were keen to continue attending workshops to gain more knowledge on their current health status.

4.3 Socio-economic questionnaire: Nawaikama, 27th February, 2009.

Interviewees: One middle-aged man, three elderly men, and six elderly women

Village Structure

There are over 400 people in the village of Nawaikama, of 65 families in total. There are 50 children aged between zero and six years old, 98 children aged between six and thirteen, and 50 children aged between 14 and 18. There is a preschool, primary school and secondary school in Nawaikama. There is also a vocational school where children learn about practical skills such as building, tailoring and cooking. Ten children currently attend this school.

Fishing

Half of the 65 families of Nawaikama fish each day using lines and spear fishing, and using nets once a week. They do not use fibres to fish from but occasionally fish along the barrier reef at low tide using spears and lines. Fishing is conducted alone and in groups and both at night and during the day. Every fish caught is used irrespective of size and species. Most commonly caught species are matu, kawa kawa, kaeatia, saqa and kaviace. Net size is 1-2 inches wide with the average fish size around 12 inches long. Matu is reportedly caught most often. Prawn, shrimp, crab and lobster are also caught and eaten as well as black sea cucumbers. Turtles are only caught for special occasions. No fish are taken to Suva to be sold.

Agriculture

Crops grown include cassava, taro, yams, banana, papaya, sugarcane, kava, pears, chilli, breadfruit, lemons, oranges and mangoes. Each male villager has around one to three hectares of land and all farming is carried out by hand. Villagers employ a shifting cultivation method on a 3 year rotation, with land cleared by weeding, drying, control burning and ploughing. Produce remains on the island for sale and consumption; none is taken to Suva.

Mangroves

The area of mangrove forest at Nawaikama has gradually increased over the last 20 years. Mangrove trees have previously been used as firewood but this has ceased to occur since the importance of mangroves as nursery areas for fish was recognised. Some mangrove areas around the village were replanted during the 1990s.

Conservation Issues

The *Turago ni Koro*, or village administrator Neumi, is in his 3rd year in the role, having been voted in by the villagers. The Village Head and 3 others are part of the Lomani Gau Committee (Matai, Ilisoni, Marika and Ana). The last meeting of the initiative occurred in 2008, however, there should be four meetings conducted each year. Consequently, there is a common feeling of frustration and discontent as the chairman Mr Seru has not conducted any recent meetings and villagers feel he is not pushing for common objectives. Villagers do believe, however, that the initiative is positive.

4.4 Socio-economic questionnaire: Somo Somo, 11th March, 2009

Interviewees: Eleven elderly men, two middle-aged men, one young man, one middle aged woman and two young women

Village Structure

Somo Somo consists of 121 people from 26 families, including 26 children. A large majority of the children were born in Somo Somo village itself. All the children in the village will receive an education, and most will attend boarding school in the nearby village of Sawaieke.

Fishing

Although the frequency of fishing activity in Somo Somo appears to vary, fishing occurs every day (except on Sundays), sometimes twice daily, with fishing at night being also conducted. It is mainly the females of the village who fish. The average catch is usually between ten and twenty fish, with some reportedly greater than 50 cm in length. The main species caught are snappers, barracudas, walrus, groupers and trevallys. Most of the fishing is conducted from boats or bamboo rafts using a single line to fish. Although large nets are occasionally used on the beach or reef, this method is problematic due to snagging on hard coral forms.

The people of Somo Somo are aware of the no-take zones and appear to respect them as their benefits are widely understood. If the catch is too small whilst fishing, the fish are often thrown back. Equally if the catch is large, the fish will be bought by “Kali” and exported and sold to Suva (where the demand is high and all fish can be sold at once). This has proven to be a very good source of income for the village and is much more effective than employing others to sell fish to other villages around Gau. Allegedly when storms are predicted to occur in the area, the numbers of fish being caught decreases sharply and fishing activity is reduced.

Agriculture

In Somo Somo, the male villagers are responsible for farming. Farms are located both on hills and flat land. A wide range of crops are grown in the village, including tarot, yams, kassava, sweet potato, bella, kava, cabbage, four varieties of banana, papaya, mango and pineapple. Almost all crops are grown entirely for consumption on the island, with the exception of some taro and kava which are exported and sold in Suva. The importance of having large trees present to ensure greater quality soil composition is widely understood, although ‘slash and burn’ techniques are still employed to clear parts of the land. Pesticides are sometimes used, however no fertilisers are applied and crops are rotated every four to five years to allow nutrients to regenerate naturally in the soil.

Mangroves

Mangroves in Somo Somo are located to one side of the bay and are not found in any other area around the village. Mangroves have previously been used for firewood by villagers, as well as for the construction of bures and other structures. Extensive cutting of mangrove areas ceased to occur in the village around ten years ago after the benefits of the forests were noticed. Currently, there is no replanting occurring, although interest has been expressed for this to occur if help from Frontier-Fiji staff and volunteers can be provided, following the example set in Lekuva.

Conservation Issues

The people of Somo Somo have received relatively little information recently with regards to the Lomani Gau Initiative. The initiative meetings appear to rely heavily on the presence of Dr Joeli Veitayaki and, as a result, the last meeting was held around six months ago in 2008 when he was present. However, there is keen interest in the initiative, with funds allegedly donated by the USP to initiative members in return for attendance to the meetings. In terms of understanding the aims of the initiative, the survey indicated some knowledge of the efficient use of resources, farming practices and waste management. As well as flushing toilets that direct human waste far out to the sides of the

bay, there are also special places for waste rubbish (for instance where cans and plastic can be burnt safely). Whether the importance of these issues in protecting the marine environment is fully comprehended by the villagers is unknown.

5. DISCUSSION AND FUTURE PLANS

5.1 General Conclusions

The socio-economic survey data outlined in this report represent an important first step in exploring the impact of the Lomani-Gau Initiative and in interpreting rationally the extensive baseline ecological data collected by Frontier-Fiji. Although the project is still in its early stages, several trends can be identified from the four example villages chosen and thus indicate the effectiveness of the initiative to date.

Village Structure

Levuka, Nukuloa and Somo Somo villages were found to be similar in total population (averaging 125 people per village), with Nukuloa indicating a greater proportion of children and total families than the other two villages. Nawaikama showed by far the largest total population with over 400 inhabitants, with half of those reportedly children belonging to 65 families. Education is available to children in all four villages in the form of primary and secondary schools and in Levuka and Nawaikama, pre-school education is also present.

Fishing

Across the four villages, there is some variation in whether fishing is conducted by men or women of the village and whether it is conducted individually or in groups. Various methods are used to catch fish with a variety of fish caught, and all or almost all fish caught are used. In Nawaikama and Somo Somo, fishing is conducted both at night and during the day. In Levuka, Nukuloa and Somo Somo, larger fish caught are taken to Suva to be sold. In all villages, fishing is conducted most or all days of the week and thus fishing pressure appears to be high in all areas surveyed. In Levuka and Nukuloa, fishing on the fringing reef occurs most days of the week, while fishing on the barrier reef occurs only once a week.

Agriculture

In all villages surveyed, farming appears to be an extremely important means of food production and livelihood for local villagers. Farming can occur on either flat or sloping land, the latter of which is a concern in some areas. In all villages, a variety of crops are grown with the majority of the harvests being kept for sale and consumption in the village itself or more widely on Gau. A small proportion of Levuka's and Somo Somo's harvests are exported to Suva to be sold. 'Slash and burn' techniques appear to be used to clear areas of land as part of a shifting method of cultivation, which varies from three year to five year rotations. All farming appears to be carried out by hand. Only in Levuka are fertilizers occasionally used, whereas pesticides are reported to be sometimes used in Levuka, Nukuloa and Somo Somo.

Mangroves

The results of the mangrove questionnaire indicate that local people believe there are mangroves around each of the four villages. Villagers from Levuka, Nukuloa and Somo Somo state that any removal of trees from mangrove areas ceased many years ago and that they presently do not use the mangroves in any way. In the past, trees from mangrove areas have previously been used for firewood and for the construction of various structures, however many villagers responded that they are now aware of the importance of maintaining healthy mangrove forests for coastal protection from erosion and the preservation of fish stocks.

In Levuka and Nukuloa, mangrove forests are believed to have remained at a stable size in the past several years, with the area believed to be slowly increasing in Nawaikama. A replanting project is currently underway in Nukuloa. No such projects are currently planned for Somo Somo or Levuka, although some interest has been expressed. A replanting project has already taken place in Nawaikama some years ago.

Conservation Issues

In Levuka, Nukuloa and Nawaikama, villagers appear to be positive about the presence of the no-take zones in the villages, the role of Frontier-Fiji and the initiative. However, there are still some issues which need to be addressed in order to make the initiative run more successfully, such as a lack of complete adherence to some of the restrictions in at least one of the villages, and a lack of information with regards to the principles and implications of the project. Clearly there is still some way to go before the initiative can be deemed fully effective across the island.

Despite some of these issues, the initiative remains an important local community tool in preserving Gau's natural resources and local livelihood, which the majority of local people wish to preserve and improve.

To summarise, the strengths of the initiative include:

- The involvement of local people in the management of their natural resources;
- The promotion of self-determined initiatives;
- The combination of resource management aspects with development activities;
- The attraction of new development partners;
- The promotion of new development options.

The main weaknesses of the initiative are:

- Limited funding which slows progress;
- A lack of government support for community development initiatives;
- Poaching from community groups by non-community members;
- Social and cultural pressure.

5.2 Code of Conduct for Sustainable Living in Gau

'The Code of Conduct for Sustainable Living in Gau was to be produced following the resource use, management and rehabilitation plans, which were to be written by a

representative of each village. This is yet to be formulated but would be a useful document if made available to every household on Gau. The Code of Conduct should then be followed by every community member at every level of authority, should be included in each village, and each island meeting should also utilise the document as a basis for discussion and support.

It should be endorsed by the Gau Island Council, to which the Lomani Gau Committee reports to, and should emphasise the following points:

- Local people working together to formulate and implement resource management and development plans for each village;
- The preservation of the virgin mountain forests and landscape on Gau;
- The formulation and use of proper land use guides for Gau;
- Surveys of the resources, social and economic potential and needs in each village;
- Training workshops and follow up activities to inform and engage people in each village;
- Adherence to relevant traditional practices;
- Use of a participatory manner in planning and decisions making;
- Implementation of the appropriate economic activities in all villages.

Targets should be set, external evaluation conducted and developments monitored more effectively. Leadership and information dissemination should also be reviewed. Frontier-Fiji has the ability to work alongside the Lomani Gau Committee and could thus take a more prominent role as educators, mentors and assessors. Members of the Frontier-Fiji team have the resources available to disseminate information from past workshops to a wider target audience, thus making the information available, not only to those on the committee or to those who attend the workshops, but to everyone. Developing a management plan to run alongside the initiative and have specific targets to meet within each community would be both beneficial and attainable.

6. REFERENCES

Lisca, T. (2008) Conservation, Community and the Chief: A case study of Community Based Natural Resource Management in Gau Island, Fiji. *BA Thesis*, Kings College London

Veitayaki, J. and Murai, T. (2005) Fisheries Management Workshop Report: Gau Island, Fiji (7th-10th Nov., 2005). JICA and IOI-Pacific Islands. Suva, Fiji. 64pp.

Veitayaki, J., Tawake, A., Bogiva, A., Meo, S., Vave, R., Radikedike, P., Ravula, N. and Fong, S. P. (2005a) 'Partnerships and the Quest for Effective Community-based Resource Management: The Mositi Vanuaso Project, Gau, Fiji', *Journal of Pacific Studies*, Vol. 28, No. 2, pp. 328-349.

Veitayaki, J., Tawake, A., Bogiva, A., Meo, S., Vave, R., Radikedike, P., Ravula, N. and Fong, S. P. (2005b) 'Addressing Human Factors in Fisheries Development and Regulatory Processes in Fiji: The Mositi Vanuaso Experience' in A. Chircop & M. McConnell (eds.) *Ocean Yearbook 21*, Chicago IL, University of Chicago Press.

Veitayaki, J. and Liwaiono, F. (2007) Enhancing resource management through the provision of alternative sources of livelihood: the role of the International Ocean Institute- Pacific Islands. Building capacity and cooperation Mercure Hotel, Townsville, Australia.

7. APPENDICES

Appendix 1. Frontier Workshop schedule and questionnaire in English.

Frontier Workshop Schedule, Gau

Proposed dates: 2nd/3rd February from approximately 10am till 1pm
Time schedule: 30 minutes introductory presentation by Frontier
30 minutes for lunch
60 – 90 minutes for group discussions and questionnaires

Who is Frontier?

Frontier is a not-for-profit conservation research organisation based in the UK. Frontier was invited to the island of Gau in 2006 with the help of the University of the South Pacific and Joeli Veitayaki to compliment the work previously conducted on the Eastern side of Gau as part of the Lomani Gau Initiative.

Why are we here?

Our purpose on the island of Gau is to conduct research on the islands marine resources working in collaboration with the local communities, the USP and IOI-PI with the aim of providing valuable information to the local communities to assist with the conservation of the marine ecosystem and promote sustainable development in the use of marine resources.

What do we do here?

As a team of five staff and three volunteers, we survey the surrounding fringing coral reef system and research the current levels of fish, algae, invertebrates and coral species diversity and abundance. This takes places at fourteen sites located in front of Sawaieke, Somo Somo, Nukuyaweni, Naviavia, Nawaikama, Nukuloa and Levuka. Frontier-Fiji uses Naviavia as its base camp from which to conduct such research projects.

What is the importance of the work we do?

The current state of the fringing reef is relatively unknown. This information is important due to the links between reef health, fish stocks, local activities and land use. A relatively new initiative, locally managed marine areas (LMMA), was established to involve local communities in the management of their marine resources. Part of Frontier's aims and objectives is to use our research capabilities and knowledge of the marine ecosystem to help extend the current environmental management activities to encourage waste management, replanting or mangroves and control of fishing and livestock activities to help improve resource management and sustainability.

What is the purpose of the workshop?

1. To introduce ourselves and open the channels of communication between the locals and Frontier-Fiji.

2. To provide a forum from which Frontier-Fiji can share our information including regular updates on the status of the seagrass, mangrove and coral reef health, including fish stocks, to locals and in return learn more about the local activities and culture.
3. To build relationships and work more closely with the locals in the development of resource management programs.
4. To instigate a possible teaching program in the local high schools about the reef system and its conservation issues.

Social Economic Questionnaire

General and social aspects

- Male/female
- Ages
- Daily Jobs
- How many people are living in the village and how many families?
- How many children are there under the age of 15?
- How many of the children attend school, primary and secondary?
- Is there a local school or do the children board in a different village, if so where and for how long?
- Is there a pre school in the village?

Fishing

- How many times a week do you fish?
- What is the average size and number of fish you catch?
- What species do you catch most frequently?
- What method of fishing do you use; boat fishing, net fishing, line fishing etc?
- Where do you fish, on the fringing reef, barrier reef or lagoon?
- Do you use retain all your catch or does some get exported to Suva?

Agriculture

- What type of crops do you grow?
- How often you harvest the crop and what is the average yield?
- How do you clear the area for crops, e.g. slash and burn?
- What do you do with the crops, sell locally, export, or consume within the village?
- What type of farming practices do you use?

Mangroves

- Do you have any existing mangroves (if not then were there previously existing mangroves present)?
- Do you harvest the mangroves is so what do you use them for?
- Has your generation removed any of the mangroves within the last 10 years?
- Is there a replanting management scheme in place?

Conservation and management issues

- Are you familiar with LMMA (locally managed marine areas) and the no-take fishing zones in front of the village?
- Do you know where the boundaries are for the no-take zones?
- How do you feel about the conservation of the reef and the work that Frontier-Fiji is doing?

Appendix 2. Frontier Workshop schedule and questionnaire in Fijian.

Tuvatuva Ni Vuli Frontier Gau

Tiki Ni Siga E Vakaturutaki: 2 Kei 3 Siga Feb 10 Kaloko Mataka 1 Kaloko Yakavi

Gauna Ni Vuli: 30 min Vakamacala Frontier

30 min Vakasigalevu

60 – 90 min wasewase vakalawalawa me saumi kina taro

Ko cei na Frontier?

Frontier e dua nai soqosoqo ka tiko mai bolatagane na kena vale ni volavola liu ka ra dau dikeva na I yau bula ni dua na vanua. E sega ni soqosoqo ni vakaqara I lavo se bisinisi. Ena yabaki 2006 a sureti me mai dikeva na yanuyanu ko gau ena veitokoni ni ceva ni pasifika kei (Joeli Vietayaki) me mai dua na vakadidike mevaka sa vakayacora tiko mai ena tokalau kei Gau ko ya na (Lomanai Gau).

Nai naki ni neitou tiko eke?

Na naki ni neitou tiko eke me keitou dikeva naiyau bula ni waitui, ka cakacaka vatakei ira na lewe ni koro, (USP) IOI – PI (Tabana ni vakadidike e wasewase e vuravura ka qadava tiko na pasifika) nai naki me kumunai nai tuku tuku matata ka me na vukei ira na lewe ni vanua. Na nodra vakatorocaketaka na I yau bula e na nodrai qoli qoli.

Nai tavi keitou qarava eke?

Keitou lewe 5 na dau veivakavulici ka 3na gone vuli. Meratou vakadikeva na cakau kei nodra bula na veimataqali ika, vata kei na vuqa tale na veimataqali yau – bula e bula tu e nai qoliqoli e tini kava (14) taucoko na vanua e vakayaqori kina na vakadidike oqo. Oqo ena matasawa kei Sawaieke, Somosomo, Nukuyaweni, Naviavia, Nawaikama, Nukuloa ke Levuka I Gau. Na keba ni Frontier e tiko mai Naviavia.

Vei ka e baleta na neitou cakacaka?

Dikevi ni veiyamotu e sega ni kilai oya e bibi kina na kena kumuni na I tukutuku me baleta na veicakau na nodra bula na veimataqali ika nodra I tovo ni qolo na lewe ni vanua, Kei vakayagataki ni nodra qele na lewe ni vanua. Sanavuci e dua nai tuvatuva vou vei keda na lewe ni vanua, na kena taomaki nai qoliqoli ka tiki ni cakacaka ni Frontiers. E nodatoudikeva ka vakatakilavei keda na veika me baleta nai qoliqoli me rawa ni. Taqomaki ka qarana vinaka ne veika volivoliti keda, mororai ni benu I teivaki ni vei tiri vakacaca ni manumanu taqomaki noda qoli me rawa ni vukei na kena taqomaki noda qoli me rawa ni vukei na kena taqomaki ni noda I qoliqoli.

Na cava nai naki ni vuli oqo?

1. Me dolava e dua na katuba ni veitala – noa vei kemuni na lewe ni vanua kei na (Frontier).
2. Me vakarautaka vua na Frontier e due na vanua me da veisoli tukutuku kina me baleta na sasalu ni nomuni qoliqoli, veimataqali co ni watui. E bula wavokita na

nomuni matasawa na vei tiri se dogo na bula ena na veiyamotu, na vakarau ni nomuni qoli, kei na tovo nil ewe ni vanua.

3. me taraicake e due na veimaliwai e na kena vakatorocaketaki ni kena qaravi se taqomaki na veika sa vakaraitaki e cake.
4. me bucina e dua na porokaramu ni vuli veira na gone vuli me baleta na veicakau kei na taqomaki ni qoliqoli.

Na Veitaro Me Baletana Tikotiko Kei Na Rawaka Vakailavo

Ka raraba e baleta ne bula vakaitikotiko

- tagane/ yalena
- yabaki ni bula
- cakacaka e qaravi ena veisiga
- wiliwili ni tamata e tiko e nakoro kei na levu ni mata vuvale
- wiliwili ni gone kara tiko nodra yabaki ni bula ka lailai mai ena yabaki 15
- e vica na gone era vuli tiko e na primary school ka vica ena secondary?
- E dua tiko na koronivuli ena nomudou i tikotiko seramoce e bure na gone e na tale na koro ke vake kina ko cei na yacani koro ka vakacava na kena yawa mai vei kemudou?
- Tiko e dua na koro ni muri vuli ena koro?

Qoliqoli

- Kodau laki qoli vakavica e na loma ni dua na macawa
- E vica na ika ko dau rawata kei na kedra levu
- Mataqali ika cava kodau rawata vakawasoma
- I vakarau qoli ko dau vakayagataka siwa ena boto, siwa nunu, lawa kei naso tale
- Vanua I vei ko dau lei siwa kina yamotu, cakau, seki lomalomaa
- Ko dau vagataka kece na ka ko rawata se volitaki yaniki Suva

Teitei

- Mataqali I tei cava ko dau tea
- Vica na dede ni gauna ko dau tamusuka kina nai tei kei nakena levu
- Ko dau samaka vakacave na vanua ko teitei kina. Wereca se vakama kama
- A cava ko dau cakava ena nomu i tei volitaka ga eke se vakauta yani se laukana ga
- Mataqali teitei cave ko dau cakana

Veitiri

- E ra tubu tu eso na veitiri ena nomu dou matasawa (ke sega a rabau tu e so)
- Ni dua tamusuka na veitiri vagataka eso naka
- Ena loma ni tini na yabaki sa oti era bau kauta laivi na veitiri ko ira na tabatamata ka bula tiko qo
- E bau tiko e dua na I tuvatuva me bau teivaki na tiri

Na veika me baleta na taqomaki ni yau bula

- Ko bau kila vinaka na vakatatabu ni qoliqoli keina kena vakatabui me qolivi na matasawa ni koro
- Ko kila vinaka na vanua e vakatabui tiko

- A cava na nomu vakasama ena kena vakatata butaki na cakau na veita eratou cakava tiko na Frontier keina eratou vakatatabutaka tiko

Appendix 3. Interview with Amelia Savou from Somo Somo.

Amelia reviewed each of the objectives of the Lomani Gau management plan for Somo Somo and answered some general questions about meetings and support. She attended the initial meeting in November 2005 held in Lovu as the Youth Group Representative alongside two other members of the community; Taniela Delaiverata, Village elder, and Kalivati Bakani, Turaga ni Koro. The attendees at this initial meeting were informed about Frontier-Fiji and that Frontier-Fiji would be arriving in 2006 to assist in LGI. The villagers were told Frontier-Fiji were a source of income for them and they could see us fruit and vegetables.

Healthy living

Tomasi Dravikula, the Leader for Healthy Living community group, meet once a month for a village meeting in the community hall. Points of discussion are how to dispose of rubbish carefully, how to maintain healthy living spaces in your home (kitchen, eating areas), where to bury certain rubbish items such as tins and containers. There have been no recent meetings as Tomasi is not keeping up to date with them and fulfilling his role effectively since the end of 2007. He has to work closely with the health workers of the village but unfortunately this community group seems to have been let down by a ineffectual manager.

Pig fence

The fencing around the pig huts have been completed and are located over the waters edge on the left hand side of the bay in Somo Somo. All villagers helped complete the pig huts for the owners of the pigs. Waste from the pig huts falls directly into the bay.

Rubbish dump

Two holes are dug in the adjacent bay; one is for burning. New holes are dug approximately once a month. When the holes are full and a new one is needed to be dug the matter is brought up at the village meeting where the Healthy Living leader will co-ordinate a new hole to be dug.

Drain construction

This is currently incomplete. The village initially requested government funds to assist in the building of the drain as when storms and high waters assault the village many of the lower houses and those sited in the natural drain channel from the hills flood very badly. They have never received any funds or cement to build the drain. Youth groups and the Ladies Club all assist in bringing up stones and other materials to help bank the drain but cement is necessary to complete the work.

Fish Aggregation Devices

Professor Morai from JICA, a Japanese funding organisation, brought FAD's to Gau and distributed them amongst the villages. Somo Somo were given an FAD which was taken into the lagoon and secured to an anchor. Women report higher fish levels around the FAD. Rafts have to be used to travel to the FAD as fuel is not available. Unfortunately a

bad storm broke the moorings on the FAD and it was lost. Mooring fittings need to be replaced and were requested from Dr Joeli Veitayaki 2.5 years ago but they have not had any updates on the FAD situation since.

Honey Making Venture An initial briefing was given in the first LG meeting on honey making however the tools and know how to build and maintain bee hives were not forthcoming and nothing has become of this venture.

Lomani Gau meetings

The first LG meeting was held in Lovu in November 2005. Dr Joeli and two USP members and Prof Morai with one JICA member initiated the meeting and Seru was appointed leader of LG. A second meeting was organised for November 2006 in Sawaieke however only representatives from the villages of Nawaikama, Somo Somo and Sawaieke were present and the meeting did not take place. To organise a meeting Dr Joeli would contact the Turaga ni Koro in each village and 3 members from each village (from the Youth Group, Ladies Club, Village Elders and the Turaga ni Koro) would be expected to attend. There have been no more meetings. The last time Dr Joeli was seen in Somo Somo was in 2007 with Prof Morai and spoke to the Turaga ni Koro and the village elders for about two hours and left. Amelia did not speak to him as if invited to the meeting is actually not allowed to converse with Dr Joeli.

Other meetings

There are three types of meetings that currently take place involving Gau; Provincial meeting, Island meeting and a Tikina (District) meeting. The Provincial meeting occurs in Levuka (the old capital of Fiji) twice a year. The last meeting was held in May 2009. The Mata ni Tikina (Leader of the Sawaieke District and all the Turaga ni Koro) Kaliavati Bakani and the Turaga ni Koro from each village attend the Provincial meeting. The Island meeting is held on Gau and is called by the Island Paramount Chief Taka li Gau. This seems to be held when problems arise on the island maybe twice a year and is open to the village elders, leaders of the youth group, ladies club and the Turaga ni Koro. Seru did not attend the last one in 2007 however Alan Rees from Frontier-Fiji did attend. The final meeting that is held involving Gau is the Tikina meeting. This is purely for the Sawaieke district and is held three or four times a year. Taka li Gau decides on the location of the meeting and again it is open to the village elders, leaders of the youth group, ladies club and the Turaga ni Koro. The latest one was held in May 2009 two weeks after the Provincial meeting. It seems that the LGI is only really discussed at the Island and Tikina meetings and somebody could raise the issue of unhappiness with Serus' abilities and call for him to be replaced.

Village groups

The Youth group meet every Monday for a youth day where by the youths help around the village at various tasks. They are guided by a village elder who makes a program for them and encourages their assistance and hard work. The youth group fell apart a few years ago however the return of the Youth Group leader Mel has restarted the enthusiasm for village projects and youth days the situation looks very positive. The Ladies Club meet to discuss the healthiness of the houses, the cleanliness of the village, weaving and household chores. The men apparently just wait for the women to come home for some nookie.

Amelias thoughts on Seru

Amelia seems very disappointed in the current status of the Lomani-Gau Initiative. She believes a meeting should be called very soon and the management plan of the village needs to be discussed and reviewed. Seru should be changed as the leader of LG as he is ineffectual and unapproachable. Amelia feels Seru needs to be managed better by Dr Joeli. Amelia feels that Frontier-Fiji can help by initiating more training workshops, helping with the manual tasks as part of the management plan and lending a hand with other tasks as required by the community in Somo Somo to show an interest in the local village. Each year there are new staff for Frontier-Fiji asking the same questions but she does not mind as our presence is always a positive factor.

Appendix 4. Interview with Kalivati Bakani from Somo Somo.

In 2005, Kalivati was the Turaga ni Koro of Somo Somo followed by a promotion to Mata ni Tikina. Kali is also the LG representative for Somo Somo. Kali felt that Seru was a good man but an apparent falling out between Seru and Mattai from Nawaikama prevented a meeting being called over the last two years. Kali feels it necessary for Dr Joeli to tell Seru to call a meeting. Kali did attend the Provincial meeting held in May 2009 but Seru was not present. Kali believes the LG committee is very much in working order but it is very important for Seru to take immediate control and call a meeting. The last time Kali saw Seru was at Christmas time 2008. Kali mentioned that the LG committee was part of an Environmental Health NGO. Kali also stated that since Frontier-Fiji was part of the Lomani-Gau Initiative in 2006 repairs were done for free by members of the LG committee and the Turaga ni Koro from each village over a two week period.

Appendix 5. Interview with Samisoni Seru from Levuka (President of the Lomani-Gau Initiative).

Seru was nominated in the 2005 Island Meeting as President for the Lomani Gau committee. Every two months each village representatives for the LGC meet in Sawaieke. Seru calls a meeting by sending a message via radio through the Postmaster in Qarani and asks for confirmation of attendance however moving around the island is expensive and people find it impossible to attend. Seru's position is an unfunded one and he received no financial aid from Dr Joeli for transportation costs. The first meeting in November 2005 was attended by Dr Joeli and Professor Takeshi Murai from JICA Japanese International Cooperation Agency. The JICA donated four FADs to some of the villagers to help fish catch however all have been lost due to bad weather and have not been replaced. Levuka still has the anchor but no mooring buoy. Seru hopes that Dr Joeli will come to Gau at the end of May 2009. This is to be confirmed.

Seru stated that Joeli comes each year and checks on the progress of the development plan and visits each village around the island. Dr Joeli informed Seru there was 50 000 USD in the bank from the Global Environment Facilities and needed proposals from each village as how to direct the funding. Proposals are sent to Dr Joeli via the Provincial Office and the Post Office? LG seems to be very slow moving and needs time and money to move forward. Seru states that LG needs money from outside sources to make the development plan progress quicker. In 2006 the Ministry of Health donated 3 tonnes of cement. The Ministry of Fijian Affairs donated 7000 FJD for a water pipe to be built in Nukuloa.

Each village has a development committee. Next month (June 2009) the Roco (?) will check on the progress of the development plan and if they can pay for fuel?

Previously Frontier-Fiji has made a satellite camp in Nukuloa/ Levuka but did not help with community work. They did make workshops of some description but Seru was unsure of the content. Levuka and Nukuloa have requested help with replanting mangroves which Frontier-Fiji can aid with.

In 2006 clams were donated by the Ministry of Fisheries from the Vanuoso Tikina (the nursery is in Makogai) to place in the MPAs to grow and eat/ sell (1800) however they grow 30cm in two years and only sell for 15 FJD. Giant clams grow to size after twenty years.

Seru informed us that the villages often see fisherman from Suva fishing in Ngali many times per week at night time. He doesn't inform the police and seemed un-committed to trying to take record the boats identification and take it further with the authorities.

Seru reviewed each of the objectives of the development plan for Levuka.

Footpath

This is incomplete however the villagers have all the materials apart from cement.

Piggery Fence

This is a youth project assignation. The nails, fence material, posts and labour are ready however 10 coils of wire is needed to keep the pigs enclosed.

Flush Toilet

24 Flush Toilets were provided to Levuka village and only four are left to fit. in 2005 they wanted toilets for each household. All that is needed is roofing iron to complete the last four restrooms. Toilet waste directly flushes into a cesspit dug into the ground. The cesspits have not been emptied yet. When they are full they are filled in with soil and left. Another one is dug and the pipe re-routed.

Seru reviewed each of the objectives of the development plan for Nukuloa.

Planting of coconut trees

The village wanted to plan more trees in and around the village. For every 10/15 houses they own one piece of land of around 400/ 500 hectares.

Piggery

The villages have pigs however no fences to stop them roaming. Seru didn't seem very conducive to the idea of finding their own materials to make the fences since they can use the labour of the village.

Farming

The village is trying to grow dalo/ talo to sell in Suva which are planted every 8 months to take to the market by the Sandy as this is cheaper transportation than using a fibre. Seru wants each village to produce five tonnes from each village to sell in Suva.

Who is Frontier?

Frontier is a not-for-profit conservation research organisation based in the UK. Frontier was invited to the island of Gau in 2006 with the help of the University of the South Pacific and Joeli Vietayaki to compliment the work previously conducted on the Eastern side of Gau as part of the Lomanai Gau Initiative.

Why are we here?

Our purpose on the island of Gau is to conduct research on the islands marine resources working in collaboration with the local communities, the University of the South Pacific and International Oceans Institute - Pacific Islands with the aim of providing valuable information to the local communities to assist with the conservation of the marine ecosystem and promote sustainable development in the use of marine resources.

What do we do here?

We consist of a core team of five members of staff (introductions) and we are all responsible for different aspects of the project. We currently have 3 volunteers. Despite being a UK based organisation we have staff and volunteers from a number of different countries and we all work together to achieve the same objectives. Our volunteers stay on Naviavia for between 4 and 20 weeks. As a team of staff and volunteers, it is our primary objective to survey the surrounding fringing coral reef system and research the current levels of fish, algae, invertebrates and coral species diversity and abundance. Frontier-Fiji uses Naviavia as its base camp from which to conduct such research projects.

This program starts with training all volunteers to dive, making sure they are all fully competent in the water. This is followed by intensive training in the identification of fish, invertebrate, algae and hard coral species and all the techniques we use to study them. During this time they also become accustomed to camp life, learning to live without their usual basic luxuries such as an endless supply of water, electricity, gas cooker and comfortable beds. They all learn to cook on the open fire and become more aware of their surroundings and learning to appreciate the local culture particularly enjoying the Kava sessions.

Once they have fully integrated into camp life the core surveys start to take place. These are called the baseline survey protocols (Figure 2). These consist of two 20m stretches under the water that we swim along recording the total number and species of fish, algae, invertebrates and hard corals. The surveys are conducted at four different depths, 0-2m on the shallow reef flat, 2-4m on the reef crest. Because these two locations on the reef are still quite shallow we use snorkelling equipment. The remaining two depths are at 6-8m and 10-12m which required us to use scuba diving equipment. These surveys take places at fourteen sites located in front of Sawaieke, Somo somo, Nukuyaweni, Naviavia, Nawaikama, Nukuloa and Levuka. The program also includes studies of the seagrass beds, the presence of mangroves along the coast and water analysis looking at changes in the temperature and salinity.

What is the importance of the work we do?

Gau has become more and more involved and concerned with the use of its land and marine resources. This initiated locally run management methods that directly involved the local communities and were known as the Locally Managed Marine Areas (LMMA) this was first adopted on the east coast of Gau by the Vanuaso district and led to the establishment of five no-take zones in the waters directly in front of the villages. This has since been extended to incorporate a combined effort with the formation of the Lomani Gau committee and resulted in each village in Gau designating a no-take zone in front of their villages as part of a marine protection area. Frontier was invited in 2006 with the help of the University of the South Pacific to assist with this locally run initiative. This has the overall aim of assisting the local communities in the management of their environmental resources. This initiative has arisen due to the increasing village populations, commercial agriculture, intensive fishing, and alteration of coastal habitats such as mangroves and seagrass beds that are currently taking place. The biggest concern is the exploitation of the natural resources. Some of the issues now being addressed by Lomani Gau include:

1. The surveying of all communities and their resources
2. Proper use of the land use guidelines
3. Planting and managing coastal forests and special habitats
4. Protecting valuable coastal habitats
5. Reducing the uncontrolled cutting of trees, burning and farming on hill slopes
6. Protecting water catchments to avoid contamination of drinking water
7. Improving fishing areas
8. Establishing an appropriate level of fishing effort and increasing fisheries management activities
9. Setting up ecotourism operations

Unfortunately the current state of the fringing reef of Gau is relatively unknown. This information is important due to the links between reef health, fish stocks, local activities and land use. Part of Frontier's aims and objectives is to use our research capabilities and knowledge of the marine ecosystem to help extend the current environmental management activities to encourage waste management, replanting of mangroves and control of fishing and livestock activities to help improve resource management and sustainability.

Diagram explaining the links between local activities and the management of natural resources (Figure 3).

1. Deforestation leading to soil erosion and land run off, lack of a root system to retain some of the nutrient rich top soil. This could directly affect the productivity of local farming activities and could reduce yield. Excess water run off could also become a problem during heavy rain-fall.
2. Increasing populations in the coastal villages, including livestock, will lead to increased waste production; this needs to be carefully managed to ensure water sources are not contaminated. Increased sewage waste into the open sea can cause a shift in the balance of algae and corals as the increased nutrient content of the water will encourage increasing growth of algae that will smother the hard corals and directly affect the productivity of fish populations.
3. Due to increased populations many of the mangrove systems have been removed, to use the land for other uses such as sea defences or additional land for building.

Mangroves are valuable extensions of the reef system providing important habitats for juvenile fish and invertebrate without which many of the species are unable to survive in the open sea. The mangroves also help trap the suspended solids this is important for the adjacent seagrass beds which rely on very clear waters for their growth, these are also valuable nursery and feeding grounds for fish.

4. All these factors can affect the fringing reef by causing a shift in the dominant species, algae and sediment will smother the reef destroying the hard and soft corals that are essential for the fish and invertebrate communities. This will directly reduce the numbers and types of fish present. The overall results will be much smaller and much fewer fish present.

These points highlight the need for a well developed monitoring system to manage local activities including both land use and marine resources. The no-take zones are important as they form the basis of a Marine Protection Area whereby resources extraction or human access are strictly regulated or prohibited. The establishment of no-take zones are an important ecological factor in improving the health of the fringing reef system.

1. They can enhance stock size and yield of fish catches
 - An unaffected reef can produce up to 25 tons of fish per Km annually
 - An affected site will only produce 5 tons
2. No-take zones can improve the general recruitment and enhance yields of the surroundings areas via the migration/movement of fish from the un-fished no-take zone. This can also assist with the rehabilitation of over fished areas or damaged areas.
3. Help increase fish size as within the No-take they will be able to grow to full adult size. If large fish are continually removed this will result in an overall decrease in fish size. Beqa lagoon as an example.
4. Encourages habitat protection and species preservation as an untouched habitat will be able to maintain a high level of species diversity providing a better environment for recruitment, growth and overall productivity.

Summary

Well managed MPA's have an ability to halt depleting fish stocks and help damaged reefs recover. The long term increase in fish yield, recruitment, size and species variability will compensate for the restricted fishing zones.

Frontier-Fiji aim to help with this by providing information to help further developments towards a long running management program to ensure sustainability of the marine resources of Gau for several generations and hopefully extend current management schemes.

We aim to encourage water management programs, replanting of mangroves, preservation of seagrass beds and reef systems, management of land use and sea activities as a means of achieving the islands long term objectives.

What is the purpose of the workshop?

- To introduce ourselves and open the channels of communication between the locals and Frontier-Fiji.

- To provide a forum from which Frontier-Fiji can share our information including regular updates on the status of the seagrass, mangrove and coral reef health, including fish stocks, to locals and in return learn more about the local activities and culture.
- To build relationships and work more closely with the locals in the development of resource management programs.
- To instigate a possible teaching program in the local high schools about the reef system and its conservation issues.