

“Sacred Water”; 10 years of community managed marine protection supported by ecotourism-based income generation at Waitabu Marine Park, Fiji Islands

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ABSTRACT

In April 1998, a small indigenous community began one of the earliest Community-managed Marine Protected Areas (MPA) in Fiji, beginning a decade of commitment to protecting reef life for future generations. The project was a founder member of the Fiji Locally Managed Marine Areas (FLMMA) network, and one of the few FLMMA projects to include an income-generating community-managed tourism operation.

Annual biological monitoring since the project’s inception, undertaken by a team of scientists and community members, utilised in-water survey methods, including Catch Per Unit Effort (CPUE) for key invertebrate species, Manta Tows for broad-scale habitat and invertebrate assessment, Point Intercept Transects for coral cover, and Fish Underwater Visual Census (UVC). These surveys demonstrated increased fish populations within the MPA after 3 years, and increased invertebrate populations after 5 years. Fish and invertebrates important to local subsistence and commerce are harvested in the spill-over area near the MPA. Some poaching occurs inside the MPA, but so far has not significantly impacted overall populations, suggesting the ecosystem is now adequately robust to withstand some harvesting.

Coral growth was retarded by a bleaching event in 2000, but herbivory has reduced macroalgal cover within the MPA, creating better coral-growth substrate, accelerating coral settlement and recovery in comparison with heavily fished areas where macroalgae covers most available substrate, preventing new coral settlement. A small coral restoration project is thriving inside the MPA.

Socio-economic surveys have shown the MPA to have economic and social importance to the local inhabitants, and the value of the MPA as a reserve for conservation and future fish stocks has been reinforced by the income-generating potential of eco-tourism activities.

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Keywords

Community Managed Marine Areas, Ecotourism, Sustainable development, Long-term biological monitoring, Coral bleaching, Habitat phase shift.

1. INTRODUCTION

1.1 Bouma Heritage Park

Bouma is a district on the north eastern side of Taveuni, the third largest island in the Fijian Archipelago. It contains four villages and several small settlements, within a traditional land-owning community unit (“Vanua”). In Fiji, these land-owning units also own the fishing rights to the surrounding reefs (“Qoliqoli”).

In 1989 a logging company proposed to cut hardwood in Bouma District. After an assessment by the Fiji Native Lands Trust Board, and the New Zealand Royal Forest and Bird Protection Society, the communities opted to protect their tropical forest. Instead of awarding the logging contract, the Bouma Environmental Tourism Project was formed, utilizing ecotourism to supplement their income through a waterfall park and rainforest hike, termed “Tourism instead of toothpicks”.

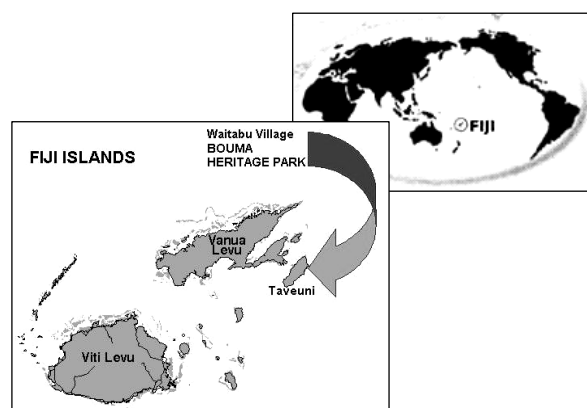


Figure 1. Maps showing position of Vanua Bouma and Taveuni Island

The objectives of the Bouma National Heritage Park are fourfold:
1. To protect the Vanua Bouma (four communities) forest and ecosystems, including the marine areas of Bouma

2. To create sustainable livelihoods for the four villages
3. To preserve natural and cultural traditions where possible
4. To have projects managed by and for the local communities (British Airways Tourism for Tomorrow Awards 2002)

In time this initiative led to three more conservation-based income-generating ecotourism projects. All four projects involve conservation of natural resources, supported by direct tourism income, and managed by communities as cooperatives.

The four projects within the Bouma National Heritage Park are:
 Since 1989: Korovou Waterfall Park, Lavena Coastal Walk
 Since 1998: Waitabu Marine Park, Vidawa Rainforest Hike

1.2 Waitabu Marine Park, “Sacred Water”

Waitabu village lies within the Vanua Bouma and is a very traditional Fijian village. It has 25 houses and 129 inhabitants. (Reddy 2007)

In Fijian Wai-tabu means “Sacred” or “Forbidden” Water, making it an apt choice for the location of a Marine Protected Area (MPA) supported by ecotourism.

Waitabu Marine Park (WMP), formed in 1998, is a shallow fringing reef area 900 m long by 300 m wide, from beach to 100m off the reef slope, including a deepwater channel and a sea grass bed. It has been a no-take zone for more than 10 years, with over 7 years of snorkelling tourism run by the community.

1.2.1 Forming the MPA

In April 1998, at the request of the Waitabu community, and after workshops and consultations with tourism development experts, the no take zone was established by the clans (“Mataqali”) of the village, using a traditional system of closure (“Tabu”). The period of protection was left open-ended with no fixed term.

Subsequently the project was introduced to, and recognised by, the other communities of the Vanua, through the District (“Tikina”) and Provincial Councils. Recognition at national level (gazetting by Parliament) is pending.

In 2001 the Fiji Locally Managed Marine Areas (FLMMA) network was formed, and WMP became one of the founding members, sharing in, and benefiting from, lessons learned by teams working with similar projects in the country. (LMMA Learning framework)

Poaching in MPAs is one of the commonest threats to FLMMA sites, and WMP is no exception. In 2009, six community members received training from the Fiji Government Department of Fisheries, which gave them the rank of “Fish Warden” with power to arrest, and to confiscate illegal fishing gear.

1.2.2 Ecotourism project



Figure 2. Photo of graduates of snorkel guide training in Waitabu 2008

For the first 3 years the reef was left undisturbed to recover from many years of subsistence fishing. In 2001, after 3 years of marine protection, snorkelling tourism was started. Local youths receive annual training as snorkel guides and in First Aid. This is done alongside annual biological monitoring of the MPA, to create a full week of community involvement.

In 2003 community members were involved in an experiment in small-scale reef restoration which has also provided an additional tourist attraction. Villagers built “Micro-reefs”: small stacks of rocks cemented together to form artificial coral substrate. The completed Micro-reefs were cemented onto the sea bed, and corals collected from storm damaged areas, or moved from vulnerable areas, were collected and cemented on to them, to provide new coral growth and fish habitat.

The half day ecotourism trip includes a ride into the MPA on a traditional Fijian Bamboo Raft (“Bilibili”), guided snorkelling in the MPA, and refreshments and entertainment in the village. For this tourists are charged F\$50 (16.66 Euro).

The proceeds are divided up immediately, and used to pay the project manager, snorkel guides, tea ladies, boat captain and boat fuel. Care is taken to ensure that all clans are equally represented in income generating opportunities. Any profit is deposited into the project funds, to be used eventually for traditional community commitments and children’s school fees.

A small campground has been established, but is yet to receive any tourist campers. It has been of great use to scientific teams visiting the park.

1.2.3 Monitoring the effectiveness of the MPA

Annual biological monitoring is carried out to establish the effectiveness of the protection on the marine habitat and populations.

Biological monitoring was initially started as a descriptive tool to assist with management planning. This project was not designed to provide scientifically rigorous data, and although surveys have been improved and expanded in recent years, the authors acknowledge that the biological data presented here is necessarily limited. However, long term trends have been clearly seen and are described. The importance of even limited monitoring will be discussed.

The monitoring is carried out by a collaborative team of scientists and local community members, who receive training every year, and who take part in data collection, basic analysis and presentation of results to the community.

The WMP manager collects standard information on each visitor to the park via a visitor's book, and provides monthly visitor numbers and income data. Socio-economic monitoring and fish catch monitoring was started in 2007 and 2008 respectively. A survey of poaching levels was started in 2009.

2. METHODS

2.1.1 Annual biological surveys

Community members under the supervision of the scientific survey team carry out:

- Manta Tow estimations of broad-scale habitat and invertebrate assessment.
- Catch Per Unit Effort (CPUE) 15 minute searches for key invertebrate species.
- "Reef Check" 20m x 5m Belt Transects for indicator fish and invertebrates (Reef Check 2004).
- 20m x 40 Point Intercept Transects for coral cover to Reef Check and Lifeform Categories (English et al 1997).

In addition, scientific teams carry out:

- Fish abundance in abundance categories over a 45 minute timed swim (since 2002).
- Fish Underwater Visual Census (UVC), counts and size estimation of all fish species seen along 50m x 5m transects (since 2007).

2.1.2 Socioeconomic assessments

Monthly visitor numbers and income generation are recorded in the marine park visitor book.

The Fiji Locally Managed Marine Areas (FLMMA) network socioeconomic survey was carried out in 2007 and 2009: (LMMA Learning Framework, Reddy 2007, Reddy 2009)

3. RESULTS

3.1 Annual biological surveys

3.1.1 Increased fish populations within the MPA

At the start of the project, the MPA area was over-fished and in a physically similar condition to the fishing grounds immediately in front of the village.

Species richness increased in the MPA over the first 5 years of protection, and then plateaued as the area achieved its natural ecosystem balance, while very few changes were seen in the fishing grounds. After 7 years of protection, fish species richness started to gradually improve in the fishing grounds. (Sykes, H., 2007, Sykes, H., 2009)

By 2008, the species richness in the fishing grounds was almost equal to that in the MPA, but fish abundance was still considerably higher in the MPA.

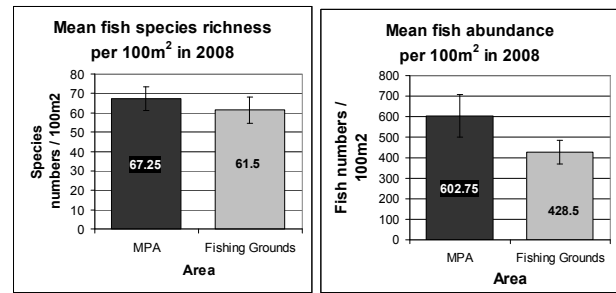


Figure 3. Fish species richness and abundance in the MPA compared with the fishing grounds in 2008.

3.1.2 Increased invertebrate numbers in the MPA

After 5 years of protection, the numbers of macro-invertebrates targeted for subsistence or commercial fishing, Giant Clams (*Tridacna* spp), "Trochus" shells (*Tectus niloticus*) and Spider Conch (*Lambis lambis*), had increased in the MPA over the fishing grounds.

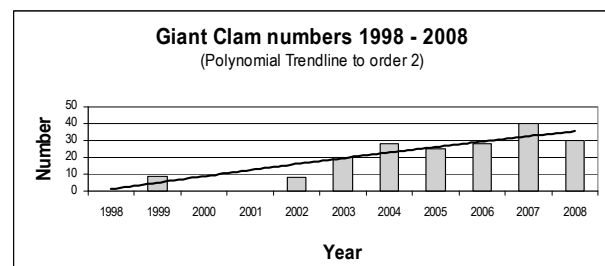


Figure 4. Number of *Tridacna* Giant Clams in MPA from 1998 - 2008.

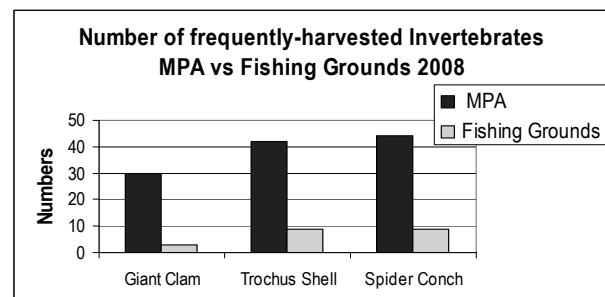


Figure 4. Number of targeted Invertebrate Species found during a timed search in the MPA compared with the fishing grounds in 2008.

3.1.3 Increased hard coral cover within the MPA

Algal cover is higher in the fishing grounds than in the MPA, retarding new coral growth by limiting availability of substrate.

In the MPA, large schools of surgeonfish (*Ctenochaetus striatus*) graze on macro-algae on the coral tops, creating clean substrate for new coral growth.

This algal reduction has created areas of higher coral cover in the MPA than in the Fishing Grounds. (Sykes 2007 and 2009)

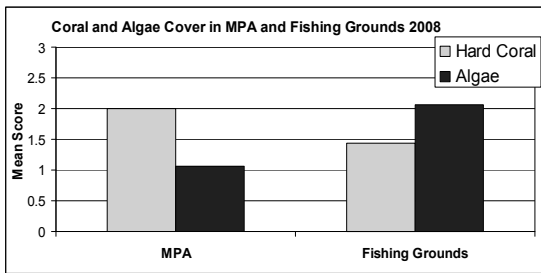


Figure 5. Levels of hard coral cover and algal cover in the MPA and fishing grounds in 2008

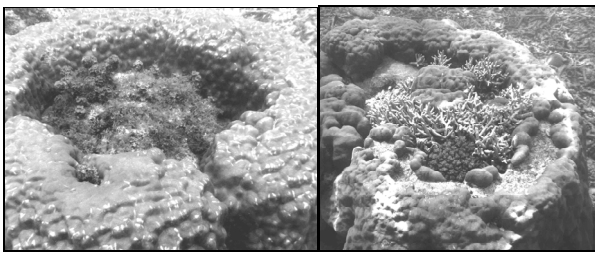


Figure 6. Algae covered boulder coral in fishing grounds compared with clean boulder coral showing new coral growth in MPA

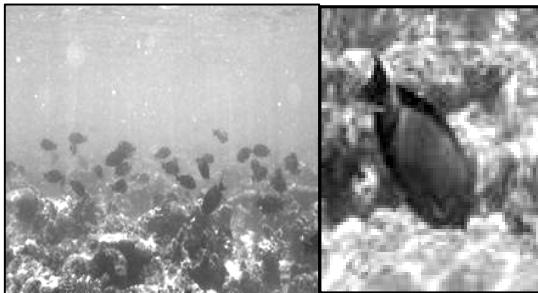


Figure 7. School of Lined Bristletooth, *Ctenochaetus striatus* grazing on Macroalgae in MPA

3.2 Socioeconomic issues

3.2.1 Tourism project

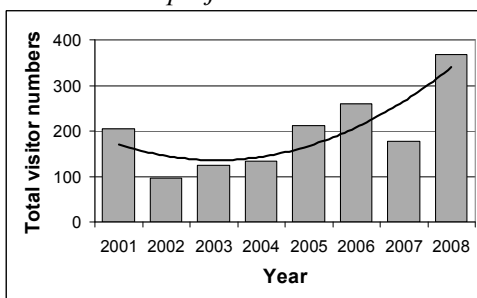


Figure 7. Total annual visitor numbers to WMP, 2001 to 2008

The park hosts an average of 15 - 20 visitors per month. Over the past 8 years the Marine Park has received 1,574 visitors and earned an estimated gross total of F\$62,319.65 (25,926 Euro).

Business progress has been slow. Visitor numbers from resorts on Taveuni Island have not increased since the project's inception. 2 websites have been created, but without regular email and phone contacts they have not been useful to create bookings

Visitor numbers have been augmented since 2006 by a bi-annual visit of a small nature-based cruise ship, and by organised student groups from local and international schools and universities. The first camping tourists are coming in May. There are concerns about cultural impacts

Earnings dropped in 2007 when a reduced rate backpacker trip was introduced, in an attempt to stimulate visitors, but which resulted simply in lower income for the same number of visitors.

Earnings in 2008 were raised by addition of T-shirt sales and a donation box for contributions to community projects.

3.2.2 Socioeconomic assessment

Material wealth status of the community is average for a rural Fijian community, and low for Fiji as a whole, with a mean income per household of 55 Euro per month (highly variable as monthly income depends on sales of farm products).

Most people rely heavily on farming root crops such as Dalo (Taro), and Yagona (Kava) for subsistence and commercial livelihood, and on subsistence fishing for dietary protein.

3.2.3 Community perceptions of the importance of the MPA

The cash livelihood from harvested marine resources is minimal. Villagers are more reliant on agriculture for cash income.

Important benefits and services derived from the MPA are food security, monetary benefits (tourism), and a future reserve for natural resources (fish for the children's future).

Tourists / visitors to the MPA are seen as an important source of supplemental income.

The highest priority threat to the MPA is illegal fishing (poaching).

Environmental knowledge is moderate amongst the villagers, and good amongst the local snorkel guides.

Environmental attitudes towards long-term commitment and participation in the MPA is positive in all community members

4. DISCUSSION

The MPA has proved itself a success from a biological perspective, with proven increases in coral cover, and fish and invertebrate populations. Significant improvements in coral and invertebrate life were not seen until after 5 years of protection.

This has become a long term project, originally set up without any limited term to the protection, and the MPA is now permanent in people's minds. Children have grown up with the concept of marine protection for the past 11 years. Some of them are now snorkel guides in the park.

Community participation in the annual biological monitoring and regular snorkel guide training has served to raise awareness of the functions of the MPA, to establish feelings of "ownership" of the protected area, and reinforce commitment to the project.

Income generation through tourism has been a mixed success, as the business has not grown in the way in which a professionally run enterprise may be expected. Most of this is due to poor communications and lack of organisational skills within the community. However, even at a low level, tourism has created and reinforced the perception of the MPA as an asset to the people of the community, and this in turn has strengthened their commitment to the project.

The project provides a little supplementary cash income, but certainly has not contributed significantly to community wealth. It has been very important to concentrate on mechanisms to ensure that all income generation opportunities are fairly shared between families and clans. It is important not to raise unrealistic expectations, and to manage conflicts.

In the future it has been decided to concentrate on promoting a different type of tourism, primarily student or nature-based groups, some of whom who will stay in the village in the campground or in local homes, and have a more intimate connection with the village and the project. This should be more profitable, more easily organised within the village milieu, and also more culturally sensitive.

These will take a great deal of training and discussion amongst the community, but it is hoped that it will be both more profitable and sustainable.

5. CONCLUSIONS

Marine Conservation is close to the hearts of rural Fijian people, who depend on subsistence fishing for protein more than for cash income.

Community involvement in MPA activities and work leads to a stronger sense of ownership and connection to the project than if the work is done entirely by an outside agency.

Tourism activities in rural communities take a great deal of work and support, and may not contribute a large amount of income generation in early years. However, tourism can be used to supplement income, raise awareness and education on environmental issues, and reinforce the value of a MPA.

The trick is not just how to start a project, it is how to create long-term sustainability. Community involvement and alternative income generation can help to achieve this.

6. ACKNOWLEDGMENTS

This paper is dedicated to the memory of Sala Apao, the project founder and leader from inception until her untimely death in

2005. We congratulate the leaders and the community of Waitabu village and of Vanua Bouma for their foresight and continuing dedication to this project, and wish we had space to name them all.

The New Zealand Overseas Development Agency (now NZAID) has remained a long-term supporter of the project, administered through the National Trust of the Fiji Islands.

Although the project has frequently been without regular funding, many organisations have supported individual aspects of the work, including Aquaventure Divers, Beqa Adventure Divers, The Coral Reef Alliance (CORAL), Fiji Water, Pacific Sun Airlines, Quiksilver Clothing, and Reef Check.

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