CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica & Belize

Report Compendium

Centre for Resource Management and Environmental Studies (CERMES)
University of the West Indies, Faculty of Pure and Applied Sciences
Cave Hill Campus, Barbados

2007

CONTENTS

Citation
CERMES. 2007. Report compendium. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No. 11. 417 pp.

About this report

This report comprises nine appendices or outputs produced during a regional project to evaluate management effectiveness of marine protected areas (MPAs), and to learn lessons from this process, at three MPA sites in the Caribbean – Sapodilla Cayes Marine Reserve, Belize; Negril Marine Park, Jamaica; and Tobago Cays Marine Park, St. Vincent and the Grenadines. This project was funded by an international Coral Reef Conservation Grant from the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce.

Appendices 1 to 3 (Pena 2006; Roach 2007; Roach and Garcia 2007, respectively) are the evaluation reports for each of the three MPA sites. They each contain a general introduction the project, a description of the project methodology and a section on the goals, objectives and indicators specific to each site. Indicators specific to each MPA site are then examined in detail, where possible, by providing a background, methodology for evaluation of the indicator, evaluation results and a discussion of the results. Lessons learned throughout the evaluation process are discussed. Each report concludes with a section on adaptive management for each site.

Appendix 4 is a MSc research paper produced by Donna Roach (CERMES MSc student) on 'Learning from evaluating MPA management effectiveness.' This paper focused mainly on the evaluation of management effectiveness at the Negril Marine Park and examined all aspects of water quality monitoring at all three MPA sites as well as lessons learned from each site. Appendix 5 is a paper by Roach and others that was presented by Donna Roach (CERMES MSc student) at the 59th annual meeting of the Gulf and Caribbean Fisheries Institute (GCFI) in Belize City, Belize in November 2006. The paper will be published in the Proceedings of the 59th GCFI and should be available by November 2007.

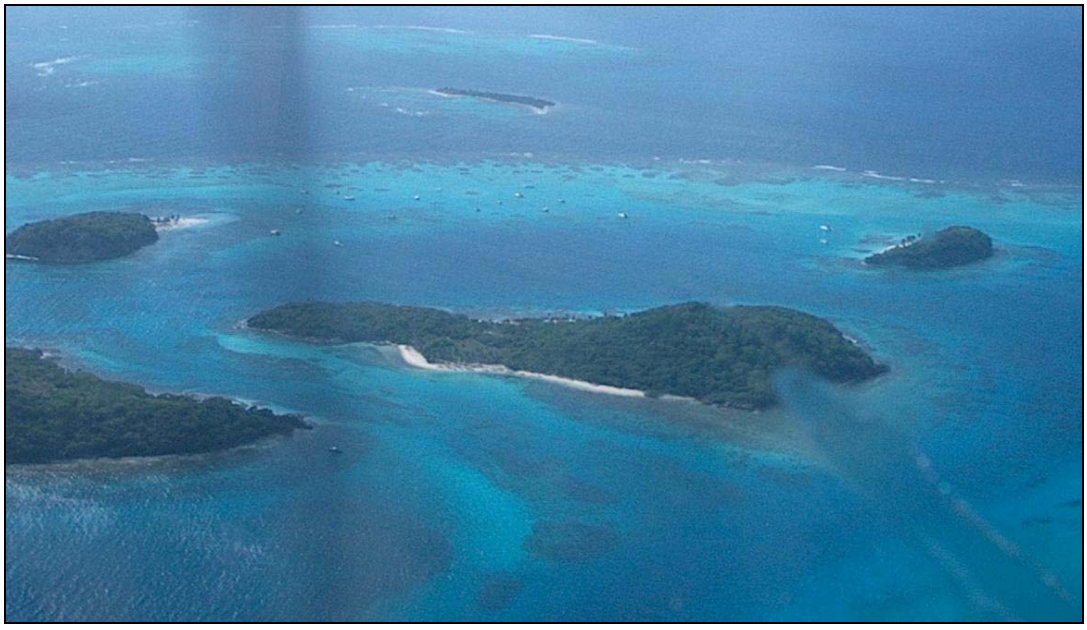
Appendix 6 comprises the report of a workshop held in Punta Gorda, Belize in November 2006 to review the products and process of management effectiveness evaluation in the CERMES regional MPA-ME project. Appendices 7-9 contain site specific reports of meetings held to share the evaluation results and lessons learned with suggestions of how to improve and adapt management.

Appendix 1

Pena, M. 2006. Report on Management Effectiveness at the Tobago Cays Marine Park (TCMP), St. Vincent and the Grenadines. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No. 5. 69 pp

CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica & Belize

Report on Evaluating Management Effectiveness at the Tobago Cays Marine Park (TCMP), St. Vincent and the Grenadines



Centre for Resource Management and Environmental Studies (CERMES)
University of the West Indies, Faculty of Pure and Applied Sciences
Cave Hill Campus, Barbados

2006

CONTENTS

Citation

Pena, M. 2006. Report on Evaluating Management Effectiveness at the Tobago Cays Marine Park (TCMP), St. Vincent and the Grenadines. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No. 5. 69 pp.

Disclaimer

This report was prepared by the Centre for Resource Management and Environmental Studies (CERMES) under Coral Reef Conservation Grant NA05NOS4631049 from the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce. The statements, findings, conclusions and recommendations are those of the author(s) and do not necessarily reflect the views of NOAA or the U.S. Department of Commerce.

Acknowledgements

Special thanks to the evaluation teams who conducted the field research for this project. These include the bio-physical evaluation team. Jason Alexander, Meritha Baptiste (née Small) Samuel Debique, Albert Hanson, Olando Harvey (all of TCMP), Lucille Grant and Sophia Punnett (both of St. Vincent and the Grenadines Fisheries Division) were involved in Reef Check and water quality monitoring throughout the project. The socio-economic evaluation team comprised Nicole Delpeche, Ann Harvey and Jeremiah Jones who conducted questionnaire surveys to gather socio-economic data pertinent to selected indicators. Meritha Baptiste provided the majority of the information relating to the governance indicators and was overall project contact person. Mr. Vibert Dublin, Rev. Andrew Roache, Mr. Raymond Ryan and the TCMP rangers must also be thanked for their invaluable information regarding the management of the TCMP.

Ms. Kim Baldwin (CERMES) must be thanked for conducting the necessary training in Reef Check and water quality monitoring methods for the project as well as for her advice regarding the reporting of the results these monitoring surveys. Special thanks are also extended to Ms. Renata Goodridge (CERMES) for analysing the Reef Check results for the evaluation.

Contact

Dr. Patrick McConney
Senior Lecturer, CERMES
UWI Cave Hill Campus
St. Michael, Barbados

Tel: 246-417-4725
Fax: 246-424-4204
Email: pmcconney@caribsurf.com
Web site: www.cavehill.uwi.edu/cermes

1 INTRODUCTION

Marine protected areas (MPAs) are important ecological, economic, social and cultural assets for Caribbean countries and beyond, partly due to their significance to tourism earnings in the region. Despite many projects and proposals, and good intentions, management authorities and small field staffs have struggled with very inadequate capacity to manage most MPAs in the region. This situation needs to be remedied immediately.

In October 2005, the Centre for Resource Management and Environmental Studies (CERMES) of the University of the West Indies (UWI) Cave Hill Campus began to implement a regional project to evaluate MPA management effectiveness, and to learn lessons from this process, at three MPA sites in the Caribbean:

- Belize - Sapodilla Cayes Marine Reserve
- Jamaica - Negril Marine Park
- St. Vincent and the Grenadines - Tobago Cays Marine Park.

The project is funded by an international Coral Reef Conservation Grant from the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce.

The project utilises new methods for evaluating how a marine park is being managed set out in a recent guidebook by Pomeroy et al. (2004) entitled "How is your MPA doing?" in which bio-physical, socio-economic and governance indicators of MPA management are assessed using existing information, natural and social science surveys, and various other means of data collection to measure the effectiveness of management decisions and actions in achieving goals and objectives that are specific to the MPAs, the marine environment and coastal communities (Pomeroy et al. 2004).

The project duration is October 2005 to March 2007 with the following four main components:

1. Inception site-specific training workshops in MPA management effectiveness and evaluation
2. Participatory management effectiveness research and evaluations at the three MPA locations
3. A terminal joint workshop on lessons learned and the consequent adaptation of management
4. Production of training materials based on experiences of the process and on lessons learned

The goal of this project is to promote and institutionalise improved and adaptive coastal management practices and policies in the Caribbean through use of applied research and interdisciplinary training. The project will contribute towards building capacity in MPA management effectiveness evaluation in the Caribbean (CERMES 2005).

Knowing the strengths and weaknesses of management in the past facilitates making improvements. Integration with the University of the West Indies, Cave Hill Campus, communications network, teaching and research programmes, curriculum development and other initiatives will add value to the project and its regional impact through sharing lessons learned and disseminating output products. Participatory and community-based approaches will facilitate stakeholder involvement and adaptive management to ensure that the best practices are institutionalised based upon the lessons learned and the skills acquired during the project or afterwards (CERMES 2005).

The specific objectives for this project are:

1. To conduct participatory management effectiveness research and evaluations by training at least 30 people across three MPA sites.

2. To improve MPAs in the region by monitoring outcomes documented in lessons learned combined with training and communication materials for coursework, research, management and coastal policy.

This document reports on the Tobago Cays Marine Park (TCMP) Marine Protected Area Management Effectiveness (MPA-ME) project during the evaluation fieldwork period March-October 2006. Project participants at the three MPA sites evaluated MPA management effectiveness using bio-physical, socio-economic and governance indicators. For each indicator, a general background is provided followed by a description of the method(s) employed, results, and discussion. The report concludes with references and appendices following an evaluation summary, some lessons learned and adaptive management recommendations for the TCMP.

2 METHODOLOGY

At all three project sites, inception training workshops for evaluating MPA management effectiveness were held (CERMES 2005; CERMES 2006a; CERMES 2006b). Bob Pomeroy, lead author of the guidebook and the project's method trainer and adviser, introduced the marine protected area management effectiveness (MPA-ME) methodology. A description of the evolution of the methodology and its application in other locations around the world was provided. See Pomeroy *et al.* (2004) for details on the evaluation methods and indicators.

Participants were then trained in the use of the guidebook with accompanying worksheets to identify (Negril Marine Park and Sapodilla Cayes Marine Park) or determine (Tobago Cays Marine Park) applicable goals and objectives for their MPAs. Goals and objectives that were most relevant and feasible to evaluate were selected by a combination of discussion and open voting. These goals and objectives were then used to identify overlapping goals and objectives in the guidebook and their associated indicators (bio-physical, socioeconomic and governance). The indicators were then examined in detail and prioritised, resulting in the selection of 10 indicators for the Sapodilla Cayes Marine Reserve, eight indicators for the Negril Marine Park and 13 for the Tobago Cays Marine Park.

For each of the three types of selected indicators, participants considered factors related to the evaluation such as human resource needs and the evaluation team, equipment needs, budget needs, timeline, audience and outputs. Details of these requirements are provided in each of the inception training workshop reports (CERMES 2005; CERMES 2006a; CERMES 2006b).

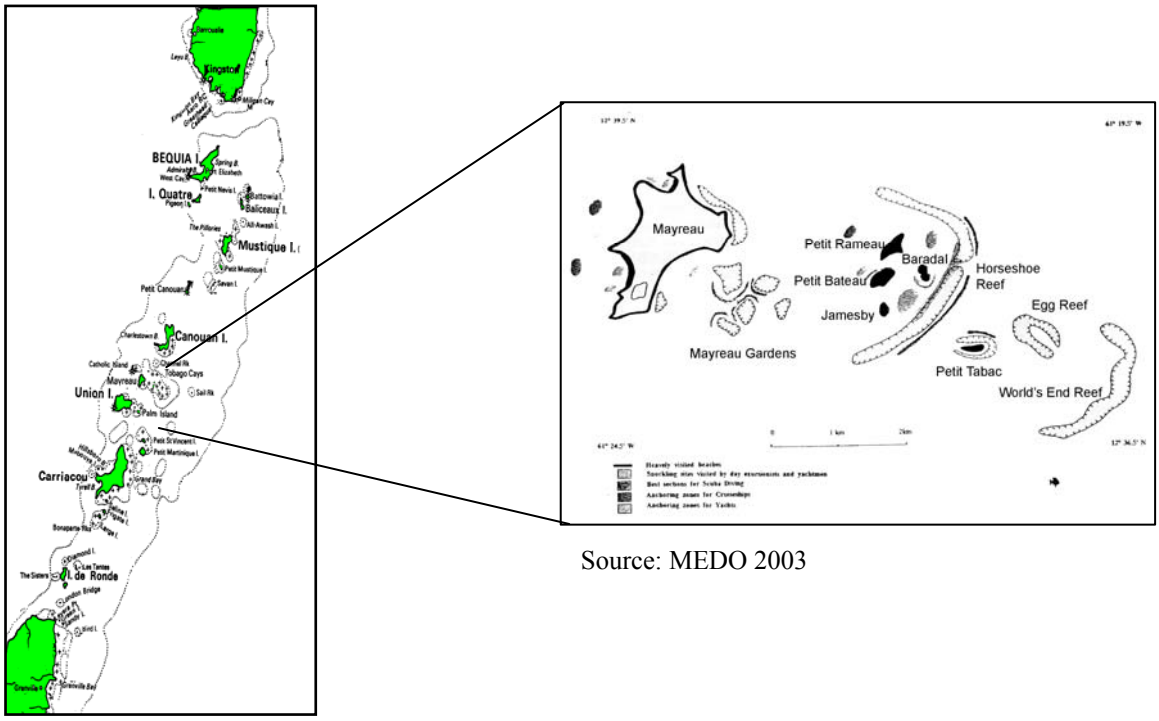
Participatory management effectiveness research and evaluations pertaining to the selected indicators was intended to begin in February 2006, with all data collection scheduled to be completed by September 2006, followed by draft report writing in October 2006. The data collection schedule was postponed by a month and ended in October.

An evaluation workshop of researchers and representatives from all study sites was held to discuss lessons learned from the evaluation experience and the consequent recommendations for adaptive management. The draft site evaluation reports were presented at the workshop held on 4 November 2006 (Pena and Roach 2006). This preceded the 59th Gulf and Caribbean Fisheries Institute conference in Belize City, Belize, at which a presentation on the progress of the project was made (Roach in prep.). Training materials based on the process and products of the evaluation of management effectiveness, and on lessons learned at the three MPA sites, will be produced as a final output of the project.

3 GOALS, OBJECTIVES AND INDICATORS

3.1 Background

In 1987 the Government of St. Vincent and the Grenadines began the process for the establishment of the Tobago Cays Marine Conservation Area with specific reference to managing fisheries resources (Heyman *et al.* 1988). This marine conservation area outlined in the Fisheries Regulations of 1987 encompasses five small uninhabited islands – Petit Rameau, Petit Bateau, Jamesby, Baradal and Petit Tabac – that enclose a sand bottom lagoon and the island of Mayreau. Later the Government decided to upgrade the Conservation Area to the status of national park, the Tobago Cays Marine Park (TCMP), emphasising tourism development and resource conservation. The overall area of the TCMP (Figure 3.1) is rectangular in shape with a total area of 14 km^2 (1,400 ha).



Source: MEDO 2003

Figure 3.1 Location and features of TCMP

In the 1990s, the French government provided technical cooperation for the marine park, a Marine Parks Board was established, Marine Parks (Tobago Cays) Regulations were promulgated and a manager was appointed. In 1998, the first management plan for the park was drafted. In 1999, the Government of St. Vincent and the Grenadines finalised the purchase of the area from a private party, the Tobago Cays Holding Company Ltd., that sold the area for just over US$1,000,000 and on condition that the area would remain a national park. The management plan was revised in 2000 but has never been approved. There have been numerous plans and studies (Cordice 1998; Cordice 2000; Gourmain 1993; Heyman *et al.* 1988; MEDO 2003; OECS-ESDU 2003; PIRL 2003; UNECLAC 2002) over an extended period (Figure 3.2). Currently, a management plan is being drafted by the Board of the TCMP, but this may be superseded by another being prepared by an external consultant under the OECS Protected Areas and Associated Livelihoods (OPAAL) Project (Dan Hoggarth *pers. com.*). It is uncertain when any plan will be finalised or become operational, but it may occur during the MPA-ME project.

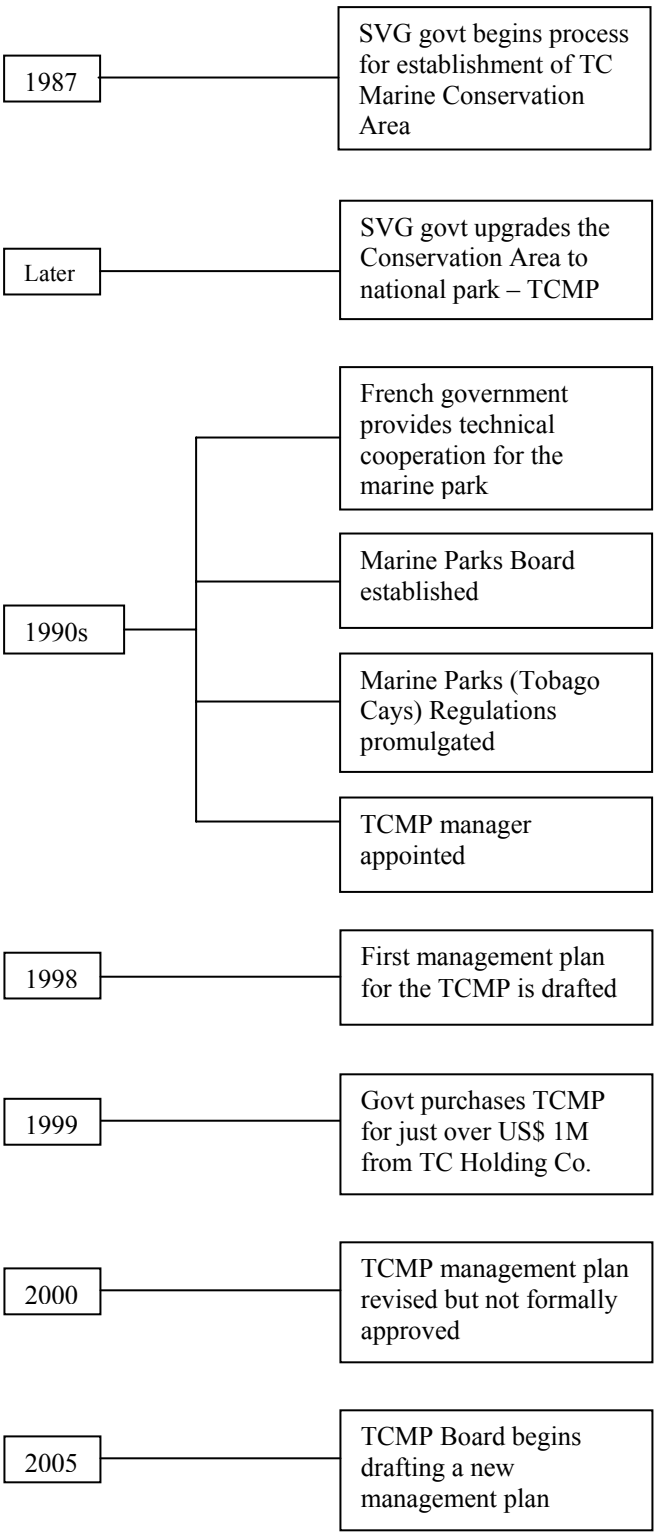


Figure 3.2 Timeline of TCMP events

The Tobago Cays are important ecologically, economically, socially and culturally to St. Vincent and the Grenadines (SVG), partly due to their significance to tourism earnings. The Cays are a primary attraction to overnight tourists, day excursionists, yachtsmen and cruise ship passengers.

The range of estimates for annual number of visitors to the Tobago Cays is wide (16,500 – 200,000) based on yacht, cruise ship, air day charters and stay-over visitor arrival statistics (Bacci 1998; French Mission for Cooperation 1995; Heyman *et al.* 1988; MEDO 2003; OAS 1988; St. Vincent and the Grenadines 2004; UNECLAC 2002). However, most estimates range between 50-60,000 annually (French Mission for Cooperation 1995; Heyman *et al.* 1988; MEDO 2003). Although accurate data on the number of visitors to the Tobago Cays are not available and they are not reported in annual tourism statistical reports of the St. Vincent and the Grenadines Ministry of Tourism and Culture, it is known that the Tobago Cays represent the Grenadines most frequented watercraft anchorage attracting high numbers of visitors annually.

Sound management decisions and actions with respect to protecting and conserving the marine resources of the TCMP as well as revenue generation for the park should be a priority. However, in spite of considerable amounts of projects and proposals on the Tobago Cays, and good intentions, the TCMP Board and small TCMP staff have struggled with very inadequate capacity to manage the TCMP. The steps taken to protect, conserve and improve the natural resources of the Tobago Cays remain more on paper than in effect. In addition, much of the unapproved revised 1998 management plan remains unimplemented (Heyman *et al.* 1988; CERMES 2005; OECS-ESDU 2003). The implementation of this project is therefore seen as timely since the results should help in assessing areas of successes and challenges in management of the park. This will in turn allow for improvement in management of the TCMP through learning, adaptation and the identification of whether the TCMP goals and objectives have been achieved.

3.2 Goals and objectives

On project inception, a list of goals and objectives for the TCMP were devised since no approved goals and objectives have been written or actively used in managing the TCMP. For this project the goal of the TCMP was defined as: *"To protect, conserve and sustainably utilise the natural resources of the Tobago Cays for future use"*. The objectives of the park were listed as follows:

- Working with other relevant agencies using the media to promote the marine park as a tourist resort and attraction
- Ensuring that the park is managed along commercial lines
- Protect the biodiversity of the park
- To conserve the marine resources
- Public awareness and stakeholder participation
- Public education
- To protect sustainable livelihoods (CERMES 2005)

3.3 Indicators

These goals and objectives as outlined in Section 2 were used to select 13 indicators for evaluating TCMP management effectiveness. Table 3.1 provides a list of the relevant indicators chosen for evaluation of the TCMP, those for Belize and Jamaica are provided for information. A description of the indicators, their assessment by the various evaluation teams (CERMES 2005) and a discussion of the evaluation is provided separately for each indicator.

Table 3.1 Indicators selected for evaluation at each MPA site

MPA	Indicators selected for evaluation
Tobago Cays Marine Park	***Biophysical*** 1. B1 Focal species abundance (marine) 2. B8 Water quality ***Socioeconomic*** 1. S2 Local values and beliefs about marine resources 2. S3 Level of understanding of human impacts on resources 3. S7 Material style of life 4. S9 Household income distribution by source ***Governance*** 1. G2 Existence of a decision-making and management body 2. G3 Existence and adoption of a management plan 3. G6 Availability and allocation of MPA administrative resources 4. G9 Degree of interaction between managers and stakeholders 5. G12 Level of stakeholder participation and satisfaction in management process and activities 6. G14 Clearly defined enforcement procedures 7. G15 Enforcement coverage
Negril Marine Park	***Biophysical*** 1. B8 Water quality 2. B9 Area showing signs of recovery (total habitat level) ***Socioeconomic*** 1. S3 Level of understanding of human impacts on resources 2. S14 Distribution of formal knowledge to community ***Governance*** 1. G2 Existence of a decision-making and management body 2. G6 Availability and allocation of MPA administrative resources 3. G12 Level of stakeholder participation and satisfaction in management processes and activities 4. [New] Success of fundraising strategies (revenue and diversity of sources) that form part of the business plan
Sapodilla Cayes Marine Reserve	***Biophysical*** 1. B4 Composition and structure of the community 2. B8 Water quality ***Socioeconomic*** 1. S14 Distribution of formal knowledge to the community 2. S1 Local marine resource patterns ***Governance*** 1. G5 Existence and adequacy of enabling legislation 2. G11 Level of training provided to stakeholders in participation 3. G12 Level of stakeholder participation and satisfaction in management processes and activities 4. G13 Level of stakeholder involvement in surveillance, monitoring and enforcement 5. G14 Clearly defined enforcement procedures 6. G15 Enforcement coverage

The relationships between the TCMP objectives devised at the inception workshop, the proxy objectives from the guidebook and the final selection of indicators are shown in Table 3.2. How the evaluation results related to the objectives is set out in the evaluation summary rather than in the discussion of individual indicators.

Table 3.2 Relationships between objectives and indicators

TCMP Objectives	Overlapping guidebook objectives	Indicators
• Protect the biodiversity of the park	2B = Ecosystem functions maintained	B1
• To conserve the marine resources	2E = Unnatural threats and human impacts eliminated or minimised inside and/or outside the MPA	B8
• To protect sustainable livelihoods	2A = Economic status and relative wealth of coastal residents and/or resource users improved	S7, S9
• Working with other relevant agencies using the media to promote the marine park as a tourist resort and attraction	6A = Respect for and/or understanding of local knowledge enhanced	S2
	6B = Public's understanding of environmental and social 'sustainability' improved	S2, S3
• Public education	6C = Level of scientific knowledge held by public increased	S2
• Ensuring that the park is managed along commercial lines • All other objectives	1A = Management planning implemented and process effective	G2, G3
• All objectives	2E = Enforceability of arrangements ensured	G14
• Public awareness and stakeholder participation	3A = Representativeness, equity and efficacy of collaborative management systems ensured	G12
	3C = Community organising and participation enhanced	G9
• All objectives	4A = Surveillance and monitoring of coastal areas improved	G6, G14, G15

(Adapted from CERMES 2005)

4 FOCAL SPECIES ABUNDANCE (B1)

4.1 Background

Species abundance is one of the most widely used biological 'success' indicators of management effectiveness. A focal species is an organism of ecological and/or human value whose management through a marine protected area (MPA) is of priority interest (Pomeroy *et al.* 2004). Obtaining an inventory of the focal species present in the TCMP and their abundance, as well as the major habitat types present along with their composition, distribution and location is an essential first step to protecting and managing the fragile coral reef ecosystem of the TCMP. The focal species of interest to the TCMP are conch, lobsters and grazers such as parrotfish. The protection, enhancement and or maintenance of populations of focal species are among the most common reason for using MPAs. Improved and sustained numbers of focal species in the MPA through time is widely seen to indicate effective MPA use (Pomeroy *et al.* 2004). As a result, monitoring changes in the abundance of focal species is of priority in evaluating management effectiveness of the MPAs.

The goals of the TCMP in existing management plans (Gourmain 1993; Cordice 1998; MEDO 2003; PIRL 2003) and the more recently devised goal considered for this project (CERMES 2005) encompass the protection, conservation and sustainable utilisation of the natural resources of the Tobago Cays for future use. The TCMP objectives include protection of the biodiversity of

the park and conservation of marine resources (Heyman *et al.* 1988; CERMES 2005). Hence monitoring the marine environment in the park is an important aspect of TCMP management, in that it will provide management with the information to gauge the effectiveness of management actions. As such, one of the indicators chosen for measurement in this project was that of focal species abundance (B1). Although monitoring is mentioned in some detail within all of the existing management plans for the TCMP, no clear monitoring plan and methods have been devised (Byrne 2005) with the result that the marine resources of the Tobago Cays have received little scientific attention.

The available information on marine habitats and communities in the Tobago Cays is limited, of widely varying quality and is scattered throughout numerous documents (Mahon 1996; Mahon and Pena 2005). Surveys of marine resources of the Tobago Cays have provided information on habitat and biodiversity assessments, as well as evaluations of the physical resources. Detailed site descriptions, inclusive of coral species present in the Cays are provided and range from purely descriptive (Lewis 1975; Heyman *et al.* 1988; Simmons and Associates 2000) to quantitative (Comely *et al.* 2002; Deschamps 2000).

Lewis (1975) provides an overall narrative descriptive of the distribution of habitats in the area of Horseshoe Reef, with schematic diagrams of habitats in the vicinity of the four cays in the lagoon of this reef, as well as a list of corals found in the area. Typical profiles of the leeward and windward coasts of these cays and across Horseshoe Reef are provided. However, these observations are not quantitative and therefore cannot be used for comparison through time except regarding the gross disappearance of habitat (Mahon 1996).

In the OAS project proposal for the development of the Tobago Cays National Park, Heyman *et al.* (1988) surveyed 18 reef sites in the TCMP. They describe each site's coral species and reef condition and rank them as excellent, good, fair or poor. This gives an idea of the relative distribution of habitats and has been used as a guide to choosing dive sites in the TCMP. A constraint of this aspect of the study is that it is simply descriptive and does not permit quantitative comparison of the reefs over time (Mahon 1996).

The first attempt to quantitatively assess the reefs of the Tobago Cays was conducted by the French Mission for Cooperation (1995) in which a reef monitoring program in the Tobago Cays was launched in early 1994 at 15 permanent photo quadrat sites, five at each of three locations: inside north of Horseshoe Reef, north of Jamesby and east of Petit Rameau. Two photos at each site were taken and used to estimate the percent of live coral cover and the abundance of coral species (Mahon 1996). Follow up was to provide information about the health of the reef in relation with human activities and would have been very helpful in management decisions. However, it seems as if the monitoring programme was not sustainable since further documents detailing the outputs of the programme and continued monitoring cannot be found.

Lists of invertebrate marine species present within the Tobago Cays are included in the St. Vincent and the Grenadines National Fisheries Biodiversity List. However, quantitative estimates are not present (Simmons and Associates Inc. 2000).

Research by Deschamps (2000) is the most recent quantitative research conducted in the Tobago Cays and provides valuable information on shallow marine habitat composition and distribution in the Tobago Cays as well as an indication of the current health of Horseshoe Reef. Based on Atlantic Gulf and Rapid Reef Assessment (AGRRA) indicators it was concluded that Horseshoe Reef was in good condition but showed some signs of disturbance. A digital thematic map of

shallow marine habitats surrounding the Tobago Cays and Horseshoe Reef was created and provides valuable information on the composition and distribution of the shallow marine communities of the TCMP, with sufficient accuracy to be used as baseline information for long term monitoring (Deschamps 2000).

Many of the activities in the Tobago Cays have negative impacts on the marine environment and contribute to the loss of the biodiversity of the Cays. Information available indicates that the conditions of the reefs in the Tobago Cays have deteriorated due to various factors such as storm damage, white band disease, physical damage and local sewage pollution from visiting yachts (Simmons and Associates Inc. 2000; Deschamps 2000). Quantitative data are essential in the protection and management of the coral reef ecosystem of the TCMP and provide the necessary baseline information for long term monitoring that can be used to assess the management efficiency of the TCMP. Therefore it was decided during the implementation of this project that a monitoring programme, such as Reef Check, was required for evaluating some aspects of focal species abundance (CERMES 2005). Additionally, information from these surveys could be used in the development and adoption of a management plan for the TCMP.

Reef Check was developed in 1996 as a volunteer, community-based monitoring protocol designed to measure the health of coral reefs on a global scale in areas with limited economic resources. Reef Check is an international programme that works with communities, governments and businesses to scientifically monitor, restore and maintain coral reef health. Currently, Reef Check is active in over 82 countries and territories throughout the tropical world. Reef Check has evolved into the largest international marine monitoring environmental organisation with goals of educating the public about coral reefs; creating a global network of volunteer teams regularly monitoring and reporting on reef health; scientifically investigating coral reef processes; facilitating collaboration among academia, NGOs, government and the private sector that produces ecologically sound and economically sustainable solutions; and stimulating local community action to protect pristine reefs and rehabilitation of damaged reefs worldwide. (http://www.reefcheck.org/about/mission.asp; Baldwin *et al*. in press).

During the period January to April 2005, a team of five volunteers with the Amadis Project acted as a roving Reef Check research training team in St. Vincent and the Grenadines with the aim of educating communities about Reef Check and soliciting volunteers from amongst stakeholders to train as Reef Check survey teams with the responsibility for annual surveys (Baldwin *et al*. in press).

To reiterate, although it was acknowledged that Reef Check was not ideally suited, it was the most practical methodology for the evaluation, and its implementation was timely given the recently concluded training in April 2005 (CERMES 2005).

4.2 Methods

In the first week of March 2005, Kim Baldwin, Reef Check Scientist attached to the Amadis project and Marine Technician with the Office of Research, UWI, Cave Hill Campus, trained five TCMP rangers (Hyron Joseph, Jason Alexander, Samuel Debique, Albert Hanson and Olando Harvey, Union Island Reef Check Coordinator) and Sophia Punnett, the designated Reef Check Country Coordinator, SVG Fisheries Division, in Reef Check methods of surveying. Training consisted of a number of classroom sessions in which Reef Check and Reef Check indicator organisms were introduced and the importance of coral reef monitoring was emphasised. Through a combination of slide shows, field identification of fish, invertebrates,

benthic substrates, and survey techniques by snorkelling, the participants were able to practice before performing the actual surveys. A separate data entry and analysis session was conducted giving the participants a well-rounded initiation of Reef Check surveying (Baldwin *et al.* in press).

For the training session, three appropriate survey sites, Horseshoe Reef (inner side of the reef), Petit Bateau and Petit Tabac were selected. For the Reef Check survey for the TCMP MPA-ME project, one additional site further north and offshore of the Horseshoe Reef (outer reef) was selected for inclusion in the surveys. These sites were chosen because the reefs were located in the TCMP and due to their perceived level of impact. Sites at both Horseshoe reef (inner side of reef) and Petit Bateau were considered to be fairly high impact areas, whereas Petit Tabac was considered as a medium impact site and Horseshoe reef (outer reef) was considered to be a low impact site (Sophia Punnett *pers. com*.). The sites to be monitored were marked with metal stakes, and their GPS coordinates recorded (Figure 4.1). Two Reef Check monitoring episodes for purposes of evaluation of the focal species abundance indicator for this project were conducted on 18-19 May, and 11 and 13 October 2006.

All surveys were conducted parallel to shore, at the same depth contour and in relatively shallow reef areas ranging between 2 and 3m in depth. For each survey, a site description and associated socio-economic uses questionnaire was completed by the team members. For each site, a total of four 20 metre belt transects, each five metres wide were surveyed for fish and invertebrates. Additionally at each site, four 19.5 metre line transects were surveyed for benthic substrates. Local TCMP alterations to the Reef Check surveys included the addition of supplementary indicator species, specifically, queen conch, bristle worms and the West Indian sea egg, and socio-economic site description questions regarding turtle nesting beaches, turtle fishing and motor boat traffic within the area (Baldwin *et al*. in press). Additionally, the use of 'Coral Watch' bleaching cards were proposed for use while surveying as an indication of bleaching levels but due to lack of time and manpower throughout the two days of monitoring in May 2006, the use of these cards were abandoned. These cards were also not used in Reef Check monitoring in October.

During the initial training in Reef Check in 2005, Sophia Punnett, SVG Fisheries Division and Meritha Baptiste (née Small), TCMP office secretary, were trained in data entry and analysis. For the subsequent Reef Check surveys, Ms. Baptiste entered the data into automated Reef Check spreadsheets and then forwarded these to the Fisheries Division for review and forwarding to Reef Check. Due to limited capacity at the SVG Fisheries Division, the Reef Check data were analysed by Renata Goodridge, Senior Marine Technician, CERMES, UWI, Barbados.

A terrestrial assessment of the flora and fauna of the cays was also planned at the inception workshop to complement the marine surveys. This was not implemented mainly due to the unavailability of the designated team leader, a local authority on the natural history of the area.

4.3 Results

The inner side of Horseshoe Reef shows no recently killed corals, but coral counts have decreased slightly over the last year. There has been a dramatic increase in mean nutrient indicator algae (NIA) from 2.25 in April 2005 to 11.25 in May 2006 and 21.25 in October 2006. Black sea urchin (*Diadema antillarum*) abundance decreased over this same time period. The gorgonian count also decreased at this site, with the largest decrease occurring between the last

two surveys. Fairly good fish species diversity and abundance were observed at this site, however no groupers or snappers were recorded.

At the outer side of Horseshoe Reef, hard coral cover remained the lowest between the May and October 2006 surveys, whilst the NIA remained high. Black sea urchin counts for this site remained low through both survey periods. Gorgonian counts were high in May, but low in October, repeating the same trend as the inner side of the reef. A decrease in rock cover and a slight increase in sand cover were observed. The surveys show few fish species and numbers at this site.

Petit Tabac consistently showed very low coral cover over the survey periods. A gradual increase in soft corals was observed over time. The NIA increased two-fold over the last year, and the sea urchin counts have dramatically decreased. Gorgonian counts on this reef decreased dramatically over the last year. The site reports do not indicate signs of increased flamingo tongue predation or disease. Rock cover decreased sharply between April 2005 and May 2006.

Fairly low coral cover was also observed at Petit Bateau over the three survey periods. However, the NIA increased over the last year, with a decrease in the May. This decrease coincides with a slight increase in black sea urchin abundance during the same period. Abundance decreased again in October 2006. Rock cover decreased over the three surveys, with sand increasing marginally. Gorgonian abundance also decreased dramatically on this reef. This site was the only site at which butterfly fish, grunts, parrotfish and snappers (with no change in the snapper numbers) were consistently recorded. It should be noted that for all sites fish species abundance declined from 2005 to 2006.

4.4 Discussion

Based on the results from the March 2005 Reef Check training survey, and the May and October 2006 surveys for this project, the coral reef systems at the four sites surveyed vary in condition but appear to be declining across all four sites. Generally, fish species diversity is low for all sites however Petit Bateau and Petit Tabac have greater fish species diversity than the two Horseshoe Reef monitoring sites. This low diversity in fish species is consistent with surveys undertaken in 2002 which showed that the area of the Tobago Cays supports a low diversity of habitats, which in themselves are low in biodiversity. The increasing NIA coverage observed at all sites is also consistent with other scientific data which indicate that the Tobago Cays is undergoing a possible phase shift from coral to macroalage dominated communities (Comely *et al.*2002).

The shallow Horseshoe Reef monitoring site appears to be typical, with fairly good reef fish species diversity and abundance, and reasonable hard coral cover. However this coral cover has declined slightly from 2005-2006. This site exhibited the highest numbers of butterfly fish of all the sites. Again these data are consistent with those of Comely *et al.* (2002) in which Horseshoe Reef had the highest abundance and most common sighting of butterfly fish. Since the use of butterfly fishes as reef health indicators is widely practised and is based on the coralivore nature of species within this family, continued protection and monitoring for management should be undertaken to assess the extent of the macroalgae phase-shift that can be observed in some localities in the reef systems (Comely *et al.*2002).

Although the average NIA coverage was the lowest at this site, it was the only site that exhibited the most dramatic increases in NIA throughout the surveys. These increases are probably due to

the decline in black sea urchin numbers over the same period since this urchin grazes on macroalgae. The reasons for the increase in algae and decrease in urchins cannot be explained at this time since there are insufficient data and observations to make a hypothesis. Increases in macroalgal abundance may be due to increases in nutrients. However, the water quality data for the site did not indicate increases in nitrates and phosphates during the monitoring period (Section 5). It is expected however that this site and that of Petit Bateau would be richer in nutrients than the other sites, since the former are common anchorages for yachts.

The deeper Horseshoe site has low reef fish species diversity, low hard coral cover and high nutrient indicator algae coverage. These data are consistent with those of Deschamps (2000). In general, the deep Horseshoe Reef site appears to be in worse condition than the three other sites. Overall, it has the highest macroalgal counts and lowest reef fish diversity. This result is somewhat difficult to explain since due to its location and the fact that it is too deep to be used as an anchorage, it is thought that this site is one of low impact. However, the data are consistent with those of Deschamps (2000) in which it was found that although the reef was in good condition at the time, it was showing signs of disturbances.

Petit Bateau and Petit Tabac have shown similar trends over the survey period of low coral cover, increasing NIA and dramatic declines in gorgonians. However it should be noted that coral cover, NIA and the decrease in gorgonians was greater for Petit Tabac than for Petit Bateau. Again this result is surprising given the fact that Petit Bateau is a preferred anchorage in the Tobago Cays. Petit Bateau does exhibit high fish species abundance which might indicate that management has been effective at controlling fishing in the area. The dramatic decrease in gorgonians is disturbing since all sites showed a marked decrease in counts in October 2006. Further monitoring of this species is required to determine the cause of its decline.

Due to what appears to be a declining condition in the reefs of the Tobago Cays it is imperative that long-term monitoring of TCMP coral reefs, fishes, and marine habitats be implemented to improve management effectiveness. The Atlantic and Gulf Rapid Reef Assessment (AGRRA) protocol could be examined for more in-depth monitoring and broader surveys of reef fishes, conchs, lobsters and sea urchins may be desirable.

Sophia Punnett, SVG Reef Check Country Coordinator, was pleased with the level of training received by the TCMP rangers and would like to see continued and increased cooperation from them in conducting Reef Check with follow through to the implementation of a regular monitoring programme for the TCMP. Cooperation from all rangers for the Reef Check surveys was good however the availability of the Union Island Reef Check Coordinator, Olando Harvey, was reported as inadequate due to his study commitments at St. George's University (S. Punnett pers. comm.).

With respect to the Reef Check methodology for monitoring species abundance in the TCMP, Ms. Punnett believes Reef Check surveys to be useful but suggests that a more in-depth monitoring protocol such as a modified AGRRA would be ideal. Therefore AGRRA training is necessary. For species for monitoring abundance in the TCMP should be conch, lobsters and grazers such as parrotfish.

Ms. Punnett has recommended the establishment of a programme in which rangers would be present more in the water to increase their confidence. The Reef Check surveys were also carried out by volunteers. The problem with volunteers is that they are not as knowledgeable about the water as the rangers and as such species identification for the surveys was not easy for these

individuals. There seems to be some uncertainty as to where funds for continued monitoring will come from once this project is completed.

Delays in receiving the Reef Check data from the TCMP office for analysis were reported by the SVG Fisheries Division despite making numerous requests. In early August 2006, the May 2006 Reef Check data had not yet been forwarded to Ms. Punnett for analysis and reporting purposes. Initially, the analysis of the Reef Check surveys was to be undertaken by Ms. Punnett but due to numerous assignments at the Fisheries Division, she was unable to conduct the analysis and report on the results of these surveys. Therefore this data was analysed by Ms. Goodridge of CERMES.

The total costs of conducting Reef Check were far less than the estimated costs (CERMES 2005). This was due to the location of the sites, three of which (Petit Bateau, Petit Tabac and inner Horseshoe Reef) were shallow sites enabling the surveys to be conducted by snorkelling.. The outer Horseshoe Reef site was the only site requiring dive equipment. For this, SVG Fisheries Division diving gear was used and discounts from dive operators were obtained for extra gear required. Funds for SCUBA rental were not all used since discounts were provided by Mr. Glenroy Adams, Grenadines Dive, Clifton, Union Island.

In general, Reef Check training and surveys went well. Interviews with Ms. Punett and the rangers indicate an eagerness to learn and implement monitoring at the TCMP. There however seems to be the need to have a team leader stationed in Union Island to coordinate future surveys since the current coordinator is unavailable due to study responsibilities at the St. George's University.

There also needs to be greater and more efficient communication and transfer of data from the TCMP office to that of the SVG Fisheries Division for future surveys. Additionally, either a biologist should be employed at the TCMP or staff at the TCMP needs to be trained in data analysis and report writing since human resources at the SVG Fisheries Division are limited and are unable to undertake additional work. Building the capacity of the TCMP will increase the efficiency of the park office and will lead to increased management effectiveness.

5 WATER QUALITY (B8)

5.1 Background

Water quality is an abiotic and biotic (in the case of bacterial pollution) measure of ambient environmental parameters present within the water column. Parameters of water quality include temperature, salinity, oxygen content, turbidity, sedimentation rate, nutrient loading and presence and density of toxins, bacteria and other particulate matter. Water quality is a limiting factor to biological processes within organisms, populations and habitats present within a MPA. Therefore, water quality is a key determinant of overall community health and viability and is an important indicator to monitor (Pomeroy *et al.* 2004).

Water quality can be negatively influenced through multiple sources of human activities in or near the coastal zone. In the Tobago Cays water quality is being compromised by waste disposal problems (GEF-IWCAM 2001). Yachting is an activity suggested as having had and as still having a negative impact on water quality and the marine environment within the TCMP. Pollution from sewage and garbage dumped by boats has been identified as a human-induced threat within the TCMP and is expected to worsen unless management measures are implemented (French Cooperation Program 1994; Simmons and Associates Inc. 2000). In

surveys conducted by Heyman *et al.* (1988) high mortality in many species of coral was observed indicating that other factors such as pollution from yachts anchored in the lagoon or high water temperatures, rather than disease might have been causal factors of the condition. It was further noted that this high mortality was probably caused by pollution due to the high algal growth present on reefs.

No facilities to receive and treat liquid waste from yachts are available anywhere in St. Vincent and the Grenadines and there is currently no requirement for yachts to have holding tanks. Furthermore, yacht charter companies do not appear to have a uniform policy with respect to liquid waste. No routine monitoring of water quality takes place in St. Vincent and the Grenadines. Although some people in the yachting industry feel that sewage does not create a problem due to the small numbers living onboard yachts, a water quality study conducted at Young Island was alarming to the extent that the authorities never made the results public. Disposal of solid waste from yachts is another problem with possible impacts on water quality within the TCMP due to a lack of proper waste management facilities in any of the islands of St. Vincent and the Grenadines, a lack of onshore waste receptacles in the main yachting centres and the inappropriate disposal of garbage collected by 'boat boys' (Simmons and Associates Inc. 2000).

During the high season, November to March, it is estimated that 80-100 yachts anchor and overnight in the Tobago Cays. The impacts of this intense use of the area are diversified and include continued dumping of garbage from boats and increase in pollution due to sewage which may affect water quality and marine organisms. It has been estimated that more than 50 boats in the lagoon at one time exceeds the carrying capacity of the site. Except for a few weeks in autumn, this number is always exceeded. Overcrowding of boats is certainly a serious issue in the Tobago Cays in peak seasons. Leaking fuel and bilge water emissions are also potential sources of pollution (Gourmain 1993; MEDO 2003).

Water taxi operators may also be contributing to the degradation of the marine environment in the Tobago Cays. Water taxi operators throughout the Grenadines (Carriacou, Petit Martinique, Union Island, Mayreau and Bequia) visit the Tobago Cays frequently during their day trips or to solicit business from yachts but their current practices are often not environmentally friendly and may lead to poor water quality due to spillage of oil and fuel, poor engine maintenance and the use on non-environmentally friendly cleaning agents and equipment. However, they are aware of measures that they need to take to become environmentally friendly boat operators (Cooke 2005; Lizama 2005). Capacity building of water taxi operators to reduce impact on the environment has been recognised as a priority area by the Sustainable Grenadines Project (CCA CaMMP 2002) and as such has been addressed by hosting training workshops in environmental awareness, 'green boat' practices for St. Vincent and the Grenadines water taxi operators (CEC 2005) and the compilation of a draft booklet, "Sustainable "green boat" practices for water taxi operators in the Grenadines" (Lizama and Mahon 2006).

There is no documented information on marine water quality in the TCMP. In St. Vincent and the Grenadines there is concern about the quality of coastal water and its impact on health and tourism. The Central Water and Sewage Authority (CWSA) and Environmental Health Department (EHD) monitor water quality in potable water using international World Health Organization (WHO) standards, but no monitoring of marine water quality, even at recreational beaches, occurs (Central Water Sewage Authority (CWSA) pers. comm.; S. Thomas pers. comm.; GEF-IWCAM 2001). Blue Flag has not been adopted. The monitoring of recreational

waters in St. Vincent and the Grenadines was included the Environmental Health Department (EHD) strategic plan for 2000 and was actively undertaken in 2001, but due to a deficiency in institutional capacity there was no follow through in monitoring (GEF-IWCAM 2001).

Although scientific biological and environmental monitoring and garbage/waste management policies are included within the management policy of the 1998 TCMP management plan and revision of 2000, no monitoring with respect to marine water quality in and around the TCMP has been conducted. In association with the TCMP office, the Fisheries Division is trying to develop through this project the pilot phase of a marine water quality monitoring programme for St. Vincent and the Grenadines (L. Grant pers. comm.). Given the importance of the Tobago Cays as an international nautical tourism destination, the TCMP should be able to make informed statements about sea water quality. This project will provide the baseline water quality data for the TCMP on which further monitoring and sound management decisions can be based.

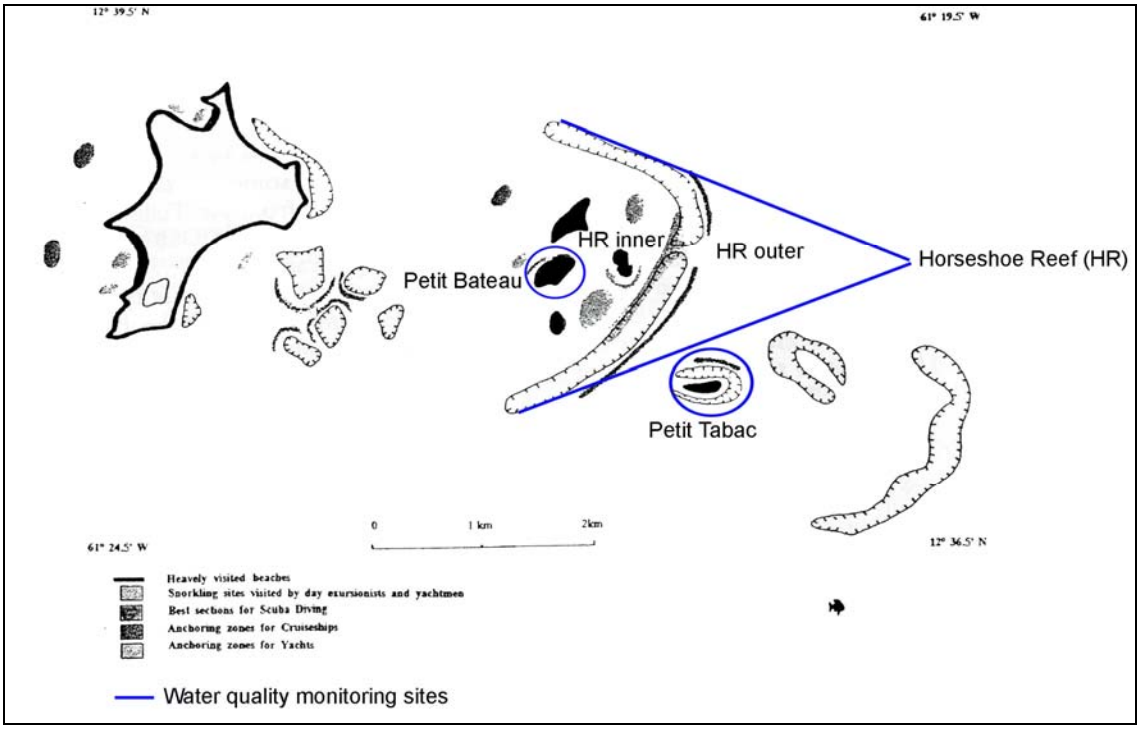
5.2 Methods

All TCMP rangers (except the Chief Ranger) as well as Sophia Punnett and Lucille Grant (of SVG Fisheries Division) were trained in sea water collecting methods for both chemical (nitrates and phosphates) and biological (bacteria) parameters (Eaton *et al.* 1995a) by Kim Baldwin of CERMES. Training was carried out in a one-day session in which sterilisation of sample bottles, observation of physical conditions at sampling, chain of custody procedures and preservation and storage of samples were demonstrated. The boat driver was trained in boat handling, specifically in methods for avoiding contamination of samples with fuel, during water collection. TCMP rangers, Sophia Punnett and Lucille Grant were also trained in nitrate and phosphate analysis using La Motte test kits. Expired test kits were initially used for practice in analysing nutrient content.

Water sampling for this project was conducted for the period May-September 2006. For each sampling event, sample bottles were sent to Union Island from the Fisheries Division in St. Vincent by SVG Air. Sampling occurred once per month in the morning, with two samples (one for nitrates and phosphates and one for microbiological examination) collected at each of four sites, Egg Reef, Horseshoe Reef (inner side of the reef), Petit Bateau and Petit Tabac by TCMP rangers (Figure 5.1). These sites, except for Egg Reef, were the same as those used for Reef Check monitoring. The samples were then stored on ice and the bottles transported by SVG Air back to St. Vincent on the same day for collection by the Fisheries Division to go to the Bureau of Standards for analysis. Dates for sampling were designated by the Fisheries Division based on the availability of the Bureau of Standards to conduct the analyses. The TCMP office was informed of sampling dates, conducted the sampling and confirmed the completion of sample collection by phone before the samples were transferred to St. Vincent for analysis. Lucille Grant, SVG Fisheries Division, negotiated US$100 worth of analysis with the Bureau of Standards to cover all agreed services listed below.

- Heterotrophic plate count using membrane filtration
- Determination of total coliforms using membrane filtration
- Determination of faecal coliforms and *E. coli* using membrane filtration
- pH
- Salinity
- Temperature
- Turbidity

- Conductivity
- Oxygen
- Biological Oxygen Demand (BOD)



Adapted from MEDO 2003

Figure 5.1 Water quality monitoring sites

Nitrates and phosphate concentrations were measured using Merck test kits. Microbiological analysis for the following bacteria: total coliforms, faecal coliforms, *Escherichia coli* (*E. coli*), and heterotrophs, was carried out using the membrane filter technique (Eaton *et al.* 1995b). All samples were measured against Blue Flag and Ministry of Housing, Lands and the Environment, Government of Barbados (GOB), water quality standards (Table 5.1).

The Fisheries Division, in an attempt to develop a monitoring programme, ordered a standard methods manual for water quality monitoring. Equipment for microbiological analysis of water samples (membrane filtration unit, vacuum pump, filters and petri dishes) was also ordered in June through the TCMP office so that the Fisheries Division could conduct in-house analysis of water samples. Lucille Grant attended an OECS workshop on water quality during the period.

Table 5.1 Water quality standards for biological and chemical parameters

Parameter	Standard
Blue Flag	
pH	6.5-8.5
Nitrates (NO_3)	0.6 mg/l
Phosphates (PO_4)	0.1 mg/l
Total Coliform	<250 CFU/100 ml in minimum 75% of samples taken over a period of a year
Faecal Coliform	<100 CFU/100 ml in minimum 75% of samples taken over a period of a year
Ministry of Housing, Lands and the Environment, Government of Barbados (Draft)	
pH	7.0-8.7
Salinity	30-38 ‰
Temperature	<31°C
Dissolved oxygen	5.5mg/l
Turbidity	1.5 NTU
Nitrates	0.002mg/l
Phosphates	0.009mg/l
Faecal coliform	200 CFU/100ml in minimum of 5 samples taken over a period of 30 days 400 CFU/100ml in no more than 10% of samples

5.3 Results

Water sample collection and analysis for this project was generally well organised. However, the time of sampling, physical conditions at the time of sampling (such as weather conditions, current direction or number of boats in the vicinity of the sampling sites), time of sample transfer and chain of custody were not recorded by the TCMP. There was loss of data for the June sampling due to inadequate coordination of sample collection and transfer of samples to St. Vincent for analysis. Due to miscommunication between the TCMP office and the SVG Fisheries Division about transfer, the Fisheries Division was unaware that the samples for that month had been sent. This resulted in the samples being left in Customs for two days awaiting collection. Additionally, the microbiologist at the Bureau of Standards was out of the country when the samples arrived, resulting in the samples not being analysed. Poor labelling of sample bottles also contributed to the lack of analysis for June.

Temperature and salinity results for the sample sites were unusual. Mean water temperatures were 19.4, 20.8, 20.9 and 19.8°C for May, July, August and September respectively across the four sites (Table 5.2). Salinity was unusually high with mean salinities of 40.1, 40.0, 40.5 and 40.0‰ for May, July, August and September respectively across the four sites. The mean pH for the sites was 8.38. Phosphate concentrations were zero at all sample sites for the monitoring period and hence were below the Blue Flag standard of 0.1 mg/l. Nitrate concentrations were consistently <10mg/l for all sites for the duration of monitoring (Table 5.2).

Table 5.2 Water quality analysis for the TCMP

Date	Site	Temp (°C)	pH	Phosphate (mg/l)	Nitrate (mg/l)	Heterophic plate count (CFU/g/ml)	Total coliform count (CFU/g/100ml)	Faecal coliform and E. coli count (CFU/g/100ml)	Biological oxygen demand (mg/l)	Oxygen (mg/l)	Salinity (°/₀)	Conductivity (mV)	Turbidity (NTU)
19/05/06	Egg Reef	19.4	8.48	0	<10	1	Nil	Nil	1.2	5	40.1	-85.8	0
	Petit Tabac	19.5	8.32	0	<10	1	Nil	Nil	1.3	1.5	40.1	-80.3	3
	Petit Bateau	19.1	8.52	0	<10	Nil	Nil	Nil	1.5	4.5	40.1	-87.9	5
	Horeshoe Reef	19.5	8.45	0	<10	2	Nil	Nil	0.5	1.3	40.1	-84.4	0
12/07/06	Egg Reef	20.9	8.31	0	<10	2	240	Nil	1.1	5.3	40	-76.2	0
	Petit Tabac	20.9	8.31	0	<10	Nil	100	Nil	1.3	4.7	40	-76.2	0
	Petit Bateau	20.9	8.4	0	<10	TNTC	TNTC	6	1	4.8	40	-81.7	0
	Horeshoe Reef	20.5	8.39	0	<10	2	TNTC	Nil	1.2	5.2	40	-82.1	0
14/08/06	Egg Reef	20.6	8.4	0	<10	TNTC	2	Nil	0	5.6	40	-83.3	10
	Petit Tabac	20.6	8.45	0	<10	2	4	Nil	0.3	5.7	40	-84.7	6
	Petit Bateau	20.6	8.44	0	<10	TNTC	16	Nil	1.7	6.4	40	-84.9	10
	Horeshoe Reef	21.8	8.39	0	<10	100	6	Nil	2.3	5.3	42	-83.2	3
19/09/06	Egg Reef	19.8	8.35	0	<10	TNTC	50	4	4.3	4.3	40	-79.2	5
	Petit Tabac	19.8	8.29	0	<10	TNTC	110	12	4.0	5.5	40	-76.6	7
	Petit Bateau	19.8	8.35	0	<10	TNTC	80	20	3.8	5.1	40	-79.3	5
	Horeshoe Reef	19.8	8.28	0	<10	TNTC	40	28	3.4	5.0	40	-74.0	7

In general, faecal coliform and *E. coli* counts were nil for all sites for the first three months of the sampling period with the exception of Petit Bateau in July in which 6 colony-forming units (CFU)/g/100ml were recorded. Significant increases in CFU were observed in September for all sites with Horseshoe Reef exhibiting the greatest number of coliform counts. Total coliform counts were nil for the May sampling but showed increases in July, August and September. High counts recorded as 'too numerous to count' (TNTC) were observed for Petit Bateau and Petit Tabac in July. Egg Reef and Horseshoe Reef had counts of 240 and 100/100ml respectively. In August lower numbers of coliforms were observed for all sites. Coliform counts increased in September with Petit Tabac exhibiting the greatest number of coliforms (Table 5.2).

Biological oxygen demand (BOD) was generally low and stable from May to August with an average of 1.1 mg/l for all sites but increased in September to an average of 3.8 mg/l.

The lowest mean turbidity, 2 nephelometric turbidity units (NTU), occurred in May which had an average of 4 NTU. This decreased in July to 0 NTU, increased in August to a mean of 7.3 NTU and decreased slightly in September to 6 NTU (Table 5.2). Turbidity measurements for three of the months during sampling were above the GOB standard of 1.5 NTU.

Dissolved oxygen concentrations fluctuated during the sampling period but were generally below the GOB standard of 5.5mg/l throughout the sampling period. In May, dissolved oxygen concentrations were substantially lower than 5.5mg/l. Petit Tabac and Horseshoe Reef showed the lowest concentrations of dissolved oxygen, 1.5 and 1.3 mg/l. In July, dissolved oxygen concentrations increased but were still below 5.5 mg/l for all sites. The highest concentrations during the sampling period were recorded in August, with all sites, except Horseshoe Reef, having concentrations greater than 5.5mg/l. In September, these concentrations decreased slightly, with all sites, except Petit Tabac, showing concentrations below 5.5mg/l. In general mean dissolved oxygen concentrations for all sites sampled were low with Petit Tabac and Horseshoe Reef showing the lowest concentrations, 4.35 and 4.2mg/l, respectively.

Regarding equipment for analysing water quality samples, funds for this equipment were sent to the supplier on 3 August 2006. There was some delay between the time when the order was first placed and when the funds were wired to the supplier. Total cost for sample analysis by the SVG Bureau of Standards over the entire period amounted to approximately US$98 to the Fisheries Division.

5.4 Discussion

Tropical marine water, particularly oceanic water, is typically relatively low in nutrient content and suspended sediments. Therefore it is clear, has high light penetration and appears deep blue, or is turquoise where shallow and over white sand. Coral reefs and seagrasses thrive in shallow water environments characterised by relatively low nutrient concentration conditions and are highly susceptible to changes in water quality such as increased nutrient levels, sediment load, turbidity, temperature, salinity and toxic chemical load. High water quality, defined as water having the characteristics of an undisturbed natural tropical environment, is therefore important in the coastal zone for maintaining productive marine communities which in turn support high marine species abundance and variety, and nearshore fisheries, are important in maintaining coastal stability and have a high aesthetic value. High water quality also has a high aesthetic value in the coastal zone and has important implications for human health in bathing areas and seafood harvesting areas (DELCAN 1994). This is particularly important in the TCMP which attracts numerous nautical visitors annually.

Marine pollutants are any parameters which adversely affect the natural ambient quality of marine water and include increased levels of sediments, increased levels of nutrients (particularly phosphates and nitrates), addition of toxic chemicals (pesticides, herbicides, chlorine, metals and oil), addition of disease-causing organisms (bacteria), addition of solid waste (garbage) and changes in temperature and/or salinity (DELCAN 1994). It is therefore important for the TCMP to implement a marine water quality monitoring programme in order to measure any changes in water quality which could impact on the marine park. Consistent monitoring will also allow the TCMP Manager or Board to make informed management or policy decisions.

Water temperature, salinity, turbidity and dissolved oxygen are measured as part of a minimal monitoring programme (Rogers *et al.* 2001). Water temperature is an indicator of thermal pollution. Changes in temperature can affect the toxicity of chemicals or kill coral directly through bleaching. Salinity is a general parameter describing the total salt content of seawater and is an indicator of the presence of freshwater or hypersaline discharges (DELCAN 1994).

The temperature and salinity measurements were not recorded at the time of sampling, but by the SVG Bureau of Standards after the samples had been stored on ice and transferred from the TCMP to the lab, and then left in the lab environment of 21°C. Therefore recorded temperatures for the sampling period were those equilibrated to the lab and well below ambient temperatures on site for each sampling date. Actual mean air temperatures recorded on sampling days in May, July, August and September were 28.8, 29.3, 29 and 30°C respectively (SVG Meteorological Service). The gradual trend of increasing air temperature is expected, and average sea surface temperatures normally follow this trend, but are slightly cooler. Such temperatures would be within the GOB standard for water temperature (<31°C) and are indicative of normal tropical sea surface temperatures.

Laboratory recorded salinity for the TCMP ranged between 40 and 40.5‰, well over the normal range of 30-35‰ (and sometimes slightly lower due to river plume lenses). These high salinity readings may be due to the need for the salinity probe at the SVG Bureau of Standards to be calibrated. The average pH for all sites was 8.38. This is within the Blue Flag and GOB standards of 6.5-8.5 and 7-8.7, respectively. TCMP rangers although trained in taking measurements and observations of physical conditions at sampling, failed to record them during the sampling period. The need for these measurements and observations to be made *in situ* during sampling needs to be reinforced with a data recording sheet that should accompany the samples. Water temperature readings taken after samples have been stored on ice are not valid. Observations of weather conditions, current direction and number of boats in the area at the time of sampling are extremely important as they aid in describing and corroborating the results obtained.

The amount of light available for photosynthesis of free-living and symbiotic algae affects the growth of corals and other organisms. Suspended particles in the water absorb and scatter light, reducing light penetration (Rogers *et al.* 2001). Therefore light transmission is measured by measuring turbidity. Without observations of conditions at the time of sampling, it is difficult to provide reasons for the increase in turbidity during the latter portion of the sampling period. It could be a seasonal factor since the increases occurred in the latter part of the year. This is typically the rainy season in the Caribbean and therefore could be attributed to an increase in rainfall and perhaps land runoff. An increase in plankton and solid waste could also cause high turbidity readings.

Dissolved oxygen is necessary for the survival of marine animals. Low levels may indicate high bacterial concentrations (Rogers *et al.* 2001). Dissolved oxygen concentrations fluctuated during the sampling period but were generally below the GOB standard of 5.5mg/l throughout the sampling period. There seems to be no apparent correlation between these results and those for bacterial counts, as may be expected. For example, although the lowest dissolved oxygen concentrations were recorded for May, bacterial counts during this month were either nil or well below the recommended Blue Flag and GOB standards. Therefore these low levels did not indicate high bacterial concentrations. The increase in bacterial concentrations observed for September, the largest for the sampling period, did not result in substantial decreases in dissolved oxygen concentrations as might have been expected. This could be due to a small data set since monitoring has been relatively short-term.

In general faecal coliform and *E. coli* concentrations were nil (with the exception of Petit Bateau for July) for the first three months of the monitoring programme. Increases in these bacteria were observed in September but were not significant since they were well below the standards of Blue Flag and GOB. Total coliforms were nil for May, increased in July, where Petit Bateau and Horseshoe Reef exhibited counts well above the Blue Flag and GOB standards. These bacterial levels decreased in August but rose steadily in September to insignificant levels below the accepted standards. The greatest total coliform counts, well above the Blue Flag standard, were observed at Petit Bateau and Horseshoe Reef in July. This may have been due to an increase in the number of yachts anchoring in these popular anchorages during the summer vacation. However, without observations taken on the day of sampling or for the month in general, it is difficult to determine potential causes for these results.

Water quality monitoring should be an ongoing activity within the TCMP conducted throughout the year during the high (November to March) and low (April-October) yachting seasons. Data of this type will provide information on observed trends throughout the year and will enable comparisons of water quality during the high and low seasons. With these data, the TCMP manager will be better able to make decisions regarding the management of the TCMP with respect to the number of yachts allowed in the TCMP during the peak season as well as location of anchorages. These data may also be used together with those from Reef Check to indicate potential sources of impacts on the marine resources.

In order for accurate and reliable water quality monitoring, rangers should be re-trained in water sampling techniques. Special attention should be paid with respect to recording the physical conditions on forms provided at the time of sampling and to proper labeling of sample bottles with permanent markers. There were problems with the use of sticky labels which peeled off sample bottles before reaching the SVG Bureau of Standards. This made correct analysis of the samples next to impossible. To strengthen the water quality monitoring programme in the TCMP, rangers should be asked to record the number of yachts and number of days spent by each yacht in the TCMP as well as practices regarding garbage and sewage disposal. This information which is currently non-existent could provide valuable insight on boat traffic and impacts on various pollutants such as sewage and garbage on water quality within the TCMP.

Communication between the TCMP office and SVG Fisheries Division is essential, especially at the time of sample collection. A monitoring programme should be scheduled annually with consistent sampling dates arranged and agreed to. For example, for monthly monitoring samples could be collected within the first week of each month. Setting specific dates will also ensure that all partners involved in the monitoring will be informed so there will be efficient collection,

transfer and timely analysis of the samples. This schedule should be shared with the Bureau of Standards to ensure their preparation for sample analysis.

Due to numerous difficulties and inconsistencies in the monitoring programme for this project it is recommended that these results be discarded and that, following re-training and improving procedures, a new programme be established for ongoing monitoring. The project suffered from not having the water quality results from the first samples available in time to rectify the faults.

For the four-month monitoring period, the total cost for sample analysis was US$98. This is relatively inexpensive and should ensure that a continuous monitoring programme could be developed. However, the real cost of undertaking the service should also be calculated in order to have quantitative evidence for determining cost recovery fees or management subsidies.

6 LOCAL VALUES AND BELIEFS ABOUT MARINE RESOURCES (S2)

6.1 Background

This indicator is a measure of "how people make choices and undertake actions related to marine resource use and management based on their values about what is good, just and desirable and their beliefs of how the world works. A value is a shared understanding among people about what is good, desirable or just. A belief is a shared understanding by members of a group or society of how the world works". People's values and beliefs about marine resources influence behaviour within the stakeholder group, community or society. Therefore, understanding this indicator can aid MPA managers in effectively integrating people's local values and beliefs into the management structure of the MPA and help to minimise adverse effects of management (Pomeroy *et al.* 2004).

Of the socio-economic data available for St. Vincent and the Grenadines, limited primary and secondary data on people's local values and beliefs about marine resources within and around the TCMP exist. In a study to assess sustainable 'green boat' practices of water taxi operators in the Grenadines, results indicated that water taxi operators agree that the marine environment is under stress from various threats, with the majority expressing that they value the marine environment greatly since they depend on these resources for their livelihood (Lizama 2005).

Secondary data on values and beliefs of people in the Grenadines about marine resources in the TCMP have been indicated and recorded in some of the nearly 150 newspaper articles (published during late 2003 and 2004) regarding their reaction to the consideration by the St. Vincent and the Grenadines Government in 2003 of a proposal from a private foreign investor to manage the TCMP. The common theme in some of these newspaper articles was that there had been a decline in marine resource condition due to environmental damage, over-fishing, pollution, dying coral reefs, overcrowding and poor waste management in the Tobago Cays (Browne *et al*. 2004).

6.2 Methods

Four socio-economic indicators (S2, S3, S7 and S9) and one governance indicator (G12) were addressed by a questionnaire administered in Union Island (Clifton and Ashton) and Mayreau. Patrick McConney (CERMES), Robert Pomeroy (University of Connecticut) and Alexcia Cooke (Sustainable Grenadines Project) assisted with the questionnaire design and training. Seventy TCMP users (water taxi operators, dive shop owners and coastal cruisers) and the general public (a convenience sample attempting to get roughly equal proportions of marine and terrestrially oriented respondents) were interviewed to gain information on these indicators. The interview

team comprising Ann Harvey (team leader), Nicole Delpeche and Jeremiah Jones conducted interviews at the three locations from March-April 2006.

Indicator S2 was specifically addressed by three questions (two closed and one open-ended) in the first section of the questionnaire - condition of marine resources, 5 years ago and present; description and explanation of the difference between conditions 5 years ago and at present; and beliefs about marine resources.

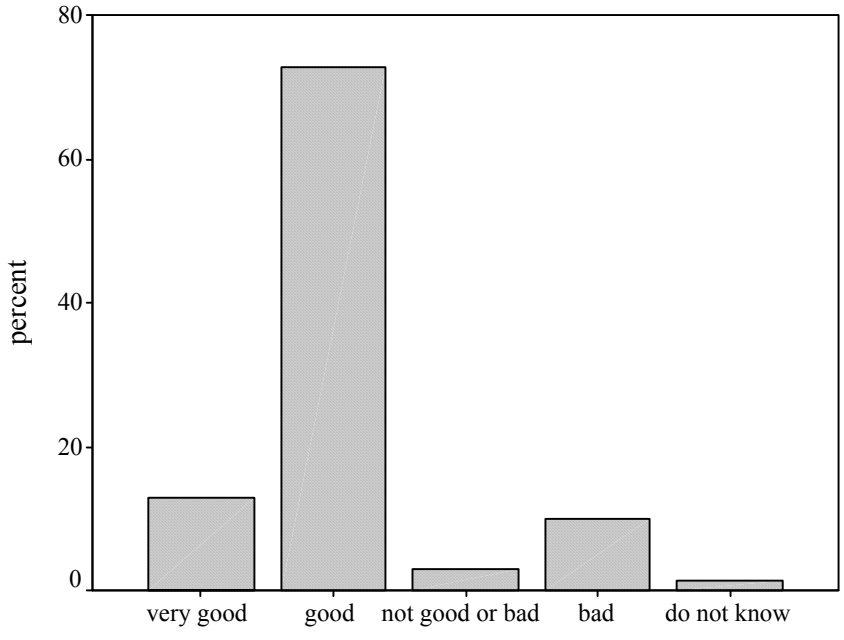
The data from the questionnaires were coded and entered in a Microsoft Excel spreadsheet and were analysed by Patrick McConney and Maria Pena (CERMES) using the Statistical Package for Social Sciences (SPSS) version 11. Meetings to obtain feedback on the interviewers' experiences with the survey process and lessons learnt, and to provide feedback on data analysis, were held in May 2006 in Union Island.

6.3 Results

6.3.1 Condition of marine resources

Cumulatively, an overwhelming majority of respondents (86%) thought that the condition of marine resources five years ago (around 2000-2001) was very good or good. When compared to the present condition of these resources, only 46% thought the condition of these resources to be very good or good, 32% bad or very bad, with 20% stating that they were neither good nor bad (Figure 6.1).

In total, 24% of respondents thought that there was no difference in the condition of marine resources in the TCMP in the past five years. Of these, the majority (94%) believed the conditions to be good five years ago and also at present, with only (6%) believing the condition of marine resources to be bad five years ago and also at present.



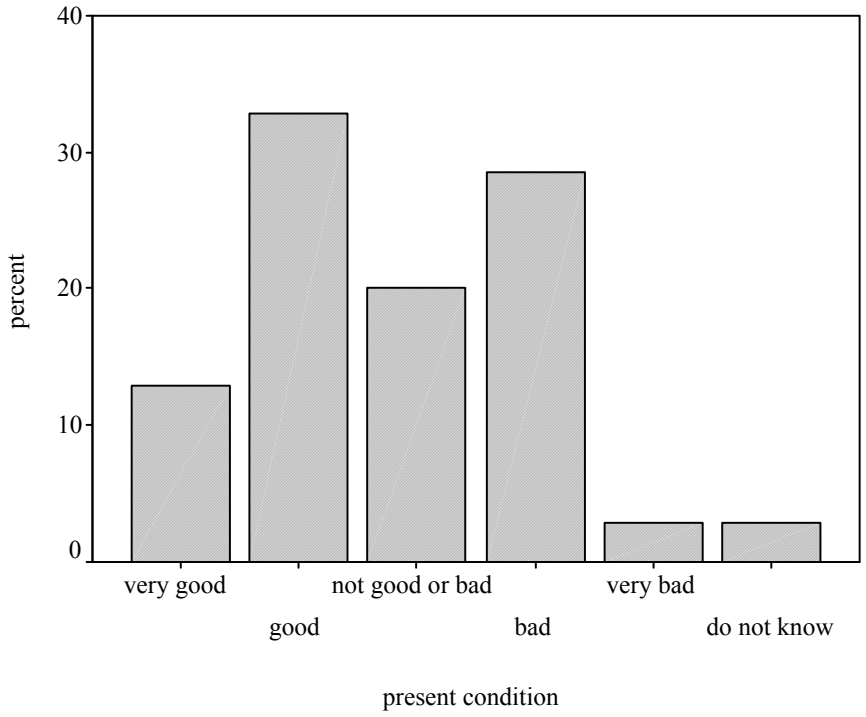


Figure 6.1 Perception of the condition of marine resources in the TCMP today and 5 years ago

Table 6.1 Reasons for the declining condition of marine resources (2000/2001-2006) in the TCMP

Response	% respondents (n = 70)
Overfishing	20
Lack of knowledge about marine resources	3
Hurricanes	6
Environmentally unfriendly boat and marine practices	8
Decline in reef health	8
Lack of stakeholder participation in management	3
Ineffective management by TCMP Board	3
Natural events, decline in reef health, overfishing, environmentally unfriendly practices	6
Overfishing, decline in reef health, dumping of garbage	3
Decline in reef health, erosion, overfishing	3
Total	63%

Of the 50% of respondents who noticed a decline in the condition of marine resources over the past five years, over half (63%) identified overfishing, unfriendly environmental boat and marine practices (such as SCUBA diving), declining reef health, hurricanes, lack of stakeholder participation in the management of the resources, ineffective management by the TCMP Board, lack of knowledge about marine resources and combinations of these reasons as factors contributing to this decline. This question was more problematic in that 31% of the respondents provided responses that were not applicable and 6% did not answer the question. See Table 6.1.

Table 6.2 Reasons for the improved condition of marine resources (2000/2001-2006) in the TCMP

Response	% respondents (n = 70)
Better TCMP management	40
Increase in abundance of fish and turtles	13
Improved education	6
Improved practices (environmental) of people	6
Not applicable	33

Respondents (21%) noted an improvement in the condition of marine resources in the TCMP with 66% providing reasons such as better management of the TCMP, improved education, improved practices of people and increased abundance of fish and turtles in the TCMP to account for this. Thirty-three percent of respondents provided answers that were not applicable. See Table 6.2.

Only 4% of respondents were unable to state whether they thought the condition of marine resources had improved or declined over the past five years. These respondents either noted good conditions in the past but did not know the condition in 2006 or did not know the condition in the past but stated that presently it was neither good nor bad.

6.3.2 Beliefs about marine resources

In total, 73% of respondents disagreed or strongly disagreed that divine intervention would take care of the marine resources. Instead, 93% of respondents strongly agreed or agreed that management of marine resources in the TCMP is necessary to maintain them in a healthy condition. Many (91%) strongly disagreed or disagreed that marine resources should be exploited as needed irrespective of their condition. Respondents disagreed or strongly disagreed (67%) with the view that the main reason for managing the park was for tourists over local communities. Half of the respondents (50%) believed that the TCMP office in Union Island can manage the TCMP while 26% did not believe this was possible. About 24% neither agreed nor disagreed with this view. See Figure 6.2.

6.4 Discussion

The results indicate local communities believe that the conditions of the marine resources in the TCMP have worsened in the past five years due to various factors. The survey showed that local knowledge of the resource condition is consistent with the very limited scientific evidence available for the area. Over the past 18 years, this documentation has indicated deterioration in the condition of the reefs in the Tobago Cays due to a number of factors that include storm damage, diseases, physical damage from fishing gear and boat anchors and localised pollution from visiting yachts and water taxis (Heyman *et al.* 1988; Smith *et al.* 1997; Comely *et al.* 2002; Deschamps 2000, Lizama 2005).

Furthermore, the first quantitative survey of the reefs of the Tobago Cays by Deschamps in 2000 indicated that the Horseshoe Reef was in a relatively healthy condition but at that time was showing signs of disturbances. Additionally, low densities of commercially valuable fish species were present and were relatively small in size indicating that overfishing was occurring. The latter is consistent with the views of the respondents, 20% of which stated that overfishing was the primary factor contributing to the worsening state of marine resources over the past five years.

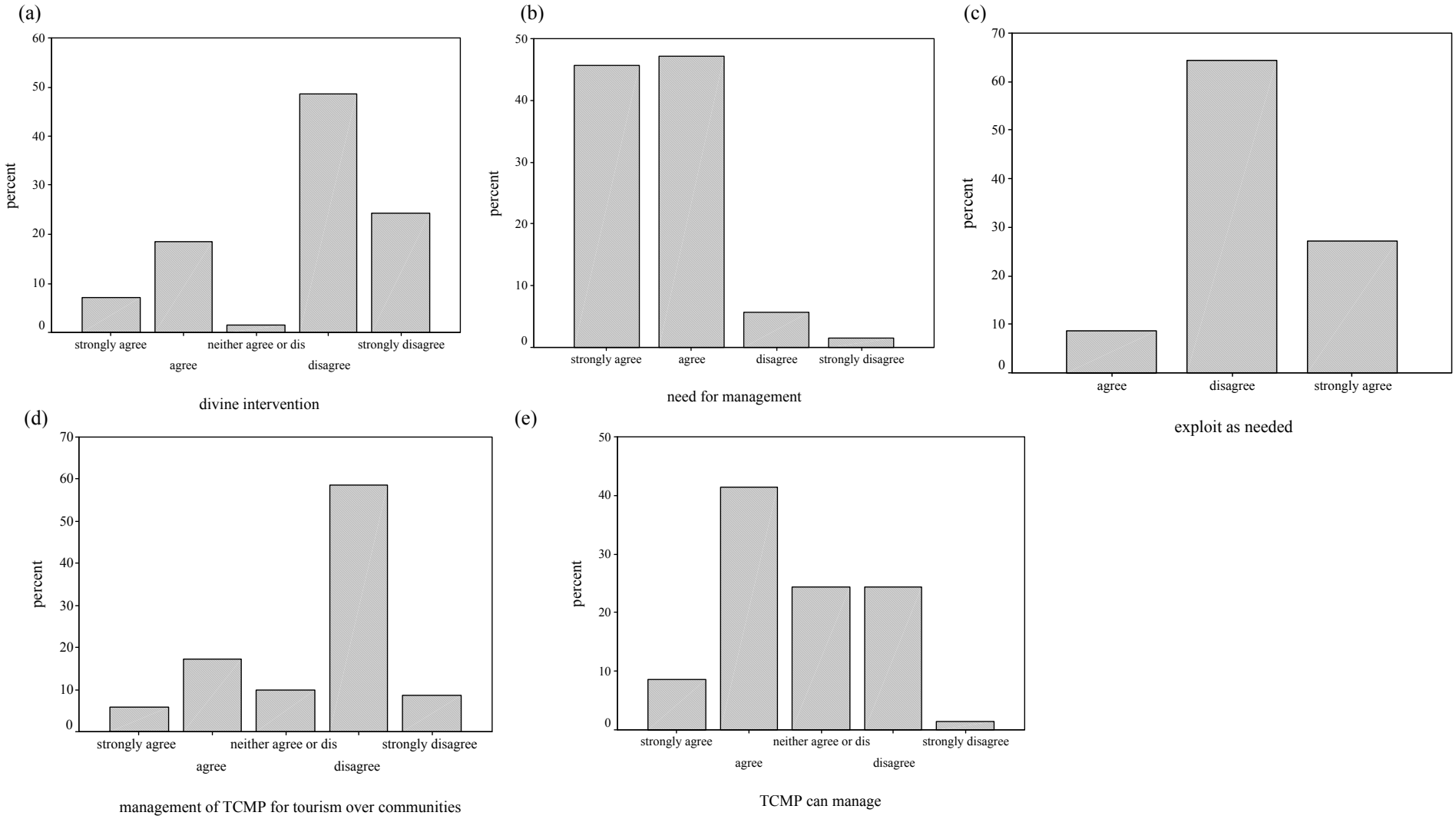


Figure 6.2 Views of respondents regarding (a) divine intervention as a means of managing marine resources in the TCMP, (b) the need for management of marine resources in the TCMP, (c) exploitation of marine resources regardless of their condition (d) management of the TCMP for tourism versus local communities and (e) ability of the TCMP office to manage the marine resources in the marine park.

The local communities' beliefs about the marine resources indicate an awareness of the factors affecting these resources and the need for management, stakeholder responsibility in managing the resources and sustainable use of these resources to maintain them in a healthy condition. This is consistent with the views of people throughout St. Vincent and the Grenadines who have called for management of the Tobago Cays in various newspaper articles (Doyle 2004; Anon. 2004a; Anon. 2004b; Thomas 2004).

It appears as though there was some misunderstanding of question 3 due to the reasonably high percentage of responses that were not applicable (23%). This question asked for a description and explanation of the difference between conditions of marine resources in the TCMP five years ago and presently, however instead of providing reasons for the difference in conditions, which was the main aim of the question, respondents simply repeated their answers to question 2. This might suggest a slight problem with the technique of the interviewer to gain relevant information or their misunderstanding of the question. Additionally, the interviewers themselves might not have fully understood the question. All interviewers pre-tested the survey, but amongst themselves. Perhaps if pre-testing was done on a small sub-sample of the community, problems with questions could have been solved. Alternatively, the responses which were not applicable might be attributed to a lack of understanding of the question or people's unwillingness to give their opinions regarding this question. Interviewers stated that there were a few people who encountered difficulties in understanding some questions but these questions were clarified by the interviewer. One interviewer noted the reluctance to provide opinions on TCMP-related matters has been occurring for years and is a characteristic of the communities.

In general, the survey process was successful since all of the interviewers are active in the communities and are known by many people. Although one interviewer found that a few participants were not very cooperative, there were generally no refusals to participate in the survey.

In the long term, users' ecological knowledge which includes perceptions of resource conditions is increasingly recognised as both influencing receptivity and providing information for governance, use rights and actual management efforts (Berkes *et al.* 2001).

7 LEVEL OF UNDERSTANDING OF HUMAN IMPACTS ON RESOURCES (S3)

7.1 Background

This indicator is a measure of the degree to which local stakeholders understand basic relationships between living things (in this case marine resources and human beings), their environment and one another, and the impacts that human activities have on the natural environment. An indication of individual perceptions of factors influencing the status of marine resources can be used to identify the distribution of faulty as well as accurate perceptions. This knowledge can then be used to structure interventions designed to involve the community in management of its resources and to evaluate the resulting changes. Information on types of impacts is useful for identifying threats to coastal resources. Community people, particularly people who directly use the resources, are often the most knowledgeable about what is affecting the resources they use on a regular basis. This information can be critical for identifying activities in need of scientific study (Pomeroy *et al.* 2004).

With the exception of one component of Lizama's research (2005), local stakeholder understanding of human impacts on resources in St. Vincent and the Grenadines has not been

studied. In this research, one specific group of stakeholders, water taxi operators, were surveyed to assess sustainable 'green boat' practices of water taxi operators in the Grenadines, and it was found that this group was aware that the marine environment has different roles and functions to all life that depends on its resources (Lizama 2005). The evaluation of this indicator will add to Lizama's by obtaining the level of understanding of human impacts on resources in the TCMP from a wider cross-section of stakeholders and will provide these stakeholders perceptions of human activities that damage the TCMP.

7.2 Methods

Four socio-economic indicators (S2, S3, S7 and S9) and one governance indicator (G12) were addressed by a questionnaire administered in Union Island (Clifton and Ashton) and Mayreau. Patrick McConney (CERMES), Robert Pomeroy (University of Connecticut) and Alexcia Cooke (Sustainable Grenadines Project) assisted with the questionnaire design and training. Seventy TCMP users (water taxi operators, dive shop owners and coastal cruisers) and the general public (a convenience sample attempting to get roughly equal proportions of marine and terrestrially oriented respondents) were interviewed to gain information on these indicators. The interview team comprising Ann Harvey (team leader), Nicole Delpeche and Jeremiah Jones, conducted interviews at the three locations from March-April 2006.

Indicator S3 was specifically addressed by one two-part question (closed and semi-structured open-ended) on human activities in the TCMP. The data from the questionnaires were coded and entered in a Microsoft Excel spreadsheet and were analysed by Patrick McConney and Maria Pena (CERMES) using the Statistical Package for Social Sciences (SPSS) version 11. Meetings to obtain feedback on the interviewers' experiences with the survey process and lessons learnt, and to provide feedback on data analysis, were held in May 2006 in Union Island.

7.3 Results

The majority of respondents (74%) thought that human activities are damaging the TCMP whilst 26% thought they were not contributing to the damage (see Figure 7.1). Of those respondents who thought that human pressure was having an impact on the TCMP, 72.8% identified activities that were causing harm while 1.4% did not provide such information. Respondents listed a total of 12 activities which they thought people were doing to damage the TCMP, the most common of which were garbage (30.1%), irresponsible fishing (16.8%) and general reef damage (15.4%).

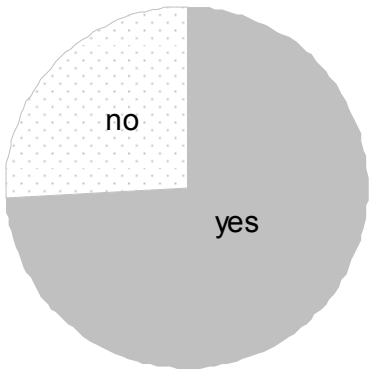


Figure 7.1 Are human activities damaging the TCMP?

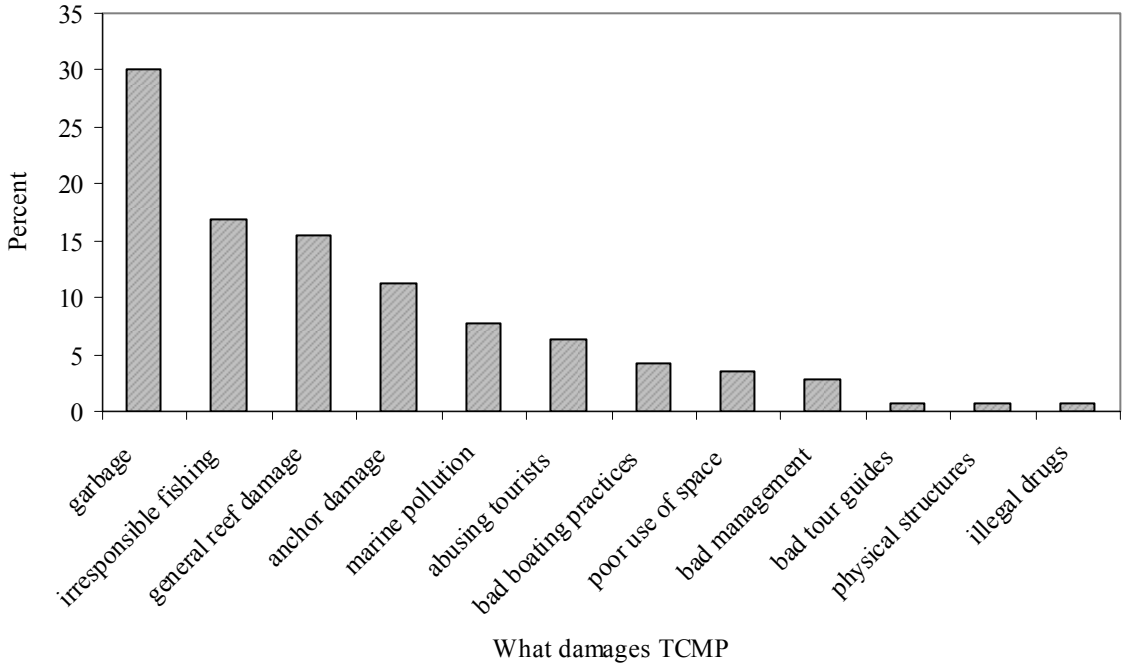


Figure 7.2 Activities perceived to be damaging the TCMP

7.4 Discussion

Based on these results, community members conclude that human activities are impacting on the coastal resources in the TCMP, the primary culprit being garbage. Several activities are believed to be impacting the resources, however scientific research to confirm this finding is lacking. With the exception of indiscriminate garbage disposal, poor boating practices, overfishing and anchoring listed by respondents and noted in other studies (Gourmain 1993; Cooke 2005 and Lizama 2005) as activities impacting the marine resources of the Grenadines and the TCMP, the other activities listed by the respondents have not yet been studied to determine their level impact, if any, on the TCMP. Research such as this therefore should be undertaken to increase understanding of the full range of activities affecting the TCMP.

Information on and monitoring these activities in the future will enable the TCMP manager to determine the impact management has had on these activities and therefore how effective management has been. This information is critical for developing awareness programs and seeking stakeholder participation. Since the respondents identified several activities perceived to be adversely affecting the TCMP then there should be no difficulty in engaging them in coastal management when necessary (Bunce and Pomeroy 2003).

8 MATERIAL STYLE OF LIFE (S7)

8.1 Background

Material style of life is often used as an indicator of wealth or economic well-being. It is a measure of the relative social status of a community. The evaluation of this indicator is important in determining the economic impact of the MPA on MPA communities. This indicator is usually

evaluated by assessing assets that are locally associated with wealth and poverty and usually includes assets that are likely to be purchased or upgraded within a reasonable time. Evaluation of these assets is important to facilitate comparisons and measure change in material style of life of MPA communities (Pomeroy *et al.*2004).

Economic well-being has been a component of a few studies in the Grenadines, notably the Canada-St. Vincent and the Grenadines Fisheries Development Project and OECS Protected Areas and Associated Livelihoods (OPAAL) Project. In general, material style of life is not disaggregated for the Southern Grenadines. A comparison of households in the Southern Grenadines with St. Vincent and the Northern Grenadines showed that there was very little significant difference in the possession of household appliances between the two (Espeut 2006).

Communities in Union Island have considerably higher disposable incomes than those in the other Grenadine islands. Most households in Union have indoor plumbing, electricity, television, refrigeration and may even have videoplayers (SENJAN Associates and Consultants 1990; Espeut 2006). Information on material style of life for Mayreau does not seem to exist.

8.2 Methods

Four socio-economic indicators (S2, S3, S7 and S9) and one governance indicator (G12) were addressed by a questionnaire administered in Union Island (Clifton and Ashton) and Mayreau. Patrick McConney (CERMES), Robert Pomeroy (University of Connecticut) and Alexcia Cooke (Sustainable Grenadines Project) assisted with the questionnaire design and training. Seventy TCMP users (water taxi operators, dive shop owners and coastal cruisers) and the general public (a convenience sample attempting to get roughly equal proportions of marine and terrestrially oriented respondents) were interviewed to gain information on these indicators. The interview team comprising Ann Harvey (team leader), Nicole Delpeche and Jeremiah Jones, conducted interviews at the three locations from March-April 2006.

This indicator was addressed by four questions relating to social status and wealth – possession of property and household appliances, type of roof, type of outside structural walls and type of floor. The data from the questionnaires were coded and entered in a Microsoft Excel spreadsheet and were analysed by Patrick McConney and Maria Pena (CERMES) using the Statistical Package for Social Sciences (SPSS) version 11. Meetings to obtain feedback on the interviewers' experiences with the survey process and lessons learnt, and to provide feedback on data analysis, were held in May 2006 in Union Island.

8.3 Results

The results show that just over half of the households own land and a house. The majority of households (96%) have electricity. Household ownership of some electrical appliances such as televisions, stereos and refrigerators is greater than 60% in all instances. Ownership of washing machines and computers is significantly lower; 40% or less. Household ownership of a boat is approximately two and half times greater (37%) than that of a vehicle (14%). See Table 8.1

In terms of household structure, structural walls are primarily concrete (78%) with galvanised roofs (81%) and tiled floors (43%). None of the households have shingle roofs. Only a small proportion of households have wood (6%) or plywood (1%) floors. None of the households have dirt floors. Floor coverings are mainly tile (43%) and vinyl (23%) whilst carpet (8%) and wood (7%) are not common. Some respondents were reluctant to answer questions 13-15 relating to household structural materials since they were regarded as being personal.

Table 8.1. Property ownership and possession of household appliances in Union Island and Mayreau

Possession	% respondents
Land	54.3
House	51.4
Electricity	95.7
Vehicle	14.3
TV	88.6
Telephone	77.1
Stereo	67.1
Washing machine	40.0
Refrigerator	87.1
Computer	34.3
Boat	37.1

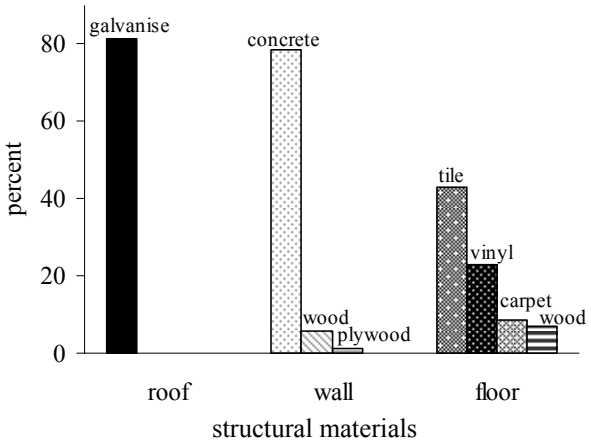


Figure 8.1 Household structural materials

8.4 Discussion

In Union and Mayreau, home and land ownership is reasonably low with just over half of all respondents possessing these assets. This may be a result of high numbers of couples or single people who have sufficient incomes to rent homes (SENJAN Associates and Consultants 1990). The majority of households in the TCMP communities are concrete structures with galvanised roofs and tiled floors, with electricity, television, refrigeration and stereos. The major means of communication are televisions, telephones and to a lesser extent, computers. These results indicate a fairly high material style of life (living standard) in these communities and is consistent with the results of SENJAN Associates and Consultants (1990), Espeut (2006) and with trends in ownership of goods in St. Vincent and Grenadines (SVG Statistical Office 2001).

Data from the St. Vincent and the Grenadines 2001 Census show that the number of households living in concrete homes has increased from 55.1% in 1991 to 71.6% in 2001 (SVG Statistical Office 2001). A high percentage of households living in homes constructed of concrete are present in the surveyed communities of Union Island and Mayreau. The other major types of construction material used by households have declined throughout St. Vincent and the Grenadines. Evidence of significantly lower percentages of households living in wooden houses compared with concrete houses in Union Island and Mayreau is evident from the current results.

Ownership of appliances such as refrigerators and washing machines can also indicate improvements in quality of life. These results for Union and Mayreau are consistent with those throughout St. Vincent and the Grenadines which show a trend of high ownership of refrigerators but a significantly lower amount of washing machines (SVG Statistical Office 2001). Boat ownership is higher than that of vehicle ownership as expected due to the small size of Mayreau (2.6 km^2) and Union Island (8.9 km^2) and therefore ease of travel within the islands, and predominant marine-oriented livelihoods necessitating marine rather than land modes of transportation. For example, Union Island has the largest percentage of water taxis in both the Northern and Southern Grenadines islands (36.4%) (Cooke 2005).

Information on material style of wealth is not subdivided by island in the St. Vincent and the Grenadines Population and Housing Census Report (2001) therefore a comparison of change in economic well-being of the communities closest to the TCMP since its establishment in 1997, cannot be done at this time using the results of this evaluation study. Disaggregating the census data into Southern Grenadines enumeration districts may be particularly useful. However, the current data still provide a good baseline for the TCMP to measure change in this indicator over time and to determine whether the TCMP and associated management regulations are increasing, decreasing or stabilising the economic well-being of the communities. This will help indicate potential threats or challenges that the TCMP manager may face when implementing management regulations.

With respect to respondents' reluctance to answer certain questions pertaining to material style of wealth, it is not uncommon for persons to wish to keep wealth information private. Perhaps the interviewers could have explained in more detail the reason for asking these questions thereby making the respondents feel more comfortable that the survey was not overly intrusive.

9 HOUSEHOLD INCOME DISTRIBUTION BY SOURCE (S9)

9.1 Background

This is a measure of the primary sources of income for households in the MPA community. Information on livelihood and income sources (occupational structure) is important since it allows a MPA manager to better measure and understand the impacts of the MPA on households within the community. An understanding of shifting sources of income is useful in determining the effects of MPA management strategies on community livelihoods and may indicate whether the MPA is impacting positively or negatively on the community. Information on occupational structure is also useful for determining the importance of marine resources to the community. This information can be used to make changes in MPA management in order to diversify or protect livelihoods of communities living around the MPA (Bunce and Pomeroy 2003; Pomeroy *et al.* 2004).

The Population and Housing Census (SVG Statistical Office 2001) is the primary source of data on activities engaged in by the population throughout St. Vincent and the Grenadines, in terms of gender, age group, occupation, employment and educational level. However, studies such as the Canada-St. Vincent and the Grenadines Fisheries Development Project (SENJAN Associates and Consultants 1990) and more recently, the livelihoods analysis of water taxi operators in the Grenadines (Cooke 2005) focus on specific communities within the Grenadines. The former focuses primarily on fishing communities, including Union Island, in the southern Grenadines while the latter examines livelihoods of water taxi operators throughout the Grenadines. The current study will build on the data already available for the TCMP communities and in some cases will provide preliminary baseline data for these communities which may be used for monitoring changes in household income by the TCMP.

9.2 Methods

Four socio-economic indicators (S2, S3, S7 and S9) and one governance indicator (G12) were addressed by a questionnaire administered in Union Island (Clifton and Ashton) and Mayreau. Patrick McConney (CERMES), Robert Pomeroy (University of Connecticut) and Alexcia Cooke (Sustainable Grenadines Project) assisted with the questionnaire design and training. Seventy TCMP users (water taxi operators, dive shop owners and coastal cruisers) and the general public (a convenience sample attempting to get roughly equal proportions of marine and terrestrially

oriented respondents) were interviewed to gain information on these indicators. The interview team comprising Ann Harvey (team leader), Nicole Delpeche and Jeremiah Jones, conducted interviews at the three locations from March-April 2006.

This indicator was examined by three questions addressing household size; distribution of income by gender, importance, and seasonality; and occupation. The data from the questionnaires were coded and entered in a Microsoft Excel spreadsheet and were analysed by Patrick McConney and Maria Pena (CERMES) using the Statistical Package for Social Sciences (SPSS) version 11. Meetings to obtain feedback on the interviewers' experiences with the survey process and lessons learnt, and to provide feedback on data analysis, were held in May 2006 in Union Island.

9.3 Results

The mean household size in of households surveyed in Union Island and Mayreau is 2.2 persons. The majority of households (74%) were of one or two persons in nearly equal proportions among twenty-seven out of 70 households surveyed (38% comprising a single person; 36% comprising two people). Households made up of three to five individuals were significantly less and represented 24% of households surveyed. See Figure 9.1.

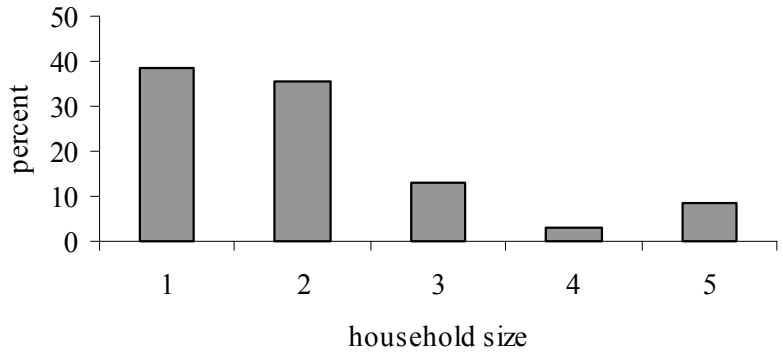


Figure 9.1 Household size in TCMP communities

Twenty different occupations were noted by the respondents as their main line of work. As shown in Figure 9.1, the greatest number of respondents were involved in water taxiing (14%), followed by business (11%) and sales (8%). Office worker, food service and skilled artisan occupations were represented by 7% of respondents each; fishing and vending by 6% each; construction, teaching and other marine by 4%; and child care (3%). Counselor, travel agent, hairdressing, housewife, pharmacist, real estate and vending were the least represented occupations (1% each). Occupations categorized as 'other marine' were those of seaman and captain. The 'other' category comprised occupations such as telephone operator, time keeper and trafficking. Only 1% of respondents provided no response to this question. Cumulatively, 24% of households are engaged in marine-related occupations, such as water taxiing, fishing and other marine occupations (seaman and captain), relevant to the TCMP. See Figure 9.2.

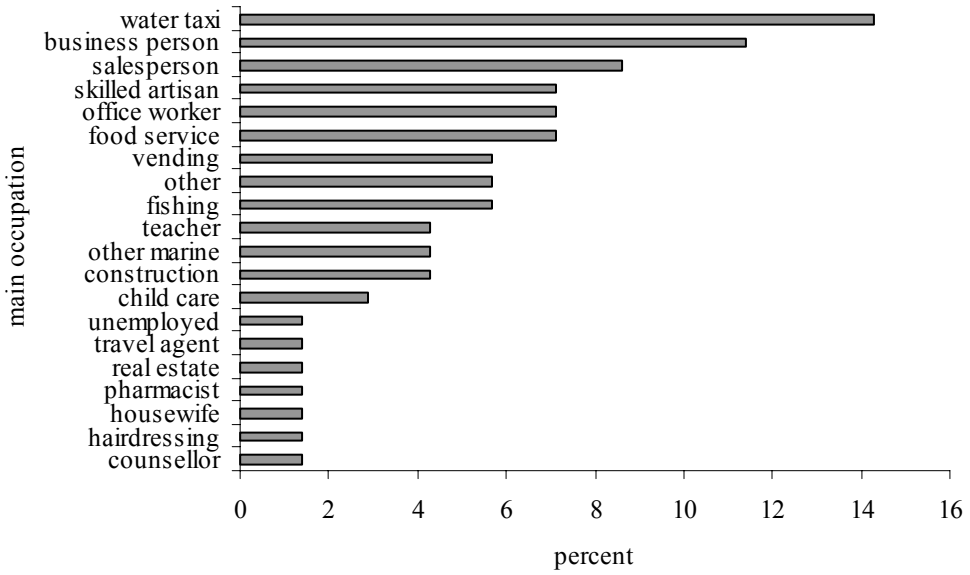


Figure 9.2 Main occupation of respondents in the TCMP communities

Fifteen of the 20 occupations described as main occupations were noted as being of 'high' importance in terms of household income. Some respondents (15%) stated that mainly business and another were of greatest importance to household income. Water taxiing (13%) was the second largest occupation rated as being of primary importance to household income with teaching (11%) being the third occupation of primary importance to the household. Although being of primary importance to household income, the remaining 11 occupations were each represented by less than 10% of respondents. See Figure 9.3.

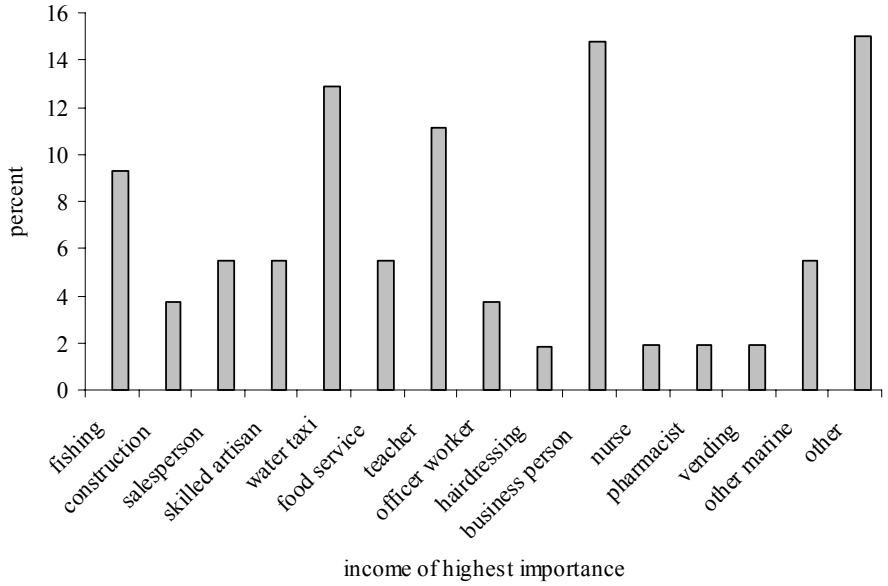


Figure 9.3 Occupations rated as being of high importance to household income

Occupations of highest importance to household income were male dominated. Of the 15 highly important occupations, eight were predominantly male. Fishing, construction, skilled artisan occupations, water taxiing, office jobs, vending and other marine jobs were 100% male-dominated. Many male respondents (63%) were engaged in occupations categorised as 'other'. Only five of the primary occupations were predominantly female. Food service, hairdressing, nurse and pharmacist occupations were 100% female-dominated. The salesperson occupation had 67% female respondents. Teaching and business occupations are distributed equally by gender. See Figure 9.4.

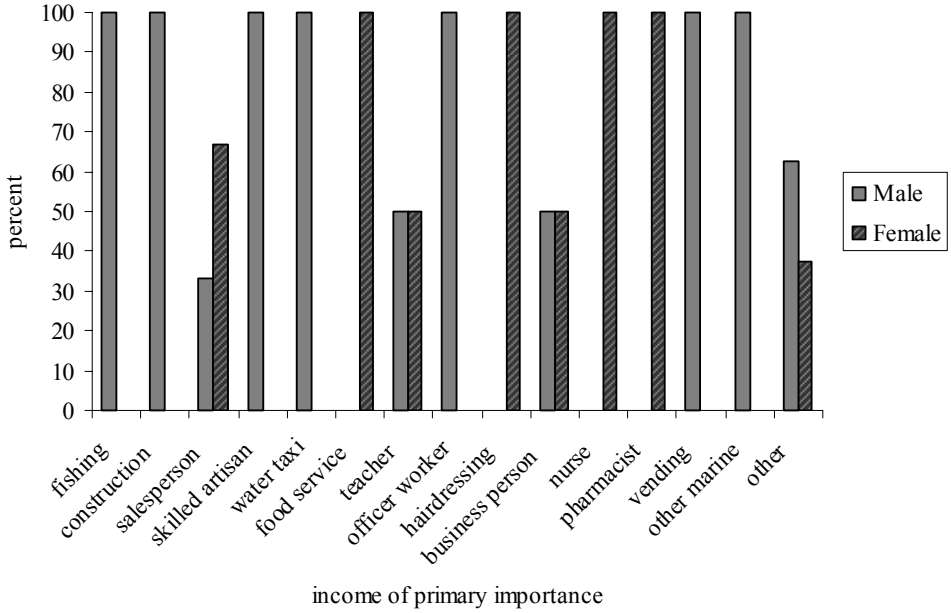


Figure 9.4 Occupations of high importance to household income by gender

9.4 Discussion

The average size of households in Union Island and Mayreau is a little smaller than that of the entire Southern Grenadines which had an average size of 2.6 in 2001, the smallest for the nation of St. Vincent and the Grenadines (SVG Statistical Office 2001). The small household sizes seen in communities near to the TCMP, specifically on Union, are supported by data from SENJAN and Associates (1990) which showed that households there comprised many adults living alone or with one or two other adults. This small mean size of households may be indicative of increasing or high disposable incomes and is supported by the relatively high material style of life found in communities in the TCMP (See section 8.). This effect of increasing income per capita on the reduction in household size has been acknowledged for a long time (Mincer 1963; Neher 1971; Raut 1991). A trend of decline in mean size of households throughout St. Vincent and the Grenadines is evident (SVG Statistical Office 2001). This trend in household size in the TCMP communities should be monitored to determine whether changes are in fact occurring and to determine the relationship to management strategies for the TCMP.

Household occupational structure is one of the most useful sources of information regarding threats since it provides, among other things, an understanding of the number of people

dependent on coastal resources for their livelihood. From the results it can be seen that the majority of respondents in the TCMP communities, albeit a small percentage (14%), are engaged in water taxiing as their main line of work while the second largest main occupation is business-oriented (11%). For Union Island, this is supported by evidence that the largest number of water taxi operators in the Grenadines occur here (Lizama 2005). Furthermore, water taxiing is the second largest occupation (13%) of high income importance to households. This information is especially important since the TCMP is one of the most popular sites for water taxi operators operating in the Grenadines for day trips and for soliciting business from yachts (Cooke 2005) therefore any changes in the implementation and enforcement of regulations within the TCMP will directly impact the livelihood of this group and will be particularly significant for water taxi operators from Union Island.

Only 6% of respondents noted fishing as their main occupation, with 9% stating it was the income of high importance in the household. This small percentage of households engaged in fishing may be indicative of the declining resource conditions in the TCMP over the past five years (see Section 6) and may be due to overfishing which was noted by respondents as having an impact on the TCMP (see Section 7). Alternatively it may be explained by the fact that Union Island's economy has been dominated in the past by subsistence agriculture and cotton production (SENJAN Associates and Consultants 1990).

The results provide good baseline data on which shifts in primary household occupation as a result of TCMP management can be measured over time to determine whether household dependency on marine resources of the park is increasing or decreasing, and to identify and determine acceptance and relative importance of alternative livelihood opportunities (Pomeroy *et al.* 2004). The marine resources of the TCMP are of significant importance to a fairly high percentage of households (24%) engaging in marine-related lines of work (water taxiing, fishing and other marine occupations). Therefore, socio-economic information such as the data presented in this report should be incorporated in TCMP management since conservation decisions are likely to displace these resource users and impact negatively on their livelihoods.

Additionally, mitigation measures or alternative job opportunities should be developed with the resource users. Due to the fairly high percentage of households engaged in business (11%) and the importance of income from this occupation to the majority of households surveyed (15%), this occupation could be explored as an alternative livelihood option should conservation strategies within the TCMP result in displacement of current resource users.

10 EXISTENCE OF A DECISION-MAKING AND MANAGEMENT BODY (G2)

10.1 Background

A management body is an institution that governs the way in which a MPA is managed, used and ensures that there is transparency in the process for management planning, and establishing and enforcing rules and regulations. Management bodies may be government, non-government or community organisations and may operate at local, national or international levels. This indicator therefore is a measure of the recognition of such an institution (Bunce and Pomeroy 2003; Pomeroy *et al.* 2004).

The existence of a legally mandated MPA decision-making and management body leads to more professional, effective and accountable management of the MPA. Information on the management body is useful for determining the overall impacts of management on MPA

communities. The identification of the management body allows a MPA manager to better understand the range of management activities taking place in the area and be more effective in terms of management.

10.2 Methods

This indicator was evaluated by Maria Pena (CERMES) and Meritha Baptiste (née Small,of TCMP) through the review of documents relating to: management authority and responsibility (notably several management plans developed for the TCMP); legal and formal authority of the body (relevant legislation); and frequency of meetings (TCMP Board meeting minutes). Additionally, Maria Pena conducted key informant interviews with Vibert Dublin (TCMP Manager), Raymond Ryan (former Chairman, TCMP Board) and Andrew Roache (Chairman, TCMP Board) to clarify the structure of the TCMP Board and to gain additional information regarding a timeline for Board establishment, changes and decisions made.

10.3 Results

The management plan currently being used by the TCMP to guide management is that of the informally adopted plan of Cordice (1998). This management plan however does not identify the decision-making and management authority responsible for the TCMP nor does it have an organisation chart showing the lines of authority and management responsibility. It does however reference the relevant legislation from which this information may be obtained. The revised version of this plan (Cordice 2000) has a section on the structure and operation of the TCMP Board.

The general management structure of the TCMP is explained in the Marine Parks Act, 1997 and regulations of the Tobago Cays Marine Park (Marine Parks (Tobago Cays) Regulations, 1998. The Marine Parks Act (1997) provides for the establishment of a Board of management, the Marine Parks Board, to oversee the management and conservation of marine parks throughout St. Vincent and the Grenadines. This Board now functions as the Board of management for the TCMP. The TCMP Board was established in 1998 and is responsible for the day to day management of the TCMP and directly answers to the Administrative Head (Permanent Secretary) for the Ministry responsible for management (Prime Minister's Office) of the TCMP. It functions to enforce decisions taken by Cabinet; prepare the annual programme and budget for submission to the Prime Minister's Office; prepare and submit annual reports on the state of the TCMP to the Prime Minister's Office; manages the finances of the TCMP consistent with policies of the Prime Minister's Office; recruits, pays and supervises TCMP staff (Park Manager, Rangers, Office Staff); provides the Park Manager with workplans and budgets; controls the regulations that are enforced and enhances public education of all users of the TCMP. See Figure 10.1.

The TCMP Board currently comprises 11 members, inclusive of the Chairman and holds monthly meetings at the Fisheries Division in Kingstown. Appointment of members of the Board (other than *ex-officio* members) is for three years with eligibility for re-appointment for a second term. The Board appoints a Chairman and Vice-Chairman from among its members. The Board appoints a Park Manager who is directly responsible to it and is responsible for the overall management of the TCMP, a Chief Ranger and Rangers to carry out the regulations of the Marine Parks Act and may appoint such number of persons as authorised officers for the proper administration of management (Marine Parks Act 1997).

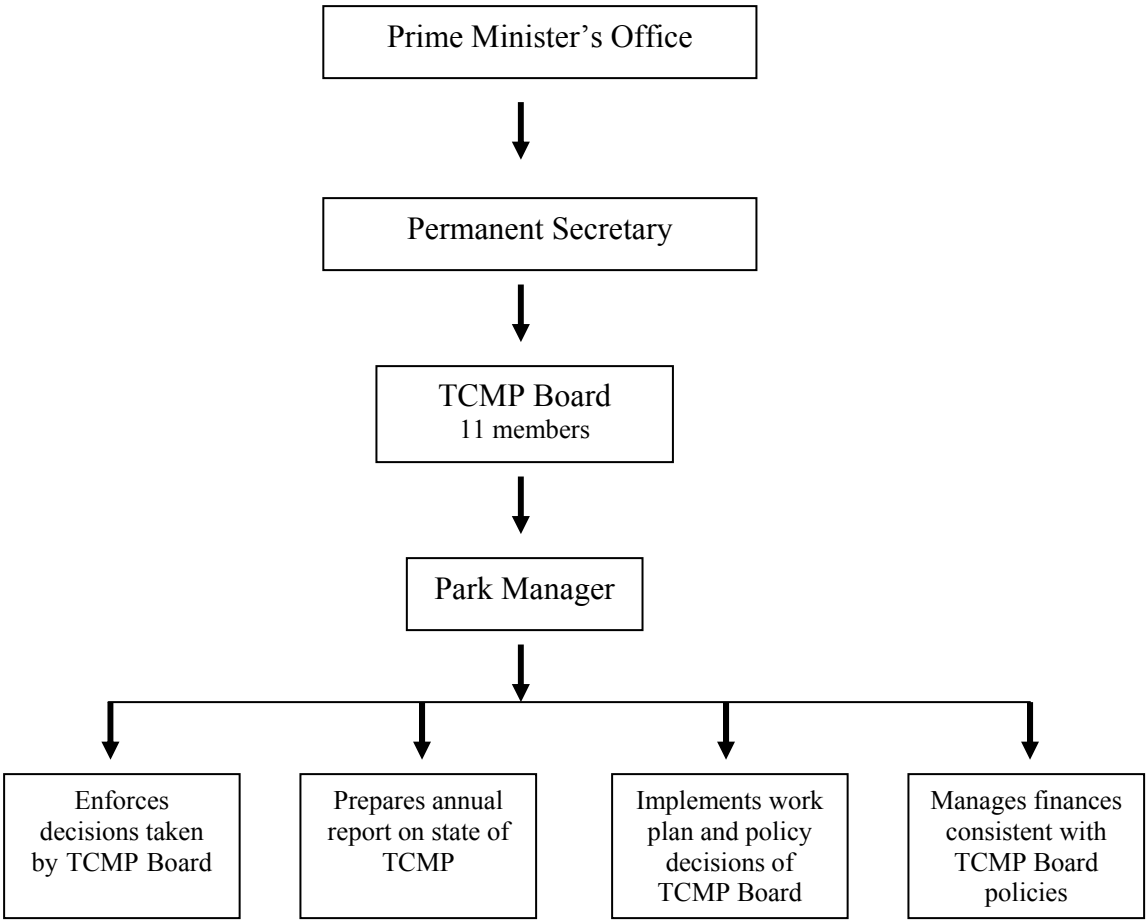


Figure 10.1 TCMP management structure

The Cordice (2000) management plan divides the operational management of the TCMP into two specific units, a management unit and a safety unit. Responsibilities of the management unit include the collection of fees in the TCMP; park maintenance; public relations work; research and general surveillance, while the responsibilities of the safety unit include fulfilling the need for an enforcement and medical unit in the marine park. The management unit has been partially implemented but the safety unit is not in existence.

Minutes of the TCMP Board Meetings have been recorded fairly well but the TCMP Office only has copies of those for 2005 and 2006. Mr. Raymond Ryan, the previous Chairman of the Board was asked to provide minutes of TCMP Board Meetings prior to 2005 but these Minutes were not received in time for reporting. Minutes are generally well-written but in some cases are not explicit and informative. For example, paragraph 8 of the Minutes of August 2005 mentions that, "The Nature Conservancy and the University of the West Indies wish to meet with the Board to discuss the proposed project", however, there is no indication of the name of this project and prior minutes do not allude to it. Generally, the structure of the minutes lacks formatting by category. The minutes however provide a record of suggestions and decisions made by the TCMP Board as well as information on the planning process to implement the operation of the TCMP. See Table 10.1 for a timeline of suggestions, decisions and planning activities proposed or made by members of the TCMP Board. On average the number of Board members attending meetings for the period 2005-2006 was seven. Board meetings are to be held quarterly (January,

May, September) with additional meetings to be called at the discretion of the Chairman. Board meetings for 2005 have not been consistently scheduled. Those for 2006 have been held almost monthly.

Table 10.1 Timeline of TCMP Board actions with regard to management of the TCMP

Date	Action
February 2005	Proposal to submit memos to Cabinet concerning the creation of a Trust Fund for the TCMP and proposed fee structuring for moorings and all TCMP fees Consultations with stakeholders should be held on proposed fees before seeking Cabinet's approval Park boundaries to be addressed by Chief Surveyor to exclude Mayreau to a certain point Collection of taxes for use of the TCMP could be done by a ticketing system at specific areas Use of the TCMP logo to be investigated. Perhaps it was being used by unauthorised persons Moorings to be put down in near future. Expected date of completion: May 2005.
April 2005	TCMP Project launch in Kingstown – 3rd week of April Legislation regarding TCMP boundaries to exclude Mayreau except for 100ft from the shoreline Moorings placement pending. The Minister responsible requested consultation with the Port Authority on the matter Discussion of costs of a boat for the TCMP. Boats in Miami to be investigated for cost and appropriate specifications
August 2005	Secretariat to organise three national consultations (Bequia, Union Island and St. Vincent) on moorings and park fees to be organised utilising funds from the budget Request for Ministry of Finance to give a short presentation on park fees at the consultations Secretariat asked to liaise with the Minister responsible for Grenadine Affairs to lead consultations. Meetings with stakeholders regarding Park fees: 22-24 August 2005 Park boundaries determined and mapped. Boundaries to be included in TCMP regulations TCMP Board must develop a funding policy for the Park. Fees must be finalised and implemented Four rangers on duty from 8am to 4pm. More rangers needed for night shift. 12 rangers should be on staff by the end of the year to ensure the maintenance of a 24 hour surveillance Staff at TCMP comprises: Park Manager, 3 Park Rangers, Secretary and an Attendant The TCMP requires a base boat and additional boats for surveillance Breach in security regarding surprise surveillance Manager to brief Chief Ranger when raids are planned and warn rangers about breaching security Campaign to reduce speed in the TCMP, specifically targeting yachts, to be planned Proposal for the establishment of a Resource Centre adjacent to TCMP office Manager to develop a proposal for the Resource Centre and engage someone to design the building Public awareness of the TCMP to be funded by the OPAAL Project Manager to identify areas for TCMP staff training, to be provided by relevant government agencies Structure of command for rangers to be developed and submitted to the Park Manager Approval for moorings given by the Port Authority. MoorSecure to be awarded the contract for installation. Installation of moorings to commence September 2005. Brochures and tickets to be developed by the TCMP Sub-committee of the TCMP Board constituted to examine Marine Parks Authority draft bill. Specifications for two boats for the TCMP presented to the Board. Approval by Board to purchase the boats using funds provided by the OPAAL Project.
September 2005	Determination of dates and venues for consultations on Park fees Suggestion to produce radio and newspaper advertisements to raise public awareness on Park fees Discussion of enforcement of the speed limit in the TCMP and penalties Scuba diving for rangers with Glenroy Adams to begin soon Rangers to participate in training camps abroad Funds allocated by the OPAAL Project for purchase of boats for the TCMP. Quotations for boats to be presented at next Board meeting Chairman to speak to Prime Minister's Office about moorings Board to request technical expertise from TNC to help the Park Manager draft a management plan $3,000 to be allocated towards TCMP brochure

Date	Action
	Changes to the Marine Parks Authority draft bill proposed and discussed Water Taxi Association to manage garbage disposal in the TCMP. Garbage will be dumped in Union Island for the first two years
February 2006	Restructuring of TCMP Board. Recommended Board restructuring sent to Cabinet for approval TCMP to be in operation by June 1 OPAAL Project visit to Union Island: 28 Feb 2006. OPAAL Project stakeholder meetings: 1 Mar TNC representative visit: St. Vincent 13-14 March 2006 to finalize the management plan for TCMP TCMP work plan available Request for quotations between US$ 25,000-60,000 for purchase of boat for the TCMP Board informed about the CERMES Marine Protected Area Management Effectiveness (MPA ME) Project and advised that project funds have been received
March 2006	Consultations on Park fees completed Concern regarding number of financial accounts set up for the TCMP and request for representative from the Ministry of Finance to be signatory to the account Request for formation of a site committee (by the next Board meeting) comprising 9-10 persons to deal with management and stakeholder issues Board to create TCMP management plan based on previous draft plans Suggestion to increase number of rangers from 3 to 6 Board to decide on MoorSecure recommendation to install dinghy moorings in the TCMP TNC to be asked to train TCMP rangers
April 6 2006	Board to consult with the OECS for assistance in drafting a management plan for the TCMP which would then be taken out to consultation Specifications of boat for TCMP to be submitted to the OECS for purchase Revised boundaries for the TCMP submitted to Cabinet. Suggested that these new boundaries be submitted as an amendment to the Marine Parks Act, 1997 Suggested that fees be collected under the Marine Parks Act, 1997
April 20 2006	Consultant (via OPAAL) to assist with drafting of management plan to visit in mid-May 2006 Boat specifications to be confirmed with someone with technical knowledge. Budget to be adjusted to suit the boat required for the TCMP. 34' boat was choice of the Board. Fee structure and procedure for collecting fees for the TCMP discussed. Receipts are to be issued in triplicate – one for Port of Entry, one for rangers on arrival in the TCMP and the other for yacht Suggestion to begin implementation of fees immediately. Fees to be published in the Gazette with suggested adjustments from the consultation. Stakeholders to have opportunity to comment on fees. Board members requested to examine the proposed fees and make suggestions at the next meeting. Proposed Management Plan Workshop: mid-May 2006
May 11 2006	Implementation of OPAAL projects dependent on formulation of a TCMP management plan. Board to assist in drafting assigned sections of the management plan with June 6 as submission deadline and June 29for final discussions on completed draft
August 10 2006	Update on the business plan for the TCMP Discussion on staffing. TCMP staff dissatisfied with their work contracts and conditions. The quarterly government subvention is sufficient to pay salaries for two months bills. A special finance warrant to cover TCMP expenditure should be requested for remainder of 2006 Dissatisfaction over TCMP financing. Board advised to write Finance Minister indicating concern. The status of the fees structure for the TCMP was discussed. Certain categories of fees revised but it was decided to implement the old fee structure while advising public that it was subject to change when park boundaries set. Options arising out of the last fee structure consultation were described. Suggestion to start the operation of park and inform the public of the implementation of a new fee structure by January 2007. Agreement to start and enforce fees in the TCMP. Uniforms for rangers queried. A logo for the t-shirts for the rangers had been designed. Revenue to be generated under the old fee structure would be insufficient to operate the park. New structure may generate less revenue than the old. A new fee structure must be able to sustain park. Discussion and assignment of fees for Park use. Discussion of rangers collecting fees in the Park.

Date	Action
	Board members informed of Peter Murray's (of OECS) upcoming visit to conduct a workshop. This would be a baseline study of the Tobago Cays and Board members were asked to attend. Information provided on documents and components of the OPAAL project.

As of 1 September 2006, the following were appointed to the TCMP Board for one year by Cabinet:

- Father Andrew Roache (Chairman)
- Herman Belmar
- Chief Fisheries Officer
- Director General/Finance and Planning
- Solicitor General or nominee
- Coast Guard Commander or nominee
- Water Taxi Association representative
- Edwin Snagg
- Augustine Douglas
- Jacques Daudin
- PS/Grenadine Affairs

10.4 Discussion

When searching for relevant documents to evaluate this indicator it was apparent that the process for management planning, establishing and enforcing rules and regulations is not as transparent as it should be since minutes to TCMP Board meetings prior to 2005 are not available from the TCMP office. As the headquarters for the marine park, these minutes should be readily accessible to the Park Manager for reference.

The current TCMP management structure appears to be fairly effective in its current operation with management following the mandate of the Marine Parks Act (1997). However, the drafting of a new Marine Parks Authority Bill (2005) may be indicative of the need for re-structuring the management authority.

The minutes of TCMP Board meetings for 2005 and 2006 have focused primarily on putting structures in place for formal operation of the Park. However, the decision-making process of the TCMP Board seems to be somewhat hampered with decisions on important issues for effective operation of the TCMP experiencing lengthy delays. This is exemplified by Board actions relating to mooring installation, boat purchasing and TCMP user fee structure.

The minutes of August 2005 recorded that approval for the installation of moorings had been given by the Port Authority, yet in March 2006 the Board still had to decide on the installation of dinghy moorings based on the recommendation of the company contracted to carry out the installation. Installation of moorings has been discussed in numerous Board meetings during the period 2005-2006 with expected completion dates continuously pushed back. Moorings have not been installed as yet.

Additionally, decisions regarding the purchase of a boat for the TCMP have been ongoing since April 2005 and up to now the boat has not yet been purchased. The production of an updated management plan for the TCMP has also been an ongoing Board activity and has been delayed by cancellation of meetings. With the planned full operation of the TCMP from June 2006, the development of this management plan should have been viewed by the TCMP Board as a

priority and there should have been a strict deadline for completion. In relation to meeting with stakeholders about proposed user fee implementation in the TCMP, recommendations to hold consultations with stakeholders were made in February 2005 but were never completed until March 2006. Reasons for these delays should have been noted in the minutes but have not. These delays may not be entirely the fault of the TCMP Board, but they may be seen as a weakness in the functionality and effectiveness of the Board.

Low attendance at TCMP Board meetings has been a concern for some Board members with the issue noted in the minutes of 8 March 2006. This appears to be attributed to a lack of reminders about meetings or the fact that members were not directly contacted to be reminded. Therefore adjustments to ways in which Board members are given reminders about upcoming meetings should be made.

The TCMP Board is supposed to meet in the second week of each month but Board minutes indicate otherwise. Generally, meetings, particularly for 2005 seem to have been haphazard with meetings held in February, April, August and September. For 2006, regular monthly meetings have been held, possibly due to the proposed formal operation of the Park scheduled for June. The TCMP Board should continue to adhere to scheduling frequent meetings in order to improve its functionality resulting in increased effectiveness of the TCMP.

Another view comes from Espeut (2006) who states that the Marine Parks Board established under the Marine Parks Act (1997) and functioning as the TCMP Board with the responsibility for daily management of the TCMP may be seen as a conflict of interest since this Board cannot objectively oversee its own management activities. Therefore another entity should be contracted as local managers of the TCMP.

11 EXISTENCE AND ADOPTION OF A MANAGEMENT PLAN (G3)

11.1 Background

A management plan outlines strategic directions for a MPA management programme and states the overall MPA goals and objectives to be achieved, the institutional structure of the management system and a portfolio of management measures (Bunce and Pomeroy 2003; Pomeroy *et al.* 2004). This indicator is a measure of the existence and adoption of such a document. Knowledge of the existence of management plans for various activities is important to determining the overall impacts of management on the MPA, particularly governance. The existence and adoption of a management plan informs managers that MPA management is guided by goals and objectives to achieve specific outcomes, that a basic strategy to achieve these goals and objectives exists and that the overall plan has a legal mandate for implementation (Bunce and Pomeroy 2003; Pomeroy *et al.* 2004).

Several proposed management plans and or sections for them have been developed for the TCMP over the past fifteen years (French Mission for Cooperation 1993, 1995; Anon. 1998; Cordice 1998; Cordice 2000; UNECLAC 2002; MEDO 2003; PIRL 2004; Dublin 2005) but none have been formally adopted. The management plan currently used to guide management of the TCMP is that of the informally adopted plan by Cordice (1998). This plan was revised in 2000 but has never been approved. Currently, a management plan is being drafted by the Board of the TCMP. It is uncertain when this plan would be finalised or become operational, but it may occur during the MPA-ME project. For the purpose of evaluating this indicator, the management

plan of Cordice (1998) and its revision (Cordice (2000)) were used since it is this plan that has been used to guide the daily management of the TCMP.

Information on this indicator is readily available since the management plan of August 1998 and its revision in July 2000 were evaluated by the Economic Commission of Latin America and the Caribbean (ECLAC) as part of an evaluation of the TCMP in 2002. The purpose of that evaluation was to identify the main factors responsible for the lack of implementation of management and to make recommendations for improvement. Additionally, an analysis of the existing management plans for the TCMP was recently conducted by The Nature Conservancy (Byrne 2005) in an attempt to evaluate the strengths and weaknesses of each plan and from this to define existing gaps and make recommendations for improvement. This comprehensive analysis is useful in that it synthesises the information in all the management plans. Both the UNECLAC (2002) evaluation and that of Byrne (2005) can be used as guides in drafting an updated management plan to reflect the current reality of the TCMP.

11.2 Methods

This indicator was evaluated by reviewing and providing a narrative on the informally adopted management plan of Cordice (1998; 2000). The section of the management plan for which Mr. Dublin (TCMP Manager) has the responsibility for drafting for the current update by the TCMP Board was also evaluated.

11.3 Results

The original management plan of 1998 and its revised version of 2000 currently exist in printed form and were obtained from the TCMP office. This plan has not been formally adopted but is currently being used to guide management decisions within the TCMP. The 1998 plan is divided into nine sections: introduction and mission statement; related legislation; boundaries and zones of the TCMP; buoy identification in the TCMP; specific rules; management structure; environmental monitoring and management policy; community and international relations; and financial organisation. The 2000 revision provides additional and updated information on boundaries and zones of the TCMP; and includes a section on general policy relating to garbage/waste management, land use and potential impact from terrestrial sources; structure and operation of the Marine Parks Board; management structure of marine parks; enforcement and financial revisions. Mr. Dublin's draft section (2005) follows a similar layout to that of Cordice (1998) being divided into an introduction; related legislation; boundaries and zones of the TCMP; buoy identification; staffing; environmental monitoring and management policy; data analysis and financial organisation.

The current management plan addresses goals of the TCMP in the form of a broad mission statement, "*to protect, conserve and improve the natural resources of the Tobago Cays*" whereas defined objectives have not been developed. Dublin's (2005) draft section of the plan does not state the mission statement and objectives of the TCMP.

Legislation relevant to the TCMP is listed in the 1998 plan under the 'Related legislation' section and rules of compliance are outlined in the 'Specific rules' section. These rules apply to vessels entering the TCMP, use of beaches, water sport activities and commercial activities in the TCMP. The revised version of the plan contains a section on general policy in which rules related to garbage and waste management, land use and potential impact from terrestrial sources,

and enforcement are detailed. Dublin's (2005) draft lists all the legislation that is listed in the 1998 plan.

The boundaries and zoning plan of the TCMP are addressed in the management plan. In the 1998 management plan, the official boundaries of the TCMP are defined as coordinates of latitude and longitude. The revision of 2000 states that the boundaries will be defined by chosen intersect points recorded as latitude and longitude coordinates and in Universal Transverse Mercator (UTM). Additionally, the revised plan specifies that certain zones must be quadrilateral in shape for easy identification of boundaries. Initially the zoning plan proposed for the TCMP in the 1998 management plan comprised two major zones, a multiple-use zone and a preservation zone however the revised plan proposes a three-tiered zoning system. This proposed system comprises an overarching marine management area composed of controlled zones and intra-zone control areas. Maps showing boundary demarcation or proposed zoning are not included in the plan.

The marine management area is the area of the TCMP defined by its boundaries. The controlled zones are sub-divided into a management zone for areas of high marine activity where there may already be substantial environmental damage; a preservation zone for areas of pristine natural beauty and/or containing important natural habitats; and a terrestrial management zone for land areas that are intricately linked to the marine ecosystem or marine activities. The proposed intra-control areas may constitute an entire controlled zone or defined boundaries within the preservation or management zones. These control areas are further divided into exclusion and restriction areas with a list for each respective area.

Dublin's (2005) draft addresses only the zoning system to be implemented in the TCMP and does not include a discussion of the boundaries for the TCMP. The zoning system is that defined in the Cordice (1998) plan comprising a multiple-use and preservation zone. Details relating to the boundaries of the preservation zone which are outlined in the 1998 plan are not provided in the draft of 2005. Enforcement is addressed in the revised management plan (Cordice 2000) where the establishment of a ticketing system for the TCMP and compliance requirements are briefly described. Any plan can become enforceable under the legal basis of the Marine Parks Act (1997) and the Marine Parks (Tobago Cays) Regulations (1998).

The management plan (Cordice 1998; 2000) does not have a component to address social and cultural studies. It does however recognise the close link between the TCMP and its users and proposes the formation of a group, the Friends of the Tobago Cays to maintain this link. Additionally, the plan makes provision for an internship program within the TCMP and youth education throughout St. Vincent and the Grenadines. Social and cultural studies are also not addressed in Dublin (2005).

In terms of a resource studies plan, the need for monitoring has been detailed in the management plans (Cordice 1998; 2000 and Dublin 2005). Monitoring is to include that of human usage (number of users of the park over time), geographical features (development and updating of an accurate map of the park) and biological and environmental resources (biological organisms in the park and physical factors that impact on these organisms) of the TCMP.

Both the 1998 management plan and its revision of 2000 contain sections addressing the administrative issues of staffing and budget for the TCMP. Staffing is addressed in the section on management structure in the 1998 plan with staff structure, comprising a park manager, head ranger, four rangers and management assistant. Accompanying job responsibilities are briefly described. The revised version of the plan adds three new positions to the staff structure, those of

a marine parks coordinator, park warden and educational officer/administrative assistant. Job responsibilities are also included in the revision. In Dublin's 2005 draft section, staff structure is slightly different to the 1998 plan and its 2000 revision with the staff complement comprising one park manager, one head ranger, 12 rangers, one management assistant, one marine biologist as well as additional personnel for the development and implementation of marine park policy, preparation of management plans, assessment of logistical requirements and activities such as research, monitoring, visitor use education and training. Job responsibilities are outlined in the draft.

The management plan does not have a business plan but sections on financial organisation and budgets for the periods August-December 1998 and July to December 2000 are included. In the Financial Organisation section of the 1998 plan, methods of sourcing finances by way of user fees and sponsorships are described. User fees are divided into yacht, day charter, diving, commercial worker and other fees. The fee types are defined and are quoted. The section of Dublin's (2005) draft does not include a business plan but provides an updated budget for 2006 inclusive of salaries, operational expenses and projected income. In this draft, fees have been revised with yacht fees applying to specific sized vessels per day, fees for dinghy and dive moorings. Additionally, vendor and water taxi licences have now been included. Other fees pertaining to underwater filming and barbeques have been excluded.

Training is only mentioned with respect to the Commander of the safety unit who will receive training in emergency first aid, open water rescue techniques and on-site emergencies. Training is listed in the budget and is allocated EC$15,000 in the start-up costs. Annual financial requirements for training are grouped together with those for travel and are allocated a total of EC$1,500. The need for training staff in monitoring is stated but is not specified. Training of other staff members of the TCMP is not included in the management plan (Cordice 1998). In the 2005 draft, training requirements for monitoring are also stated but is not specified. The budget of the draft plan separates training and international travel budget requirements with training now allotted EC$9,600 annually.

The 1998 management plan and its revision both address the budget for operation of the TCMP. Initial start-up costs for the TCMP were estimated at EC$155,000 but were amended in 2000 to EC$174,000. These initial costs include those for a safety vessel, park vessel, park dinghy; field, medical and office equipment; environmental and TCMP awareness publications; training; international travel; and uniforms and other expenses. Start-up costs in the draft for 2005 increased to EC$179,000.

The total annual estimated budget for 1998 was EC$426,000 and included costs for salaries, operational expenses (fuel, vessel maintenance, buoy maintenance, electricity, communications, office supplies, training and travel), depreciation (vessels and equipment), publications and other expenditures. The budget in Dublin's draft section of the new plan is similar to that of Cordice (1998) in terms of line items.

11.4 Discussion

The management plan of 1998 and its revision of 2000 should be more structured. Although there is an overarching mission statement, it does include the role of the TCMP in providing socio-economic benefits to communities adjacent to the park and does not reflect the communities' opinions on what the goals of the TCMP should be (Jackson and Associates 2004; Byrne 2005). This is an important aim of management and should be reflected in the revised

mission statement of the upgraded management plan. This is not currently included in Dublin's (2005) draft but may be due to the allocation of different sections of the plan to different TCMP Board members for drafting.

In the 1998 management plan and its revision, specific management objectives for the TCMP were not developed. This has been addressed in the *Management Plan for the Tobago Cays Project Proposal Development* (Anon. 1998). This document lists eleven specific objectives encompassing biological and socio-economic factors addressing issues such as protection and replenishment of marine resources that are in decline, threatened or vulnerable and that are of commercial and touristic value; alternative livelihoods; and reduction and management of human impacts on marine resources, which perhaps could be adapted to the plan currently being drafted.

The 1998 management plan lacks information on the resources in the TCMP and resource uses and does not systematically identify management issues and problems that need to be addressed by management actions. The uses of resources within the TCMP are not discussed but may be inferred from the 1998 management plan. The draft of the new management plan also lacks this information which is the critical basis for management planning. This is an essential part of the management plan since all threats should correspond directly to the resources and management actions should correspond directly to the threats (UNECLAC 2002; Byrne 2005). Byrne (2005) has recommended that a section on resources and resource uses in the TCMP be included and properly structured in revised management plans with the inclusion of information on yachting activity in the Tobago Cays and work being conducted by the Sustainable Grenadines Project.

The legislative authority for the functioning and management of the TCMP consists of a list of related legislation in the 1998 management plan and brief definition of each piece of legislation. However, a more thorough description of each Act, set of Regulations and Statutory Rules and Orders should be provided in the document. Additionally, copies of this legislation should be included in an Appendix in the plan for easy reference. The new management plan being drafted provides a good overview of environmental legislation relevant to resource conservation in St. Vincent and the Grenadines but a comprehensive list of this legislation as well as those directly relevant to the TCMP are not included.

Although boundaries and zoning of the TCMP are covered in the 1998 plan and its revision of 2000, certain issues need to be addressed. Boundaries are described well in the plan but there is no map included for reference. The zoning plan in the 1998 plan is quite basic and is fairly well described but again lacks a detailed map for visualisation. As stated in the ECLAC evaluation, the zoning plan proposed in the 2000 revision is complex. If this zoning system is to be implemented, zoning regulations may be difficult to enforce. Therefore, the zoning plan should be re-visited and a simple, transparent and enforceable system should be developed since zoning is a powerful management tool for marine protected areas. This seems to have been done in the current draft (Dublin 2005) in which the zoning system outlined seems to be that initially stipulated in the 1998 plan. Each type of zone should have clear objectives and a set of zone-specific regulations.

The draft of the new management plan needs to address these requirements. The zoning system designed in this plan is simple therefore zoning regulations should not be difficult to enforce. The management zones in the draft plan are not fully described but ought to be. A map has not been referenced for inclusion but should be.

Information on the management structure for the TCMP is included in the 1998 plan and that of the 2000 revision. However, more detailed information on the management authority is required. In the management plan currently being drafted by the TCMP Board, an organisational chart could perhaps be included in the description as well as reference to the relevant legislation guiding management authority. The function of and mechanism for electing the TCMP Board should be included to add transparency to the process. Staffing is fairly well covered and has been updated in Dublin's section of the draft but training requirements of staff should also be incorporated into the plan. Byrne (2005) suggested that training could be incorporated into a training plan which could be supplemental to the management plan and could be updated annually.

Monitoring is mentioned in some detail in the 1998 management plan however a monitoring plan and methods to be used for monitoring have not been developed but should be, based on the objectives for the TCMP. The monitoring proposed in the 1998 plan and Dublin's draft is mostly biological but should also include socio-economic monitoring. Methods for conducting the monitoring and specific indicators for evaluation should also be detailed. Monitoring is an important component of MPA management, providing information to the MPA manager which helps to determine the effectiveness of management actions. The results of monitoring will allow management to take an adaptive approach to management (Byrne 2005).

The 1998 management plan and its revision and that of the current draft have fairly good financial details relating to management and methods of financing for the TCMP, however, this information could be improved on and could be better structured with the development of a financial or business plan for the TCMP. Byrne (2005) recommends that the business plan for the TCMP should address long-term financial planning and the identification of new and sustainable revenue generating opportunities. Further recommendations include "willingness to pay" and carrying capacity studies. These will help in understanding how much each of the stakeholders is willing to pay and how the fee structure for the park should be developed, and will indicate how much use the park can sustain without suffering irreversible damage. The plan should also include details on accounts administration (Byrne 2005).

Dublin's (2005) section of the new management plan being drafted is an improvement on that of related sections of the 1998 plan but should be revised to take into consideration the development of a business plan for the TCMP. It should also be noted that there has been some delay in the drafting of the new management plan by the TCMP Board. Meetings to discuss the draft have continuously been postponed and some Board members had not produced their draft sections up to August 2006 (V. Dublin and M. Baptiste pers. comm.).

In searching for documents relevant to this indicator it was noted that the management plan drafted by Dublin was not titled. This is extremely important and should be addressed. All drafts should be appropriately titled to include authorship and dates of drafting. The exclusion of this information led initially to some problems regarding relevant plans and drafts.

12 AVAILABILITY AND ALLOCATION OF MPA ADMINISTRATIVE RESOURCES (G6)

12.1 Background

This indicator measures the capacity of the management team to administer and complete its various MPA activities over time, based on the degree of access to and level of enabling human,

equipment and financial resources. The operation of a MPA involves several activities including surveillance and enforcement, staff training, budget and finances, monitoring and evaluation, environmental education, planning and advisory committees. An understanding of staff and budget allocations required to undertake these activities is useful in order to understand the importance of these activities, estimating the number and frequency of certain activities and for estimating the level of compliance with rules and regulations (Bunce and Pomeroy 2003; Pomeroy *et al. 2004*). In general, understanding management resources is useful for determining the overall impacts of management on communities in the area of the MPA (Bunce and Pomeroy 2003).

Information on staffing for the TCMP inclusive of numbers of staff and job responsibilities is provided in the 1998 management plan and draft of 2005 (Dublin 2005) currently being developed by the TCMP Board. Additionally, some information on staffing and allocation of resources is provided in Espeut (2006). The current information provided in this evaluation builds on that of the management plans and the Espeut (2006) study.

12.2 Methods

Maria Pena conducted interviews in August 2006 with all TCMP staff in order to collect data on activities undertaken for TCMP management, environmental education, monitoring and evaluation, staff resources and training, budget and equipment available for management and record keeping. Mr. Vibert Dublin (TCMP Manager) and Ms. Meritha Baptiste (TCMP Secretary) were the key informants for these interviews. Meritha Baptiste provided additional information regarding staff and training requirements. When additional specific information such as level of education and training was required, individual staff members were interviewed. The following questions asked are those recommended by Pomeroy *et al.* (2004) in *How is your MPA doing?* :

- What is the number of MPA staff assigned to the programme?
- What is the number of non-MPA staff assigned to the programme?
- What level of training is provided to management and staff?
- What is the experience and education of each staff member?
- What is the budget for the activity?
- What equipment is available for the activity?
- What is the age and condition of equipment used?
- What is the level of equipment maintenance?
- What record keeping procedures are used?

12.3 Results

As outlined in the 1998 management plan and to some extent in the draft section by Dublin (2005) and reiterated by interviews with Mr. Vibert Dublin and Ms. Meritha Baptiste, the main TCMP activities undertaken are that of administration, enforcement and surveillance, and public education. In terms of enforcement, rangers patrol the TCMP six days per week from 8am to 4pm but due to current mechanical problems with the patrol boat, patrols are not as regular (four days per week). Public education about the TCMP is conducted mainly by Mr. Dublin and Ms. Baptiste but is infrequently undertaken. Promotional material in the form of brochures has been developed with a new brochure designed recently by Father Andrew Roache (Chairman, TCMP Board). Further advice on this brochure is to be received from Ms. Tecla Fontenard (OECS

Communications Specialist). OECS meetings to address issues affecting stakeholders have been held (see Section 13). Table 12.1 provides a list of TCMP staff, their MPA activities, educational background, former employment experience and years of experience in the TCMP.

Table 12.1 TCMP staff, educational background and experience

Position	Activity	Educational background	Past employment	Year of employment with TCMP
Park Manager Vibert Dublin	Park management; administration; public education	University: Business management, Administration and Biology	Account District Officer Customs Grammar school	
Rangers Hyron Joseph Albert Hanson Jason Alexander Samuel Debique Orlando Harvey (temporary)	Enforcement and surveillance	 Secondary school Secondary school Secondary school Secondary school College (USA); University of Grenada (current)	 Day charter company Tourism, forestry and Member of Board responsible for beach cleaning	 1998 1998 2003
Secretary Meritha Baptiste	Administration; public education	Secondary school	Secretary, accounts, customs, teacher	2005
Office Attendant Roslyn Delpeche	Administration	Primary school	Office attendant (Health Centre)	

In the TCMP, the following administrative resources were identified

Boating equipment

1 boat owned by the TCMP, approximately 20ft with 40hp Yamaha outboard engine. Not adequately equipped for the enforcement and surveillance but equipped with:

- life jackets: need to be upgraded
- GPS: need to be upgraded
- no binoculars

TCMP boat is old (purchased 1995) and needs to be replaced

2 other boats are available from Departments of Fisheries and Forestry but not suited to patrolling; neither boat properly outfitted for patrols

Dive equipment

- wet suits (2)
- snorkel and fins (6 pairs)
- masks (6)
- no SCUBA gear (usually rented)

Equipment is new (purchased March 2005) and in good condition

Office equipment

- computer
- printer
- telephone

Equipment is new and in good condition having been purchased in February 2005. A new printer was bought in July 2006

Administrative resources

TCMP Manager, Vibert Dublin, and Chief Ranger, Hyron Joseph, noted that the TCMP boat is not properly outfitted for patrolling. The size of the boat prevents efficient manoeuvring among the yachts in the TCMP. The rangers suggested that a small 15ft dinghy would be small enough

to prevent reef damage and to efficiently patrol the TCMP. Mr. Dublin and all the rangers stated that the boat should have a canopy, proper seating and fenders along the side. Currently the boat is equipped with life jackets and flares but these must be upgraded.

Training

Staff training is not frequent but TCMP staff have participated in short training courses (2 weeks in duration) or attachments. Mr. Dublin participated in a training course for developing MPAs held in Miami. Both Mr. Dublin and Ms. Baptiste have attended management training courses. Mr. Joseph participated in a training session in St. Lucia for instruction on the requirements for designation of a MPA as a World Heritage Site. All TCMP Rangers have been trained in SCUBA diving and life-saving techniques. The Chief Ranger is only ranger that has not taken the final SCUBA exam. Specifically for the MPA-ME project, all rangers have been trained in Reef Check and water quality monitoring techniques. All rangers are satisfied with the level of training provided for Reef Check monitoring and are keen for additional information. The rangers mentioned that training in water quality monitoring was brief and expired test kits were used for demonstrations. They have requested further training in water quality monitoring and would eventually like to conduct the analyses themselves. Mr. Dublin stated that Ms. Baptiste required upgrading in her current administrative training.

When interviewed, Ms. Baptiste stated that in general she would like to see increased training opportunities for staff. For herself, she would like further administrative training and in her opinion, the rangers need MPA training and internships with MPAs in the region.

In interviews with the rangers, basic level training in languages, particularly French, was requested to improve communication with visitors in their daily patrols. Rangers have also requested additional training in first aid, disaster management and environmental boating practices. Two of the rangers have been trained in GPS. Mr. Debique and Mr. Hanson have not been trained.

Staff

Mr. Dublin noted that more rangers need to be added to the TCMP staff complement.

Budget

A Government subvention of EC$150,000 annually is currently provided to TCMP with disbursements of EC$35,000 every quarter. Additionally, the OECS is to provide funds to the TCMP through the OECS Protected Areas and Associated Livelihoods Project (OPAAL) but this is subject to the development of a management plan for the TCMP.

Although a programme of MPA activities is not explicitly defined in the 1998 management plan and the current plan being drafted, from the budget it can be deduced that annually enforcement has been allocated EC$70,000 (fuel, engine and buoy maintenance); education/public awareness has been allocated EC$6,000 and EC$9,600 has been assigned to staff training activities. Additionally, salaries to support TCMP staff (park manager, chief ranger, three rangers and secretary) to conduct these activities account for approximately EC$125,000. This is in contrast to allocations in the 1998 management plan in which approximately EC$140,000 was allocated to enforcement (fuel, engine and buoy maintenance and vessel insurance); EC$24,000 to education and public awareness and EC$18,000 to training (combined expenses for training and travel). Salaries to support staff in these activities was estimated at approximately EC$94,000.

12.4 Discussion

Currently, the TCMP lacks capacity and human resources to adequately and effectively manage the TCMP. The staff complement comprises six individuals – one park manager, four rangers and a secretary. As outlined in the management plan currently being drafted by the TCMP Board (Dublin 2005) more rangers are needed to maintain a strong presence and regular surveillance in the 14km^2 TCMP. The TCMP also lacks a marine biologist even though budget allocations for one have been made. Since the most of the TCMP is marine, not terrestrial, an individual skilled in a combination of fisheries biology and management, coral reef ecology and aquatic chemistry would be an asset to the park and its management. Additionally, an individual trained in forestry management, wetland science and terrestrial ecology may also be an asset to the current staffing of the TCMP since the park also has a terrestrial component.

The boat for patrolling needs immediate maintenance and should be regularly maintained to ensure regular surveillance of the park. Efforts to purchase a new and appropriately sized boat are being made and should be priority for effective enforcement and surveillance activities within the park. Essential safety gear for outfitting the boat should be regularly upgraded and needs immediate attention since life jackets and the GPS are old and need to be upgraded. Flares, binoculars and a medical kit for the boat also should be purchased. Due to an old boat and poor maintenance, patrols in the TCMP have been substantially reduced which will lead to increased infringement of park regulations. The park manager and rangers were unable to state when the boat was last serviced. This is indicative of poor record keeping within the TCMP and also needs to be addressed. Each time the boat is serviced, the date of maintenance, type of maintenance and parts changed should be fully recorded.

Staff training should be ongoing. Currently, rangers lack the appropriate communication skills to deal with visitors to the park and have requested basic language classes in French. This is a very good suggestion and should be investigated. Perhaps a two-hour evening class twice a week for about six months would better equip rangers with the skills they need to make visitors aware of park regulations. Rangers have also requested further training in water quality monitoring and analysis. This is essential given the poor water quality data obtained for this project (see Section 5). A one-week workshop in basic water quality monitoring and analysis could be provided possibly by CERMES. This capacity-building will enable continuous monitoring of water quality in the TCMP and sound management actions. Internships for rangers in MPAs in the region such the Soufriere Marine Management Area (SMMA) in St. Lucia and Scotts Head Marine Reserve in Dominica should also be explored to demonstrate enforcement techniques to rangers which may be adapted to the TCMP. Administrative training for Ms. Baptiste (née Small) should also be explored since she is the main person involved in managing the park's accounting, minute taking and correspondence. As recommended by Espeut (2006) staff would benefit from extensive training in environmental laws of St. Vincent and the Grenadines, especially those regulations pertaining to the TCMP; methods in taking statements from witnesses; ways to caution accused persons; methods of preserving physical evidence; training in giving evidence in court, conflict resolution and environmental education techniques.

At present the budget for staff training, enforcement, education and salaries in support of these activities amounts to approximately EC$200,000, substantially more than the subvention provided by government but less than that allocated in the 1998 budget. The budget for

enforcement and training has been almost halved in the 2006 budget whilst education has been reduced to one third that in the 1998 budget. However, in terms of importance of TCMP activity, the order in the 1998 management plan and that of the one currently being drafted is the same – enforcement, education and training. It is evident that the TCMP is under financed since the estimated budget for enforcement, education and training (EC$200,000) is greater than that of the government subvention. Unpaid salaries for extended periods of time have been an issue in the TCMP and is recurrent. The TCMP Board meeting minutes of April 2006 indicate that salaries had been unpaid for several months prior to the meeting. Additionally, during the visit for this evaluation (2-3 August 2006) staff salaries had also not been paid for months. This matter needs to be immediately addressed since staff morale and effective management can be significantly impaired as a result. Additionally, financing for the TCMP's operation needs to be sought. User fees need to be implemented immediately to satisfy this demand. With the numerous yachts and other visitors visiting the TCMP daily and weekly, it would be possible for the TCMP to fund its recurrent costs without external funding.

13 DEGREE OF INTERACTION BETWEEN MANAGERS AND STAKEHOLDERS (G9)

13.1 Background

Degree of interaction between managers and stakeholders is a measure of the number of regularly scheduled meetings between MPA managers and staff and stakeholders to discuss compliance with MPA management plans. Discussion, input and participation from stakeholders with MPA staff about compliance with MPA management plans will lead to greater compliance and increased success of the MPA (Pomeroy *et al.* 2004). This indicator has not been previously assessed for the TCMP. Therefore the narrative provided will give baseline information for additional monitoring.

13.2 Methods

Meritha Baptiste (Secretary) and Vibert Dublin (TCMP Manager) were interviewed to determine the types of formal and informal interactions between the TCMP and its stakeholders, reasons for these interactions, number and location of meetings. Additionally, Minutes on consultations obtained from Ms. Baptiste were reviewed to provide relevant information on this indicator.

13.3 Results

In general, meetings with stakeholders are not regularly scheduled. Meetings are held when the need arises. The TCMP office does not have records of meetings held prior to 2005 but these minutes may be on the mainland. Stakeholders are informed of meetings by letters or word of mouth and are reminded by phone. Recently held meetings, reasons for the meetings and their location are provided in Table 13.1. For these meetings, no records of invitations, attendance or absence were taken. Other than for the consultations, Minutes have apparently not been recorded for any of the other meetings held with stakeholders.

Table 13.1 Interactions between TCMP and stakeholders

Interaction, date and location	Reason for interaction	Outcome
OECS: Sarah George and Tecla Fontenard February 2005 Union Island	To inform stakeholders (t-shirt vendors, water taxi operators, Tourist Board and resource users) of OECS funding and activities for the TCMP.	• Information sharing
Consultations September 2005 St. Vincent Bequia Union Island	To inform stakeholders (water taxi operators, charter and dive operators and general public) about proposed fee structure for TCMP and to solicit views about the fee structure in order to make adjustments where necessary	• Poor attendance in St. Vincent due in part to late invitations • Use of moorings criticised since other studies suggested that yachts could moor in the sandy lagoon • A call for different rates for yachts from the Caribbean and St. Vincent and the Grenadines and those for outside the region • Recommendation that all charter companies and users be informed of the fee system at least three months prior to implementation • Fee suggestions made • Recommendation to keep yachts of a certain size out of the TCMP • The chairman informed those in attendance that moorings would make the park more organized • Recommendation for cruise ship passengers to be ferried to the TCMP by water taxis • Recommendation for a willingness to pay study on those persons using the TCMP • Water taxi operators asked if they would have to pay both vending and water taxi fees • Suggestion for annual fees for water taxi operators • Objection raised to the EC$ 30 fee for yachts. Suggestion to charge US$ 5 per person due to other fees that must be paid • Chairman clarified that fees for vending and water taxis are separate and that a per person tax for yachts could not be charged since it would be seen as a head tax which could cause potential problems • Objection to fees for visitors since it was felt that tourists were already being charged a lot and tourism arrivals were down • Accused the TCMP group of not coming to consult but rather to inform the users about fees • Chairman recommended that vendors form an association
Peter Espeut presentation April 2006 Union Island	To inform stakeholders of activities and present conditions in the Tobago Cays.	• Information sharing

13.4 Discussion

Given the limited amount of data available for evaluating this indicator, the preliminary results indicate that there is a scarcity of interactions between TCMP staff and stakeholders although there has been a concerted effort to involve stakeholders in management decisions. The active

participation of stakeholders in TCMP decision-making can improve the success of management activities. If resources users are involved in TCMP management decisions and feel ownership over the process they will be more likely to support MPA management activities and adhere to regulations. This will in turn lead to greater success of the MPA.

There needs to be an enhanced effort on the part of the TCMP office to record minutes for all meetings and presentations held with stakeholders. Stakeholder attendance and absence also needs to be recorded. This will provide information on those users who regularly participate in these interactions and will also allow the TCMP office to identify those users who need to be reached by other means.

14 LEVEL OF STAKEHOLDER PARTICIPATION AND SATISFACTION IN MANAGEMENT PROCESSES AND ACTIVITIES (G12)

14.1 Background

This indicator is a measure of the amount of active involvement of people in making MPA management decisions or involvement in management activities and of their satisfaction with their level of participation including whether their views and concerns are being heard and considered by MPA managers (Pomeroy *et al.* 2004).

The active participation of stakeholders in the planning and management of a MPA can improve the success of the MPA. Furthermore, stakeholders are likely to feel ownership of and are more likely to support the MPA if they feel their views and concerns are being considered in the process. If stakeholders are not satisfied with the management process and activities, they are unlikely to support the MPA. Therefore stakeholders can be potential partners or threats in managing the MPA. Stakeholder level of satisfaction with participation in management processes of the MPA is an indication of whether the MPA has met its objective in educating stakeholders about the benefits of the MPA (Pomeroy *et al.* 2004).

Although water taxi, dive and charter operators, as well as the general public, have been involved in consultations regarding proposed TCMP fees and have been invited to meetings and presentations relevant to the TCMP and its management (see Section 13), the level of this participation and stakeholder satisfaction in TCMP management has never been evaluated. This project therefore provides baseline data on which further monitoring can be developed.

14.2 Methods

Four socio-economic indicators (S2, S3, S7 and S9) and one governance indicator (G12) were addressed by a questionnaire administered in Union Island (Clifton and Ashton) and Mayreau. Patrick McConney (CERMES), Robert Pomeroy (University of Connecticut) and Alexcia Cooke (Sustainable Grenadines Project) assisted with the questionnaire design and training. Seventy TCMP users (water taxi operators, dive shop owners and coastal cruisers) and the general public were interviewed from a convenience sample to gain information on these indicators. The interview team comprising Ann Harvey (team leader), Nicole Delpeche and Jeremiah Jones, conducted interviews at the three locations from March-April 2006.

This indicator was examined by three questions addressing stakeholder participation and satisfaction in management of the TCMP. The data from the questionnaires were coded and entered in a Microsoft Excel spreadsheet and was analysed by Patrick McConney and Maria Pena (CERMES) using the Statistical Package for Social Sciences (SPSS) version 11. Meetings

to obtain feedback on the interviewers' experiences with the survey process and lessons learnt, and to provide feedback on data analysis, were held in May 2006 in Union Island.

14.3 Results

In general the majority of people surveyed (77%) consider themselves to be stakeholders in TCMP management but only 41% of these had participated in any process or activity related to management. 41% of those interviewed indicated their satisfaction with the management of the TCMP, 30% were neither satisfied or dissatisfied and 28% were dissatisfied. Reasons for satisfaction with TCMP management included good management, informed TCMP employees, improvement in marine resources and enforcement of park regulations. The main reason for respondents neither being satisfied or dissatisfied with management of the TCMP was because they lacked information on TCMP management. Other reasons included inadequate resources for rangers to do their job, inactive management, inequity as local livelihoods are threatened by management, no stakeholder participation in management and no audit of the current management. Inadequate resources, capacity and organisation was the main reason stakeholders provided for their dissatisfaction with TCMP management. Respondents also expressed that their dissatisfaction with management was due to TCMP management taking away the rights of locals, lack of stakeholder participation in the management process, a confusing management process and lack of government support for management of the TCMP.

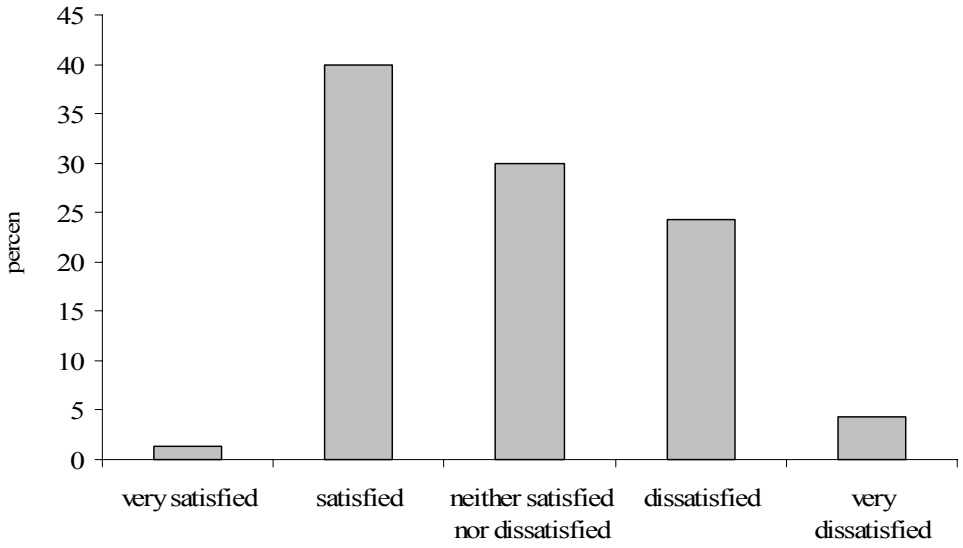


Figure 14.1 Stakeholder satisfaction with TCMP management

Generally, respondents were willing to answer these questions regarding stakeholder participation and satisfaction in the management process and activities. However, one interviewer indicated that some respondents were reluctant to answer the questions even with guaranteed anonymity.

14.4 Discussion

The results indicate that the overwhelming majority of resource users in Union Island and Mayreau consider themselves to be stakeholders in the TCMP management, however only a

minority have actively participated in a process or activity related to the management of the TCMP. Although a fairly large proportion of respondents were satisfied with the management of the TCMP, cumulatively, the majority (58%) were either dissatisfied or neither satisfied nor dissatisfied with management due to a lack of information about management processes and activities and inadequate management resources, capacity and organisation.

TCMP stakeholders in Union Island and Mayreau must be encouraged to participate in management of the park by the TCMP office. They need to be made aware of the fact that they have a key role to play in the management of marine resources in the TCMP and are necessary as partners in the management of the TCMP. The low participation observed may be due to a lack of communication and inadequacy on the part of park management in informing the stakeholders on management issues. This must be addressed by TCMP management so that management can be inclusive and successful.

In order to increase the level of stakeholder participation in resource management in the park, the TCMP manager and staff must find other effective methods of informing resource users in Union Island and Mayreau and continually keeping them involved in the park management process and activities. Participation may be encouraged through regular community meetings and community outreach programmes to raise public awareness and enhance participation. Generally, meetings with stakeholders have not been regularly scheduled (see Section 13). This is a weakness in the management process of the TCMP which needs to be remedied since at present, the TCMP has not been able to effectively educate stakeholders about the benefit of the park. This lack of meetings however may have been due to the fact that the TCMP has not been fully operational but should not be an issue when the park is in full operation.

15 G14 CLEARLY DEFINED ENFORCEMENT PROCEDURES

15.1 Background

Clearly defined enforcement procedures is a measure of the existence and description of guidelines and procedures developed for staff charged with enforcement responsibilities and how they are to act depending on the type of offence encountered. Enforcement is a crucial step in the MPA management system. Clearly defined enforcement procedures allow MPA enforcement staff to more effectively undertake their duties and resource users to be aware of consequences of non-compliance (Pomeroy *et al.* 2004).

15.2 Methods

The management plan currently being used to guide management of the TCMP was examined to identify the section dealing with monitoring, surveillance and control and enforcement. Dublin's (2005) section of the management plan now being prepared by the TCMP Board was also examined for comparison. The TCMP manager and rangers were interviewed to determine, among other things, the enforcement guidelines (formal and informal), to describe the guidelines and procedures, to determine if they are reviewed and updated periodically and if staff are trained in the guidelines and procedures, number of reported violations, number of successful prosecutions, number of attempted prosecutions and accessibility and availability of enforcement guidelines.

15.3 Results

The informally adopted management plan by Cordice (1998) currently being used to guide management in the TCMP has a section on specific rules to be adhered to in the TCMP. These

rules are divided into rules for vessels entering the marine park, use of beach in the TCMP, watersports in the TCMP and commercial activities in the TCMP. The 2000 revision of this plan includes additional policy on garbage and waste management and land use. The draft 2005 plan currently being developed does not have a section on specific rules but this may be due to the fact that the draft is not yet completed. Both plans lack sections specifically outlining a monitoring, surveillance and enforcement programme.

There appears to be no formal document on enforcement guidelines and procedures for the TCMP but an interview with the Park Manager revealed that enforcement guidelines and procedures exist. Rangers are instructed by the Park Manager to patrol the Tobago Cays and surrounding areas. On a daily basis, rangers enforce speed and anchoring regulations, undertake general monitoring of the area and educate users about park regulations. TCMP brochures are currently being re-designed for distribution by the TCMP office and rangers. Rangers warn non-compliers in the TCMP about illegal actions within the TCMP but do not have the power of arrest (preventative law enforcement), instead the rangers must solicit the assistance of the Coast Guard and Special Services Unit (branch of the Police) when violators persist. With the help of these units, rangers may confiscate equipment and bring it to Union Island. Alternatively, violators may be brought to the TCMP office before the Park Manager who as a Justice of the Peace has the power of arrest. Any breaches in regulations are brought before the court.

There have been numerous infringements of park regulations with most of the problems arising during the high tourist season (November to March). During this period there may be as many as 40-60 violations per week whereas during the low season (April-October) there are between 1-10 per week. Anchoring, fishing in the closed season, spearfishing and violation of the speed limit in the TCMP are the most common offences in the TCMP. Other problems arise with snorkellers on the reefs. Arrests have been made and violators have been taken to court however no records of these violations have been kept by the TCMP. The brochure currently being re-designed contains general information on the TCMP, its location and park guidelines.

The enforcement guidelines have not been reviewed or updated since 1998.

15.4 Discussion

Clearly defined enforcement guidelines and procedures will improve monitoring, surveillance and enforcement of the MPA thus benefiting TCMP management. They will also allow enforcement staff to act professionally and will reduce the possibility of legal action against the TCMP by violators. Due to the absence of records on violations, it is impossible to determine whether enforcement guidelines and procedures are implemented in a fair and equitable manner. The TCMP needs to start keeping official records of park regulations to increase the legality and likelihood of prosecutions.

Both the park manager and the rangers have noted that prosecuting offenders is a challenge since the court in Union Island only meets every three months. Therefore failed prosecutions have occurred due to the inadequate mechanism for prosecuting offenders and not due to failure in the enforcement procedure. Since serious action against offenders is never taken, rangers are now ignored and are finding their job more challenging. They are calling for the power of arrest. One notable violation was that of a person fishing illegally in the TCMP. The person was to be prosecuted but the case was dismissed in 2005. In order to reduce the number of infringements encountered in the park, users need to be educated through preventative law enforcement about park regulations. The French Mission for Cooperation (1995) noted that a programme to raise

educational awareness of locals had been conducted however it does not seem as if this is an ongoing activity. This needs to be undertaken by the rangers. Additionally, tourists should be educated by brochures of park regulations and restrictions. The brochure is produced in English but since the majority of visitors to the Tobago Cays are French and German, perhaps the brochure could also be printed in these languages.

Since a formal document on enforcement guidelines and procedures has not been produced this should be done to provide transparency of park operation. Production of a staff handbook was recommended in the 2000 revision of the 1998 management plan for the TCMP in which details of the responsibilities of each park position, training information, procedures connected with park operation and other information could be included.

16 ENFORCEMENT COVERAGE (G15)

16.1 Background

Enforcement coverage is a measure of the number of surveillance and monitoring patrols undertaken by MPA staff during a given time period and in a specified area. This information is used to review the consistency of patrol activities and is a necessary prerequisite for assessing trends in violations or non-compliance since the latter is generally measured as the number of violations per patrol effort. It is also useful in determining how well the MPA management is meeting the goal of surveillance, monitoring and enforcement (Pomeroy *et al.* 2004).

16.2 Methods

The Park Manager and Rangers were interviewed to determine the patrol schedule, variation in temporal and spatial pattern of patrols and types of infractions. Rangers were also asked to map the patrol routes and identify area of patrol coverage. The management plan (Cordice 1998; 2000) was also examined for a patrol schedule and procedures.

16.3 Results

The 1998 management plan, its revision of 2000, and Dublin's section of the draft plan of 2005 do not outline procedures for enforcement coverage. The TCMP has no patrol records although a patrol record form with sections regarding departure time, duties performed, boat counts, arrival time and infringements exists and should be completed as part of the procedure. In the event of an infringement, rangers are required to write a formal report to the TCMP Manager.

Rangers patrol the TCMP daily, six days per week between the hours of 8:00 or 9:00 am to 4:00 or 6:00 pm. This schedule however can vary. Patrols are expected to increase to seven days per week once the TCMP is in full operation. Rangers used to adhere to a temporal pattern of patrol but due to information regarding breaches in regulations, rangers have now varied their patrol schedule. During the latter part of 2005, illegal activities taking place in the park at night prompted the Chief Ranger to conduct surprise patrols. There is variation in the spatial pattern of patrol. Hyron Joseph (Chief Ranger) was asked to draw the patrol routes taken by rangers. Two different routes were mapped. The area covered is that of the Tobago Cays and Mayreau and sometimes the area of the Mayreau wreck, encompassing 14km^2.

Infringements typically include spearfishing, lobster harvesting in the closed season, anchoring in restricted areas, speeding, tree cutting and grazing by goats and sheep. Spearfishing, lobster harvesting and anchoring in restricted areas are offences common to locals and yacht visitors. The highest percentage of infringements typically occurs during the high tourist season

(November to March) when there can be as many as 40-60 infringements per week. During the low season (April to October) rangers estimate that there are between 1-10 infringements per week.

16.4 Discussion

Rangers typically dedicate approximately 216 man hours to patrolling per month. This is good coverage but will be improved when the park is in full operation and patrols are extended to seven days per week. Surprise night patrols are a good means of improving enforcement and compliance within the park and have been attempted by Rangers. However, this effort was breached when persons undertaking illegal activities in the TCMP had been forewarned of night patrols. This was an issue raised at TCMP Board meetings in August 2005 and in February and March 2006 in which the TCMP Manager was instructed to document the occurrence for legal advice to be sought. The Board advised the TCMP Manager to provide the Chief Ranger with short notice of planned night patrols in an effort to prevent breaches in security.

Since patrol logbooks and charts have not been kept by the TCMP rangers types of action taken could not be ranked and identification of trends and patterns in these actions taken during each patrol was impossible. Therefore the evaluation of this indicator is incomplete. One infringement which has been addressed by the TCMP Board is that of speeding in the TCMP. A speed reduction campaign has been planned to specifically target yachts which are the main offenders. Education before prosecution was the way in which the Board felt this issue could be approached.

The TCMP must ensure that all patrols are logged with the appropriate information. This will provide baseline data for observing trends in violations and will provide information on if TCMP management is meeting the goal of surveillance, monitoring and enforcement. This is crucial to the efficient operation of the TCMP.

17 EVALUATION SUMMARY

The evaluation of management effectiveness at the TCMP has been largely a learning process. Although primarily external in nature, being initiated by CERMES, this project has tried to encourage participatory research by training TCMP and SVG Fisheries Division staff, along with civil society stakeholders, in evaluation methods. A total of 11 persons have been trained in the techniques necessary for conducting the evaluation of various bio-physical, socio-economic and governance indicators. Prior to the project seven people, six TCMP staff and one SVG Fisheries Division staff member, were trained in Reef Check survey methods, data collection, data entry and analysis. Five of these, as well as one additional SVG Fisheries Division staff member, were also trained in standard water collecting methods for water quality monitoring. Three community members were trained or refreshed in interview techniques for questionnaire surveys.

This evaluation of MPA management effectiveness in the TCMP did not start in the typical and recommended fashion. Instead of working from an agreed management or strategic plan the inception workshop participants devised their own MPA management objectives from a mix of sources, including legislation, a series of documents and their perceptions of what was being done and what should be done. The objectives were thus neither skilfully crafted nor ones against which management could be fairly evaluated upon as being the driving forces of decisions and action. Nevertheless, participants felt that the exercise would be informative and worthwhile. In Table 17.1 are the objectives devised, the indicators selected and their evaluation results. These are discussed below.

Table 17.1 Summary of indicator results in relation to MPA objectives

Indicators and objectives	Results summary
B1 Focal species abundance • Protect the biodiversity of the park • To conserve the marine resources	Varying conditions of shallow reef health and generally low hard coral cover in the TCMP. Biodiversity and focal species appear under threat, but more data are required. Reef Check should be continued along with monitoring of key species and coral bleaching. TCMP has trained human resources for Reef Check, but additional training needed.
B8 Water quality • Protect the biodiversity of the park • To conserve the marine resources	Water quality parameters may be within accepted standards (e.g. Blue Flag) but difficulties in the project monitoring programme invalidated these results. A new programme based on both ecosystem and public health should be established after better procedures are put in place. Capacity and communication may be constraints.
S2 Local values and beliefs about marine resources • Working with other relevant agencies using the media to promote the marine park as a tourist resort and attraction • Public education	They recognise the need for managing the resources and have some confidence that the TCMP office can do the job. They do not see tourists as more important drivers for managing the TCMP than the local communities.
S3 Level of understanding of human impacts on resources • Working with other relevant agencies using the media to promote the marine park as a tourist resort and attraction • Public education	Most people understand that human activities can have an impact on the TCMP, and that this is often negative. Respondents said that declining conditions of marine resources in the TCMP were due mainly to overfishing.
S7 Material style of life • To protect sustainable livelihoods	Low home and land ownership in TCMP communities but a fairly high material style of life was found. The majority of households live in substantial structures with modern conveniences. The data were unsuitable for rigorously comparing the lifestyles of those who used the TCMP with those who did not but they seem similar.
S9 Household income distribution by source • To protect sustainable livelihoods	Mean household size in TCMP communities is of two persons. Twenty different occupations were the main types of work. Of these, the most important in terms of numbers involved are water taxiing, business and sales. There were 15 jobs of high importance for household income with the most important being business, water taxiing and teaching. Many people are multi-occupational.
G2 Existence of decision-making and management body • Ensuring that the park is managed along commercial lines • All other objectives	The management structure for the TCMP is outlined in the Marine Parks Act (1997) and Marine Parks (Tobago Cays) Regulations (1998). The TCMP Board (established 1998) is responsible for park management. No management along commercial lines (e.g. user fees, commercial leases, merchandising) was prominent.
G3 Existence and adoption of a management plan • Ensuring that the park is managed along commercial lines • All other objectives	The informally adopted management plan of Cordice (1998 updated in 2000) is used to guide daily management of the TCMP. Specific management objectives for the TCMP have not been developed. Documented information on resources and resource uses is limited. The section on legislative authority for the TCMP lacks detail. There is no map outlining boundaries and zones in the management plan. No financial, training, monitoring and administrative plans have been developed. The management plan being drafted by the Board may be an improvement over 1998

Indicators and objectives	Results summary
	and 2000 plans but there have been delays in drafting.
G6 Availability and allocation of MPA resources • All objectives	The TCMP has three main activities: administration, enforcement and surveillance, and education. Human resources include one Park Manager, four Rangers , one Secretary and one Office Attendant. Operational resources are scarce but include one boat (old), dive gear (new) and office equipment (new). Enforcement and education have the least allocation of resources, but amounts are not clear.
G9 Degree of interaction between managers and stakeholders • Public awareness and stakeholder participation	There is some degree of interaction between management and stakeholders but this needs improving. Meetings with stakeholders are not regularly scheduled but are held when the need arises. No records of meetings held prior to 2005 are available in the TCMP office.
G12 Level of stakeholder participation and satisfaction in management process and activities • Public awareness and stakeholder participation	People consider themselves to be stakeholders in TCMP management but there has been low participation in and low satisfaction with some aspects of management. The process of managing the TCMP has become highly politicized, and this may detract from participation.
G14 Clearly defined enforcement procedures • All objectives	No apparent formal document on enforcement guidelines and procedures for the TCMP. Rangers enforce speed and anchoring regulations, undertake general monitoring of the area and educate users about park regulations.
G15 Enforcement coverage • All objectives	Procedures for noting enforcement coverage not outlined in management plan, its revision of 2000 and the draft plan of 2005. Coverage extends over the 14km^2 area of the MPA. No patrol records are kept. Patrols are varied in time and space. Main infringements: spearfishing, out-of-season lobster harvesting, anchoring in restricted areas, speeding.

In general the indicator evaluations have been successful in providing baseline data for the TCMP since much of the information for management decision-making is lacking. However, we note the problem of shifting baselines and suggest that additional retrospective bio-physical and socio-economic information should be assembled where possible. The TCMP management arrangements are new and institutional memory is recent, incomplete and severely fragmented.

Protecting biodiversity and conserving marine resources are laudable objectives. Due to limited quantitative data on focal species abundance and coral reef health in the TCMP, and no time series, it is not possible to clearly determine whether the TCMP has resulted in improvements in focal species or reef condition. However, the available data hint that improvement due to the TCMP is unlikely, and it is more likely that resources have continued to deteriorate due to the limited management interventions. The Reef Check monitoring provided initial data and perhaps an impetus for continued monitoring. A sustained monitoring programme will be needed to measure bio-physical changes and therefore should be implemented with surveys done at least twice a year, in the low and high tourist seasons, and preferably more often.

The marine water quality monitoring implemented during this project is the first for the TCMP and in general for St. Vincent and the Grenadines. Therefore it had the potential to provide baseline data which could be compared to future data from continued monitoring. It would not have been able to provide information on whether the establishment and management of the TCMP would have resulted in water quality improvement, such as via a reduction in human activities that pollute the marine environment. The results obtained showed that water quality

within the TCMP may generally be good since various parameters measured fall within accepted Blue Flag and GOB water quality standards. However, due to problems with data collection and analysis, it is recommended that all of these results be discarded. After appropriate re-training and procedures improvement, a monitoring programme should be implemented throughout the year to encompass both the high and low tourist seasons.

People in Union Island and Mayreau recognise that marine resources in the TCMP have declined over the years and realise that management of these resources is necessary in order to improve their condition. As such, management efforts should be enhanced and supported by the existing beliefs and values. Public education, another TCMP objective, will reinforce these. However, the TCMP does have to improve the communities' confidence in its ability to properly manage the resources of the MPA since currently there is only reasonable confidence in TCMP management.

Promoting the marine park as a tourist resort and attraction is not actively being done, and need not be a high priority objective since the TCMP is reputed to be attracting many more tourists (particularly on yachts) than is advisable, at least in the high season. Respondents suggest that tourists should not be the main drivers of TCMP management and the implication is that local community groups and businesses should be among the relevant agencies to work with. The selected indicators did not address this objective as directly as they could have.

Community perceptions indicate several human activities are damaging the TCMP with garbage being the main activity thought to be most affecting the resources. The effects of the majority of these activities on the resources of the TCMP have not yet been scientifically studied and are priority to be addressed by TCMP management.

Communities around the TCMP have a relatively high material life style. However since the data obtained in this project are baseline, they cannot be currently used to determine the economic impact of the TCMP on the communities. Similar types of data combined with census data can however be used to measure change in the economic status and relative wealth of people in these communities over time and to perhaps determine whether the TCMP and associated management regulations are impacting on the economic well-being of the communities. Confounding effects will have to be addressed in such analyses, and perceptions of change would also be important.

The information obtained from the evaluation of 'household income distribution by source' is the first to target a cross-section of people in the settlements near the TCMP and not specific target groups such as fishers or water taxi operators alone. Since the data are preliminary, rough and not necessarily representative, it is impossible at this time to identify if there have been any shifts in the sources of income with the establishment and operation of the TCMP. However, note that the TCMP has not been fully operational. Continued monitoring should provide this information. The results, however, do indicate that there is a strong dependence on marine resources and the marine environment for livelihoods since a fairly large percentage of households engage in water taxiing, fishing and other marine occupations. Water taxiing in particular was noted as the second largest occupation in terms of an occupation of high importance to household income. Therefore management efforts will have to take these resource users into consideration should it be necessary to diversify occupational and household structures within TCMP communities. If the objective is for livelihoods to be sustainable, TCMP management will need to be quite innovative and effective, working closely with the many people who depend on the park area.

The TCMP Boards appear to have been fairly ineffective in their operation if all of the objectives are considered. But remember that the Boards cannot fairly be evaluated via these hindsight

objectives. Primarily, there have been some lengthy delays in making decisions regarding the operation of the TCMP, including the finalisation and operationalisation of a management plan. Decisions need to be timely and perhaps could be better made if Board meetings were to be held regularly. This may result in more effective and successful management of the MPA, but matters of Board member expertise, the composition of the Board, the politicisation of management, the management of conflict, procedure and record-keeping, and a host of other factors may seriously impact on performance. The situation in the TCMP is too complex for this superficial analysis to reach meaningful conclusions. It could be that Boards have performed to the best of their ability under difficult and changing circumstances, and without strategic planning guidance.

The evaluation of the indicator for 'existence and adoption of a management plan' showed that there are several important gaps in the informally adopted management plan of Cordice (1998) and its revision of 2000. For this plan to guide management it should contain clear objectives for the TCMP as well as financial, monitoring, training and administrative plans, all of which outline strategic directions and actions for implementing the TCMP. The new management plan(s) being drafted should seek to address these issues, among others. Business planning will be particularly important if tourism and other commercial uses are to be the focus of the TCMP as stated in law.

The primary activities of the TCMP are currently administration, surveillance and enforcement, and education. Human and administrative resources of the TCMP are limited and in some cases scarce, but there is also little allocated to the other activities. In order to increase these resources, the budget for the operation of the TCMP has to be addressed. Additional capacity and resources are needed to adequately and effectively manage the TCMP in almost every aspect. In order to build capacity, additional staff should be employed and existing staff trained in administration, communication skills, conflict resolution and environmental education among many skills. This also impacts upon all objectives.

A thorough evaluation of the 'degree of interaction between managers and stakeholders' and its related objective was not possible since the TCMP office does not have copies of the minutes of meetings held with stakeholders prior to 2005. However, there have been only a few meetings and consultations with stakeholders since 2005 with no records of minutes or attendance (except for the consultations). Therefore there is very limited information on problems or issues arising from these interactions, or the dynamics of the interactions. The TCMP office needs to improve its efforts to hold meetings with stakeholders and begin keeping records of participants, meeting dates and minutes. Greater participation from stakeholders could enhance content, legitimacy and compliance with management measures leading to the increased success of the TCMP.

Also related to the participation objective devised at the inception workshop, the evaluation of 'level of stakeholder participation and satisfaction in management process and activities' has indicated that although people consider themselves to be stakeholders in TCMP management there has been low participation in, and low satisfaction with, management. TCMP management therefore has to find ways of encouraging people to participate in management if management is supposed to be participatory. The current status of low satisfaction with current management of the TCMP means that the TCMP communities are less likely to support the TCMP and management decisions that are made by the TCMP office or Board. The stakeholders could become a possible threat to the TCMP if levels of dissatisfaction increase.

Although enforcement procedures exist, and rangers are aware of them, no formal document outlining them exists. This document should be produced defining the enforcement guidelines

and procedures. This will allow the TCMP rangers to effectively conduct their duties and will inform the resource users of the consequences of non-compliance.

Current TCMP management appears to be fairly efficient at surveillance and enforcement activities but since the rangers do not keep patrol logbooks, trends in violations and non-compliance cannot be measured. For example, some people identified several illegal activities ranging from drug trafficking to illegal fishing that persist in the TCMP, perhaps due to constraints on surveillance and enforcement. Enforcement coverage extends throughout the area of the TCMP but is being hampered by an old patrol boat that is in need of maintenance.

The TCMP-ME evaluation may be timely since it was conducted before the TCMP was in full operation. With the official re-launch of the TCMP on 2 December 2006, the evaluation will provide baseline data of management effectiveness before full operation and functioning, and can perhaps be used to compare management effectiveness after a few years of operation. Few of the management objectives were met, but several of these were not the aim of management in the absence of having them in a plan. An evaluation similar to this should therefore be conducted in the next two years for a comparison of management effectiveness since the park has become fully operational, hopefully against a set of appropriate and measurable objectives. Indeed the management procedures should be designed to facilitate monitoring and evaluation using this methodology or any other that can guide decision-making and adaptation.

18 LESSONS LEARNED

One of the main features of this evaluation methodology is to learn from it and adapt. Lessons learned from the TCMP evaluation summarised above included, in brief:

- TCMP office appreciates importance of evaluating management
- Reasonable capacity exists to conduct in-house evaluations
- Willingness to learn, to adapt and to improve management
- Weak agency culture of evaluating management
- Lack of systems to assess some bio-physical indicators
- TCMP staff training in data analysis and report writing is required
- Longer training sessions necessary to build expertise
- Stakeholders are interested in the TCMP but need to be encouraged to participate in management
- Public awareness of TCMP and its value should be enhanced
- Critical to build and sustain the capacity to learn collectively and adapt management
- Need for well-structured management and business plans for the TCMP
- Staff and administrative resources lacking
- Procedure needs to be adhered to (in case of enforcement coverage)

19 ADAPTIVE MANAGEMENT

To reiterate, the aim of conducting an evaluation of management effectiveness is primarily for MPA staff and decision-makers to use the information generated to adapt and improve the management, planning, accountability and overall impact of the MPA. Essentially, adaptive management emphasises learning-by-doing. It is the cyclical process of systematically asking

specific questions, generating learning by evaluating the results of these questions and further revising and improving management practices. The result of adaptive management in the context of a protected area is improved effectiveness and increased progress towards the achievement of the goals and objectives of the protected area (Berkes *et al.* 2001; Pomeroy *et al.* 2004).

Through this project, a sub-grant of up to US$1,500 will be made available to each project site for adaptive management based on the results of the evaluation and lessons learned as summarised above. At the workshop on MPA Evaluation Products and Process, Punta Gorda, Belize, on 4 November 2006, participants from each of the project sites were encouraged to propose at least two adaptive management activities that could be completed by mid-February 2007 for which the sub-grant could be used (Pena and Roach 2006).

The TCMP representative present, Meritha Baptiste, made five recommendations for adaptive management:

1. Improving the TCMP brochure
2. Training in MPA enforcement systems and patrol log book use
3. Training in water quality monitoring
4. Training for administrative staff
5. Determining how a Junior Rangers Programme could be implemented at the TCMP.similar to the programme at Negril

One or two these will be chosen for the adaptive management trial following consultation with others at the TCMP. The results of adaptive management, even as a work in progress, will be made available in a subsequent report.

The remaining component of this project is the development of educational and training material based on experiences of the process and from the lessons learned during the MPA evaluations. Production of this material is due to be completed by February 2007.

20 REFERENCES

Anon. 1998. Management plan for the Tobago Cays project proposal development 1998. 13 pp.

Anon.2004a. Establishing the Tobago Cays Marine Park. Voice of the New Democratic Party; The Vincentian. Friday, February 6, 2004.

Anon.. 2004b. What is your solution to the Tobago Cays situation? Community Opinion; Searchlight. Friday February 27, 2004.

Bacci, M.E. 1998. Marine protected areas in the eastern Caribbean: A tourism market study. CANARI. Prepared in collaboration with the French Mission for Cooperation and Cultural Affairs in the Lesser Antilles and the Parc National de la Guadeloupe. CANARI Technical Report No 251. 42pp.

Baldwin, K., S. Punnett and C. Smith. Involving communities in the implementation of Reef Check: Strategies for co-management of marine resources in St. Vincent and the Grenadines. Proc. Gulf Carib. Fish. Instit. In Press.

Berkes, F., R. Mahon, P. McConney, R. Pollnac and R. Pomeroy. 2001. Managing small-scale fisheries: Alternative directions and methods. International Development Research Centre, Ottawa, Canada. 308 pp.

Browne, M., M. Pena and P. McConney. 2004. Tobago Cays Marine Park: How is this MPA doing? Proceedings Gulf and Caribbean Fisheries Institute 57: 1008.

Bunce, L. and R. Pomeroy. 2003. Socioeconomic monitoring guidelines for coastal managers in the Caribbean: SocMon Caribbean. October 2003. 88 pp.

Byrne, J. 2005. Tobago Cays Marine Park: Analysis of existing management plans. November 2005. 17 pp.

CCA CaMMP. 2002. A participatory strategic plan for sustainable development in the Grenadines. Sustainable Integrated Development and Biodiversity Conservation in the Grenadine Islands, Coastal and Marine Management Programme, Caribbean Conservation Association, Barbados, Version 1, 55 pp.

CEC. 2005. Greening of boats workshops. Strengthening environmental stewardship among major stakeholders in the Grenadine Islands. Carriacou Environmental Committee, Hillsborough, Carriacou, Grenada, 6 p.

CERMES. 2005. Report of the inception training workshop for enhancing the management effectiveness of the Tobago Cays Marine Park, St. Vincent and the Grenadines. Union Island 19-20 December 2005. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No.1. 25 pp.

CERMES 2006a. Report of the inception training workshop for enhancing the management effectiveness of the Negril Marine Park, Jamaica.26-27 January 2006. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. ReportNo.2. 31 pp.

CERMES 2006b. Report of the inception training workshop for enhancing the managementeffectiveness of the Sapodilla Cayes Marine Reserve, Punta Gorda, Belize.

4-5 February 2006. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No.3. 26 pp.

Comely, J., M. Mason, K. Cordice and P. Raines. 2002. Tobago Cays marine biodiversity conservation project: Summary report. Coral Cay Conservation Ltd., London. 18 pp.

Cordice, K. 1998. Tobago Cays Marine Park Management Plan. August 1998. 19 pp.

Cordice, K. 2000. Tobago Cays Marine Park Management Plan Revisions. July 2000. 13 pp.

Cooke, A. 2005. A livelihoods analysis of the water taxi operators in the Grenadines. MSc Thesis. University of the West Indies, Barbados. 45 pp.

DELCAN. 1994. Nearshore marine water quality of the west and southwest coasts of Barbados: Present status and management recommendations. October 1994. Feasibility studies on coastal conservation. Government of Barbados, Coastal Conservation Project Unit. 86 pp.

Deschamps, A. 2000. Characterization of modern reefs using the Atlantic and Gulf Rapid Reef Assessment (AGRRA) protocol and digitized aerial photographs, Tobago Cays Marine Park, St. Vincent and the Grenadines. MSc thesis, Ottawa-Carleton Geoscience Centre and University of Ottawa. 196 pp.

Doyle 2004. The Tobago Cays in crisis. The News. Friday January 23, 2004.

Eaton, A.D., L.S. Clesceri and A.E. Greenberg .1995a. Standard methods for examination of water and wastewater. 19th Edition. Pages 1-19 to 24. American Public Health Association, American Water Works Association and Water Environment Federation.

Eaton, A.D., L.S. Clesceri and A.E. Greenberg .1995b. Standard methods for examination of water and wastewater. 19th Edition. Pages 9-17 to 20, 9-53. American Public Health Association, American Water Works Association and Water Environment Federation.

Espeut, P. 2006. Opportunities for sustainable livelihoods in one protected area in each of the six independent OECS territories for the OECS Protected Areas and Sustainable Livelihoods (OPAAL) Project. March 2006. OECS/121/05. 157 pp.

French Cooperation Program. 1994. Case study on coastal and marine ecosystems of St. Vincent and the Grenadines with special emphasis on the Tobago Cays National Park. French Cooperation Program on Environmental Management and Land Use. Prepared for the workshop on coastal and marine ecosystems. Union Island, St. Vincent and the Grenadines, March 21-23, 1994.

French Mission for Cooperation. 1993. Action plan for the Tobago Cays National Marine Park. December 1993.

French Mission for Cooperation. 1995. Tobago Cays Marine Park project reef monitoring programme. Evolution of the Tobago Cays coral reefs, June 1994-January 1995. Unpublished report. 21 pp.

GEF-IWCAM. 2001. National report: Integrating management of watersheds and coastal areas in SIDS of the Caribbean. The Vincentian perspective. June 2001. 31 pp.

Gourmain, P. 1993. Action plan for the Tobago Cays National Marine Park. French Cooperation, Fisheries Division.

Heyman, A. M., T.J. Riegert, A. Smith, T. Shallow and J.R. Clark. 1988. Project Proposal: Development of the Tobago Cays National Park. Government of St. Vincent and the Grenadines and Organisation of American States. 97 pp.

Jackson, I. and Associates. 2004. Management guidelines: Tobago Cays Marine Park. Ministry of Tourism and Culture, Government of St. Vincent and the Grenadines. Draft. July 2004. Ivor Jackson and Associates. Landscape Architects and Planners, Antigua.

Lewis, J.B. 1975. A preliminary description of the coral reefs of the Tobago Cays, Grenadines, West Indies. Atoll Research Bulletin No. 178.

Lizama, D.T. 2005. Assessing sustainable "green boat" practices of water taxi operators in the Grenadines. MSc Research Paper, Natural Resource and Environmental Management Programme, Centre for Resource Management and Environmental Studies, the University of the West Indies, Barbados. 46 pp.

Lizama, D. T. and S. D. Mahon. 2006. Sustainable "green boat" practices for water taxi operators in the Grenadines. Caribbean Coastal Co-management and Coral Regeneration (4Cs) Programme, Sustainable Grenadines Project (SGP) and Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados. 36 pp.

Mahon, R. 1996. Local area development and environmental management plan for Union Island, Mayreau and Tobago Cays (Phase 2): Literature review and identification of interested non-governmental parties.

Mahon, R. and M. Pena. 2005. Annotated bibliographic information on the Grenadines. Sustainable Integrated Development and Biodiversity Conservation in the Grenadine Islands, Coastal and Marine Management Programme, Caribbean Conservation Association, Barbados, Version 2, 30 pp.

Marine Parks Act. 1997. St. Vincent and the Grenadines.

MEDO (Mayreau Environmental Development Organisation). 2003. A management proposal for the Tobago Cays Marine Park, St. Vincent and the Grenadines. Mayreau Environmental Development Organisation. Mayreau Island, Southern Grenadines. 19th September 2003.

Mincer, J. 1963. Market prices, opportunity costs and income effects. In Christ (ed.) Measurement in economics. Stanford Press.

Ministry of Foreign Affairs and Tourism & French Mission for Cooperation. 1995. Survey on the yachting activity in the Tobago Cays and the Grenadines. 19p.

Neher, P.A. 1971. Peasants, procreation and pensions. A.E.R. 61.

OECS-ESDU. 2003. OECS protected areas and associated alternative livelihood (OPAAL) project. Annex 13: Environmental Assessment. 311 pp.

PIRL (Palm Island Resorts Limited). 2003. St. Vincent and the Grenadines. Tobago Cays National Marine Park management proposal.

Pena, M and D. Roach. 2006. Report of the Workshop on MPA Evaluation Products and Process, Punta Gorda, Belize, 4 November 2006. CERMES Regional Project on Enhancing

Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No. 4. 47 pp.

Pomeroy, R.S., J.E. Parks and L.M. Watson. 2004. How is your MPA doing? A guidebook of natural and social indicators for evaluating marine protected area management effectiveness. IUCN, Gland, Switzerland and Cambridge, UK. 217 pp.

Raut, L.K. 1991. Capital accumulation, income distribution and endogenous fertility in an overlapping generations general equilibrium model. Journal of Development Economics 34.

Roach, D. M. Pena, P. McConney, R. Pomeroy, M. Baptiste, J. Nightingale and E. Hemmings. Learning from evaluating MPA management effectiveness. Proceedings of the 59th Gulf and Caribbean Fisheries Institute, Belize City, Belize. In prep.

Rogers, C.S., G. Garrison, R. Grober, Z. Hillis and M.A. Franke. 2001. Coral reef monitoring manual for the Caribbean and Western Atlantic. National Park Service, Virgin Islands National Park. June 2001.

SENJAN Associates and Consultants. 1990. Community and fishing profiles of Canouan, Paget Farm, Ashton, Clifton and Kingstown Beach: Report of baseline data studies. Volume 1: Overview of results and community development issues.

Simmons and Associates Inc. 2000. National Biodiversity Strategy and Action Plan for St. Vincent and the Grenadines. 41pp. Environmental Unit of the Ministry of Health and the Environment.

Smith , A.H., C.S. Rogers, and C. Bouchon. 1997. Status of Western Atlantic coral reefs in the Lesser Antilles. Proceedings of the 8th International Coral Reef Symposium I:351-356.

St. Vincent and the Grenadines. 2004. Strategic alliance for the protection and preservation of the Tobago Cays Marine Park between Palm Island Resorts Ltd. and the Government of Saint Vincent and the Grenadines. Draft. 25 pp.

St. Vincent and the Grenadines Statistical Office. 2001. St. Vincent and the Grenadines 2001 population and housing census. Preliminary report. Prepared by census office.

Thomas, J. 2004. Those Tobago Cays. Page 11. The Vincentian. Friday March 12, 2004.

UNECLAC. 2002. St. Vincent and the Grenadines: Evaluation of the Tobago Cays Marine Park. General .Caribbean Development Committee. May 2002. WP/2002/4.47 pp.

Appendix 2

Roach, D. 2007. Report on Management Effectiveness at the Negril Marine Park (NMP), Jamaica. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize Report No. 7. 68pp.

CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica & Belize

Report on Evaluating Management Effectiveness at the Negril Marine Park (NMP), Jamaica

Centre for Resource Management and Environmental Studies (CERMES)
University of the West Indies, Faculty of Pure and Applied Sciences
Cave Hill Campus, Barbados

2007

CONTENTS

Citation
Roach, D. 2007. Report on Management Effectiveness at the Negril Marine Park (NMP), Jamaica. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize Report No. 7. 68pp.

Acknowledgements
Special thanks to all of the evaluations teams who conducted the field research for this project. Your patience and diligence in this regard is greatly appreciated. These include the biophysical evaluation team which consisted of NCRPS Rangers who were involved in the collection and analysis of water samples as well as reef transects within the NMP. The socio-economic evaluation team consisted of Ansurd Carey, Granville Johnson Vernon Somerville, Elsa Hemmings, Gloria Gilpin, Errolyn Mullings, Keisha-Ann Mullings and Chantelle Black who conducted questionnaire surveys to gather socioeconomic data pertinent to selected indicators. Elsa Hemmings is acknowledged for entering much of the data gathered for this indicator into the relevant database for analysis. The governance evaluation teams consisted of Erwin Caine who gave some insight into various aspects of management of the NCRPS, and Bernard Blue and Rupert Price of NEPA who conducted the financial audit for the organisation. Jean Brown, Malden Miller and Martin Hughes (CREP), and Nadia Ferguson are thanked for their invaluable information regarding the management of the NMP. Great appreciation is also extended to Maria Pena and Chagrega McPhee for their advice on various aspects of data analysis and interpretation for this project.

Contact

Dr. Patrick McConney
Senior Lecturer, CERMES
UWI Cave Hill Campus
St. Michael, Barbados

Tel: 246-417-4725
Fax: 246-424-4204
Email: pmcconney@caribsurf.com
Web site: www.cavehill.uwi.edu/cermes

1 INTRODUCTION

Marine protected areas (MPAs) are important ecological, economic, social and cultural assets for Caribbean countries and beyond, partly due to their significance to tourism earnings in the region. Despite many projects and proposals, and good intentions, management authorities and small field staffs have struggled with very inadequate capacity to manage most MPAs in the region. This situation needs to be remedied immediately.

In October 2005, the Centre for Resource Management and Environmental Studies (CERMES) of the University of the West Indies (UWI) Cave Hill Campus began to implement a regional project to evaluate MPA management effectiveness, and to learn lessons from this process, at three MPA sites in the Caribbean:

- Belize - Sapodilla Cayes Marine Reserve
- Jamaica - Negril Marine Park
- St. Vincent and the Grenadines - Tobago Cays Marine Park.

The project is funded by an International Coral Reef Conservation Grant from the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce.

The project utilises new methods for evaluating how a marine park is being managed set out in a recent guidebook by Pomeroy et al. (2004) entitled "How is your MPA doing?" in which bio-physical, socio-economic and governance indicators of MPA management are assessed using existing information, natural and social science surveys, and various other means of data collection to measure the effectiveness of management decisions and actions in achieving goals and objectives that are specific to the MPAs, the marine environment and coastal communities (Pomeroy et al. 2004).

The project duration is October 2005 to March 2007 with the following four main components:

1. Inception site-specific training workshops in MPA management effectiveness and evaluation
2. Participatory management effectiveness research and evaluations at the three MPA locations
3. A terminal joint workshop on lessons learned and the consequent adaptation of management
4. Production of training materials based on experiences of the process and on lessons learned

The goal of this project is to promote and institutionalise improved and adaptive coastal management practices and policies in the Caribbean through use of applied research and interdisciplinary training. The project will contribute towards building capacity in MPA management effectiveness evaluation in the Caribbean (CERMES 2005).

Knowing the strengths and weaknesses of management in the past facilitates making improvements. Integration with the University of the West Indies, Cave Hill Campus, communications network, teaching and research programmes, curriculum development and other initiatives will add value to the project and its regional impact through sharing lessons learned and disseminating output products. Participatory and community-based approaches will facilitate stakeholder involvement and adaptive management to ensure that the best practices are institutionalised based upon the lessons learned and the skills acquired during the project or afterwards (CERMES 2005).

The specific objectives for this project are:

1. To conduct participatory management effectiveness research and evaluations by training at least 30 people across three MPA sites.
2. To improve MPAs in the region by monitoring outcomes documented in lessons learned combined with training and communication materials for coursework, research, management and coastal policy.

This document reports on the Negril Marine Park (NMP) Marine Protected Area Management Effectiveness (MPA-ME) project during the evaluation fieldwork period March-October 2006. Project participants at the three MPA sites evaluated MPA management effectiveness using bio-physical, socio-economic and governance indicators. For each indicator, a general background is provided followed by a description of the method(s) employed, results, and discussion. The report concludes with references and appendices following an evaluation summary, some lessons learned and adaptive management recommendations for the NMP.

2 METHODOLOGY

At all three project sites, inception training workshops for evaluating MPA management effectiveness were held (CERMES 2005; CERMES 2006a; CERMES 2006b). Bob Pomeroy, lead author of the guidebook and the project's method trainer and adviser, introduced the marine protected area management effectiveness (MPA-ME) methodology. A description of the evolution of the methodology and its application in other locations around the world was provided. See Pomeroy *et al*. (2004) for details on the evaluation methods and indicators.

Participants were then trained in the use of the guidebook with accompanying worksheets to identify (Negril Marine Park and Sapodilla Cayes Marine Park) or determine (Tobago Cays Marine Park) applicable goals and objectives for their MPAs. Goals and objectives that were most relevant and feasible to evaluate were selected by a combination of discussion and open voting. These goals and objectives were then used to identify overlapping goals and objectives in the guidebook and their associated indicators (bio-physical, socioeconomic and governance). The indicators were then examined in detail and prioritised, resulting in the selection of 10 indicators for the Sapodilla Cayes Marine Reserve, eight indicators for the Negril Marine Park and 13 for the Tobago Cays Marine Park.

For each of the three types of selected indicators, participants considered factors related to the evaluation such as human resource needs and the evaluation team, equipment needs, budget needs, timeline, audience and outputs. Details of these requirements are provided in each of the inception training workshop reports (CERMES 2005; CERMES 2006a; CERMES 2006b).

Participatory management effectiveness research and evaluations pertaining to the selected indicators was intended to begin in February 2006, with all data collection scheduled to be completed by September 2006, followed by draft report writing in October 2006. The data collection schedule was postponed by a month and ended in October.

An evaluation workshop of researchers and representatives from all study sites was held to discuss lessons learned from the evaluation experience and the consequent recommendations for adaptive management. The draft site evaluation reports were presented at the workshop held on 4 November 2006 (Pena and Roach 2006). This preceded the 59th Gulf and Caribbean Fisheries Institute conference in Belize City, Belize, at which a presentation on the progress of the project was made (Roach *et al.* in prep.). Training materials based on the process and products of the

evaluation of management effectiveness, and on lessons learned at the three MPA sites, will be produced as a final output of the project.

3 GOALS, OBJECTIVES AND INDICATORS

3.1 Background

Located on the west coast of Jamaica, Negril has grown from the remote and largely inaccessible community of farmers and fishers that is was in the 1960s, to become the third largest resort area on the island. As its reputation for a tourist destination of choice grew, rapid and ad hoc development occurred to both facilitate and take advantage of the surge in visitor arrivals. This has resulted in an area that is marked by a high density of tourist facilities which cater to both short and long stay visitors. Approximately seventy water sports operators and a similar number of tourist and recreational facilities have been identified along the major beach areas by the Negril Coral Reef Preservation Society (NCRPS) in 1997. With a resident population that exceeds 5000 persons as well as large numbers of commuters into the region, this coastal area is intensely used for a myriad of purposes by a variety of people. Fast paced development and continued population growth, over fishing as well as natural phenomena have had serious implications on marine environmental health. As a result there has been a notable decline in the health of coral reefs, increased sedimentation due to physical development and dredging as well as excessive nutrient loading from inadequately treated wastewater and agrochemicals.

The recommendation to designate this site as a Marine Protected Area was made as early as the 1960s by Dr.Thomas Goreau (Sr.) It was not until 1998 that the Negril Marine Park (NMP) was legally established under the Negril Marine Park Order by the government of Jamaica. Sitting in an area that is off the coast of the parishes of Hanover and Westmoreland, its coastal boundary is approximately 33km and the park covers an estimated area of 160 km^2 (NCRPS 2002).

Bordered by 13 fishing communities, the NMP is divided into eight zones which have yet to be officially demarcated (Pena *et al.* In press). A site map for the study area is displayed in Figure 3.1. Management of the NMP is the responsibility of the NCRPS, a non profit organisation which was established in 1990 in response to concerns about the damage to and general decline in health of the coral reefs in the area. A key player in the promotion of the establishment of the existing NMP, authority for management was granted through a co- management agreement from the Natural Resources Conservation Authority (NRCA). It is hoped that the establishment of this area will enable the conservation of the natural coastal and marine resources in a manner that affords them full protection so as to maintain their health and integrity while still allowing for sustainable economic and social development (Thacker and Hanson 2003).

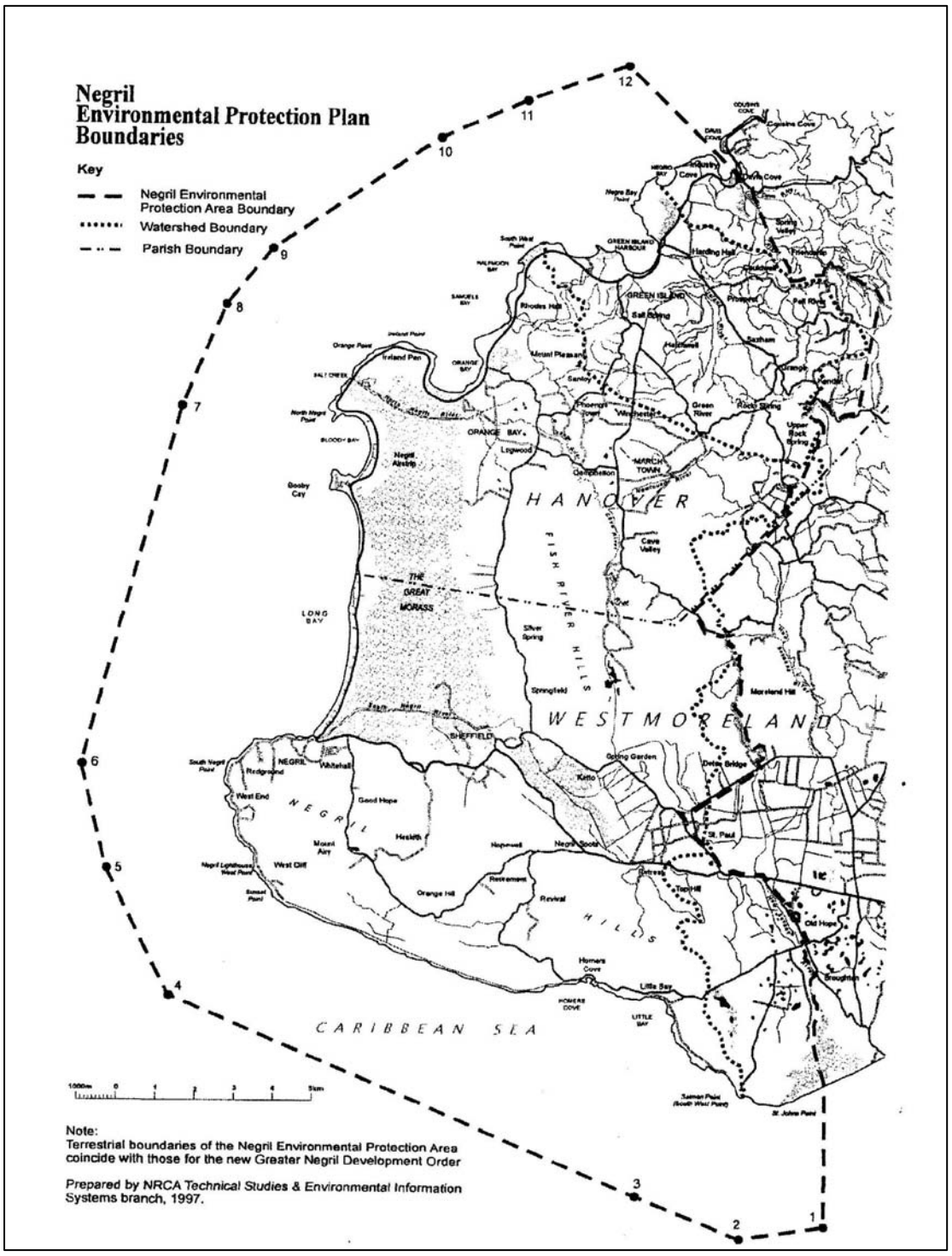


Figure 3.1 Map of the Negril Environmental Protection Area, Jamaica

3.2 Goals and objectives

On project inception, management goals for the NMP were chosen from the management plan to be assessed through the evaluation of the related objectives. The main goal of the NMP as stated in the management plan is defined as: "*To preserve the natural marine and coastal resources to protect their health and integrity allowing sustainable economic and social development within the Negril EPA"* (Thacker and Hanson 2003). The NMP plan objectives used in this project were:

- Achieve the mission of the Negril Marine Park through coordination of management programmes
- Develop and implement a financial sustainability plan which will ensure that adequate funds are available to manage the Negril Marine Park in a way that fulfils the objectives of the management plan
- Create and maintain an awareness and understanding within the local community, among the tourist population, and throughout the international arena on the purpose, goals and objectives of the Negril Marine Park and Environmental Protection Area (EPA).
- Protect natural resources within the Marine Park, conserve existing biodiversity and whenever possible restore damaged ecosystems

3.3 Indicators

The goal and objectives were used to select eight indicators for evaluating NMP management effectiveness. Table 3.1 provides a list of indicators for the NMP. Those for St. Vincent and the Grenadines and Belize are also provided for information (Table 3.2). A description of the indicators, their assessment by the various evaluation teams (see CERMES 2005 for teams) and a discussion of the evaluation is provided separately for each indicator in the remainder of this report.

Table 3.1 Indicators selected for evaluation at the NMP

MPA	SELECTED INDICATORS
Negril Marine Park	***Biophysical***
	1. B8 Water quality
	2. B9 Area showing signs of recovery (total habitat level)
	Socioeconomic
	1. S3 Level of understanding of human impacts on resources
	2. S14 Distribution of formal knowledge to community
	Governance
	1. G2 Existence of a decision-making and management body
	2. G6 Availability and allocation of MPA administrative resources
	3. G12 Level of stakeholder participation and satisfaction in management processes and activities
	4. [New] Success of fundraising strategies (revenue and diversity of sources) that form part of the business plan

Table 3.2 Indicators selected for evaluation at the other MPA sites

MPA	SELECTED INDICATORS
Sapodilla Cayes Marine Reserve	***Biophysical*** 1. B4 Composition and structure of the community 2. B8 Water quality ***Socioeconomic*** 1. S14 Distribution of formal knowledge to the community 2. S1 Local marine resource patterns ***Governance*** 1. G5 Existence and adequacy of enabling legislation 2. G11 Level of training provided to stakeholders in participation 3. G12 Level of stakeholder participation and satisfaction in management processes and activities 4. G13 Level of stakeholder involvement in surveillance, monitoring and enforcement 5. G14 Clearly defined enforcement procedures 6. G15 Enforcement coverage
Tobago Cays Marine Park	***Biophysical*** 1. B1 Focal species abundance (marine) 2. B8 Water quality ***Socioeconomic*** 1. S2 Local values and beliefs about marine resources 2. S3 Level of understanding of human impacts on resources 3. S7 Material style of life 4. S9 Household income distribution by source ***Governance*** 1. G2 Existence of a decision-making and management body 2. G3 Existence and adoption of a management plan 3. G6 Availability and allocation of MPA administrative resources 4. G9 Degree of interaction between managers and stakeholders 5. G12 Level of stakeholder participation and satisfaction in management process and activities 6. G14 Clearly defined enforcement procedures 7. G15 Enforcement coverage

The relationships between the NMP objectives devised at the inception workshop, the proxy objectives from the guidebook and the final selection of indicators are shown in Table 3.3. How the evaluation results related to the objectives is set out partly in the discussion of individual indicators but mainly in the evaluation summary.

Table 3.3 Relationships between objectives and indicators

NMP Objectives	Overlapping guidebook objectives	Indicators
Establish and maintain a reef restoration programme	5C = Habitat quality and/or quality restored or rehabilitated	B8,B9
Assist local groups and support their efforts with the understanding of the need for a well balanced, well rounded community	6B = Public's understanding of environmental and social 'sustainability' improved	S3, S14
Keep the public up to date and aware of the status of the park through its educational programmes and media recesses	6B = Public's understanding of environmental and social 'sustainability' improved	S14
[Through fundraising efforts] Heighten community awareness of the importance of financial sustainability as it relates to protection of the coral reef ecosystem, which is the tourism product	Nothing close in guidebook to this	NEW
Generate sufficient income to support the maintenance and sustainability of the park Develop an active volunteer programme to assist Marine Park staff	1D = Human and financial resources sufficient and used efficiently and effectively	G6, G12
Ensure that staff has the training, equipment and materials to facilitate their jobs	1D = Human and financial resources sufficient and used efficiently and effectively	G12
Accountability and transparency of administration and financial systems	1C = Decision making and management bodies present, effective and accountable	G2

(Adapted from CERMES 2005)

4 WATER QUALITY (B8)

4.1 Background

Water quality is an abiotic and biotic measure of the ambient environmental parameters present within the water column (Pomeroy *et al* 2004). Quality is determined by the evaluation of measured quantities and parameters which are compared to predetermined standards, objectives or criteria. These parameters may include, *inter alia*, temperature, salinity, oxygen content, turbidity, bacteria and other particulate matter. Water quality is a key indicator of ecosystem health and a limiting factor to the biological processes within organisms, populations and habitats (Pomeroy *et al* 2004). Affected by both natural processes and human activity it has serious implications for the health and viability of biological communities and the economic sustainability of coastal areas.

The decline in water quality and its subsequent effect on the marine ecosystems in the Negril area was recognised in the early 1990s due to a marked decline in coral reef health and the appearance of macroalgal blooms. Rapid and ad hoc development in the 1970s and 1980s to

facilitate the surge in visitor arrivals to the area, coupled with continued population growth, the absence of proper waste treatment facilities, overfishing and direct recreational impacts had serious implications for the health of the marine environment and its associated ecosystems. However the cause of this decline was not well understood in its initial stages. Although it was recognised that direct human activity had great bearing on declining reef health, no emphasis was placed on the role of land based sources of pollution on the water quality and its influence on shifts from coral dominated to macroalgae dominated communities. Similar studies in Hawaii, the Florida Keys and Bermuda pointed to the indirect effects of increased nutrient loading from sewage, fertilisers and top soil loss as the mechanism underpinning bottom up controls of reef structure and shifts away from corals towards macroalgae (Lapointe and Thacker 2002). Though this ecosystem shift is gradual it has significant implications for the biological, economic and social integrity of coastal systems resulting in a reduction in biological diversity and economic viability.

Land based pollution is now considered to be the single most important threat to the marine environment of the Caribbean and has the potential to impede the sustainable use of coastal resources (UNEP 1994). This makes the situation in the Negril Marine Park (NMP) a difficult one, as the potential sources of pollutants from the catchment area that feed into the Negril Morass and associated marine systems, are numerous and diverse. The effects of land use within upland areas as well as the waste it generates are often not immediately apparent. Nevertheless land use is a key determining factor of water quality within the NMP. Land use within the catchment area ranges from residential use to industrial activity and agriculture of various scales. Pollutants arrive into the coastal zone via diffused seepage, several fresh water outfalls, run off as well as the two main rivers that enter this area, the North and South Negril Rivers.

The continued dispersal of macroalgal blooms on the reef systems throughout Long Bay in 1991 created the impetus for discussion of the impact of sewage inputs and nutrient enrichment on water quality (Goreau 1992). In response to this, EU funding was obtained for the design of a central sewage collection and treatment facility to service the Negril area and address the increase in sewage input resulting from surge in tourism development (Lapointe and Thacker 2002). However, in addition to the fact that a very small percentage of the population within the Negril area is connected to this system, its limited design features were predicted to result in the escalation of nutrient pollution in the South Negril River as well as downstream reefs in Long Bay and West End (Lapointe and Thacker 2002). Such an increase would exacerbate the problem of nutrient enrichment which had already been observed in the same area from various anthropogenic sources, such as those from agrochemicals used in agriculture further inland (Goreau 1992).

In order to foster a better understanding of the nature of the land based sources of pollution as well as to monitor the status of the water quality in the area and the health of the reef systems, a monitoring program was initiated in October 1997 (Lapointe and Thacker 2002). The main goal of this program was to determine the potential impacts of land use on groundwater and rivers within the Negril Environmental Protection Area (Negril EPA) as well as on the coral reefs within the NMP. This initiative signalled a step toward wholesale watershed management, which acknowledges the fact that the current land practices had much to bear on the integrity of the NMP and only through managing and monitoring activities within the watershed would there be a chance for effective management.

At present fresh water sample sites are being monitored for nitrates, ammonia and phosphates. Samples are taken by NCRPS rangers, from streams and rivers inland, which eventually drain into the near shore marine environment. Sample collection is done mostly on a monthly basis but may be affected by weather or the amount of funding available for this activity. Since the inception of the water quality monitoring programme, three shallow marine sites have been added to the original 27 inland ones. However marine water quality analysis is an expensive undertaking due to the high dilution factor which requires highly sensitive equipment to produce accurate measurements. Samples are therefore sent to the National Water Commission in Montego Bay for analysis.

From its primary focus of water quality monitoring for the purpose of protecting the coral reefs and associated marine life in the NMP, there has been recognition of the need to expand water quality programs to encompass those parameters that have bearing on human health and safety. Though not incorporated in the monitoring program being carried out by NCRPS, the National Environment and Planning Agency (NEPA), the National Water Commission (NWC) and more recently, the Negril Area Environmental Protection Trust (NEPT), have incorporated the testing for the presence of coliform bacteria into their respective studies. As the third largest resort town on the island and an area that sees a lot of local use it is important that not only ecosystem health and integrity be monitored but that the health of persons who use this area be considered. If human health is compromised through the use of these waters it has the potential to undermine the economic viability of coastal uses.

Jamaica is currently one of the participants in the Caribbean for the Blue Flag Campaign. As such, participating properties must conduct activities stipulated under the five broad criteria. These criteria include water quality monitoring where participants are required to conduct tests for the presence and concentration of coliform bacteria. The appearance of coliform bacteria indicates the presence of sewage within the water column and the possibility that other pathogens may also be present. To date, two beaches in the Negril area have been Blue Flag certified. NEPT has assumed the responsibility of programme coordinator for this campaign in Jamaica and collects samples for testing at various sites within the NMP on a bimonthly basis.

4.2 Methods

One of the primary objectives of the water quality monitoring programme is the assessment of spatial and temporal variation of the concentrations of nutrients, salinity and chlorophyll a from various testing sites within the monitoring network. The spatial pattern of the testing sites takes into consideration various land use practices within the Negril watershed as well as shallow and deep reef systems in the NMP.

Water samples were taken from approximately 27 sites across the Negril Environmental Protection Area on a monthly basis (Lapointe *et al* n.d.). These sites included areas that were upstream and downstream of various known land use types as well as to account for the geographical variability within the EPA. Sample stations included several small creeks as well as points along North and South Negril rivers, Green Island River, Davis River and Cabarita River. Additionally in order to measure the impact that the operations of the Negril Sewerage Treatment Works was having on the receiving environment, six sites along the South Negril River were selected to determine if significant nutrient enrichment results from the treatment system.

These samples were collected in sterilised Nalgene bottles after which they were refrigerated in the dark until they could be transported to the laboratory at NCRPS. After filtration through a

0.45µm membrane filter or a precombusted 0.45µm GF/F filter, the filtrate from this exercise was frozen until it was ready to for analysis. Each collected sample was tested for ammonium, nitrate, nitrite, soluble reactive phosphorous concentrations and salinity. Analysis of nutrients is done using a Hach Model DR 2000 spectrophotometer, while salinity is determined with a hand held Bausch and Lombe refractometer (Lapointe *et al* n.d.).

Before the implementation of the water quality monitoring programme, preliminary water quality tests were conducted. These tests had shown that although nutrient content of fresh water samples was relatively high, they could be easily and accurately read from the laboratory equipment available at NCRPS. Marine samples contained much lower levels. More specialised equipment was therefore required for analyses of the latter which could not be done at the organisation's laboratory. They were previously shipped overseas for analysis at the Harbor Branch Oceanographic Institution Laboratory in Florida to be analysed using a Bran and Luebbe TRACS Analytical Console (Lapointe *et al* n.d.). At present, testing is conducted at the National Water Commission laboratory in Montego Bay. All results obtained were compared to national water quality standards for marine and fresh water. These standards are outlined in Table 4.1.

Table 4.1 Jamaica fresh water quality standards

Parameter	Measured as	Standard range	Unit
Nitrates	**(NO_3)**	**0.10 – 7.5**	**mg/L**
Phosphates	**(PO_4)**	**0.01- 0.8**	**mg/L**

Source: National Environment Planning Agency

Samples taken by NEPT were from six marine sites within the NMP. These samples were collected in sterilised bottles by a member of NEPT staff on a bimonthly basis. Sample collection was conducted in the morning. The times at which sampling was conducted were dependent on the availability of a boat to the organisation. Once collected these bottles were refrigerated and then sent to the National Environment and Planning Agency's laboratory in Kingston. Tests were conducted for nitrate and phosphate concentrations as well as the presence of faecal and total coliforms. All results are compared to Blue Flag water quality standards and posted on the organisation's website for public viewing. Results are also sent to the Blue Flag Committee as part of their obligations to the programme in order to retain status as national coordinator and to ensure that all sites meet standards for Blue Flag certification.

All water quality sample collection conducted at the NMP occurred prior to the MPA management effectiveness project. Data used in this analysis were taken from secondary sources based on results collected over significant time periods for both the NCRPS and NEPT. Due to the extensive data set compiled by the NCRPS this analysis will focus on the sample points along the two major water ways that enter the NMP, the South and North Negril rivers. Samples have been collected on a monthly basis since 1997. However, this assessment will highlight trends seen over the seven year period spanning from 1999 to 2005. The monitoring programme undertaken by NEPT has not been conducted as long as that by NCRPS. Data used in this analysis resulted from sampling conducted on a bimonthly basis from December 2003 to June 2006.

4.3 Results

Highest nitrate concentrations were generally found in the upstream areas with the exception of 2005 where there was a sharp rise in nitrate levels at the point of effluent discharge. During this

period the concentration of this nutrient increased ten fold from a 2004 average of 0.038mg/L to 0.31mg/L. The 2004 average seen for this site was the lowest recorded during the time period during which samples were collected. Due to the fact that concentrations of nitrogen in most cases are higher upstream than downstream of the sewage treatment plant, the data suggest that the sources are land based in origin and may be a result of land use activities further inland. However the significant fluctuation in concentration levels in the effluent discharge could not be linked to any specific events.

There is greater variability in ammonia concentration than nitrates in the same area. Highest concentrations are always seen at the point of effluent discharge with the lowest readings generally recorded in downstream and upstream areas. Values peak in the area of effluent discharge and return to pre-effluent levels in areas closer to the coast. In some cases samples collected further inland and further seaward of the sewage outfall had readings that were as much as ten times less than those seen at the point of effluent discharge. This may suggest that even though some of the ammonia detected may be a result of land based activities, much of this nutrient may occur in this area as a result of the release of sewage effluent.

Like ammonia, phosphate levels are also highest at the point of sewage effluent discharge. Levels of phosphates are higher than those of nitrates but significantly lower than ammonia concentrations found across sites during the sample period. Upstream values for this variable are slightly higher than those seen at the river bottom suggesting that some of the nutrients seen are as a result of land based activities. This is illustrated in Figure 4.1a to c.

In the North Negril River nitrate concentrations are highest at the extreme top and decline gradually as the sample sites get closer to the coast. This trend suggests that land based activities may be the primary source of nutrient enrichment. Although there is very little variation in nitrate concentration at any site within the sample period there is a significant surge in nutrient concentration for all areas in 2004. Increases are 1-2 times higher in 2004 than in any of the previous years. Nutrient levels return to average readings in 2005. At this stage concentrations are as high as 5.6 times greater than annual averages for 2004. This trend is seen in samples measured for ammonia and phosphate concentration for the same sample period.

There is no significant variation in ammonia concentration at the sample sites seen with the exception of the 2004 measurement which was as much as eight times the year's average. For example ammonia levels in 2004 were recorded at 5.89mg/L and returned to a value of 0.005 mg/L the following year. The highest recorded readings were measured in November. Phosphate concentrations were recorded as high as 7 times the yearly average in 2004 and fluctuated very little throughout the rest of the sample period. Nitrates were the nutrient seen in the highest amount as opposed to ammonia which was the predominating nutrient in the South Negril River. This is illustrated in Figure 4.2a to c.

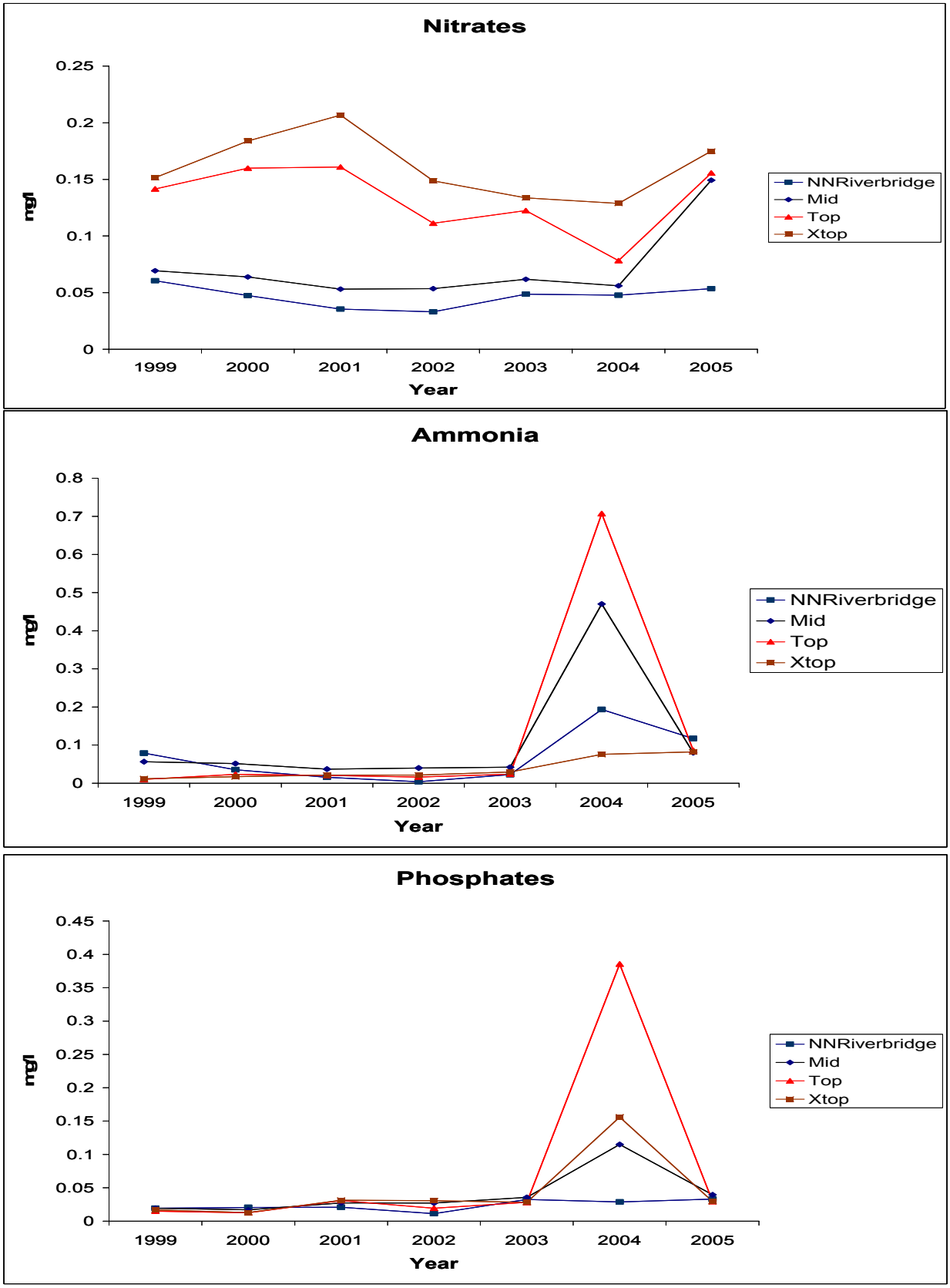


Figure 4.1 (a) Nitrate, (b) ammonia and (c) phosphate levels at the North Negril River sample sites

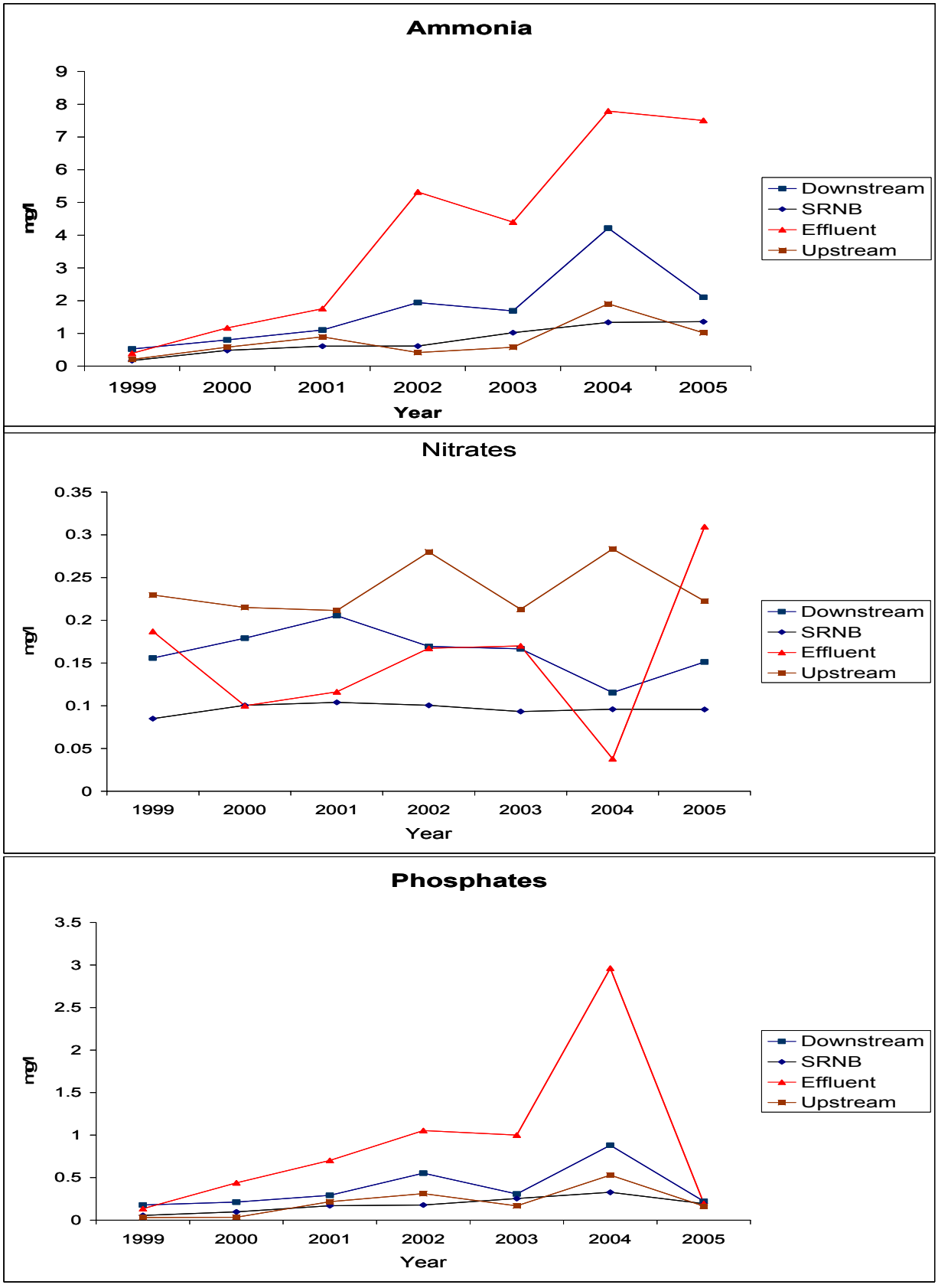


Figure 4.2 (a) Nitrate, (b) ammonia and (c) phosphate levels at the South Negril River sample sites

Faecal coliform counts fluctuated often throughout the sample period, December 2003-July 2004. No temporal patterns could be seen from the data that was collected making it difficult to correlate with any timed or recorded events. However at the South Negril River Bottom, coliform counts frequently exceeded prescribed Blue Flag standards suggesting that the water in this area is unsuitable for sea bathing. However measurements taken in the Norman Manley Sea Park (NMSP) upstream and downstream areas were almost always in keeping with water quality standards. There were few exceptions to this trend. Two significant peaks were seen in the upstream area where counts were recorded at 170cfu and 280cfu in September 2004 and April 2005 respectively. In the downstream area one peak was seen where readings were taken at 130cfu in August 2005. Such peaks in the NMSP areas may be due to isolated rainfall events. The results are illustrated in Figure 4.3.

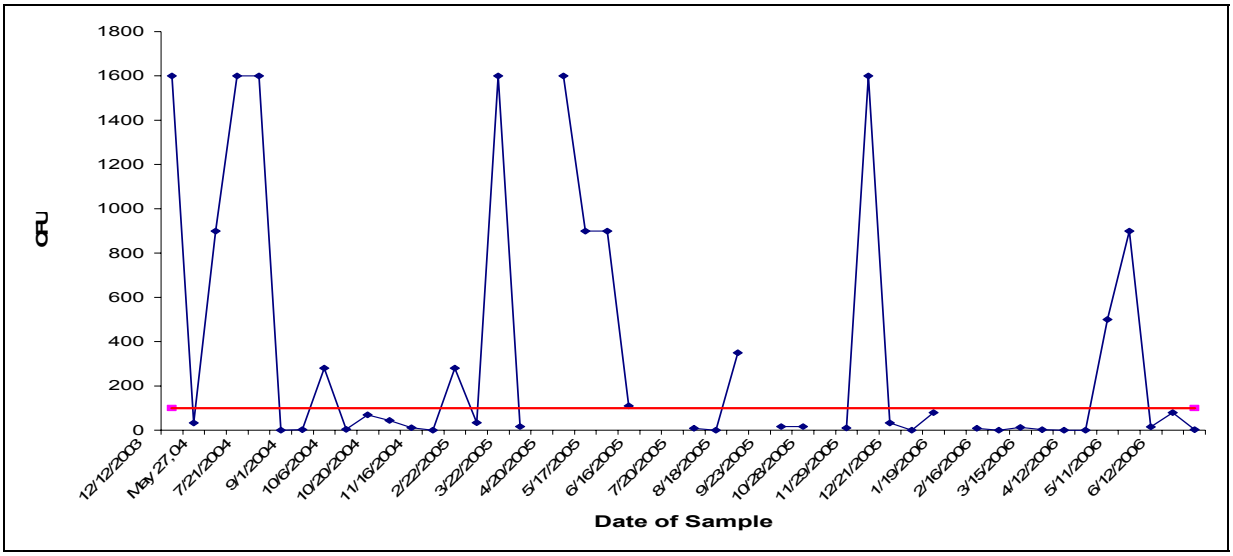


Figure 4.3 Coliform Forming Units (CFUs) at the North Negril River sample sites

The water quality monitoring programme in the NMP has been an ongoing process for close to a decade. Extensive experience and training in monitoring techniques and analysis has allowed the management body to accumulate comprehensive data that has the ability to inform policy. The monitoring programme has also been able to evolve over time in response to a move from ecosystem to watershed monitoring. In that way the sources and nature of pollutants that may have an impact on ecosystem health in the NMP can be accurately identified and assessed. Management becomes more informed and capable of focusing efforts and limited resources on priority areas which have the most potential of undermining ecosystem health and viability. It has also enabled the NCRPS to assess the impacts of the sewage treatment facility on the NMP by implementing monitoring prior to its existence in order to document the changes in water quality caused by its operational practices.

The problem lies with the fact that although the NCRPS possesses a great wealth of knowledge about the sources and nature of the threats to the MPA it has limited ability to remedy the situation and implement the changes, both engineered and bureaucratic, that are needed. Land use practices from outside the NMP have the potential to undermine the management efforts within the MPA. In addition to this many of the properties within the Negril EPA are not connected to the sewage treatment facility. In a few communities the percentage of connections to the sewage treatment plant are high. This is seen in the communities of Long Bay (95%), West

End (75 %), Whitehall and Red Ground (100%) (Francis pers comm. 2007). However this trend does not persist throughout other areas in the Negril EPA. Much of the sewage is disposed of via sinkholes or septic tanks. In some cases these disposal and treatment systems are inappropriately located and may result in the contamination of coastal waters. Additionally the sewage treatment facility only treats to secondary level. The tertiary stage needed to polish the effluent and remove nutrients has not been implemented despite promises to do so if it was found that treatment exacerbated nutrient loading (Lapointe and Thacker 2002).

Sadly in spite of the wealth of knowledge and expertise held by the staff of NCRPS as well as the clearly defined goals and structure of the water quality monitoring programme and access to a certified laboratory, little practical application of the resources is being used to enact change. Community shifts from coral to macroalgae are still being documented. Research and monitoring of any aspect of the management strategies may become pointless if there is evidence and justification to address major issues but no avenue through which this can be done.

The Negril Area Environmental Protection Trust has conducted water quality sampling at several areas within the NMP for the purpose of the Blue Flag Programme. In the absence of national water quality standards and for the purpose of this project, all results collected at the NMP were to be compared to Blue Flag water quality standards. For Caribbean beaches the Blue Flag standards have been adopted from the Land-Based Sources of Pollution (LBSP) Protocol of the Cartagena Convention. Recommendations from the Pan American Health Organisation/ World Health Organisation (PAHO/WHO) are used when defining bathing water quality and their limit values (http://www.blueflag.org). These water quality standards are some of the least stringent ones used. They fall far below the requirements that are outlined in the United States Environmental Protection Agency (US EPA) or the European Union (EU) standards. Many developing countries have sought to model national standards after these international ones. In most cases this has only served to provide unrealistic goals that cannot be realised within the limited resource capabilities of these countries. The use of Blue Flag standards as a measure of water quality provides requirements that seek to safeguard both ecosystem and human health but provides limit values that are easier to attain than those proposed by other international bodies. Their use creates an opportunity to standardise water quality monitoring on a region wide basis for easy comparison which could be applicable in a number of Caribbean states. The programme provides the additional benefits of environmental education to raise awareness and a free flow of information on water quality within certain areas which may catalyse management actions in areas where immediate intervention may be necessary.

There is a need for greater support from government agencies that have the ability to bring about the changes necessary for improvements in water quality. The collection of quality information that can justify these actions is not enough. However careful thought must be placed into the design of monitoring programmes to ensure the information adequately represents the true state of conditions within the MPA.

This evaluation was successful in highlighting the extent to which the management bodies at each MPA were able to establish and maintain a reef restoration programme. The ability of this indicator to evaluate the management objectives was good.

5 LEVEL OF UNDERSTANDING OF HUMAN IMPACTS ON RESOURCE (S3) AND DISTRIBUTION OF FORMAL KNOWLEDGE TO THE COMMUNITY (S14)

5.1 Background

Despite the fact that MPAs are not solely a product of social processes, their implementation may have great social ramifications (Mascia 2004). They act as management tools that involve a process of resource allocation and regulation which has the potential to shape the political, social and economic construct of the communities that depend on areas that have been placed under protection (Mascia 2004). It is imperative that goals and objectives, and the potential impact of such systems on wider society be clearly understood. By doing so, collaborative efforts can be made between official management bodies and communities in order for the benefits of a MPA to be recognised. This can only come from the realisation that social processes have as much impact on marine systems as biological and physical variables (Mascia 2004). The success of a MPA relies not only on the human decision-making process but the management system's ability to influence changes in human behaviour. In order to do this, management bodies must not only seek to improve the public's understanding of environmental and social sustainability (CERMES 2005b) but to understand the social cultural, political and economic variables that influence individual choice and behaviour. Once these factors have been accounted for there is a greater potential to use this information to ascertain where and when participatory approaches may be most effective. More importantly, consideration of these factors provides a better guide to managers as to how information dissemination and environmental education may impact on the public's perception of resource use and availability as well as on behaviours that may affect the viability of marine resources and their related ecosystems.

The NCRPS has sought to use environmental education and the distribution of information on the NMP not only as a management tool but as a method of retaining transparency in the management process. It is hoped that an educated public will be able to recognise the correlation between their behaviour and how these actions affect marine ecosystems. This understanding is necessary from both an economic and social standpoint. The fact remains that the livelihoods of many members of public is indelibly intertwined with marine resources and therefore affected by their use and viability. In light of this it should be a matter of public interest that these very resources be used in the most sustainable manner possible. In order to bring across this point, the dynamic that exists between natural resources and the potential effects of human behaviour must be understood. Faulty perceptions have the potential to encourage harmful behaviours which in turn reduces the level of MPA success. It is important for the management organisation to recognise where the knowledge gaps lie and what the prevailing perceptions of resource users are, in order to design interventions to fill the information gaps, involve the communities in management of its resources as well as to evaluate the changes that may result from these processes (Pomeroy *et al*. 2004). This information may also serve to determine what audiences need to be targeted.

Having knowledge of the target audience will guide methods of dissemination as well as the content of educational material which facilitates a meaningful interaction with all stakeholders. Scientific information must be distributed in such a manner that the target audience has full understanding of the message which is being conveyed. Level of exposure to previous information as well as the level of formal education will have great bearing on the terminology that should be used and the methods that are employed for this transfer of information. The level to which management bodies attempt to reach and involve their individual target audience,

include them in the management process and address their concerns will determine the level of confidence that the stakeholders will have in the information that is presented.

Previous studies carried out by Pena *et al* (2005) on socio-economic monitoring and fisheries management planning for the NMP, have suggested that many of the members of the communities within the EPA are dissatisfied with the amount of information that they receive on the MPA (CERMES 2005b). Several individuals feel that there is a lack of communication as well as a failure to properly inform community members on management issues. These studies also show that although local knowledge is consistent with scientific findings pertaining to resource decline, there has been a failure to recognise that current practices have contributed to this trend (CERMES 2005b). This situation may be a reflection of a failure to correlate human impacts with resource decline.

These two indicators seek to access what knowledge gaps exist within various groups of stakeholders within the EPA as well as the effectiveness of the information distribution systems that have been implemented by management bodies. This is done through the evaluation of two NMP MPA objectives which aim to:

1. Keep the public up to date and aware of the status of the park through its educational programmes and media recesses
2. Assist local groups and support their efforts with the understanding of the need for a balanced, well rounded community.

5.2 Methods

In order to determine the level of understanding of various user groups in the NMP of the potential influence of human impacts on the natural environment, surveys were administered to various groups of persons within the MPA. In addition to assessing the level of understanding these surveys were also used to evaluate the effectiveness of the dissemination of information from the NCRPS to these groups. These surveys were aimed at a wide cross section of persons. These included members of various settlements within the NMP, tourism workers who commute daily from outside the EPA as well as a number of tourists.

Surveys were conducted in ten communities across the EPA. A copy of this form may be found in Appendix 1. The communities targeted were: Orange Bay, Green Island, Sheffield, Mount Airy, Negril, Homer's Cove, Little Bay, Salmon Point, Broughton and Davis Cove. In addition to this, the surveys were administered to two hundred tourists within the Negril area and 100 tourism workers who commuted from outside of this area.

The information gathered from this exercise was entered into Microsoft Excel and the Statistical Package for Social Sciences version 11 (SPSS) to be analysed. The results of this analysis are outlined below and are presented according to stakeholder group.

5.3 Results

5.3.1 Community members

Most of the respondents within the communities knew about the NMP (96%). In many cases (25%) persons could not pinpoint what year they had first learnt of its existence. Similarly, the majority of respondents also knew of NCRPS (96%), 21% of which were made aware of its existence during the period 1995-1997.

Seventy-two percent of all participants were aware of some form of environmental education material that was distributed by the management organisation. This material was largely received in the form of brochures (31%), posters (30%) and via meetings (29%). Very few persons received information in the form of dramatised materials or skits (2%). In most cases the environmental message that was received provided information pertaining to the protection of the coastal and marine environment (43%). Other topics that were frequently seen included waste management and pollution issues (8%) and sustainable fishing practices (6%).

It was felt by many of those aware of the educational material that the delivery of the information was effective (88%) and was having an impact on people within the communities (69%). A large number did not share this sentiment and felt that the environmental education was having minimal to no impact on persons within the NMP (29%). It was felt that the knowledge gained through access to this information had led to an increase in the awareness of environmental issues especially those related to the marine environment. Improvements were also seen in the areas of waste disposal. This was exemplified by a marked increase in the frequency of sustainable environmental practices within the different communities. Although the majority of participants thought that the environmental education was effective both in its message and delivery, many recognised that there was still room for improvement. Recommendations for enhancement included greater dissemination of information through workshops, an increase in the use of electronic and print media, synergism with community groups and resource user organisations, as well as the improvement and continued development of environmental education material. Respondents have also requested an increase in the amount of educational programmes offered to members of the community.

The general feeling among participants was that activities taking place within the NMP were having some impact on the natural environment. Seventy-four percent conceded that these events may have had a positive or negative impact on the area while 26% felt that these activities had no impact on the MPA. When asked to provide examples of such activities, improper waste management practices (19%), destruction of coastal and marine ecosystems (13%), the staging of large social events on the coast (11%) as well as recreational activities within the marine area (11%) were some of the most frequent responses. The most common impacts that resulted from a number of the activities highlighted was a depletion of coastal resources (28%), and pollution of the marine environment resulting largely from improper waste disposal practices (8%). The results outlined in this section are illustrated graphically in Appendix 2. Table 5.1 highlights the problems respondents felt affected five major groups of resources within the NMP and solutions offered to rectify or mitigate further impacts.

Figure 5.1 Problems identified by respondents and solutions offered to rectify or mitigate further impacts

Natural resource	Problems	Suggested solutions
Beaches	Sedimentation	Prohibit the removal of vegetation
	Improper solid waste disposal	Law Enforcement, Placement of garbage receptacles, Environmental Education, Cleaning staff for beach area
	Erosion	Engineered structures to reduce erosion
	Improper sewage and chemical waste disposal	Education, Restrict the use of certain chemicals, Phasing out the use of pit toilets
	Sand mining	Law enforcement
Sea grass	Clearing of sea grass beds	Public education

Natural resource	Problems	Suggested solutions
	Destruction as a result of chemical pollution	No suggestions
	Destruction due to recreational activities (boats and jets skis)	Zoning for recreational activities
Mangroves	Improper sewage and chemical waste disposal	Law enforcement, Public education,
	Removal of vegetation	Law enforcement, Public education, Infrastructural development restrictions for wetland areas.
	Destruction by insects	No suggestions
	Improper solid waste disposal	Law Enforcement, Placement of garbage receptacles, Environmental Education
Reefs	Improper sewage and chemical waste disposal	Education, Restrict the use of certain chemicals, Phasing out the use of pit toilets
	Breaking of parts of the reef	Law enforcement
	Sedimentation	Prevent vegetation removal in wetland areas
	Anchor Damage	Law enforcement
	Unsustainable fishing practices	Restrict fishing in reef areas, Prohibit fishing within the MPA, Education of fishermen on importance of the reef, Greater Law Enforcement and the implementation of fines
Fisheries	Landing of small or juvenile fish	Environmental education, Increase in mesh size for fishing nets, Law enforcement
	Overfishing	Environmental education, Law enforcement, Prohibit fishing on the reefs, Prohibit fishing within the MPA
	Chemical pollution	Restriction of the use of certain chemicals

Many of the respondents had clear ideas of what problems affected a number of marine resources in the NMP. The fact that many were able to make recommendations on how these could be resolved attests to the fact that there is some understanding of human impacts on the natural resources within the MPA. It also bears testimony to that fact that there is an understanding of the ramifications that these impacts may have on the coastal environment. However there were still some who did not fully appreciate the importance of, and need to protect, certain resources. This was especially so for seagrasses where a number of respondents suggested that they be removed. Seagrasses were viewed as a nuisance and eyesore that sullied the appearance of the seabed, taking away from the swimming experience of persons who utilised the area.

Most of the participants in this exercise were male (71%) many of whom (27%) fell into the 41-50 year range. Very few of those interviewed attained an education beyond secondary level and the majority of respondents attended either primary (31%) or secondary institutions (48%). Many persons had resided within the NMP in excess of 15 years. It was found that the best ways in which information could be disseminated throughout the communities was via television, flyers/posters, radio or local newspapers. In addition to this the majority of respondents expressed their willingness to attend a workshop where the results of the evaluation would be discussed (87%).

5.3.2 Tourism workers

Seventy percent of all tourism workers interviewed had prior knowledge of the existence of the NMP. Many of these attained this information prior to 1998 when the park was officially declared a MPA. Several persons also knew of the existence of the NCRPS (55%). Although many persons had first heard of the organisation within the last ten years, 35% received this news within the period 2004-2006.

Seventy-six percent of the tourism workers have some awareness of the environmental education material distributed by the NCRPS. The most common ways in which it was received was through the use of brochures (60%), through other methods that were not specified such as personal dialogue and email (20%) and via flyers/posters (10%). Forty-five percent of the material received related to general environmental protection and conservation, 30% about the need for coral reef conservation, 15% to solid waste management practices and a further 10% to marine pollution. Other topics covered included the need for zoning within the NMP and the implementation of user fees for the MPA. The majority of the respondents (88%) conceded that the delivery of the environmental message was effective where 84% thought that it had some impact on people within the NMP. Noticeable impacts included an improvement in waste disposal practices and increase in the awareness of environmental issues as well as an increase in knowledge of MPA regulations. However, like the community members, the tourism workers recognised a need for improvement in both delivery and content of the information. The main issue identified was a need for greater dissemination of information to the public and various resource user groups as well as a greater effort at promoting environmental education through a range of different avenues. Forty-five percent of respondents felt that dissemination could be improved through an increase in public education and meetings, 30% felt that it should be incorporated into the school curricula while 10% suggested that it be done through the production of televised programmes.

This stakeholder group also felt that activities within the NMP were having an impact on the natural environment. Fifty-three percent felt that there was some impact while 36% felt that there was no impact all. These activities included illegal dumping (12%), beach parties and large social gatherings (10%) as well as unsustainable fishing practices (6%). The most common impacts that resulted from these activities included pollution of the marine environment (12%), destruction of reef ecosystems (6%), loss of biodiversity and beach erosion. The only positive impact cited was cleaner beaches which resulted from an improvement in waste management practices.

Many of the problems with the marine resources observed within this group of participants bore great similarities to those that were cited among community members. However, there was a better understanding of ecosystem interactions and the ramifications of human activity on the coastal environment than seen in the previous group. Many persons saw the correlations between beach erosion and coral reef destruction as well as the importance of seagrass and wetland habitats and the harm in removing critical species types. The most common example was that of the parrot fish which was recognised as an important species within coral reefs ecosystems and one which contributed to the sand budget in marine systems. The only addition to the problems with resources within the NMP was that of vehicles driving along the foreshore which had been recognised as an activity that exacerbated beach erosion. Unlike the community members, most of the suggestions dealt with issues pertaining to the removal of solid waste material from coastal

areas and an enforcement system which would encourage a reduction in illegal dumping as well as more sustainable waste disposal practices.

Most of the respondents (42%) fell in the 21-30 year age range and had attended at least secondary (59%) and post secondary institutions (31%). Many of them (22%) had resided within the Negril EPA in excess of 30 years. From the surveys it was found that the majority of participants thought that the best method to get environmental education to them was via television (30%) and at the workplace (23%). However 86% of the respondents stated that they were willing to attend any workshop where the results of the evaluation would be discussed, with the level of attendance being dependent on the date of the workshop and its location.

The general sentiment from the tourism workers was that NCRPS was not a visible organisation. This was surprising since they have been delegated management responsibility for such a large and complex area in which many of the persons interviewed work. Many felt that there needed to be greater promotion of the organisation as well as increased efforts directed toward the dissemination of environmental education.

5.3.3 Tourists

Unlike the community members and the tourism workers, very few tourists had any knowledge of the existence of the NMP or of the NCRPS. Ninety-four percent stated that they had no knowledge of the MPA while 92% had no knowledge of the managing organisation. The few that were aware had only received this information within the last two years with 50% only becoming aware of the NMP in 2006 and 83.5% only hearing of the NCRPS within the period 2004-2006. The majority of tourists (64%) were not aware of any of the activities that had an impact on the natural environment of the NMP. Similarly there was almost no knowledge of any problems that would affect the natural resources within the MPA.

Most of the tourists had attended up to tertiary level education where 78% had attended university. Like the two previous groups, television was cited as the most popular way of information dissemination to these individuals (56.2%). Other popular choices included flyers/posters (17.7%), email/internet (11.8%), newspapers (10.8%) and radio (10.3%). Due to the fact that most of the visitors were only in Jamaica for a limited time, 90% of individuals stated that they were unwilling or unable to attend any meeting were the results of the evaluation would be discussed.

5.4 Discussion

Both the community members and the tourism workers who took part in this exercise displayed some knowledge of the issues that affected the natural resources within the NMP as well as problems that were directly related to resources in the marine environment. However many of the responses placed great emphasis on solid waste issues such as illegal dumping as well as the pressures fishermen were placing on fish stocks and coral reef ecosystems. It is because the relationship between the unsustainable practice of illegal dumping and the aesthetics of the beach environment is highly visible that the relationship may be immediately apparent. Similarly fishermen are seen regularly making use of certain marine resources and a correlation may be drawn between unsustainable extractive methods and the destruction of a particular resource. Other cause and effect relationships are less straightforward and the interactions more complex. The effects of land based activities or improper sewage treatment and disposal, although discussed in some educational material, is not as visible as issues surrounding solid waste or

fisheries practices, even though they may be just as destructive. It is because of this that they are easier to pinpoint as primary offenders to the sustainability of marine resources and may have been highlighted with the frequency seen in this evaluation.

Although respondents appeared to have some knowledge of coastal resources and their importance, some members of the communities failed to recognise the significance of particular resources. This was exemplified by the frequent suggestions for the removal of seagrass beds. Educational material must be mindful of the fact that the importance of all marine resources is highlighted and the focus is not placed on the status of a particular ecosystem. The health of one system is related to the health of other resources within the marine environment. Educational information needs to ensure that this interrelatedness is highlighted so that the importance and necessity of each one is given equal weighting. Comments were made by both the community members and the tourism workers on the wording of educational material where some found that this material was difficult to read. Greater consideration should be given to the level of education of the target audience, where the literacy level and past exposure to environmental material is considered. Care must be taken that the terminology used and the format of material can be properly understood by the receiving audience. A failure to do this reduces the effectiveness of the information being delivered and diminishes the likelihood of increasing awareness to important issues.

Although a fair number of persons from among community members and tourism workers had knowledge of the existence of the NCRPS, there seemed to be a high level of uncertainty of the role it played and the programmes and projects implemented during its tenure. As a management organisation that has responsibility for the use and allocation of the resources of such a diverse group of stakeholders, it must ensure that it is visible and accountable to these persons at all times. Being visible and ensuring that those affected by MPA management feel involved and are informed of management issues and the status of marine resources increases the confidence of the stakeholders in the management body and its ability to effectively fulfil its mandate. The generation of this information to the public may foster feelings of inclusiveness and empowerment that may encourage positive behavioural changes.

On the contrary, the knowledge base for tourists appears to be very small. Very few are aware of the existence of the MPA or its management body. The Negril area is the third largest resort town in Jamaica and reputed to generate more income than Ocho Rios or Montego Bay (Outokon 2001). The potential impact of that this group may have on the MPA may be significant. The fact that so few know of the regulations that apply to such an area means that their behaviour may have the potential to undermine the goals and objectives put in place for its protection. This must be addressed with immediate effect so that this group is made aware of the issues that affect the NMP and are subject to the same rules and enforcement to which all other groups of resource users are bound.

The common thread between each of these groups is a need for more information. An informed and included group has a greater chance of making educated decisions and that may influence behavioural change and increase the potential of MPA success. Perhaps there is a need for new and more creative approaches to information dissemination that caters to the various level of education and literacy that will be found in such a diverse group of stakeholders. Certainly such an approach must be applied to foreign visitors in order to protect the very resources that draw them to these shores. Greater use should be made of both print and electronic media to convey

these messages and keep the public informed and up to date on issues pertaining to management, the status of resources in the NMP and the role they have to play in both of these arenas.

This evaluation has provided some baseline and additional data on how well members of the public are being kept up to date with the status of the MPA. However it is unclear from the analysis whether the management body was able to assist and support the efforts of local groups with the understanding of the need to create a well-balanced, well-rounded community. Therefore this assessment was partially successful in ascertaining how effective the management strategies implemented to achieve the respective objectives has been. It has served to highlight some of the information gaps in the educational material generated and how effective it has been in influencing the behaviour of stakeholders in the NMP. What was also identified were the groups where more efforts are needed to inform and update them on management performance, their role in MPA success and the regulations that apply to certain activities and resources in the NMP. Due to the subjective nature of environmental and social sustainability that is highlighted in the second management objective, information pertaining to this may be hard to quantify using the indicator that was chosen. The evaluation has failed to indicate whether this MPA objective and its related goals are being achieved. For future assessments there may be a need to simplify the terms of this objective to make evaluation simpler or make use of another indicator that may be more capable of measuring the parameters laid out in the management objective.

6 EXISTENCE OF A DECISION-MAKING AND MANAGEMENT BODY (G2)

6.1 Background

The establishment of MPAs requires the implementation of an institutional and legal framework which provides the administrative structure within which the processes of management planning, creation of rules and regulations and enforcement maybe carried out effectively. Each of these functions is absolutely necessary if the goals and objectives of such systems are to be realised. The primary function of these areas is at the protection of target species as well as to safeguard critical habitats that occur within its boundaries (Berkes *et al* 2001). In many cases absolute restriction of human activities is not done, but regulations to restrict different types of activities, the times of year at which they are conducted and the amount of harvesting of resources that is allowed, are stipulated. It is because MPAs by their very nature will result in the restriction of activities that some degree of enforcement and resource management is necessary.

The role of managers of these systems should be recognised within legal text that expresses the statutory basis by which their authority and mandate to make management decisions must be upheld. In many cases the designation of protected areas is done after considerable human development has taken place and there has already been significant anthropogenic impact on the environment. In spite of this, the maintenance of ecosystem health and sustainability cannot be considered within a vacuum. In many protected areas, management bodies need to strike a balance between the protection of the environment and allowing sustainable economic and social development to continue. The challenge for managers lies not only in how to manage coastal resources but on how to effectively use the information about, and represent the interests of, a diverse group of stakeholders (Berkes *et al* 2001).

For any management body to be able to function effectively there must be clear knowledge of the goals and objectives that such an entity has set for the establishment of a protected area system. These objectives will steer the decision-making and enforcement process in a way that will maintain transparency and accountability as well as consider equitable solutions that incorporate

all players that have vested interest in the area. Participatory approaches to the management process have been found to increase the success with which MPAs can be managed. This may be done through the consultation of these persons during the management process or the formal incorporation of their representatives into the management system. Management bodies within government agencies responsible for environmental management and protection work within bureaucratic limitations, with stringent budgets and limited institutional capacity. Often times they are the regulating and management agencies responsible for protected areas. However this is not their sole function. Limited funds and expertise must be spread across a wide cross section of environmental concerns of which natural resource management is just a small part. This is especially so in developing countries where given the tight budgetary situation, environmental concerns are viewed as an impediment to development possibilities and opportunities for economic gain (Figueroa 2002).

Nevertheless many of these countries, such as Jamaica, are signatory to international environmental agreements and as such must uphold the political obligations that have been stipulated (Figueroa 2002). Despite the weak economies in many developing countries, these multilateral agreements have acted as the impetus for the designation and proper management of protected areas. It is this atmosphere that has set the stage for the incorporation of co-management agreements for protected areas not only in the NMP but across the Jamaican landscape. Co-management can be defined as the sharing of power and responsibility between the state and resource user groups in the management of natural resources (Pinkerton, 1989). NGOs that have actively sought the delegation of management for these areas provided the Jamaican government with a prospect of new resources, increased institutional capacity and funding that was otherwise inaccessible to government agencies. In addition to this, provision had been made for co-management partnerships between state agencies and various types of resource user groups within various policy documents of the Natural Resource Conservation Authority (NRCA). This allowed this organisation the legal framework within which delegation of certain management functions to NGOs could be made (Figueroa 2002). The legal mandate for management of the NMP has been delegated in such a fashion to the National Environment Planning Agency and the Negril Coral Reef Preservation Society. This method is hoped to improve the management of the area which is critical to the success of any MPA.

It must be noted that there are different degrees to which co-management may be applied and even in arrangements such as that seen in the NMP, the management body is not always given the responsibility to make management decisions. This disparity may have serious implications on how effective management can be when there is dissociation of these two important functions. The evaluation of this indicator highlights the bodies responsible for the management of the NMP as well as their mandates to make relevant management decisions.

6.2 Methods

This indicator was evaluated through the collection and analysis of existing documents from theNCRPS. Provision of these documents was facilitated by Elsa Hemmings, Administrative Manager of the NCRPS, for them to be analysed by Erwin Caine, a NCRPS director. Additional analysis was conducted by Donna Roach, CERMES graduate student assigned to the NMP.

The aim of this evaluation was to list as well as provide a narrative description of each of the various groups within the NMP that were responsible for management of the area. This narrative

should include a description of their mandate to make management decisions with regards to the MPA (Pomeroy *et al* 2004).

6.3 Results

The National Environment and Planning Agency (NEPA) represents an amalgamation of three pre-existing state agencies: NRCA, the Town Planning Department (TPD) and the Land Development and Utilisation Commission (LDUC). Resulting from the work of the Government of Jamaica Modernisation Programme, this agency became operational on April 1, 2001. It is the lead agency with respect to environmental protection and planning with responsibilities which include natural resource management and enforcement of environmental legislation. One of the agency's primary responsibilities include the maintenance of a system of national parks and protected areas while enforcing environmental laws and regulations that have been outlined under six legal acts. In addition to these, the activities and management strategies of the organisation are guided by a number of environmental policies. The Acts that comprise the legislative mandate as well as the policies that guide the processes within NEPA are outlined in Table 6.1.

Provisions were made in the legislative mandate of the NEPA for the allocation of co-management agreements for resource user groups that expressed interest in managing protected areas. Section six of the NRCA Act of 1991 allows the Authority to delegate any of its functions, with the exception of the drafting of regulations, to parties that are deemed fit to do so (Romulus 1996). These parties may include any agent, member or officer of the Authority chosen to share responsibility for management functions. Delegation for the management of the NMP was granted to the NCRPS in 2002 after a successful bid and the submission of a management plan for the area to the Authority (Lapointe and Thacker 2002). However NEPA remains the decision-making body in the management structure for the NMP.

The NCRPS was established in September 1990 in response to a significant decline in reef health and degradation of the reef systems in the Negril area (Blackman 2005). In response to immediate threats to ecosystem health a local NGO was born, initiated by a group of dive operators who had witnessed this decline. It is a non-profit NGO whose focus is the conservation of reef ecosystems through the implementation of engineering and educational strategies aimed at increasing public awareness and mitigating boat and anchor damage. A mooring buoy project was launched in 1991 where 35 state of the art devices were anchored (Lapointe and Thacker 2002).

The primary mission of the organisation is the protection of coral reef ecosystems through public education, research, training, monitoring and lobbying as well as the creation of marine protected areas (Thacker *et al* 2003). Environmental education has been used as a management tool by the NCRPS and is exemplified through the creation of the Junior Ranger Programme where young people graduate with basic proficiency on environmental issues and strategies (Romulus1996). The organisation also has an extremely comprehensive coral reef and water quality monitoring program and has created a design for a resource use zoning programme for the NMP.

Table 6.1 Legislative instruments which guide the processes within NEPA

Legislative mandate of NEPA	Policies guiding the operations of NEPA
The Natural Resources Conservation Authority Act;	Jamaica National Environmental Action Plan (JaNEAP) 1999-2002
The Town and Country Planning Act;	National Physical Plan
The Land Development and Utilization Act;	Policy for Jamaica's System of Protected Areas – 1997
The Beach Control Act	Biodiversity Strategy and Action Plan (Draft)
The Watershed Protection Act	Watershed Management Policy (Draft)
The Wildlife Protection Act	Beach Policy for Jamaica (Draft)
The Natural Resources Conservation Authority Act	Jamaica National Environmental Action Plan (JaNEAP) 1999-2002

Source: National Environment and Planning Agency, 2006

The NMP was declared a protected area on 4 March, 1998 and the NCRPS received official responsibility for the management of this area when the proposed management plan drafted for the NMP was approved in 2002. The management plan contained the main goals and objectives of the organisation. NCRPS was declared an agent of the NRCA where legal grounds for management responsibilities were outlined in a delegation instrument used in this arrangement. The responsibilities of the state, obligations and functions of the NCRPS, procedures for implementation, sub-delegation arrangements, and reporting and terminating procedures are stipulated within this document (Thacker *et al* 2003). This instrument is valid for a term no longer than five years after which it may be renewed by the NEPA with the consent of the NCRPS.

The organisation is comprised of a board of directors as well as administrative and field staff. This board consists of 22 members who represent a variety of stakeholder groups and business houses. Each member is elected to a position by previous members and will serve in that capacity for a period of one year. Decisions are made through a democratic process where each member may vote on any resolution, which will only be approved through the unanimous decision of its members. Board meetings are held on a monthly basis where matters pertaining to funding, implementation of management programmes and updates on the status of ongoing projects are discussed. Any major decisions that pertain to the NMP or the NCRPS must receive the approval of the board of directors before it is implemented.

The Negril Area Environmental Protection Trust (NEPT) came about as a result of the NCRPS workshop of 1993 where the impact of land based sources of pollution on reef health was highlighted. The recognition that poorly treated sewage and unsustainable agricultural and land use practices had such a great impact on marine ecosystems provided the impetus for a conceptual shift from ecosystem management to whole watershed planning for the Negril area. The shift in the paradigm of natural resource management embraced the idea that single ecosystems did not exist or function within a vacuum and that the coastal environment was a large complex system comprising a nexus of linkages capable of transmitting impacts for one point to another. In order to facilitate such a shift, the formulation of a local advisory committee began at the 1993 workshop which would later lead to the creation of NEPT. This organisation is comprised of sixteen other organisations and agencies and was officially established in 1994.

NEPT became the environmental umbrella organisation for the Greater Negril Area and was delegated as the Local Advisory Committee for Parks and Protected Areas under the NRCA Act No.9, 1991 (Romulus 1996). The mandate for the NEPT at this time included working towards the establishment of the Negril Green Island Environmental Protection Area as well as drafting the Negril Environmental Protection Plan. The plan contains the role and functions of all organisations responsible for management within the EPA. At present this body holds the responsibility for environmental protection and ensuring sustainable development within the EPA through the promotion of environmental education, the management of Parks and Protected Areas, monitoring as well as the solicitation of funding for local environmental projects and activities. The current management structure of the NMP is highlighted in Figure 6.1.

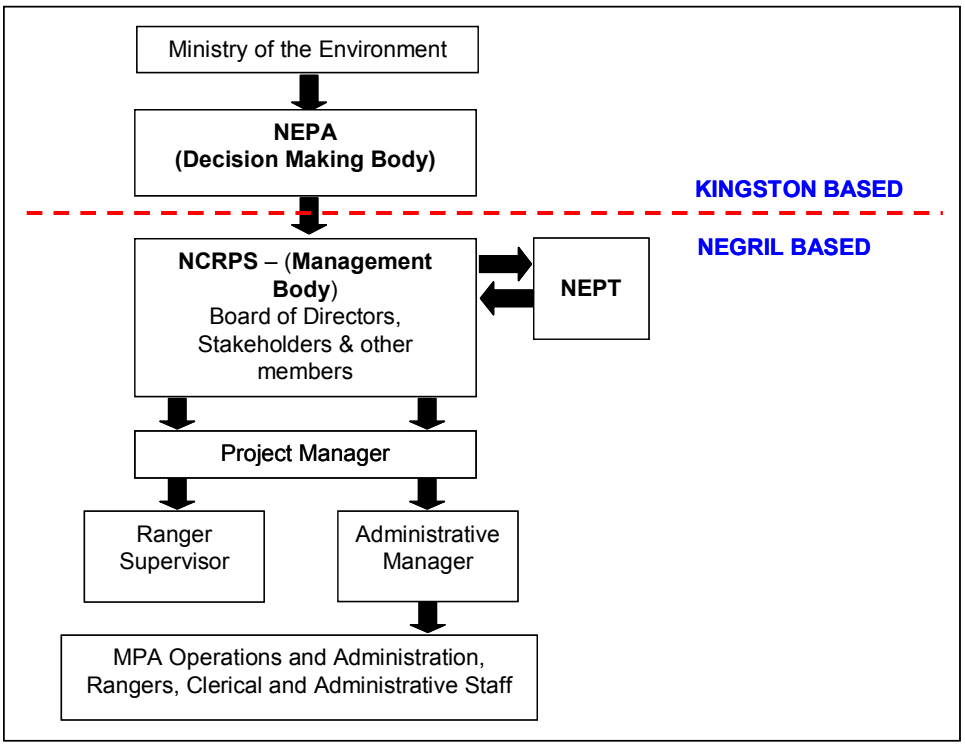


Figure 6.1 Current Management structure of the NMP

6.4 Discussion

Management effectiveness is a critical factor in MPA success. It can only occur through the establishment of truly capable management bodies that have the legal framework and the governmental support to carry out the functions that are necessary to realise the goals and of the NMP. The use of co-management to realise these goals has several benefits. Among these are the decentralisation of power and authority to resource user bodies that will be directly affected by any strategies implemented and any restrictions which will be enforced. The ability to play a meaningful role in the decision-making process is especially important to these groups. State agencies benefit through reduced challenges to their authority and shared as opposed to sole responsibility for protected area management.

In the Jamaican context however, the problem lies with the failure of state agencies to make genuine efforts towards true co-management (Figueroa 2002). There has been a tendency to delegate state functions and authority, leaving small and inadequately equipped NGOs with the

sole responsibility for management. This is not how the system was designed to work. These NGOs, such as NCRPS, which are small and non-profit in nature usually lack the institutional capacity and the financial stability to rise to such an overwhelming challenge. The NCRPS cannot on its own realise effective management of such a large social, political and geographically diverse area in the NMP. Government agencies need to uphold both their political and financial obligations to these resource user groups. This includes honouring the amendments made in the regulations for the collection of user fees as well as disbursing management fees in a timely manner as long as proper documentation of managements efforts have been recorded and submitted for approval.

In addition to this provisions should be made in delegation contracts that support effective enforcement measures that can be carried out by the management bodies. For the most part these agencies must rely on other government groups to carry out enforcement measures such as the powers of arrest. Patrols conducted by park rangers are not always done in the presence of representatives of these agencies such as the Marine Police. It is not always possible for video or photographic evidence to be gathered at the time that these transgressions are taking place. Additionally the organisations must then rely on the discretion of these agencies to determine whether or not they consider these crimes of sufficient importance that they warrant arrests. These factors have the ability to undermine any enforcement strategies that would implemented upon the establishment of management agencies.

The institutionalisation of adequate co-management strategies in Jamaica will take some time. Management is currently conducted in an environment where there is a history of authoritarian structures that promote the disempowerment of people who are not accustomed to being encouraged to take responsibility for their environment (Figueroa 2002). However recent experience has signalled a need for a framework that supports genuine co-management efforts and greater political and financial support for delegated NGOs as opposed to assigning sole responsibility for protected areas to organisations such as the NCRPS.

The evaluation was unable to indicate whether there was accountability or transparency in the financial and administrative systems, or the extent to which this management objective was being achieved. There was a need to tailor the assessment process in order to evaluate the parameters that were relevant to this specific objective. The evaluation steps outlined in the guidebook provide a guide by which the process can be carried out. However, each MPA has different objectives and each evaluation team has different capabilities. By bearing these factors in mind when devising strategies for the assessment process it increases the effectiveness of the indicator to adequately assess site specific objectives and effectiveness of management in a particular MPA.

7 AVAILABILITY AND ALLOCATION OF MPA ADMINISTRATIVE RESOURCES (G6)

7.1 Background

The ability with which an NGO is able to meet its management goals and objectives is directly related to its ability to access the administrative resources to do so. Once obtained, the manner in which they are allocated among various organisational tasks determines the capability of the management team to administer and complete specific activities (Pomeroy *et al* 2004). Such resources include the time that is available in which to adequately complete management tasks, current institutional capacity and accessible financial resources. The resources must be carefully

balanced and crossed referenced with the long term strategic goals of the NGO. Consideration must also be given to how these goals will be able to increase the potential with which management strategies may be effective.

NGOs often work within limited budgets where a significant portion may be derived from the donations and grants of funding agencies. Given the mandate to manage complex and dynamic environments, a variety of activities must be employed in order to realise conservation efforts and effect necessary change. This responsibility may involve the implementation of several activities. It is imperative therefore that all administrative resources are carefully monitored and allocated. It is essential that they are directed to where they would have the greatest impact in a timely and appropriate manner. Managers must have a full understanding of the nature of the activities to be undertaken so as to make informed decisions relating to the skill and experience of the staff needed to conduct specific tasks or the amount and type of training that must be employed, budgetary requirements and equipment needs.

7.2 Methods

Information was gathered through the analysis of existing documents made available by NCRPS. The documents included personnel records, budgets, the operations plan and equipment inventory/assets. Erwin Caine, a NCRPS director, led the analysis of this indicator with the administrative resources being provided by NCRPS. Further analysis into planned management programmes, equipment and financial needs and the allocation of resources was done by Donna Roach (CERMES graduate student) using the information contained in the 2006-2007 Operations Plan. The facilitation of access to the relevant documents was made possible by Elsa Hemmings, administrative manager for NCRPS.

7.3 Results

Table 7.1 highlights the management programmes the NCRPS seeks to implement, the available and required budget for each programme as well as the equipment necessary to complete relevant tasks. Staff requirements are also outlined for each undertaking. These results have been adapted from the 2006-2007 Operations Plan for the NCRPS.

The NCRPS has attempted to undertake several programmes which it deems relevant to the goals and objectives laid out in its management plan. Allocation of resources in each case has been determined through careful consideration of unique project requirements as well as specialised skills that may be necessary. In all cases the budgetary requirements have been outlined and account for every aspect of the programmes. Where appropriate the staff requirements for each programme as well as the specific responsibilities that will be undertaken and duration of each task have been approximated. However the equipment requirements for specific tasks are not always clear. Although mention has been made of the expected project outputs for each initiative, whether this equipment is available, if additional equipment is necessary and any further costs that may be incurred was not explicitly stated. It is however apparent that there is an urgent need for additional staff with the necessary skills and experience to carry out project activities. For several of the initiatives, the training of staff members has been taken into account to ensure that each team member is equipped with the skills needed to carry out specific tasks. Several programmes such as Disaster Preparedness and Emergency Management have included training workshops and the preparation of training material for MPA staff. It should be noted however that management fees received from NEPA have been used to fund several core functions and activities particularly under the administrative programme.

The greatest number of staff as well as the largest portion of the required budget has been allocated to administrative functions. These functions require an amount of JA$17,703,058 to be carried out effectively, which accounts for approximately 57% of the total budget. This total can be justified by the scope of administrative functions which play a major role in all of the proposed programmes. These range from proposal writing to database development, correspondence and the hiring of additional staff when necessary. These activities play a major part in most of the initiatives. In spite of this, the cost is absorbed within the allocated budget for NGO administration. It should be noted that management fees received from NEPA have been used to fund several core functions and activities particularly under the administrative programme.

The Visitor Management (5.4%), Resource Management (4.4%), Education (4.2%) and Financial Stability Programmes (3.1%) require a substantial amount of the total budget in order to be to be implemented. Adequate trained personnel will be required to ensure that all programmes are brought about in an efficient and expedient manner. In many cases additional staff will have to be hired or contracted to perform specialised tasks.

Lobbying (0%) and Public Relations (0.2%) were allocated smaller portions of the total budget. Though a select few persons were cited as being needed for these initiatives, persons capable of carrying out duties that are unique to each programme need to be hired or contracted.

Table 7.1 Management programmes, current allocation of resources and projected resource needs of NCRPS

Programmes	Staff requirements		Equipment requirements		Budget allocated (Jamaican$)	
	Available	Required	Available	Required	Budget required	Budget available
Administration	Project Manager, Administrative Assistant, Accountant	Executive Director, Director of Scientific Programmes/Assistant Park Manager, Education Officer Rangers (level one) Gift Shoppe Manager, Project Manager Administrative Manager, Accountant	Office Equipment Office Supplies, Pick up Truck	Office Equipment Office Supplies Pick up Truck	17,073,058	1,919,537
Disaster preparedness and emergency management	Project Manager, Ranger Corps (Head Ranger and 3 rangers)	Project Manager, Education Officer Ranger Corps Non MPA Staff Required Members of ODPEM Members of Red Cross	First Aid Equipment, Oxygen Cylinder	First Aid Equipment Stretcher Boards Oxygen Cylinder etc. (A complete list of equipment that is required will be available after ODPEM training workshops have been administered)	210,000	0
Education	Project Manager Rangers	Project Manager, Development Advisor, Park Manager, *Education Committee, *Interview Committee, **Non MPA Staff Required** Consultant, Graphic Artist, NEPA Staff		Marine Park brochures/ map Posters Newsletters	1,259,000	0

Programmes	Staff requirements		Equipment requirements		Budget allocated (Jamaican$)	
	Available	**Required**	**Available**	**Required**	**Budget required**	**Budget available**
Enforcement	Project Manager Rangers	Project Manager, Ranger Corps, Assistant Manager, Development Advisor, Non MPA Staff Required NEPA Staff	2 Boats, 1 Pickup Truck	Boats, Vehicles, Enforcement Manuals, Ticket Booklets	550,000	0
Financial Stability	Project Manager Administrative Manager NCRPS Board Members	Project Manager Administrative Manager NCRPS Board Members NEPT Board Members **Non MPA Staff Required** Development/ Marketing Consultant	Promotional Material	Promotional Material	921,000	0
Lobbying	Project Manager	Project Manager Education Officer Development Advisor **Non MPA Staff Required** *Scientific Advisory Council		Fact sheet for staff and board (based on the results of research and to be used for discussion with stakeholders	0	0
Public Relations	Project Manager	Project Manager Education Coordinator Development Advisor			60,000	0

Programmes	Staff requirements		Equipment requirements		Budget allocated (Jamaican$)	
	Available	Required	Available	Required	Budget required	Budget available
Research and Monitoring	Project Manager Rangers	Project Manager Ranger Corps Development Advisor **Non MPA Staff Required** Scientific Advisory Council	Laboratory Equipment Sampling Equipment 2 Boats Vehicle Diving equipment Recording devices **(Laboratory unable to test marine samples due to high dilution factor)**	Laboratory Equipment Sampling Equipment Research Boat Vehicle Diving equipment Recording devices	765,000	0
Resource Management	Project Manager Rangers	Project Manager Rangers Development Advisor			1,326,000	0
Sustainable Community Development		**Non MPA Staff Required** Development Consultant			180,000	0
Visitor Management	Project Manager Rangers	Project Manager Development Advisor Rangers **Non MPA Staff Required** Scientific Advisory Council Development Consultant	Dive and snorkel equipment	Dive and snorkel equipment Mooring buoy Maps	1,626,000	0
Zoning	Project Manager Rangers	Project Manager Rangers Education Officer **Non MPA Staff Required** Graphic Artist Development Consultant		Brochures/ Maps Zoning Maps Demarcation Buoys	300,000	0

7.4 Discussion

There are two major and readily apparent variables that limit the capacity of the management team to be able to effectively administer and complete a number of activities within the NMP. These are the glaring lack of funding available to implement each programme as well as limited institutional capacity. The only programme in the Operations Plan that has an existing budget is the Administrative Programme. For all others there are no amounts stated for existing budget allocations. This is one of the main reasons why the NCRPS has emphasised that the focus of its Operations Plan will be on attaining financial stability. So dire are the financial straits that a failure to immediately act on this problem will have serious implications on their decision to accept or reject the offer to renew the contract to remain the official delegated body for management of the area. Not only does it affect the NGO's ability to remain operational but it also affects its capability to carry out effective management and implement programmes or activities that will increase the success and viability of the NMP.

Directly related to this is the lack of institutional capacity. Without proper funding the additional staff that need to be hired or contracted who have the necessary skills and expertise to carry out tasks unique to each programme where their skills will be needed, will not be possible. Some of the staffing needs may be addressed through creative processes such as soliciting volunteers or providing internships for students. These options have recently been explored. Volunteers have been accepted from the Peace Corp Programme which contracts out volunteers for a specified time period. The structure of this programme provides the participants with incentive to carry out work required in an efficient and professional manner. However, volunteers may not be as reliable as fulltime staff provided with financial incentive to carry out their duties. In addition to this, investments may have to be made in training each new group of volunteers to carry out particular tasks when they may not feel the kind of obligation of hired staff to see their activities through to completion.

In the Operations Plan, allocations for budget and staff are outlined. The Administrative Programme due to its pervasive and broad based nature has been allotted the largest portion of the required total budget of JA$ 30,002,511 (US$ 476,230.33). Each undertaking encompasses some administrative functions which have been accounted for in that budget. Visitor Management, Resource Management and Education have all been given the largest portion of the budget after the Administrative Programme. Each speaks in some manner to the underlying goals and objectives of the NMP. The first addresses the issue of carrying capacity and identifying the number of visitors that can be facilitated in the NMP without having adverse effects on the environment. Resource management encapsulates one of the main purposes of the formulation of the protected area which is the conservation of natural resources through monitoring and enforcement of MPA regulations. The Education Programme seeks to make stakeholders aware of environmental issues, their impact on the NMP as well as enlighten them on the roles they may play in coastal conservation through addressing their knowledge, attitudes and perceptions in a way that may lead to behavioural change. It is not clear however if some of the strategies in the Visitor Management Programme are intended to generate income in addition to disseminating knowledge given the large amount of funding allocated to the community based educational tours.

Surprisingly, not as much of the budget has been geared towards the main goal of financial stability. However the NCRPS has sought to involve the board members of both their organisation as well as those of NEPT which is represented by several organisations. This

attempt at a combined effort to tackle a problem that has plagued both organisations as well as outside assistance in marketing and programme development may increase the probability of the formulation of effective strategies to address the issue as well as increased lobbying power to state agencies for promised financial assistance. Perhaps given the stagnating financial situation of the NGO and its ability to cripple the organisation, entirely more funding and more persons should be directed towards this endeavour.

In situations such as the one that faces the NCRPS it is difficult to gauge the management priorities of the NGO and say definitively how they fit into the long term strategic plans of the organisation solely based on current funding, staffing and budget allocations. Though proposed activities and budget requirements may give some indication as to the desired management direction of the NGO, current resource allocation does not present a representative picture. This is largely due to the fact that current allocation of administrative resources is done in a reactive manner rather than proactive one where resources may not be allocated based on long term objectives but on the immediate needs of the NGO. This has and will continue to impede the effectiveness of the management body and the capability with which they can achieve management objectives.

The ability to evaluate the management objectives linked to the indicator varied significantly from one objective to another. Although the financial constraints that impeded management could be deduced from the results, the assessment failed to give any indication of the amount of effort placed in the development of an active volunteer programme and whether any such attempts have been successful. The appraisal of staffing, training and equipment needs was moderate. In this case it presented a picture of what was needed but failed to highlight what resources the NCRPS already possessed, the quantities in which they could be found and the present condition of any equipment. The assessment also emphasised the need for the organisation to hire additional staff while highlighting the conditions which impeded this process. Suggestions for alternate methods such as volunteers were put forward. The indicator selected for this evaluation process was appropriate for the assessment of the related management goals and objectives. However the lack of information obtained at the time the research was conducted impeded the scope of the evaluation and reduced the ability of the indicator to successfully gauge the effectiveness of the management strategies in all areas.

8 SUCCESS OF FUNDRAISING STRATEGIES (REVENUE AND DIVERSITY OF SOURCES) THAT FORM PART OF THE BUSINESS PLAN [NEW INDICATOR]

8.1 Background

One of the recurrent challenges of many NGOs is in establishing ways in which they can sustain and support themselves financially. These organisations are generally supported in large part by donations and grants from funding organisations or municipal bodies. Many have sought to diversify their sources of income as a means of changing the funding status quo that generally typifies these NGOs. This donor-grant relationship creates a dependency on project grants and government subsidies. As a result financial support is often reliant upon donor preferences and fund availability. In addition, donor funds are earmarked for particular projects or for limited cycles where donors often attach very specific limitations on how money can be spent (Davis 2004). In many cases these funds are meant only to finance activities that are specific to the project or programme and are not intended to assist with ongoing operational and core expenses. Institutional or organisational development is not a priority for donor agencies that place more

emphasis on the project activities for the NGO and not on sustaining the organisation itself (Davis 2004). This creates a problem for NGOs which are generally non-profit in nature and may have great difficult meeting their day to day operational expenses. In some cases NGOs are forced to undertake projects where the project priorities may not be aligned with their long term strategic plans but provide a viable source of funding. This situation may be pronounced in developing countries where there is little scope for attaining local funds. Political preferences, social issues which are given higher priority and the discretionary income of the general population may impede local philanthropy (Davis 2004).

Solely depending on external funding as a means of attaining capital places NGOs in a tenuous financial situation. This has the potential to undermine the sustainability of such organisations and reduce the ability with which those that manage marine parks can do so. Ultimately it has serious implications on the success of protected areas. Diversification of income generating activities is the only way that NGOs such as the NCRPS can realise financial independence and stability. In addition to this, it would allow them the freedom to determine their own programmatic priorities irrespective of donor preference (Davis 2004). In recognition of this many NGOs have sought to implement money-making ventures in their management strategies so as to strengthen their financial base and to achieve enough income to at least be able to finance ongoing operational costs.

When the NMP was first envisaged it was thought that it would be supported by the National Parks Trust Fund. This fund was started as part of a project initiated by the Jamaican government and the USAID funded Protected Areas Conservation (PARC) project which commenced in 1989. The first phase of the project included the establishment and provision of funding for the management of the Montego Bay Marine Park (MBMP) and the Blue and John Crow Mountain National Park (B&JCMNP) (NCRPS n.d.). The second phase was to include funding for the establishment and management of the NMP. This phase was cancelled due to budgetary constraints. Since that time the fund has not experienced the growth that was expected and at present is only able to meet part of the financial needs of the MBMP and the B & JMNP.

Funding for NMP management was also expected in the form of the implementation of user fees. The Minister of the Environment signed an amendment to the park regulations which made provision for its implementation. The user fees were seen as a long term source of income for the management of the NMP. As it currently stands there has been limited support for the NMP by the Jamaican government. Although provision has been made in section 3.1 of the delegation instrument for the disbursement of management fees from NEPA since 2002, the first instalment of these fees was only granted in the first quarter of the 2006-2007 financial year. In this instance NCRPS received the sum of JA$4.8 million (approximately US$64,453.13) to cover the period March 2006 to February 2007. No real collaborative effort has been made towards the implementation user fees. In addition to government support and donations from various agencies, the NCRPS has outlined several fundraising ventures they had hoped to implement to offset the cost of operations. These included the sale of boat moorings, setting up of a gift shop, community based educational tours and other fundraising and marketing strategies such as bingo nights, and more aggressive proposal and grant writing for funds. It was originally thought that the park would be able to operate without the need for grant funding. However, in the absence of the Park Trust, outstanding management fees as well as the failure to implement the user fees, NCRPS is forced to depend on donor funds and the expected income from the initiatives listed above to effectively manage the NMP.

Financial sustainability is essential to the general operations of the NGO and has great bearing on the ability of the NCRPS to effectively manage the area as well as to implement strategies that may improve current management. It is imperative therefore for organisations such as this to evaluate their current financial situation in an effort to predict how it may impact on the viability and effectiveness of the organisation. This study seeks to evaluate the success of the various fundraising strategies and activities that may have been incorporated into the business plan and annual operation plan for the NCRPS. The level of success will be measured based on projected and received revenue as well as resources obtained from various sources that are needed to run the NMP.

8.2 Methods

A team from the National Environment and Planning Agency (NEPA) conducted an audit of the financial strategies of the NCRPS. This audit included an evaluation of the fundraising strategies of the organisation for the fiscal years 2004-2005, 2005-2006 and the first quarter of 2006-2007. The audit team consisted of Bernard Blue who led the evaluation and Rupert Price from NEPA's internal audit department. Elsa Hemmings of NCRPS provided the documentation for the analysis.

The audit covered the period April 2004 to March 2006. Staff interviews were carried out as part of the evaluation and several records were examined during the analysis. These included the Operations Plan, the Business Plan, Income statements as well as correspondence from donors.

The main objectives of the audit were as follows:

1. To assess whether the fund raising activities embarked on were sound and productive
2. To ascertain whether projected objectives were achieved

The audit was carried out from 17-18 May, 2006 after which a report of the findings was submitted by the audit team. The report was collected and analysed by Donna Roach, CERMES graduate student assigned to the NMP. Below is a summary of the results presented by the auditors.

8.3 Results

A review of the operational plan of the NCRPS was conducted. It disclosed that the organisation intended to generate a minimum of US$300,000.00 (approximately J$19,500,000.00) in revenue, to support basic operating costs in the years 2004-2006. The proceeds were to be realised from the following sources:

- User fees
- Government support and
- Grants

The amount projected to be raised from each source was not determined by the audit. The operations plan indicated that the NCRPS also aimed to raise US$793.65 (approximately J$50,000.00) to seed a Marine Park Trust Fund by December 2005 via the under mentioned sources:

- Retail sales of souvenir items
- Community-based educational tourism

- Private and corporate donations
- Fund raising events (e.g. Bingo Party)

Table 8.1 illustrates the proposed income generating events outlined in the Business Plan and an indication of the level of their success. It should be noted however, that the implementation and success of these plans could not be substantiated or analysed as no supporting documents or reports on the various ventures undertaken were presented on request, for examination during the audit review exercise (Blue 2006).

Nevertheless the perusal of several Income Statements of fundraising ventures embarked on by NCRPS revealed that the entity was successful in surpassing its set target of J$19,500,000.00 by J$10,429,336.18 (over 53%) achieving an actual intake of J$29,929,336.18. It is to be noted however, that the Income Statements submitted were not audited (Blue 2006).

Table 8.1 Proposed income generating events and their level of success

Proposed fundraising activities	Level of success of fundraising activity
User fees	None:Provision has been made for the implementation of user fees through amendments made to the park regulations by the Minister of the Environment. These have yet to be brought into force.
Management fees	None: These were to have been provided by the regulatory agency NEPA upon receipt and verification of activities that have been carried out by the NCRPS. These fees are still forthcoming.
Gift shop	Little: Though the physical space for the gift shop had been provided for at the NCRPS headquarters no formal arrangements have been made for its set up within the building. However some souvenir items such as novelty T- shirts and Polo shirts have been sold. No indication of the level of sales and demand for these items has been determined by this study.
Sale of mooring buoys	Little: According to the Business Plan equipment is available for sale and installation of buoys upon request. Personnel at the NCRPS are trained to do such installations. So far approximately six buoys have been requested, sold and installed by various hotels in the area.
Community based educational tours	None: This initiative has yet to be launched. It is unclear from this study how much planning has gone into this programme and how soon or if it will still be initiated.
Fundraising/ marketing of the park	Moderate: Most of the generated income for the NCRPS comes in the form of grants from various donor organisations. These funds are used for programmatic activities as well as core and operational costs. These initiatives have had a fair share of success and have managed to keep the organisation operational and able to carry out many of its management functions. Fundraising ventures have been marginally successful and have included such events as Bingo Night.

8.4 Discussion

In the absence of some of the documents that were requested during the evaluation, the auditors have suggested that the NCRPS streamline its administrative management structure by implementing measures to synchronise its administrative functions with the accounting

functions. For instance, information pertaining to sources and receipts of funding should be documented. Additionally, proper records, inter alia (minutes of meetings, correspondence including commitment letters, details on seminars, and records of educational events) provide substantive support for accounting entries and improve transparency (Blue 2006). The lack of appropriate documentation has bearing on the accuracy and effectiveness of the evaluation. In fact it was impossible to comment with any authority on the soundness or sustainability of the fundraising strategies employed by the NCRPS or on the level of commitment of donors to the organisation due to the absence of the relevant documents (Blue 2006).

It is clear that many of the income generating ventures that had been proposed have not done well enough to support the operational functions of the NCRPS. However the report suggests that the financial situation of the NGO is a good one in light of the fact that projected income generation was exceeded by a substantial sum (53%). These facts viewed solely as they are stated, have the potential to be misleading and may suggest that the NCRPS is doing better financially than it actually is. The figures calculated in the evaluation were aggregated sums and gave no clear indication of how much each activity contributed to the total sum or what percentages were being used for project activity as opposed to core operations needed to keep the NCRPS functioning effectively. This information does not contain the relevant details on which to make informed management decisions and required changes to, and diversification of, financial strategies implemented. It is imperative that the financial records highlight the sources of funds, how much each contributes to various management functions and the viability of each source. By doing this managers will be better able to pinpoint where changes need to be made to financial strategies and where more creative thinking is required to increase income generation. The success of each strategy can then be measured and informed decisions on whether or not the strategies are benefiting the organisation will be more expedient.

The NCRPS had stated that due to the dismal financial situation, it is unwilling, and in some cases, unable to implement new financial strategies due to the capital that would be necessary for start-up costs (NCRPS 2002). In making this decision however greater efforts need to be placed into making pre-existing programmes more lucrative. This may include improved and creative marketing strategies. This is not to suggest that the possibility of seeking alternative strategies that may be better suited to the institutional capacity, marketing capability and business skills of the employees should be dismissed.

There is a need to utilise a committee or project team whose focus is solely on formulating, lobbying for and maintaining existing lucrative income generating strategies. General accounting is still necessary to maintain a high level of accountability and transparency, but accounting for and auditing in-hand finances is not enough. Pursuing lucrative donor grants as well as planning and implementing incoming earning strategies is crucial to the sustainability of the NCRPS and should be a priority for the organisation. Additionally, government agencies need to honour their financial obligation to the organisation. The failure of these agencies to release funds in a timely manner has placed greater strain on fundraising activities to generate the funds that are necessary to keep the NCRPS afloat.

This evaluation has served to highlight some of the shortcomings in the financial management of the organisation that have lead to a perpetuation of this situation. Although the aggregation of financial data may have been misleading, a review of financial documents and interviews with staff have confirmed their continual struggle to attain the monetary resources necessary to make this aspect of management more effective. However, although the deficiencies in finances were

highlighted, the evaluation failed to give any indication of whether the stakeholder awareness of financial stability was heightened. It is therefore impossible to say with any certainty whether this management objective has been achieved or comment definitively on the success of its implementation. Perhaps it would have been prudent to select another indicator which had the ability to accurately assess level of success in realising the management objective or to tailor the evaluation process so that it would be able to extract the necessary information to determine the effectiveness of this management strategy. The ability of the indicator to evaluate the management objective can be concluded as being unsatisfactory or poor.

9 LEVEL OF STAKEHOLDER PARTICIPATION AND SATISFACTION IN MANAGEMENT PROCESSES AND ACTIVITIES (G12)

9.1 Background

One of the factors that determine the success of any MPA is the level of active stakeholder participation in the management and planning processes. By integrating participatory management strategies into existing management frameworks it allows coastal resource stakeholders an opportunity for their views, concerns and suggestions to be freely communicated with the assurance that they will be given serious consideration in any management, policy or planning decisions that are made. By fostering partnerships between formal management agencies and resource users it gives all involved a sense of ownership and responsibility. Such sentiments garner support for management efforts and increase the sustainability of the MPA. All parties must be assured that there are benefits to be had from supporting and sustaining protected areas in order to increase the level of compliance with the policies and regulations that are implemented to maintain its viability. It is imperative from a stand point of effective resource management to be able to gauge both the level of stakeholder participation in the management process as well as the level of satisfaction with existing management strategies and activities.

Since the designation of the NMP as a MPA in 1998, agencies responsible for the management of the area have incorporated environmental education into their management strategies. Through the promotion of environmental education and awareness it is hoped to increase stakeholder participation as well as encourage sustainable resource use and environmental practices. Despite these efforts recent studies have highlighted the fact that many of these stakeholders consider governmental and non governmental organisations as having the primary responsibility for the management of the NMP (Pena *et al* 2005). Many perceive themselves as having very little influence on management. This is largely due to lack of communication between management agencies and members of the communities within the Negril EPA. Ineffective communication methods and an inadequacy to inform stakeholders about management issues have hindered active stakeholder participation (Pena *et al* 2005). It is absolutely necessary that management agencies invest in mechanisms through which stakeholders may be empowered to participate, be informed of management issues and have an opportunity to effect changes where there are necessary.

Stakeholder groups within the Negril EPA are numerous and diverse. Resource use within this area is just as varied. Management processes and activities are therefore perceived differently and affect groups in different ways due to the unique nature and issues of each group. Previous studies have sought to ascertain an opinion on the management of the NMP from various members of the communities within the Negril EPA. This study seeks to solicit the views of members of the management agencies, regulatory bodies, as well as various funding and donor

organisations which are often viewed as having the most knowledge and influence over the management process.

9.2 Methods

The evaluation of this indicator was done through the formulation of surveys which were aimed at obtaining information on participation and level of satisfaction with past and current management strategies from a selected group of stakeholders. This stakeholder group included the 22 members of the NCRPS board of directors, representative members of various member organisations and regulatory agencies as well as funding and donor organisations.

Survey forms were drafted and administered by June Masters and Tenile Grant of the Fisheries Division to the predetermined stakeholder groups. A copy of this survey instrument may be found in Appendix 3. Information on each of these groups and previous methods and levels of stakeholder participation was to be obtained via documentation at the NCRPS which was to be facilitated by the former director of the organisation, Carl Hanson. Interviews were conducted via phone where possible. In some instances survey forms were faxed or emailed to selected participants who could not facilitate telephone interviews and the forms were then returned upon completion.

These surveys were aimed at determining the type of organisations that contributed to efforts made by the NCRPS as well as the type and frequency of participation of each interviewee. Methods of participation were divided into contributions, lobbying, and fundraising. This exercise was also geared towards establishing the level of satisfaction that each participant had with current activities and the level of funds raised by the NCRPS. The awareness that each organisation had of current, past, and future activities of the NCRPS was also brought into question in addition their willingness to support any future endeavours of the organisation. Participants were also encouraged to give suggestions for activities that may help to increase the financial sustainability and management effectiveness of the NCRPS. Data from these forms were collected by Donna Roach (CERMES graduate student) and analysed using SPSS version 11 and Microsoft Excel applications where appropriate.

9.3 Results

The most common method of participation in the management process and activities of the NCRPS were done through contributing (82%) to the organisation. Of this percentage, 32% participated using this method only. This was the most frequent method seen among all three groups. The least popular method was through lobbying at 32% where 7% of this group used this method only. The highest figures for lobbying were seen among members of the board of directors of the NCRPS. No lobbying was carried out by any of the funding organisations. Fundraising was done by 46% of the respondents where 10% used this approach only. None of the member organisations interviewed engaged in fundraising activities, while 26% of the board members of the NCRPS acknowledged participating in this way. These results are illustrated in Figure 9.1. Most of the respondents (89%) claimed to have knowledge of the needs, financial and otherwise, of the organisation.

Many persons stated that they participated in management activities on a regular or continuous basis (35%). Several respondents only engaged in such activities when there was a scheduled meeting or planned event (25%). In some cases participation only occurred occasionally (21%).

Some respondents provided assistance only when it was requested (10%) and very few only took part on rare occasions (7%). This is illustrated in Figure 9.2.

Almost all of the respondents had an idea as to what activities had been undertaken by the NCRPS since its inception. There were no conclusive responses on any recent developments geared towards an improvement on management of the NMP. Most persons mentioned ongoing projects that had started prior to 2005. The most popular responses were projects that have been highly publicised such as the installation of the mooring buoys, the water quality monitoring programme and patrolling of the marine area by park rangers. Although NCRPS had been seen as having a lead role in many of the activities that had been undertaken to improve park management some respondents saw the organisation as having only a participatory role in projects undertaken and initiated by other organisations.

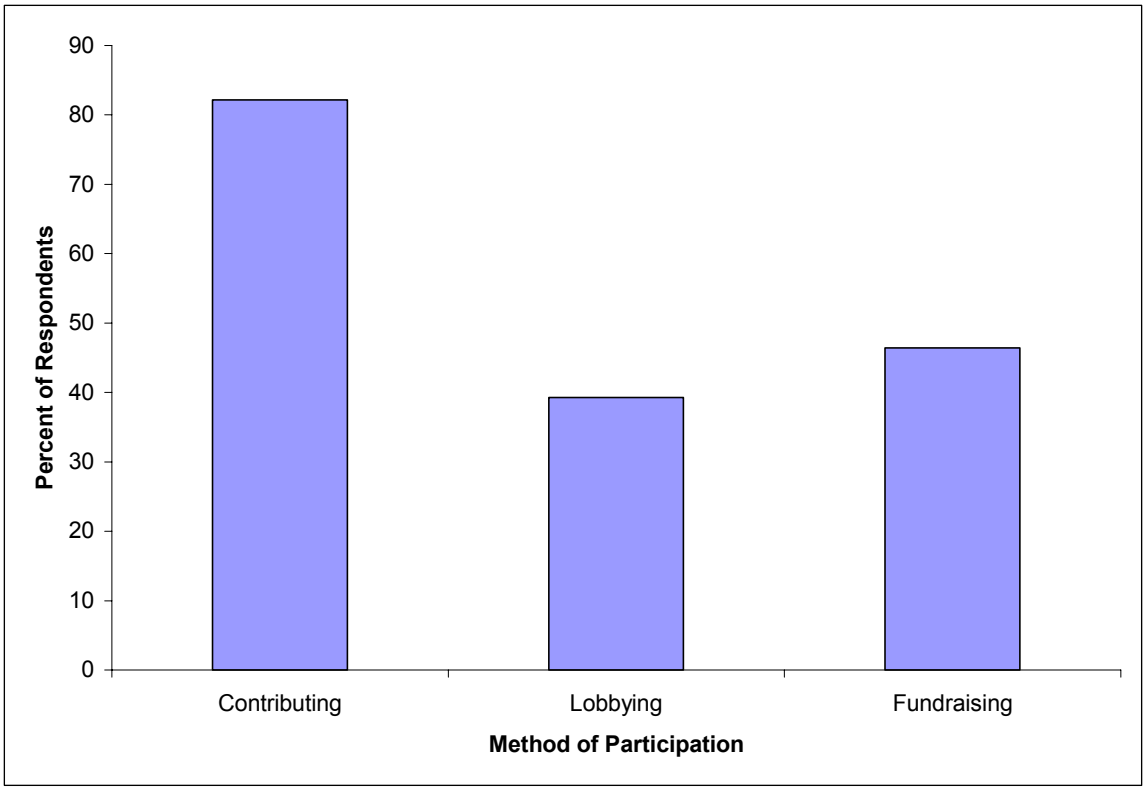


Figure 9.1 Methods of stakeholder participation s in the management process and activities of the NCRPS

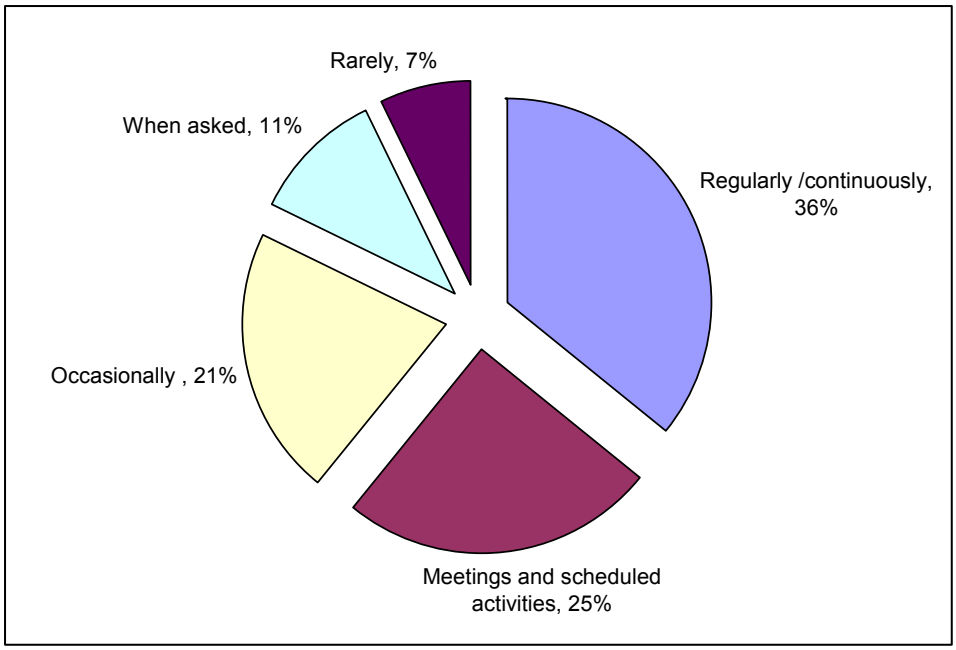


Figure 9.2 Frequency of participation by stakeholders of NCRPS

When given an opportunity to make suggestions on possible activities that may be implemented to improve management, a wide range of recommendations were made. Many of these suggestions related to improvements in financial stability. Respondents wanted to see a greater effort directed towards strengthening the financial base of the NCRPS through fundraising activities or increased governmental support of management efforts. Other recommendations included restructuring of the board to improve the efficiency with which it operates, more comprehensive educational programmes integrated into schools as well as targeting fishers, greater lobbying for support from regional organisations and state agencies, and the promotion of alternative livelihoods for fisher folk.

The majority of the respondents (89%) were not satisfied with the amount of fundraising activities undertaken by the organisation. Suggestions for improvements in this ranged from community based social events such as stage shows and Bingo games, to the provision of income generating marine research activities such as research diving. Many persons were in favour of the implementation of user fees for the NMP and thought that greater efforts should be directed towards lobbying for this cause. All interviewees expressed their willingness to support any fundraising activities undertaken by the organisation in the future.

Several methods were used to promote the NCRPS in the communities of the various respondents. Many of these included word of mouth where informal discussions were held with community or social groups. However formal meetings with fishermen and presentations to community organisations were also used to advocate the efforts undertaken by the NCRPS. Presentations to various organisations such as Negril Tourism Development Company (TPDCo) and international conferences such as Gulf and Caribbean Fisheries Institute conference were also used as sited promotion. Other forms of advocacy included the distribution of flyers with information on the NMP and NCRPS as well as participation and support for various ventures undertaken by the NCRPS that may have been publicised.

9.4 Discussion

From the results of the evaluation, as well as comments received from the interviewers, it would appear that there is some correlation between the type of relationship that existed between the stakeholders and the NCRPS and the level of participation each had in management processes and activities. The more distant the relation between respondents and the organisation, the lower the level of participation appeared to be. For example it was found that highest participation was often seen by members of the board of directors as opposed to donor and funding organisations. These levels increased for the latter if members of these organisations held a place on the NCRPS board and declined significantly once their representative was voted out. This may suggest that holding a position within the NCRPS fostered a greater sense of ownership and responsibility. Perhaps it is perceived that once this relationship was lost the level of obligation in the management activities was no longer expected or their influence on management decisions would not be as significant. In addition to this, it is easier for smaller entities or individual participants to devote more time to higher levels of participation. This NGO is one of many recipients of donations and grants from large international donor agencies. These agencies issue monetary or other donations to several organisations in several areas. As a result of this they do not have the time or institutional capacity to dedicate as much human resources to assist in the management functions of each NGO that they sponsor.

Greater efforts must be made to promote continued participation among stakeholders in management activities. Care must be taken to avoid the alienation of former board members in the decision-making process. Every stakeholder has the potential to be a tremendous asset or a threat to the viability of the MPA. Very often these persons are representatives of larger organisations who can lend financial assistance and increase the institutional capacity of the NCRPS. A loss of such resources can undermine the ability of the NCRPS to meet current management objectives and hinder strides at creating new opportunities to increase management efficiency.

In addition to levels of participation, lack of financial stability may seriously affect the success of the NMP and retard the ability of the NCRPS to orchestrate effective management of the area. Sole dependency on donor and funding organisations has not afforded the NCRPS the opportunity to achieve a level of financial independence. Without a stronger financial base their very existence hangs in the balance not to mention their ability to realise means by which to enhance the success of the NMP. Additionally creative ways must be sought to rectify this situation and greater effort made to lobby for more governmental assistance. More importantly the organisation needs to find a way to continuously generate funds independent of donations and grants. A step in this direction may be through the implementation of user fees. The NCRPS has not been successful in achieving their goal of developing and implementing a financial sustainability plan that would ensure that adequate funds are available to manage the park.

This evaluation was able to give some indication that there were insufficiencies in the funds generated by the activities undertaken by the NCRPS. However no mention was made of the amount that each activity generated or their sustainability. The use of this indicator was unable to determine whether adequate income to support the maintenance of the NMP was being achieved or how far the NCRPS was achieving this objective. The use of this indicator was inappropriate for the evaluation as it failed to guide the evaluation teams to ask the questions necessary to determine the effectiveness of the management strategies geared towards the achievement of the relevant objectives. Perhaps the use of another indicator that can better guide this process may

have been necessary for the evaluation. The ability of the assessment tool to gauge the management effectiveness was insufficient or poor.

10 GENERAL DISCUSSION AND CONCLUSIONS

10.1 Evaluation Summary

Table 10.1 summarises the results of the indicators evaluated in this exercise. It also illustrates the level of success of each indicator in evaluating the management objectives for which they were chosen to assess. Each indicator is ranked from good to bad where good indicates that the objectives have been evaluated, moderate indicates that they have provided some indication as to whether the objectives are being achieved and to what degree, and poor where the indicator failed to measure the parameters associated with the relevant objectives. The level of success of the evaluation has been discussed in detail under the previous sections and has been summarised in Table 10.1.

Table 10.1 Evaluation Summary of the performance indicators chosen for the NMP

Indicators	Results summary	Objective	Ability of indicators to evaluate management effectiveness
B8 Water quality	The nutrient levels were well below national standards for fresh water at all sites. The highest readings for both nutrients and faecal coliform both found at the South Negril River mouth. Results at the TCMP were spurious due to a failure to follow monitoring procedures and protocol. Sample collection frequency at the SCMR was inconsistent. Greater training needed for TCMP, and modification of parameters and protocol needed at the SCMR.	Establish and maintain a reef restoration programme	Good : Evaluation was able to highlight the successes and shortcomings of ongoing programmes.
S3 Level of understanding of human impacts on resource & S14 Distribution of formal knowledge to the community	Many community members and tourism workers knew of the existence of the NMP and the NCRPS. Many also had knowledge of the activities that impacted on the MPA and the effect that these activities has on the coastal environmental. The majority of the tourist had no knowledge of the NMP, NCRPS or the activities that impacted on the MPA. Need for a more comprehensive educational programme that is tailored to its target audience.	Public kept abreast of status of the park.	Good: Was able to give a picture of what educational material was being received by a variety of stakeholders
		Public's understanding of environmental and social 'sustainability' improved.	Poor: Unable to ascertain whether there was an increase in the understanding of this aspect by the public. Information concerning this is difficult to quantify given the subjective nature of environmental and social sustainability.
G2 Existence of decision-making and management body	The NCRPS has been delegated responsibility for the management of the NMP by the NCRPS under section 6 of the NRCA Act of 1991. This contract is valid for a period of five years after which it may be renewed at	Accountability and transparency of administrative and financial systems.	Poor: Results of the evaluation gave no indication of the current level of transparency and accountability in these

Indicators	Results summary	Objective	Ability of indicators to evaluate management effectiveness
	the agreement of both parties. The management structure for the NCRPS has been outlined in the management plan		systems.
G6 Availability and allocation of MPA administrative resources	Lack of funding and limited institutional capacity has impeded the implementation of most management programmes. Most funding and staff has been allocated to the administrative programme due to its pervasive nature. Volunteers have been suggested to rectify staff shortage. Need for greater financial stability for NCRPS to continue in its capacity as the management agency for the NMP.	Generate sufficient income to support the maintenance and sustainability of the park.	Good: Financial constraints impeding management activities and affecting park management were highlighted.
		Ensure that staff has the training, equipment and materials to facilitate their jobs.	Moderate: Presented more of a picture of what was lacking than what the organisation actually possessed, the quantities of materials and equipment and current condition. Lack of training opportunities for staff was highlighted.
		Hire additional staff as permitted according to funding availability and space.	Moderate: The need for additional staff was noted as well as factors that impeded this process such as inadequate finances to pay additional persons. Recommendations for alternate methods such as volunteers were noted.
		Develop an active volunteer programme to assist Marine Park staff.	Poor: It is unclear at how much effort was placed into the development and how successful any such attempts have been.
[NEW] Success of fundraising strategies (revenue and diversity of sources) that form part of the business plan to protect sustainable livelihoods	The NCRPS continues to struggle to management the NMP with limited financial resources. Aggregation of data may be misleading. There is a need to streamline administrative and financial activities.	[Through fundraising efforts] Heighten community awareness of the importance of financial sustainability as it relates to the protection of the coral reef ecosystem which is the tourism product.	Poor: Although deficiencies in finances were highlighted it was unclear of the level of the communities' awareness of the importance of financial stability.
G12 Level of stakeholder participation and satisfaction in	Most of the stakeholders are not satisfied with the level of fundraising activities undertaken by the NCRPS. They have failed to generate sufficient	Generate sufficient income to support the maintenance and sustainability of the	Poor: Evaluation was able to highlight insufficiencies in the funds generated by activities undertaken by the

Indicators	Results summary	Objective	Ability of indicators to evaluate management effectiveness
management processes and activities	income to cover the organisations operational cost. Need to diversify income generating strategies, implement user fees and lobby government for promised management fees.	park.	NCRPS as well as level of satisfaction of the stakeholders in the activities that have been attempted previously. However the amount of funding raised by each activity, its sustainability and how far short of an achievable financial goal could not be determined was not determined.

10.2 Lessons learned

At the terminal workshop held in Punta Gorda, Belize participants in the MPA management effectiveness project assembled to discuss both the products and process of the evaluation (Pena and Roach 2006). From discussions held on the outcome for each study site involved in this activity, the lessons learned from each stage of the process were discussed and main lessons as well as the site to which they were relevant were determined. The main lessons gained from this project are discussed in the sections below.

10.2.1 Lessons from the NMP

Following each NMP lesson statement is an explanation of it that applies in most cases to all three MPA sites in the project. The lessons that were generated from the other sites, but not from the NMP, are placed at the end.

MPA managers appreciate the importance of evaluating current management strategies

The process of evaluating management effectiveness in order to implement adaptive management techniques is a new process for all of the study sites involved in this project. Though in theory the evaluation of current administrative practices seems to be a logical step in order to improve the management of any conservation area, managers are often so entangled in the day to day operations of running the MPA that processes like these become secondary. However this evaluation exercise has enabled MPA managers to fully appreciate its importance in improving the effectiveness of the management area. They have recognised its potential as a tool to promote transparency and accountability within organisations charged with the responsibility of maintaining these areas. This process may in fact foster greater trust in management organisations to fulfil their mandate by stakeholders who ultimately have a vested interest in these areas.

Reasonable capacity is needed in order to conduct in house evaluations

In order to conduct the evaluation of some of the indicators a team effort was required at each stage of the process. Examples of this may be seen in the assessment of the socio-economic indicators in the NMP as well as the water quality indicator at all three sites. In some instances the availability of additional persons capable of conducting the evaluation would have improved the competency with which the assessment process was conducted. It is important to recognise that inadequate staff or the absence of persons with the skills and experience required for more

technical aspects of the evaluation has the potential to undermine the efficiency of the exercise as well as the accuracy of the final outputs. Even though there may be some aspects of management that may need to be reviewed it is pointless to undergo the assessment process if weak institutional capacity impedes the efficiency with which data is assimilated, analysed and presented. Such a decision will ultimately result in a waste of time and financial resources that may have been better spent elsewhere.

Capacity building should take place during the evaluation process

The business of running MPAs within developing countries is a difficult and daunting task. Managers must undertake tremendous tasks in the face of inadequate institutional capacity, limited funding and inconsistent assistance from government agencies. Lack of capacity has the capability to cripple both the management of the area as well as the effectiveness of the evaluation. It is important therefore that measures to build capacity within the organisation are undertaken during the assessment process. These measures may include opportunities for training in technical aspects of the process, report writing and presentation skills. In this way some of the cost of the evaluation process may be deferred by decreasing reliance on external assistance to conduct in house exercises that can be carried out by available personnel. However the level of institutional capacity that was expected to be built during the course of this project was not realised. This was exemplified in the TCMP in the implementation of its water quality monitoring programme. Despite efforts at training staff to carry out monitoring procedures, a lack of experienced persons severely affected the accuracy of the data collected (Pena 2006). Greater effort is needed in this area.

Begin with what can be managed by the organisation

Due the fact that such an undertaking has never been attempted before, management agencies run the risk of overestimating what can be accomplished within the constraints of their limited resources. There are so many aspects of management that need to be thoroughly assessed that prioritising evaluation needs may be a difficult task. Rather than run the risk of overlooking vital areas that are in need of evaluation, managers may attempt to take on more than their resources can adequately handle. The result is improper evaluation of management goals and objectives that produce outputs that are unable to guide future management decisions or create a foundation on which subsequent evaluation exercises can be built.

Confidence gained through the evaluation increases willingness to learn, adapt and improve management

Initiating evaluation exercises may often be met with some scepticism**.** Stakeholders may fail to see how such an evaluation will differ from various studies that have undoubtedly taken place in the past. Additionally, management agencies may be unsure of their ability to see such a process through to its completion and truly apply the information gained in a way that will have a meaningful effect on future park management. The training, financial assistance and outputs generated as a result of this process may serve to alleviate some of the doubts and develop a confidence in the management agency's ability to effectively conduct its own evaluations. Managers and stakeholders are able to see first hand the benefit that may be gained from the information gathered in this exercise and allowed practical experience with how it may positively influence management. Continued assessment that is built on this premise creates a reference point from which future evaluations may be conducted and a quantifiable avenue by which progress may be measured. With a viable way in which the effectiveness of various

aspects of the MPA can be presented, the need for changes can be justified and measures to implement them can be formulated. The ability to see the potential positives of such a process has encouraged many of the participants to learn more about the evaluation exercise and give serious consideration to adaptively managing natural resources. Stakeholders have had the opportunity to learn more about the MPAs in their areas and as a result now feel the need to be more involved and active in its management.

There is need to repair links between MPA objectives and its activities

Some disparity has been recognised between the MPA objectives that have been outlined for these conservation areas and the management activities that are taking place. Often what is being done in practice has no practical application to the mandates that have been envisaged for the conservation area. Many factors may be responsible for this disparity, the major culprit being lack of necessary resources to carry out the functions necessary to meet these objectives. Another factor may be the lack of clearly defined objectives, especially when these are abstract and unspecific. This result provides little guidance to those placed in charge of the MPA. It is important that the reasons behind the implementation of conservation areas not be forgotten. Careful decision-making is necessary to ensure that all available resources are allocated to this end.

Weak culture of evaluating management needs to be overcome by the process

A weak organisational culture to evaluate management effectiveness exists at both a national and international level. As a result, organisations have failed to see the benefits that can be gleaned by identifying problem areas in the management process as well as innovative ways in which management may be improved. Stakeholders have been deprived of the opportunity to effectively participate in the management process and influence decisions that are made about the conservation areas and how the resources encompassed within them are dealt with. Consequently inappropriate and ineffective management methods may continue while the benefits that may be derived from implementing appropriate conservation efforts in these areas may never be seen. Implementing evaluation methods which may lead to improved institutional capacity, attract funding for management undertakings, as well as pinpoint changes that may be necessary, may provide the impetus needed to catalyse change in the current status quo which can impede the success of regional MPAs.

A distinction needs to be made between the marine park and the management organisation

When an evaluation is being done for a particular site, distinctions need be made on whether the evaluation is being done on the management body and or on the MPA itself. In some cases they are one and the same, but in the case of the NMP the management body, NCRPS, is distinct from the conservation area. When reporting on the results of the assessment it is important to explicitly state what the information that is being presented refers to.

Questionnaires should be pre-tested on a sub sample of target group

In order to assess the effectiveness of questionnaires it may be pertinent to determine how effective they will be by pre-testing on a sub sample of the larger target population. Though this process may be time consuming it will be able to assess whether or not this evaluation tool can solicit the desired information from the target group. It will also serve to highlight whether the questionnaire is applicable to the target group and if the questions and terminology used are easily understood. Additionally this period will provide the interviewer with some practical

experience enabling them to practice techniques on how to approach and extract the information needed from the respondent without adding bias to the interview.

It is important to ensure that there is a clear understanding of evaluation requirements

In order to ensure that there is some clear understanding of the outputs that should be generated for each indicator, there must be an appreciation of what each one seeks to measure and how it is ultimately related to the MPA objective. The outputs represent quantifiable information that must be represented in such a way that it is reflective of the level to which MPA objectives are being met and can be accurately interpreted by management bodies so as to effectively inform future management decisions. The accuracy of the evaluation depends on the extent to which those given responsibility for this task understand the process of the evaluation and how it leads to the expected product. Only then can the desired outputs have a greater probability of accurately reflecting the level of success achieved by the management process and suggest the changes that may be necessary in order for effective management to be realised. During the evaluation of many of the governance indicators in the NMP, members of the evaluation teams were often unsure of how to conduct data collection, analysis and reporting despite the presentation of examples of each stage of the evaluation in the guidebook.

Necessary to present and validate results to communities and stakeholders

It is important that when results are completed from the evaluation exercise that they be presented to the communities and the stakeholders. Many of these were vital sources of information and will be willing to be more cooperative in future studies if they are informed of the results of the study. In effect this effort may offer a way in which to reduce respondent fatigue especially in those areas that will need to be accessed for information in the future. This creates a sense of ownership and involvement for community members and stakeholders who will be made to feel included in the evaluation process. It creates an avenue to improve the transparency and accountability of the management agency as the public are kept abreast of management activities, the effectiveness of these actions, as well as plans to improve existing methods. Such a forum will allow participants the opportunity to offer up suggestion thereby creating an avenue for information exchange as well as a means by which stakeholder participation in the management process can be enhanced. Additionally it gives the evaluation teams a means by which to verify their results and identify any errors in the information that was collected that may affect the accuracy of the results.

Feedback from the evaluation helps all participants to learn collectively and build capacity

The terminal workshop held at the end of the evaluation process enabled participants in the management effectiveness project to discuss the challenges involved in the management of each of the MPAs as well as their experience with the management effectiveness evaluation process. It provided an opportunity for collective discussion of the important lessons that could be derived from the experience, management methods used at particular conservation areas that could be incorporated at other sites, as well as propose recommendations for adaptive management. With the knowledge that some sites had resources and expertise that were lacking at other MPAs it gave those present a chance to create a network where skills and knowledge could be transferred and shared, providing prospects to build capacity for future management activities and management effectiveness evaluations.

Target audience should have bearing in survey design

Surveys are only as effective as their ability to extract the desired information from the targeted audience. When designing this evaluation tool the relevance of the questions to the receiving audience should be considered. If the questions cannot be easily understood or have no bearing on the potential respondents, they will fail to provide any information that may be useful for management purposes.

Evaluation process may increase the availability of secondary data

The evaluation process was based primarily on the collection and analysis of available secondary data. Where none was available baseline studies were conducted. These processes served to located secondary data relevant to management evaluation that may have been previously overlooked as well as provide baseline data on which future evaluations could build on.

Important to ensure that the budget is adequate and realistic

Adequate finances are necessary to effectively conduct the task required to carry out some aspects of the evaluation. When planning evaluation activities all aspects of the process should be carefully considered so as to determine the costs that may be incurred, if they can be deferred, and if it is at all feasible to undertake the evaluation. Failure to do this results in a waste of finances and effort when the evaluation cannot be completed or has to be delayed until additional funding can be found.

Positive recognition may be achieved through the evaluation process

From this process it was realised that positive recognition was gained at the effort to evaluate current management practices for the purpose of improving the management organisations and enhancing conservation efforts. In the NMP some donor agencies interviewed were impressed by the attempt to evaluate the ways in which resources were managed. To many stakeholders this signalled that the NCRPS was serious about its mandates and dedicated to the sustainable development of the area. Such dedication not only inspires public trust in the abilities and competency of the management bodies but may also motivate donor agencies to be more willing to fund future conservation efforts**.**

Ensure that timelines are realistic and flexible

When creating a schedule for such an undertaking reasonable timelines in which the evaluation and analysis can occur must be determined. The process should be conducted in an expedient manner but it must also take into consideration unexpected delays and should be flexible enough to accommodate them without compromising the integrity of the project.

Management organisations made aware of stakeholder perception of current management

Management agencies are allowed an occasion on which they can view how their management efforts are being perceived by stakeholders and members of the general public. Whether management has allowed for an equitable and fair distribution of resource use or if disparities are perceived by the public can be determined. Each stakeholder has the capacity to affect the success of an MPA. By trying to determine if the needs of the stakeholders are being accommodated within the management system and if educational methods are having any effect on behaviours, strategies can be formulated to address these issues. It must be noted that management agencies may never have the approval of all of their stakeholders and though

conservation efforts must be sensitive to the needs and culture of all stakeholder groups it should never be compromised to the extent that conservation efforts becomes secondary.

Water quality monitoring requires access to a competent laboratory

It is critical to have access to a fully functioning and certified laboratory in order for water quality results to be accurate. Samples must be subjected to specific conditions prior to testing in addition to being analysed within a 24 hour time frame. Outside of this, samples cannot be used for analysis due to the microbiological content of the sample and the nature of its constituents which may change drastically outside of this time frame. The situation at the TCMP has resulted in an inability to use the results procured for management purposes which has resulted in a waste of scarce and important resources and the efforts of the collection and evaluation teams (Pena 2006).

10.2.2 Additional lessons from other sites

The lessons below were not generated from the NMP evaluation, but appreciating the situation at other MPAs in the region is a step towards information sharing and establishing mechanisms for collaboratively building capacity through MPA networks rather than external intervention only.

Stronger science training or external support needed as part of the evaluation

During the evaluation of some of the indicators it is important to remember that the terminology and the process of data collection and analysis may require the technical services of someone that possesses a scientific background. While training for some indicators may be provided and the assessment successfully undertaken, technical expertise and experience may be necessary for others. Such was the case for water quality in the TCMP where data collection was compromised by lack of a scientific background by the evaluation team (Pena 2006). Participants were unable to understand the necessity of particular protocol or see the need to implement important procedures in the collection of samples**.** If such a background does not exist among current staff, measures should be taken to contract competent persons outside of the management organisation for more technical aspects of the assessment.

Training needed in data analysis and report writing

In order to improve the accuracy and quality of the outputs generated, training may need to be provided in the areas of data analysis and report writing. In this way a standardised method of reporting can be formulated where information is accurately represented and clearly understood by target audiences. Training in data analysis may be necessary especially when this process requires the use of certain analytical software such as SPSS or specialised equipment.

10.3 Adaptive management

Adaptive management presents an opportunity by which systematic learning as well as scientific research may be integrated into natural resource management (Berkes et al. 2001). By attempting to change the paradigm of traditional resource management, emphasis is placed on incorporating research into conservation action. These policies are treated as experiments where managers are able to adapt and learn from experience (Holling1978; Walters 1986). In this way the barriers between research and management are eliminated.

Founded in the field of industrial operation which was developed in the 1950s it was not until the 1970s that it was adapted as a resource management technique (Johnson 1999). Since this period, the idea of adaptive management has gained popularity and has been applied to a diverse set of

issues ranging from the management of toxicants to the restoration of wetlands and coastal habitats (Johnson 1999). It is grounded in the fact that although the management of natural resources takes place in an atmosphere of uncertainty where the environments are not static and interactions between people and ecosystems are unpredictable, effective resource management is still necessary. More importantly, it highlights the fact that conservation efforts cannot be suspended until it is felt that there is a great enough understanding about the ecosystem or a large enough store of knowledge. Rather actions should be taken in this environment of uncertainty bearing in mind that human dependence on natural systems, development within fragile ecosystems and declines in the abundance of valued biota are pressing issues (Lee, 1999).

Adaptive management is also based on the premise of social and institutional learning where emphasis is placed on the need for feedback from the environment to have the ability to inform policy (Berkes at al. 2001). There is acknowledgement of the fact that proposed solutions are ephemeral, inherently inadequate and incapable to deal with all aspects of natural resource management. Learning by intent is imperative due to the very nature of ecosystems which are dynamic and where changes are multifaceted and poorly understood. Effectively, learning does not only occur on the basis of management success but also as a result of its failures. It is important that what is learnt can be translated into changes in management approach where new and innovated methods can be employed based on the experiences undergone in the process. This learning process however is based on the premise that these experiences can be remembered long enough to result in an evolution of the management system in response to its current inability to produce a desired outcome. This brings the issue of adequate institutional memory to centre stage where documentation of decisions, evaluation of results and appropriate responses to the evaluation must be undergone for institutional learning to be realised and made able to influence policy (Hilborn, 1992).

Management of natural resources occurs against a backdrop of dynamic processes where it may be difficult to distinguish between the effects of management strategies and concurrent changes in the natural environment (Lee 1999). These constant fluctuations in causal factors, responsible for ecosystem change, may create a situation in which superstitious learning based on erroneous connections between cause and effect can be made (Lee 1999). A scientific, research-based approach which exposes management strategies to the rigours of experimentation may provide a means by which greater understanding of the complexity of natural systems can be realised. Despite its experimental nature, an explicit vision or model of the ecosystem is necessary if organisations are to manage adaptively (Lee 1999; Crosby et al, 2000). This should include clearly defined management goals and objectives as well as response indictors for evaluation (Crosby et al. 2000). This vision or model provides a baseline against which change can be measured (Lee 1999).

Although the adaptive management approach shows promise, there have been many shortfalls that have impeded the success with which it can be implemented (Johnson 1999). It has been proven that the process can be both costly and slow (Johnson 1999). The benefits of a research based approach are likely to result in a gradual understanding of ecosystem and the social dynamic, where the ways in which management does and does not affect outcomes are determined over time (Lee 1999). This has to be viewed against the backdrop of the short term goals of many bureaucratic systems as well as the immediate needs of stakeholder groups to whom managers have a social obligation. Additionally many management agencies may be resistant to change and unwilling to undertake long term policies that appear too risky and costly

(Johnson 1999). Ironically, knowledge of the combined social, economic and ecological systems is always incomplete. By undertaking this management approach there must be a shift in the status quo where it is understood that ecosystems cannot be maintained within a single optimal state. Rather an attempt should be made at maintaining optimal management capacity by endeavouring to create more resilient management systems and encouraging greater flexibility in management institutions (Johnson 1999). Perhaps there is a need to apply adaptive management practices not only to the resources but to the institutions that are charged with safeguarding them as well (Johnson 1999).

10.3.1 General recommendations

The evaluations conducted at the three MPAs have highlighted the importance of carrying out regular assessments of management strategies to determine effectiveness and to guide change. The managers who have participated in this process have gained greater appreciation of the potential benefits that can be gleaned from frequent self appraisal. It is a means by which information can be provided that creates a reference point of where management is relative to the original objectives stipulated for the conservation area. By locating that point, it is more feasible to chart a course towards the fulfilment of mandates that have been outlined for the MPA. Perhaps this will create a shift in the paradigm of evaluation from that of an opportunity to assign blame to that of an occasion to evaluate current strategies and justify the need for necessary change.

The experiences with the evaluation of water quality in the TCMP and the SCMR highlight the need to integrate such appraisal mechanisms at the inception of new management activities. The deficiencies in the monitoring programme, the need for external support and the importance of having explicitly stated goals and protocols can be applied to all aspects of management. The earlier these insufficiencies are identified, the sooner modifications can be made to the process. This will enable management agencies to make wise choices as it relates to the allocation of time and resources.

When choosing evaluation tools one must be mindful of the importance of ensuring that these tools encompass all facets of the management activities: biophysical, governance and socio economic. In this study there has been a tendency to lean towards the assessment of the governance aspect. There may be several reasons for this trend which are beyond the scope of this report. Perhaps the framework in which these appraisals can be conducted already exists. If so there would be little need for extensive training, there would be accessible sources of secondary data for assessment and little or no additional equipment would be required. These factors aid in the reduction of evaluation costs. Additionally it may be thought that enhancing administrative functions will result in a top down effect where an improvement will be seen in all facets of management. Whatever the true reason, care must be taken in the selection of performance indicators so that any appraisal conducted can provide a holistic view of management activities which adequately addresses all aspects of the conservation efforts.

Furthermore effective evaluations are only as good as their ability to influence change in MPA management. Significant time, effort and expense are often essential for in house assessments. The primary goal of this process is to highlight where management has fallen short or where methods used can be improved to increase the success of the MPA. It is a guide, providing the information required to keep activities focused in order to realise conservation goals. It may serve to highlight the need for adjustments to these goals so that through the evolution of

management objectives, conservation efforts can be enhanced and sustainable development can be achieved. However information without action achieves nothing. If the bureaucratic power to address management issues and develop means by which they can be addressed does not lie in the hands of those charged with management of the area, then those that hold this power need to recognise the important role they play in MPA success. Greater support is needed from those in a position to facilitate change if administrative organisations are to be able to manage adaptively.

Recommendation for ways in which adaptive management can be integrated into the study sites were made by those present at the terminal workshop held in Punta Gorda, Belize. Suggestions were based on the results of the evaluations, the experience in management of the respective MPAs and the learning experience which resulted from dialogue with all who were present. Site recommendations from this workshop and subsequent communication are outlined below.

10.3.2 Negril Marine Park

In the Belize workshop the priorities identified for adaptive management were communication and financial management (Pena and Roach 2006). First, there is a need for greater conservation communication. In this way stakeholders gain knowledge on how they impact on the marine environment and are able to make informed choices about their behaviours. In addition to this, greater communication creates transparency within the organisation and allows stakeholders to feel included in the management process fostering a sense of ownership. The NCRPS may facilitate this through holding regularly scheduled meetings between managers and stakeholders, increasing the frequency of public meetings, and the establishment of a comprehensive educational programme. Second, ways in which financial management can be enhanced should also be carefully considered to maintain the viability of the management organisation and to create means by which to implement programmes that may enhance management.

Following the workshop, the representative conferred with NCRPS colleagues and made a more specific recommendation for a Community Awareness Project as the proposed adaptive management activity. The evaluation results of the 'Distribution of Formal Knowledge to the Community' (S14) indicator prompted this management adaptation recommendation. It was shown that tourists who visit the Negril resort area, and who are users of the Negril Marine Park, are not aware that a marine park exists in the area nor are they aware of the various projects and activities undertaken by the Negril Coral Reef Preservation Society. In an effort to address this issue, the NCRPS made contact with the hotels who had agreed to place information brochures in their rooms regarding the programmes and activities of the NCRPS and the NMP. The evaluation also revealed that people in communities on the periphery of the NMP are not aware of the activities of either the NCRPS or the NMP. Hence the Society will need to make an effort to hold regular community meetings in these locations to ensure that persons are informed.

Participants in the activities will be residents in Negril and the surrounding communities, as well as visitors to the area, both local and international. The Negril Coral Reef Preservation Society's staff will undertake the activities themselves.

Regarding the outcomes of adaptive management, the NCRPS expects that by the end of the activity at least 80% of visitors to the area will be made aware of the Negril Marine Park. NCRPS will ensure that there is continuity in printing and placement of the brochures, so that eventually all visitors to the area will know of the NMP. Communities will also be more informed, and the Society will ensure that the process is ongoing.

Schemes for monitoring and evaluation of print material distribution in hotels and the information sharing at community meetings are being devised in order to facilitate learning and further adaptive improvement.

11 REFERENCES

Agardy, T. 2000. Information for Marine Protected Areas. Scientific Societal Bulletin of Marine Science. 66(3): 875-888

Berkes, F., R. Mahon, P. McConney, R. Pollnac and R. Pomeroy. 2001. Managing small scale fisheries: Alternate directions and methods. International Development Research Centre (IDRC). Ottawa, Canada

Blackman, K. 2005. Information for the Negril Marine Park's Fisheries Management Plan. MSc Thesis, CERMES, University of the West Indies, Barbados.

Blue, B. 2006. Assessment report of the success of fundraising strategies undertaken by the Negril Coral Reef Preservation Society in the management of the Negril marine Park for the period 2004 to the first quarter of 2006. 2pp

CERMES. 2005a. Report on the inception training workshop for enhancing the management effectiveness of the Tobago Cays Marine Park, St. Vincent and the Grenadines. Union Island 19-20 December 2005. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No.1.25pp.

CERMES. 2005b. Socioeconomic monitoring and fisheries management planning for the Negril Marine Park.26pp.

CERMES. 2006a. Report on the inception training workshop for enhancing the management effectiveness of the Negril Marine Park, Jamaica.26-27January 2006. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No.2. 31pp.

CERMES. 2006b. Report on the inception training workshop for enhancing the management effectiveness of the Sapodilla Cayes Marine Reserve, Belize.4 -5 February 2006. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No.3. 26pp.

Cicin-Sain, B., and Knecht, R.W. 1998. Intergrated Coastal Management: Concepts and Practices. Washington, D.C. Island Press.

Davis, L. 2004. The NGO Entrepreneur-Non Profit in Purpose; for Profit in Approach: Recognising the Limitations of Current Donor Funding.http://www.isar.org (accessed 27 October 2006)

Figueroa, M. 2002. Comanagement and valuation of Caribbean coral reefs: A Jamaican NGO perspective. World Fish Centre. 182-191

Francis, Junior.2007. Personal Communication. The National Water Commission, Negril Office, Jamaica.

Geoghegan, T., and Y. Renard. 2002. Beyond Community Involvement: Lessons from the Insular Caribbean. Parks 12 (2): 16-25.

Goreau, T.J. 1992. Negril: Environmental threats and recommended actions. Water Quality Issues: Final Report.

Gunderson, L.1999. Resilience, flexibility and adaptive management: Antidotes for spurious certitude. Conservation Ecology 3(1): 7. [online] URL: http://www.consecol.org/vol3/iss1/art7/ (accessed 27 July 2006)

Heyman, A. M., T.J. Riegert, A. Smith, T. Shallow and J.R. Clark. 1988. Project Proposal: Development of the Tobago Cays National Park. Government of St. Vincent and the Grenadines and Organisation of American States. 97 pp.

Hilborn, R. Can fisheries agencies learn from experience? Fisheries, 17(4), 6-14

Holling, C.S., ed. 1978. Adaptive environmental assessment and management. Wiley, London, UK

IUCN.2004. Incorporating Marine Protected Areas into Coastal and Ocean Management: Principles and Guidelines. Gland: The World Conservation Union.

Johnson, B.L. 1999. Introduction to the special feature: adaptive management- scientifically sound, socially challenged? Conservation Ecology 3 (1): 10 [online] URL: http://www.consecol.org/vol3/iss1/art10 (assessed 27 July 2006)

Goreau, T.J., Daley, L., Ciappara, S., Brown, J., Bourke, S., Thacker, K., 1997. Community-based whole-watershed and coastal zone management in Jamaica. Proc. 8th Int. Coral Reef Symp. 2, 2093-2096.

Lapointe, B.E and K. Thacker. 2002. Community- based water quality and coral reef monitoring in the Negril Marine Park, Jamaica: Land-based nutrient inputs and their ecological consequences.

Lapointe, B., P. Bell, C. Black, W. Gabbidon, L. Getten, E. Gill, E. Frame, C. Quirolo and K.Thacker. n.d. Negril water quality and coral reef monitoring. Negril Coral Reef Preservation Society (NCRPS). 23pp.

Lee, K. N. 1999. Appraising the adaptive management. Conservation Ecology 3(2): 3. [online] URL: http://www.consecol.org/vol3/iss2/art3 (assessed 27 July 2006)

Mascia, M. 2004. Social Dimensions of Marine Reserves. Marine Reserves: A Guide to Science Design and Use. Island Press Washington D.C.

McConney, P.2005. International Coral Reef Conservation Grant Proposal. Centre Resource Management and Natural Resource Studies, UWI. Cave Hill. Barbados.

NCRPS.n.d. Business Plan Negril Marine Park. Negril Coral Reef Preservation Society, Negril, Jamaica.

NCRPS. 2004. Operational Plan 2006-2007. Negril Coral Reef Preservation Society, Negril, Jamaica.

Nightingale, J. 9th November, 2006. Personal Communication. 59th Gulf and Caribbean Fisheries Institute Conference, Princess Hotel, Belize.

Outokon, S. 2001. Case study of the Negril Environmental Protection Plan, Jamaica. CANARI Technical Report No. 284. 10pp.

Pena, M., K.. Blackman, C. Hanson, P. McConney and M. Miller. In press. Socioeconomic information for managing fisheries in the Negril Marine Park. Proc. Gulf. Fish. Inst.

Pena, M. 2006. Report on Management Effectiveness at the Tobago Cays Marine Park (TCMP), St. Vincent and the Grenadines. Draft. Presented at the Terminal Workshop of the CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. 4 November 2006.61pp.

Pena, M. and D. Roach. 2006. Report of the Workshop on MPA Evaluation Products and Process, Punta Gorda, Belize, 4 November 2006. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No. 4. 47pp.

Pinkerton, E., ed.1989a. Cooperative management of local fisheries: new directions for improved management and community development. University of British Columbia Press, Vancouver, BC, Canada.

Pomeroy, R. S, John, E. Parks and L. M. Watson. 2004. How is your MPA doing? A Guidebook of Natural and Social Indicators for evaluating Marine Protected Area Management Effectiveness. The World Conservation Union (IUCN). Gland, Switzerland.230pp

Romulus, G. 1996. Towards the establishment of a management structure for a marine park and protected area in Negril, Jamaica. Prepared for presentation at the OECD/DAC Workshop on "Capacity Building in Environment," Rome. December 1996. 15pp

Salm, R.V. and John R. Clark. 2000. Marine and Coastal Protected Areas: A Guide for Planners and Managers. The World Conservation Union (IUCN). Gland, Switzerland.

Shindler, B. and K. Aldred Cheek. 1999. Integrating citizens in adaptive management: A prepositional analysis. Conservation Ecology 3(1): 9 [online] URL: http://www.consecol.org/vol3/issu1/art9/ (assessed 27 July 2006)

Sobel, J. and C. Dalgreen. 2004. Marine Reserves: A Guide to Science, Design and Use. Island Press Washington D.C.

Thacker, K and C.Hanson.2003.Negril Marine Park Management Plan.Negril Coral Reef Preservation Society.130p

UNEP. 1994. Regional overview of land based sources of pollution in the wider Caribbean region. Caribbean Environmental Program Technical Report 33. UNEP Caribbean Environmental Program. Kingston, Jamaica.

Walters, C.J. 1986. Adaptive management of renewable resources. McGraw- Hill, New York, NY, USA.

12 APPENDICES

Appendix 1. Individual and household socio-economic monitoring survey for the NMP by NCRPS

April 2006 survey on the level of understanding of human impacts on resources in the Negril Marine Park and distribution of formal knowledge to the community by the NCRPS

This survey is being done by the NCRPS, the non-governmental organisation that manages the Negril Marine Park, so as to improve the Park. It addresses how people understand human impacts on resources in the NMP and the distribution of information to the community by the NCRPS. Any information you give cannot be traced back to you. You will not be personally identified in any reports. We will be sharing results from the whole survey with the public. After a few years you may be asked questions again to see if things have changed.

Date _____ Settlement_____
yyyy – mm – dd

Record questionnaire number, settlement, respondent identity and address on separate sheet
Write DK = do not know and NR = no response as appropriate by the question where necessary

This survey asks the head of the household about his or her opinions, and about other people in the household. I would like to speak to the head of the household or the person closest to head.

1. What is your relationship to the head of the household?
[ ] head of household
[ ] wife / husband of head
[ ] common law partner of head
[ ] child of head / head's spouse / head's partner
[ ] parent of head / head's spouse / head's partner
[ ] brother / sister of head / head's spouse / head's partner
[ ] other relative of head / head's spouse / head's partner
[ ] other (explain) _____

The Negril Marine Park stretches along the coast from the mouth of the New Savannah River, by Broughton, in the south to Davis Cove in the north … and out to sea for two miles from the coast. This is what it looks like on a map … and this is where we are now. Discuss if necessary.
[*SHOW MAP, KEEP NEARBY TO REFER TO, TELL PERSON THEY CAN KEEP IT AFTERWARDS]*

2. Have you heard about the Negril Marine Park before now?
[ ] yes … In about what year did you first hear of the NMP? _____
[ ] no

The Negril Coral Reef Preservation Society, or NCRPS for short, is the non-governmental organisation responsible for managing the Negril Marine Park along with the government.

3. Have you heard about the Negril Coral Reef Preservation Society, or NCRPS, before now?
[ ] yes … In about what year did you first hear of the NCRPS? _____
[ ] no

In order to better manage the NMP the NCRPS needs to know whether scientific and educational information is getting to the people who use the area and if the mechanisms for dissemination of information are effective.

4. Are you aware of any environmental educational information distributed by the NCRPS?
[ ] yes
[ ] no

5. If yes, how was the environmental education message delivered?
[ ] 1. Brochures [ ] 4. Poster [ ] 7. Meeting
[ ] 2. T.V. [ ] 5. drama/skit [ ] 8. Training
[ ] 3. Radio [ ] 6. Workshop [ ] 9. other_____

6. If yes, what was the message of the environmental education information? _____

7. Was the delivery of the message effective?

_____

_____

8. Do you feel that the educational information is having an impact on the people in the community? Yes___ No___

9. What type of impact is the environmental education having on people?

_____

_____

10. How can the environmental information be improved?

_____

_____

Question 9 should be directed to individuals who are able to provide the information. This includes Hotel Managers, Watersports Managers and Operators.

11. Do you feel that any events or activities are having an effect, positive or negative, on the natural environment of the NMP? Yes___ No___
12. What specific events or activities are having an effect on the natural environment of the NMP?
13. What changes in the natural environment of the NMP do you attribute to these threats?

14. Do you have guests who SCUBA or snorkel?

[ ] yes … How many per month? Scuba___ snorkel___
[ ] no

15. On this map of the NMP, can you please locate the primary locations where your guests SCUBA or snorkel?

16. Do you feel that these activities (including boat tour activities) have affected the natural environment of the NMP?

17. What changes happened as a result of these activities?

18. Thinking specifically about the marine resources of the park (beaches, seagrass, mangroves, reefs, fisheries), what are the three main problems that you have observed with these resources?

1.
2.
3.

19. What are the three main solutions that you recommend to solve the three problems?

Q18 Nature of problem	Q19 Recommended solution
1	
2	
3	

In order to relate your information to the 2001 national census and other studies that describe the Negril area we need to get some basic information on the household in which you live.

20. Sex of respondent *(observed)*

[ ] Male [ ] Female

21. What is your date of birth? _____

yyyy – mm – dd

22. Which is the last type of school that you attended?

[ ] 1. none [ ] 4. post-secondary / technical
[ ] 2. primary (all-age to 10y)[ ] 5. university
[ ] 3. secondary (past 11y) [ ] 6. Other _____

23. How long has the household been located in this settlement?

Years ago_____ Year date_____

24. Which is the best way to get information to you about the Negril Marine Park?

[ ] Television [ ] Radio
[ ] School [ ] Workplace
[ ] Flyers/posters [ ] Newspapers
[ ] Area liming spot [ ] Organisation (Name) _____
[ ] Other
[ ] meeting
[ ] workshop
[ ] training
(Please describe) _____

25. Is there anything else that you would like to say about the NMP that I have not asked about?

_____

_____

26. Is there anything you would like to know about the NMP? I will pass along your questions.

_____

_____

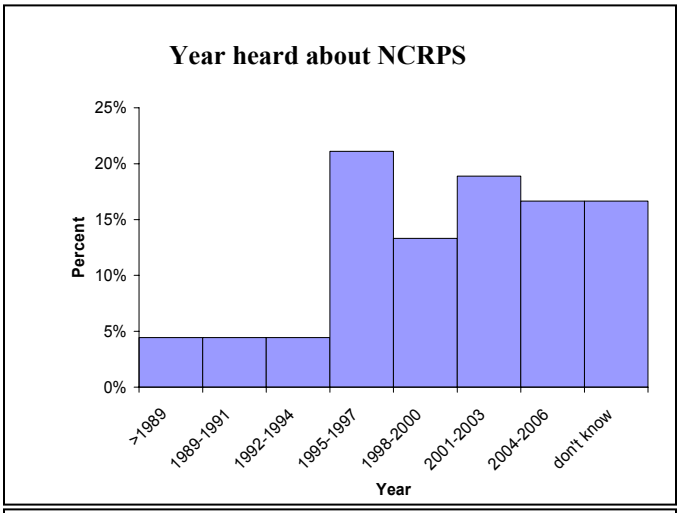
27. Would you attend the meeting where the results of the survey will be presented?

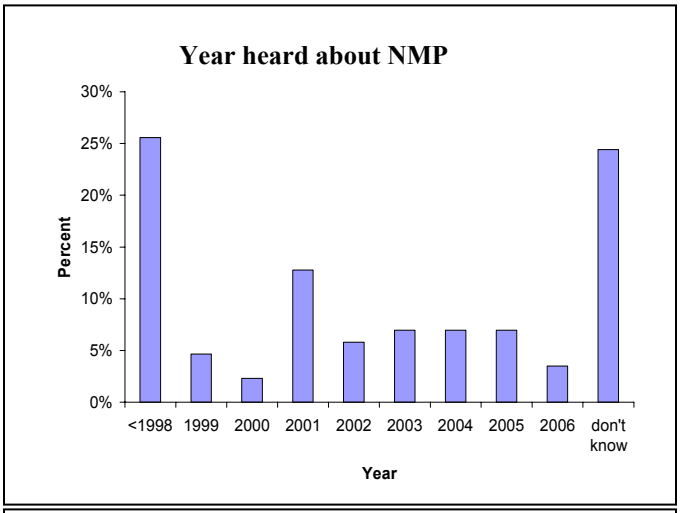
[ ] Y [ ] N

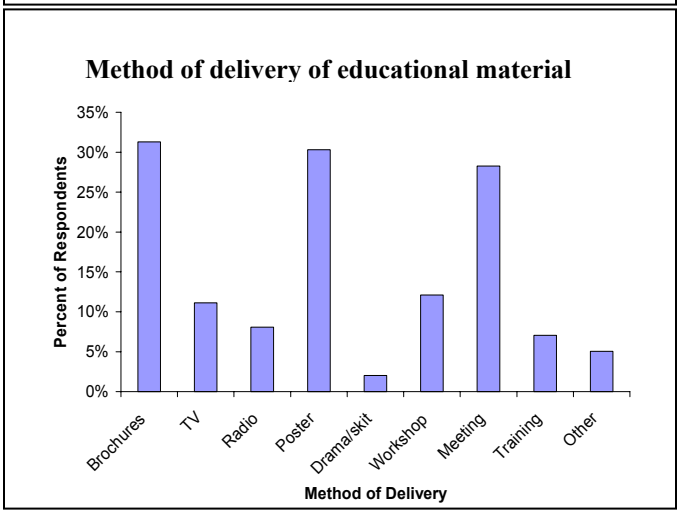
On behalf of the NCRPS — Thanks very much indeed for your assistance. Please keep the map

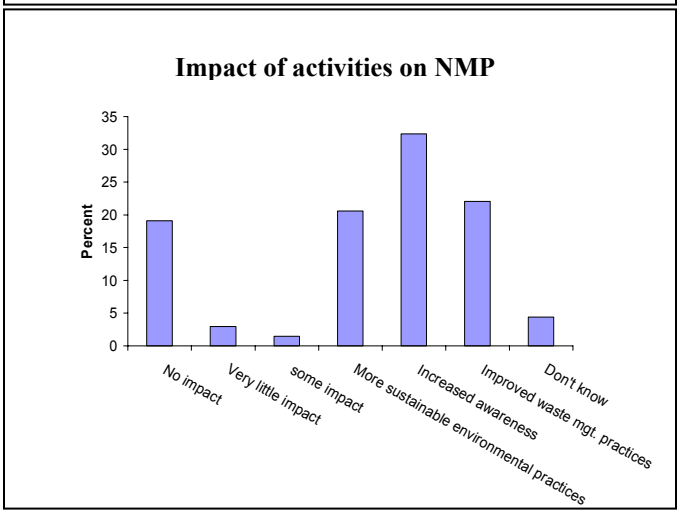
Appendix 2. Results from socio-economic monitoring survey

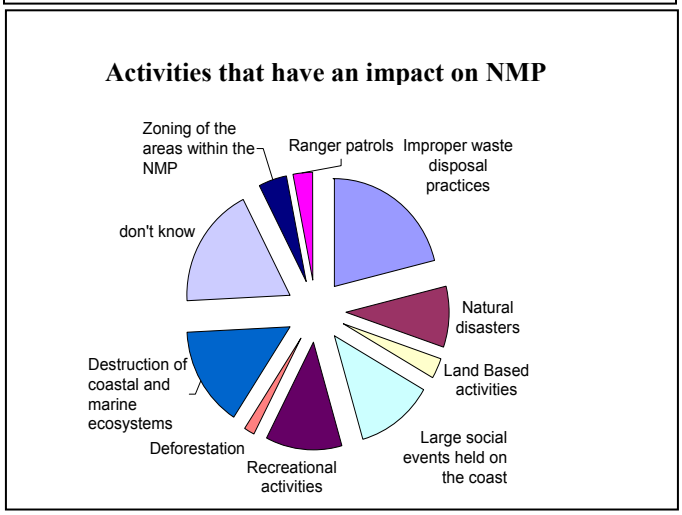
- **Community Members**

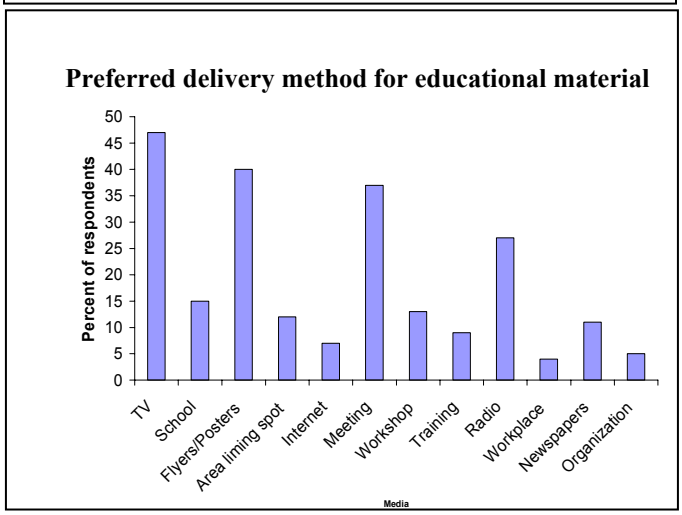




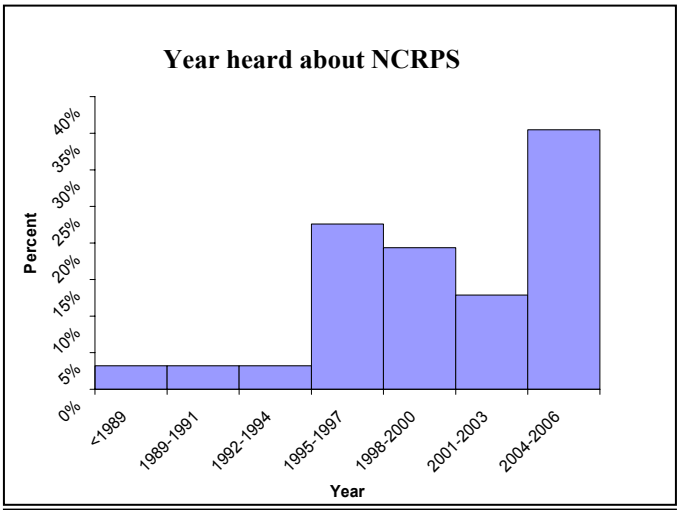


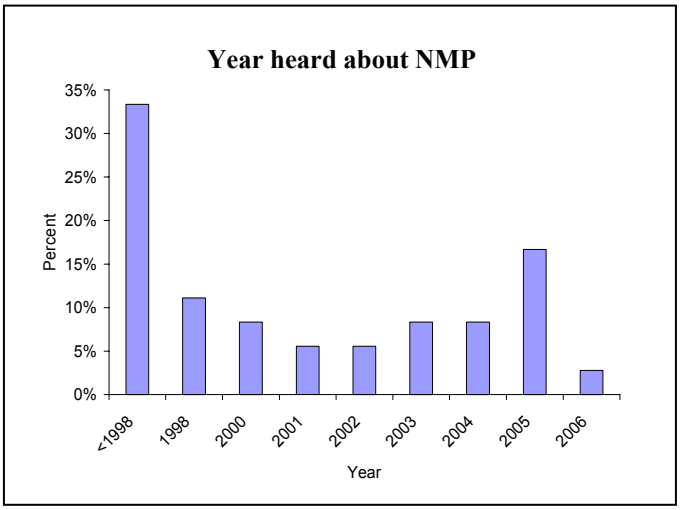


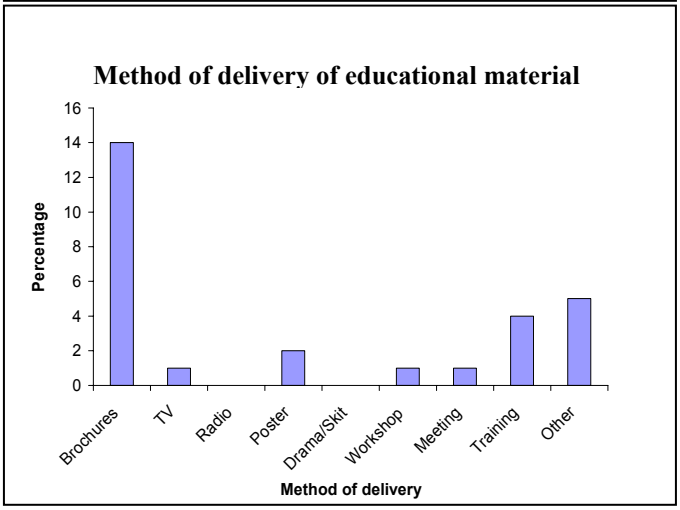


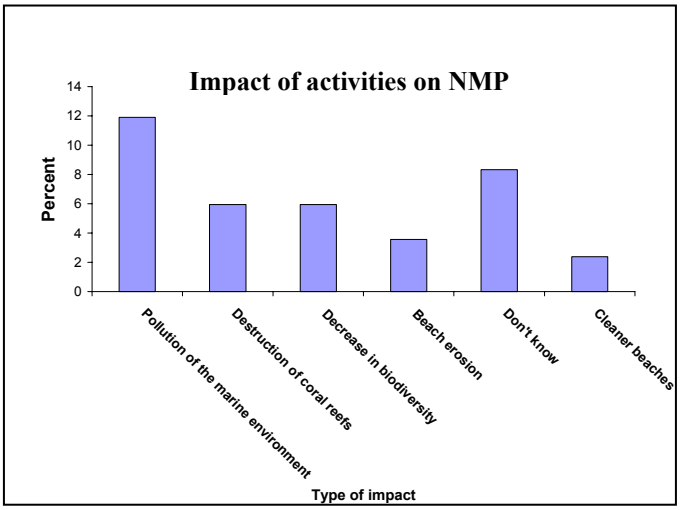


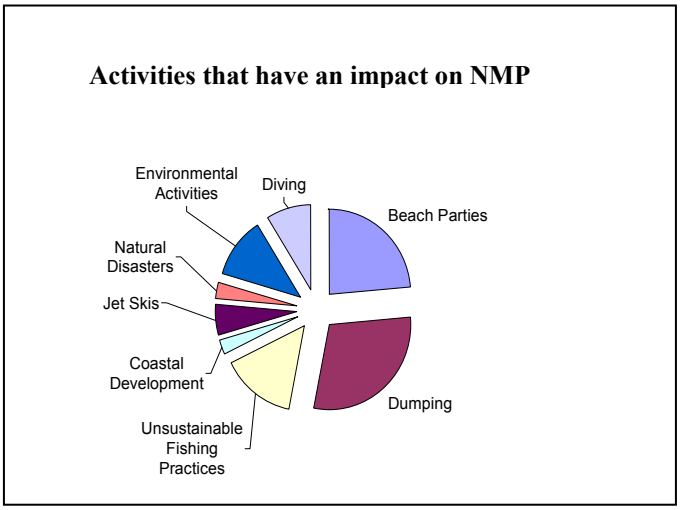
- **Tourism Workers**

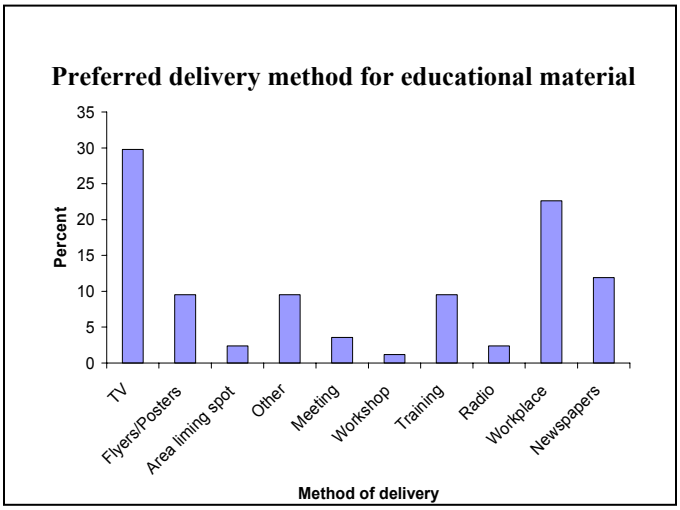




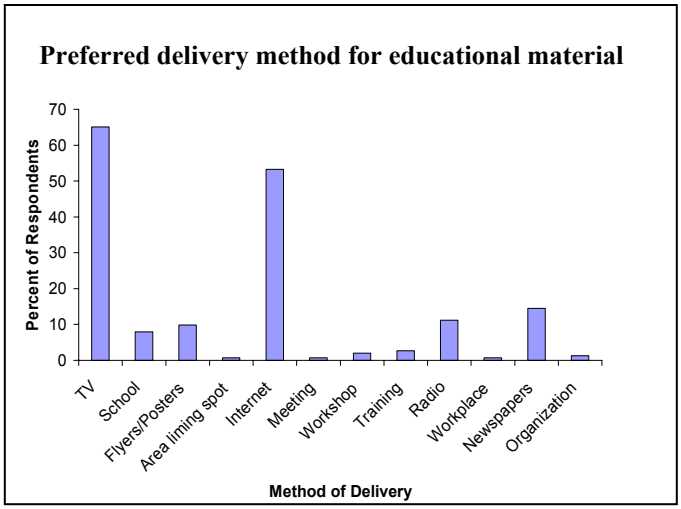








- **Tourists**


Preferred delivery method for educational material
Percent of Respondents
70
60
50
40
30
20
10
0
TV
School
Flyers/Posters
Area liming spot
Internet
Meeting
Workshop
Training
Radio
Workplace
Newspapers
Organization
Method of Delivery

Appendix 3. Stakeholder survey form for Board Members, Regulatory Agencies and donor agencies for the NMP

Stakeholder Participation and satisfaction in management processes and activities of the Negril Coral Reef Preservation Society

Questionnaire

Please tick the appropriate box

1. Which Organization do you belong?

   NCRPS Board ☐ Member Organization ☐ Funding Organization ☐

2. If you belong to a member or a funding organization, please state organization

   ---

3. In what way do you participate in the management processes and activities of the NCRPS?

   Contributing ☐ Lobbying ☐ Fund-raising ☐

4. a. Do you know the needs (financial or otherwise) of the NCRPS?

   Yes ☐ No ☐

   b. How many times per year do you participate in the activities of the NCRPS?

   ---

5. What are the activities undertaken by the NCRPS since January 2005 to improve the management of the park?

   ---

6. What (other) activities would you want to see the NCRPS undertake to improve their management of the Negril Marine Park?

---

7. Are you satisfied with the level of funds raised by the NCRPS?

Yes ☐ No ☐ Don't know ☐

8. What (other) types of fund raising activities would you want the NCRPS to execute in order to build their financial capacity to manage the Negril Marine Park?

---

9. Will you support the NCRPS in future fund raising activities planned?

Yes ☐ No ☐ Don't know ☐

10. How do you promote the NCRPS in your Organization and/or Community?

Appendix 3

Roach, D and C. Garcia. 2007. Report on Management Effectiveness at the Sapodilla Cayes Marine Reserve (SCMR), Belize. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize Report No. 10. 51pp.

CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica & Belize

Report on Evaluating Management Effectiveness at the Sapodilla Cayes Marine Reserve (SCMR), Belize

Centre for Resource Management and Environmental Studies (CERMES)
University of the West Indies, Faculty of Pure and Applied Sciences
Cave Hill Campus, Barbados

2007

CONTENTS

Citation
Roach, D and C. Garcia. 2007. Report on Management Effectiveness at the Sapodilla Cayes Marine Reserve (SCMR), Belize. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize Report No. 10. 52pp.

Acknowledgements
Special thanks to all of the evaluation teams who conducted the field research for this project. Your patience and diligence in this regard is greatly appreciated. These include the biophysical, socio-economic and governance evaluation teams. Jack Nightingale and Denise Frank are also to be thanked for contributions to this report as well as their invaluable information regarding the management of the SCMR.

Contact

Dr. Patrick McConney
Senior Lecturer, CERMES
UWI Cave Hill Campus
St. Michael, Barbados

Tel: 246-417-4725
Fax: 246-424-4204
Email: pmcconney@caribsurf.com
Web site: www.cavehill.uwi.edu/cermes

1 INTRODUCTION

Marine protected areas (MPAs) are important ecological, economic, social and cultural assets for Caribbean countries and beyond, partly due to their significance to tourism earnings in the region. Despite many projects and proposals, and good intentions, management authorities and small field staffs have struggled with very inadequate capacity to manage most MPAs in the region. This situation needs to be remedied immediately.

In October 2005, the Centre for Resource Management and Environmental Studies (CERMES) of the University of the West Indies (UWI) Cave Hill Campus began to implement a regional project to evaluate MPA management effectiveness, and to learn lessons from this process, at three MPA sites in the Caribbean:

- Belize - Sapodilla Cayes Marine Reserve
- Jamaica - Negril Marine Park
- St. Vincent and the Grenadines - Tobago Cays Marine Park.

The project is funded by an International Coral Reef Conservation Grant from the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce.

The project utilises new methods for evaluating how a marine park is being managed set out in a recent guidebook by Pomeroy *et al.* (2004) entitled "How is your MPA doing?" in which bio-physical, socio-economic and governance indicators of MPA management are assessed using existing information, natural and social science surveys, and various other means of data collection to measure the effectiveness of management decisions and actions in achieving goals and objectives that are specific to the MPAs, the marine environment and coastal communities (Pomeroy *et al.* 2004).

The project duration is October 2005 to March 2007 with the following four main components:

1. Inception site-specific training workshops in MPA management effectiveness and evaluation
2. Participatory management effectiveness research and evaluations at the three MPA locations
3. A terminal joint workshop on lessons learned and the consequent adaptation of management
4. Production of training materials based on experiences of the process and on lessons learned

The goal of this project is to promote and institutionalise improved and adaptive coastal management practices and policies in the Caribbean through use of applied research and interdisciplinary training. The project will contribute towards building capacity in MPA management effectiveness evaluation in the Caribbean (CERMES 2005).

Knowing the strengths and weaknesses of management in the past facilitates making improvements. Integration with the University of the West Indies, Cave Hill Campus, communications network, teaching and research programmes, curriculum development and other initiatives will add value to the project and its regional impact through sharing lessons learned and disseminating output products. Participatory and community-based approaches will facilitate stakeholder involvement and adaptive management to ensure that the best practices are institutionalised based upon the lessons learned and the skills acquired during the project or afterwards (CERMES 2005).

The specific objectives for this project are:

1. To conduct participatory management effectiveness research and evaluations by training at least 30 people across three MPA sites.
2. To improve MPAs in the region by monitoring outcomes documented in lessons learned

combined with training and communication materials for coursework, research, management and coastal policy.

Project participants at the three MPA sites assessed MPA management effectiveness under three main headings: Bio-physical, socio-economic and governance (CERMES 2005). This document reports on the Sapodilla Cayes Marine Reserve (SCMR) Marine Protected Area Management Effectiveness (MPA-ME) project during the evaluation fieldwork period March-October 2006. The fieldwork was carried out under the supervision of the Toledo Association for Sustainable Tourism and Empowerment (TASTE), the project partner organisation for this site. For each indicator assessed for management effectiveness, a general background is provided followed by a description of the method(s) employed, results, and discussion. The report concludes with an overall evaluation summary, section on lessons learned and adaptive management for the SCMR.

2 METHODOLOGY

At all three project sites, inception training workshops for evaluating MPA management effectiveness were held (CERMES 2005; CERMES 2006a; CERMES 2006b). Bob Pomeroy, lead author of the guidebook and the project's method trainer and adviser, introduced the marine protected area management effectiveness (MPA-ME) methodology. A description of the evolution of the methodology and its application in other locations around the world was provided.

Participants were then trained in the use of the guidebook with accompanying worksheets to identify (Negril Marine Park and Sapodilla Cayes Marine Park) or determine (Tobago Cays Marine Park) applicable goals and objectives for their MPAs. Goals and objectives that were most relevant and feasible to evaluate were selected by a combination of discussion and open voting. These goals and objectives were then used to identify overlapping goals and objectives in the guidebook and their associated indicators (bio-physical, socioeconomic and governance). The indicators were then examined in detail and prioritised, resulting in the selection of 10 indicators for the Sapodilla Cayes Marine Reserve, eight indicators for the Negril Marine Park and 13 for the Tobago Cays Marine Park.

For each of the three types of selected indicators, participants considered factors related to the evaluation such as human resource needs and the evaluation team, equipment needs, budget needs, timeline, audience and outputs. Details of these requirements are provided in each of the inception training workshop reports (CERMES 2005; CERMES 2006a; CERMES 2006b).

Participatory management effectiveness research and evaluations pertaining to the selected indicators was intended to begin in February 2006, with all data collection scheduled to be completed by September 2006, followed by draft report writing in October 2006. The data collection schedule was postponed by a month and ended in October.

An evaluation workshop of researchers and representatives from all study sites was held to discuss lessons learned from the evaluation experience and the consequent recommendations for adaptive management. The draft site evaluation reports were presented at the workshop held on 4 November 2006 (Pena and Roach 2006). This preceded the 59th Gulf and Caribbean Fisheries Institute conference in Belize City, Belize, at which a presentation on the progress of the project was made (Roach *et al.* in prep.). Training materials based on the process and products of the evaluation of management effectiveness, and on lessons learned at the three MPA sites, will be produced as a final output of the project.

3 GOALS, OBJECTIVES AND INDICATORS

3.1 Background

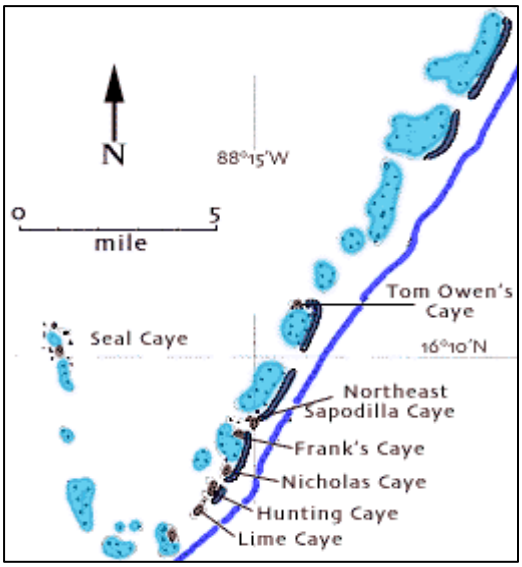
The SCMR is located within the Mesoamerican Barrier Reef System (MBRS). Stretching over 1000 km (625 mi) of coastline, the MBRS is the largest continuous reef in the Western Hemisphere and has been identified as a UNESCO World Heritage Site (WHS), a unique and globally important ecosystem. Belizean, Guatemalan and Honduran communities living along the MBRS rely heavily on it for their livelihood and sustenance. The SCMR is one of the seven reef WHSs in Belize, located on the southern terminus of the Belize Barrier Reef in the Gulf of Honduras. As part of a tri-national focus to the region, the SCMR plays a central role.

The Belize Barrier Reef provides habitat for fish and shellfish, a prime target of local fisheries, providing a valuable source of protein and livelihood for many coastal communities. The barrier reef complex of Belize is said to be one of the country's greatest natural assets. Apart from providing physical protection to the coastline against storms and hurricanes, the reef and its associated ecosystems support two of Belize's major industries: fisheries and tourism. Coral reefs are economically important as an attraction for tourists, supporting the lucrative dive tourism industry and coastal tourism in general.

In 2000, tourism accounted for more than US$114 million whilst fisheries production was valued at some US$19.4 million. Despite its enormous value to the overall economy of the country, this reef ecosystem is being threatened by damage caused by over-fishing, tourism and pollution. The need to conserve and protect this valuable resource is urgent and the Government of Belize has declared 12 marine protected areas. The SCMR was designated in 1996 but remained a paper park until 2001 when on-site management was initiated by the hiring of Fisheries Department staff. On 1 February 2001 the Fisheries Department and TASTE signed a Memorandum of Understanding for co-management of the Sapodilla Cayes Marine Reserve. The co-management entity is typically referred to as TASTE-SCMR, but sometimes just TASTE is used while recognising that this NGO has other functions besides the co-management of the SCMR.

Situated on the southernmost tip of the Belize Barrier Reef, the SCMR includes 14 sand and mangrove cayes. Six of the cayes, the Sapodilla Cayes, are arranged in a "J" formation, and are known for excellent diving and snorkeling conditions. The reef system supports various types of coral and marine life such as dolphins, manta rays, sea turtles, whale sharks and large schools of fish can be spotted. Kayaking is a popular method of exploring the SCMR, which was declared a UNESCO World Heritage Site in 1996 (http://www.planetware.com/belize/sapodilla-cayes-marine-reserve-biz-to-sap.htm).

The main focus of the reserve is the Sapodilla Cayes, considered by many to be the most beautiful range of cayes found in Belizean waters. These cayes, together with Seal Cayes, make up approximately 1.6% of the reserve and cover an approximate area of 17.67 hectares. The remaining 98% of the reserve consists mainly of submerged sand in shallow water of 3-10 meters; a carbonate pavement on the leeside of the reef crest; the reef crest; *Montastrea* Reef that dominates the coral component of the Sapodilla Cayes region; and shallow reef which consists of shallow patches of reefs and/or sea grass beds. The Sapodilla Cayes area has long been used by Guatemalans, Hondurans and to a lesser extent by Belizeans for swimming, snorkeling, diving and fishing.



Source: http://www.travelbelize.org/spanish/guide/pa/pa19.html

Figure 3.1 Map of the Sapodilla Cayes

Despite their remoteness, nearly 40 miles due east of Punta Gorda, these cayes are easily accessible by sea. Tourists visiting the area come mainly from Guatemala and Honduras by tour boats and private yachts, and usually camp in the area for several days at a time. Tourist visitation is year-round with peak use in April, August, and October. The reserve is also frequently visited by Belizean and non-Belizean fishermen. In proposals, the reserve has been divided into 3 zones of varying levels of protection: a General Use Zone (GUZ), where commercial extractive activities are allowed but managed; two Conservation Zones (CZ), where no extractive activities are allowed but other activities, such as SCUBA and snorkeling are allowed; and a Preservation Zone (PZ), where entry is prohibited except with a special permit for research (http://conserveonline.org/). The SCMR is a very rich and unique place, but if not properly managed this might all be lost. Additional information on the barrier reef and SCMR is in the boxes below, taken from various internet sources.

MBRS and SCMR cultural geography

The Belize Barrier Reef platform lies on the Atlantic-Caribbean coast of Belize, and extends 260km from the border with Mexico in the north, to near the Guatemalan border in the south. The SCMR (16°04'-16°11'N, 88°09'-88°20'W), covers the southernmost portion of the Belize Barrier Reef System, 75km north-east of the Punta Gorda Town and is approximately 12,700 ha in size. All the marine areas were designated as protected under the Fisheries Act (Chapter 174 of the Laws of Belize), through the Fisheries (Amendment) Act, No. 1 of 1983. The Sapodilla Cayes were designated as Marine Reserves in 1996. The SCMR comprises eight cayes, three of which (Frank's, Nicholas and Lime) are leased and will not be included within the protected area. The remaining cayes (Tom Owen's, Northeast Sapodilla, Hunting, Ragged and Seal) are state owned. Shell middens at Mayan sites along the coast and on the cayes provide evidence that the reefs were used for fishing some 2,500 years ago. Other important Mayan sites have been found on some of the cayes of South Water Caye, Sapodilla Cayes and Glovers Reef areas. The first major study on the reefs and cays of Belize was carried out by the 'Cambridge Expedition to British Honduras' between 1959 and 1960. Work prior to that was largely confined to personal collecting trips made by visitors and inhabitants to the then British colony. Throughout the 1960's, a series of studies focusing primarily on the geology of the barrier reef complex was carried out (Wantland and Pusey, 1975). In 1972, the Smithsonian Institute established a field station on Carrie Bow Cay. A comprehensive range of publications concerning the physical and biological characteristics of the reef and associated environment have been generated by visiting scientists, much of which has been brought together in a volume by Rutzler and Macintyre (1982). In addition,

organisations such as Wildlife Conservation International (WCI), the New York Natural History Society, and expeditions from numerous universities have added to the scientific knowledge of the Belize reef (Perkins and Carr, 1985).

In 1990, the Belize Centre for Environmental Studies (BCES) conducted an environmental review on a country-wide scale (McCorry *et al*., 1993). The Belize submarine shelf and its barrier reef,which includes the nominated site, is the world's second largest barrier reef system and the largest reef complex in the Atlantic-Caribbean area. The reef ecosystem is of remarkable biological diversity and beauty. It is an area of great scientific value and also provides a habitat for many species of conservation concern, for example manatee and sea turtles. Draft management plans have been prepared for all seven areas which make up the nominated World Heritage Site (BAS, 1986; Bevier, 1994; Dotherow *et al*., 1995, Gibson, 1986, 1988; McCorry *et al*., 1993; Young, 1994). These plans include a preliminary zonation of each area; descriptions of the types of activities permitted or not permitted; descriptions of programmes of research, surveillance and enforcement, environment education, recreation and tourism; staffing and training needs; and budget. The Fisheries and Forestry Departments are in charge of the day-to-day management of the sites. In some cases, management is being delegated to NGOs and local communities, with government agencies providing support and assistance as required. Despite its enormous economic value to the overall economy of Belize, the Barrier Reef ecosystem is threatened by over-exploitation of reef resources by the fishing and tourist industries. For decades, the Sapodilla Cayes and Glover's Reef areas have been illegally fished by Guatemalan and Honduran fishermen. Since there are no closed seasons or size limits for conch and lobster in those countries, much of the area has been depleted of its conch and lobster populations (Gibson, 1988; Young, 1994). Each protected area has a staff consisting of 3-5 people, including a manager, wardens, researchers and volunteers (BAS, 1986; Bevier, 1994; Dotherow *et al*., 1995, Gibson, 1986, 1988; McCorry *et al*., 1993; Young, 1994).

Source:http://www.unep-wcmc.org/protected_areas/data/wh/reef.htm

For a source that promotes tourism with a strongly ecological slant, see below.

SCMR ecological promotion

The outer portion of the reserve is characterised by shallow water reefs which occur as a fringe around the cayes. The depth of water over these fringing reefs is often less then 15 feet, and some of them are exposed at low tides. The drop off east of the islands is gently sloping, in contrast to the near vertical walls further north and surrounding the outer coral atolls.

The outer reefs support a wide variety of fish. Often, large schools of jacks or spadefish will feed just off the outer slope. Nearer the bottom, angelfish, parrotfish and snappers begin to dominate. The waters are often spectacularly clear as water from the Caribbean washes over and through the reef cuts. The lagoon area is characterised by silt, sand and shallow seagrass beds. Some of the most pristine reefs of lettuce coral carpet the ridges which jut into the lagoon from the barrier reef. As the depth increases, the lettuce coral gives way to more coral diversity, and more sponge and algae species.

Source: http://www.southernbelize.com/sapodilla.html

Several Belizean sources provide their information and perspectives below.

Some Belizean views

The Belize Barrier Reef stretches 220 km along Belize's shoreline and has earned its place as the second largest unbroken reef system in the world. This worldly acclaim only partially represents the reef's importance, as its role as a critical host to a myriad of marine life is unparalleled. It is extremely critical to the livelihood of the Belizean populace as it offers great ecological and socio-economic benefits. In 1996, in recognition of both its scientific and aesthetic importance, the World Heritage Site Committee formally adopted a portion of the reef system called the Belize Barrier Reef Reserve System (View info and Map) as a World Heritage Site. Despite the reef's importance, as in other countries around the world, it faces serious threats, both natural and more often, human caused. Impacts from these threats are some of the variables that the Belize Coastal Zone Management Authority and Institute attempts to assess (http://www.coastalzonebelize.org/prog05.html).

Designated in 1996, it is located on the extreme southern end of the barrier reef, which forms a J-shaped hook. Fourteen sand and Mangrove cayes are dotted along the sides of the "Hook." These cayes are surrounded by fringing reefs with extensive spur-and-groove formations extending eastwards. The central basin within the "hook" has scattered coral patches. These reefs are considered representative of the discontinuous reefs of the southern province of the barrier reef. Hunting Caye houses an important hawksbill nesting beach. The Belize Center for Environmental Studies is currently working on the marine reserve's management plan. On-the-ground management, the responsibility of the Fisheries Department, is presently constrained due to lack of funding. (http://www.ambergriscaye.com/reefbriefs/briefs9.html)

TASTE-SCMR has benefited from having foreign researchers add short term capacity, often while pursuing graduate degrees. See the perspective of one of them below.

An external insider's perspective

The Sapodilla Cayes Marine Reserve protects the southern most portion of the Belize Barrier Reef. The SCMR was declared in 1996, but on-site management did not begin until 2000. In 2001 the Toledo Association for Sustainable Tourism and Empowerment (TASTE) signed a co-management agreement with the Belize Department of Fisheries. Since that time TASTE has been working with the Department to improve management of the reserve. Effective management of marine resources should be supported by biological data. Marine reserves in Belize are designed to improve fisheries management and offer reef ecosystem protection. Without consistent biologically significant data it will be impossible to effectively manage the natural resources within the SCMR.Over the past three years with support from a number of national and international partners, there has been growing emphasis on the collection of solid biological information for the management of the SCMR's marine resources. In recognition of the need for better biological information, TASTE and other partners have worked to develop a monitoring plan for the SCMR. The goal of this project is to finalise a monitoring system to provide needed information; train a team in data collection methods; and establish a database for biological information. There is significant interest in creating a monitoring system which should provide basic baseline information about the status of the marine reserve. TASTE-SCMR is currently working with the Belize Fisheries Department to expand biological monitoring and enforcement; completion and implementation of a comprehensive monitoring plan would assist in these efforts. Establishing a consistent monitoring program supported by trained local personnel and a centralised database, should give managers important tools for making decisions.

Source: http://www.rufford.org/rsg/projects/jocelyn_rae_finch

Currently the Fisheries Department does not have the necessary capacity to fully manage the SCMR. Therefore TASTE, as the co-management partner, takes every opportunity to acquire funding to get the reserve fully functional. For example, although the SCMR is already a tourism destination and marketed as one of the seven areas comprising Belize's World Heritage Site, at present, there is a lack of trained guides from Punta Gorda and the surrounding coastal communities. TASTE has had projects to address this need by targeting local youth and offering them the training that they need to become effective guides in the reserve. The goal is to provide

alternate income generation activities by training these youths in diving, business management, boating and about the SCMR.

3.2 Goals and objectives

Management effectiveness evaluation is not foreign to the SCMR. Procedures for evaluating management effectiveness have been developed under the Mesoamerican Barrier Reef System (MBRS) Project and the recent Belize National Protected Area System Plan. At the inception training workshop it was communicated that the Fisheries Department is committed to using the MBRS methods as part of this regional project (CERMES 2006).

The SCMR has a strategic plan with five goals and ten objectives. On project inception, these goals were identified and ranked. Goals and objectives that were most feasible and relevant to evaluate were then selected (CERMES 2006 and Table 3.1).

Table 3.1SCMR goals and objectives for selected evaluation

SCMR goal	Objective
To develop sustainable fisheries in the SCMR through establishment of ownership by local southern Belizean fishers and user groups of the fisheries resources	• Establish and enforce zoning • Eliminate poaching in Belize fishing grounds
To conserve and protect biodiversity and habitat in the SCMR for sustainable use of present and future generations of Belize	• Establish well managed monitoring of biodiversity • Establish waste management practices and regulations
To address uses and activities outside of the SCMR, which threaten conservation and protection of biodiversity within the SCMR	• Establish Tri-National understanding of the SCMR as a transboundary area; its goals and objectives; regulations and care • Establish regional education and outreach programs
To ensure proper administration and implementation of the SCMR management plan	• Organise and implement multistakeholder meetings once per year to review progress • Include community stakeholders in management decision-making processes

3.3 Indicators

The goals and objectives in Table 3.1 were used to select 10 indicators for evaluating SCMR management effectiveness. Table 3.2 provides a list of the relevant indicators chosen for evaluation of the SCMR.

Table 3.2 Indicators selected for evaluation at the SCMR

MPA	Relevant indicators identified
Sapodilla Cayes Marine Reserve	***Biophysical*** 1. B4 Composition and structure of the community 2. B8 Water quality ***Socioeconomic*** 1. S14 Distribution of formal knowledge to the community 2. S1 Local marine resource patterns ***Governance*** 1. G5 Existence and adequacy of enabling legislation 2. G11 Level of training provided to stakeholders in participation 3. G12 Level of stakeholder participation and satisfaction in management processes and activities 4. G13 Level of stakeholder involvement in surveillance, monitoring and enforcement 5. G14 Clearly defined enforcement procedures 6. G15 Enforcement coverage

Indicators selected for the MPAs in Jamaica and St. Vincent and the Grenadines are provided for information in Table 3.3.

Table 3.3 Indicators selected for evaluation at the other MPA sites

MPA	Relevant indicators identified
Tobago Cays Marine Park	***Biophysical*** 1. B1 Focal species abundance (marine) 2. B8 Water quality ***Socioeconomic*** 1. S2 Local values and beliefs about marine resources 2. S3 Level of understanding of human impacts on resources 3. S7 Material style of life 4. S9 Household income distribution by source ***Governance*** 1. G2 Existence of a decision-making and management body 2. G3 Existence and adoption of a management plan 3. G6 Availability and allocation of MPA administrative resources 4. G9 Degree of interaction between managers and stakeholders 5. G12 Level of stakeholder participation and satisfaction in management process and activities 6. G14 Clearly defined enforcement procedures 7. G15 Enforcement coverage
Negril Marine Park	***Biophysical*** 1. B8 Water quality

MPA	Relevant indicators identified
	2. B9 Area showing signs of recovery (total habitat level)
	Socioeconomic
	1. S3 Level of understanding of human impacts on resources
	2. S14 Distribution of formal knowledge to community
	Governance
	1. G2 Existence of a decision-making and management body
	2. G6 Availability and allocation of MPA administrative resources
	3. G12 Level of stakeholder participation and satisfaction in management processes and activities
	4. [New] Success of fundraising strategies (revenue and diversity of sources) that form part of the business plan

Relationships between the SCMR objectives and the selected indicators are shown in Table 3.4.

Table 3.4 Relationships between SCMR objectives and selected indicators

SCMR Objectives	Indicators
Establish well managed monitoring of biodiversity	B4 Composition and structure of the community
Establish waste management practices and regulations	B8 Water quality; G5 Existence and adequacy of enabling legislation; G13 Level of stakeholder involvement in surveillance, monitoring and enforcement; G14 Clearly defined enforcement procedures
Eliminate poaching in Belize fishing grounds	S1 Local marine resource use patterns; G5 Existence and adequacy of enabling legislation; G13 Level of stakeholder involvement in surveillance, monitoring and enforcement; G14 Clearly defined enforcement procedures; G15 Enforcement coverage
Establish Tri-National understanding of the SCMR as a transboundary area; its goals and objectives, regulations and care	S14 Distribution of formal knowledge to community
Establish regional education and outreach programs	S14 Distribution of formal knowledge to community
Establish and enforce zoning	G5 Existence and adequacy of enabling legislation; G13 Level of stakeholder involvement in surveillance, monitoring and enforcement; G14 Clearly defined enforcement procedures
Include community stakeholders in management decision-making processes	G11 Level of training provided to stakeholders in participation; G12 Level of stakeholder participation and satisfaction in management processes and activities
Organise and implement multi-stakeholder meetings once per year to review progress	G12 Level of stakeholder participation and satisfaction in management processes and activities

(Based on CERMES 2006)

The way in which the evaluation results related to the objectives is set out partly in the discussion of individual indicators but mainly in the evaluation summary.

4 WATER QUALITY (B8)

4.1 Background

Water quality is an abiotic and biotic measure of the ambient environmental parameters present within the water column (Pomeroy *et al* 2004). Quality is determined by the evaluation of

measured quantities and parameters which are compared to predetermined standards, objectives or criteria. These parameters may include, *inter alia*, temperature, salinity, oxygen content, turbidity, bacteria and other particulate matter. Water quality is a key indicator of ecosystem health and a limiting factor to the biological processes within organisms, populations and habitats (Pomeroy *et al* 2004). Affected by both natural processes and human activity it has serious implications for the health and viability of biological communities and the economic sustainability of coastal areas.

The SCMR is located in the centre of the Gulf of Honduras and is subject to pollution transported from inland areas from a large numbers of rivers which originate in Belize, Guatemala and Honduras. These rivers are thought to flush sediment, nutrients, agro-chemicals and other pollutants into the conservation area. Very little is known of the sources and nature of the pollutants that are deposited in this area and the extent to which they have influenced ecosystem health within the MPA. Not only do pollutants pose major threats to ecosystem health but may affect potable water supplies of the fishermen who make use of the resources within the SCMR. Poorly developed and maintained wastewater disposal systems are thought to have contaminated the traditionally used freshwater lens within the Cayes.

Prior to water quality sampling conducted by TASTE-SCMR, funded by the small grants facility of the Protected Areas Conservation Trust (PACT), no monitoring had been undertaken within the SCMR. No new sampling was undertaken under this MPA ME project, but the available secondary data may provide a baseline and starting point from which a more extensive and detailed water quality monitoring programme may evolve, particularly through the MBRS project.

4.2 Methods

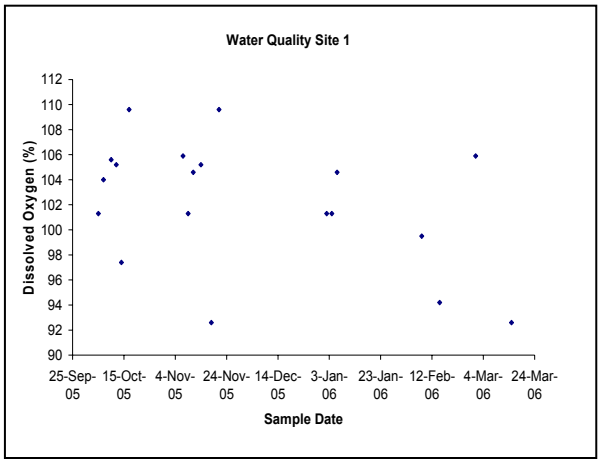
With funds received from the PACT small grants programme, TASTE-SCMR was able to purchase water quality equipment for the purpose of implementing a water quality monitoring programme in the SCMR. The primary objective of this programme was to collect and analyse water samples from various sites and log SCMR water quality data as part of a long term programme to foster better understanding of the source and nature of pollutants and current status of water quality within the conservation area. This equipment included a HACH Portable LDO meter (hydro lab), HACH Colorimeter, laptop, and sample collection equipment (sample bottles, pocket pH meter etc). Three staff members received training in data gathering and analysis from members of the Belize Fisheries Department. Sample collection was scheduled to take place once weekly at five selected sites within the SCMR. These sites were strategically chosen to attain geospatial variability. Five parameters were tested in this water quality programme; dissolved oxygen, pH, salinity, conductivity and turbidity. Measurements were taken *in situ* using the equipment listed above and recorded. A sketch map of the location of each sampling site is illustrated in Figure 4.1.

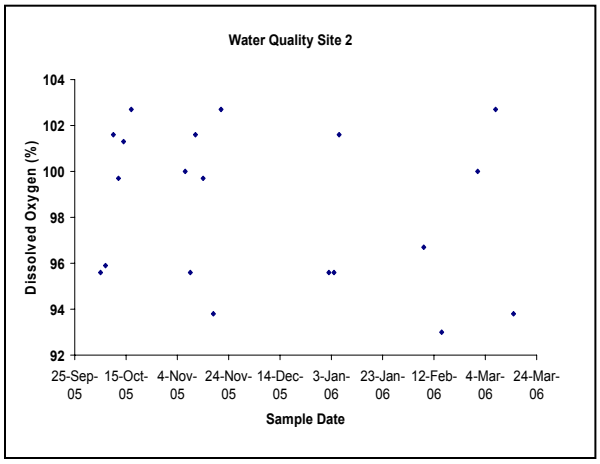
Figure 4.1 Water quality (WQ) sampling sites in the SCMR

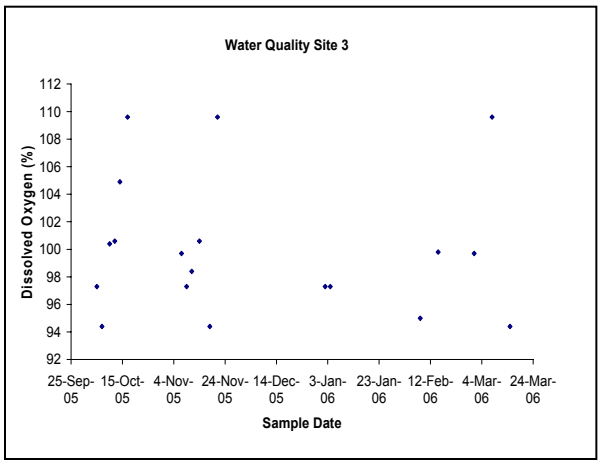
4.3 Results

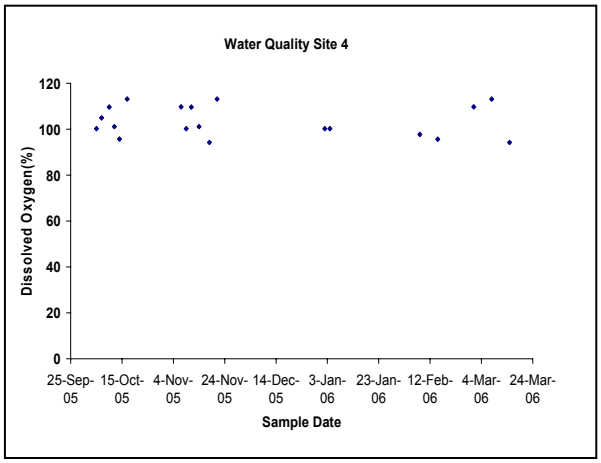
Due to the early stages of the water quality monitoring programme, and limited equipment that could be obtained with available funding, monitoring was restricted to physiochemical parameters only. No microbiological testing or nutrient analysis was conducted. The example of dissolved oxygen at all sites taken over the total sample period is illustrated in the graphs of Figure 4.2.

The features of these five graphs are reflected across the spectrum of parameters. Additionally no information was provided on human activities in the area in the past or at the time that sampling was conducted. The geographical location of each sample site relative to places of human activity, land masses or other sample sites has also been omitted. No information was presented on weather or tidal patterns making it impossible to correlate results with any specific event. The features of these five graphs are reflected across the spectrum of parameters. Additionally no information was provided on human activities in the area in the past or at the time that sampling was conducted. The geographical location of each sample site relative to places of human activity, land masses or other sample sites has also been omitted.









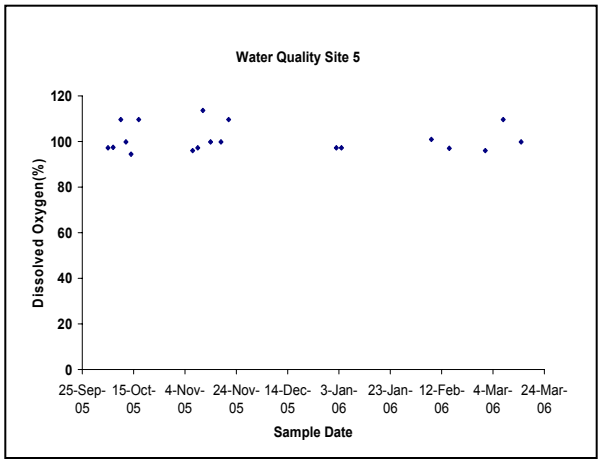


Figure 4.2 Dissolved oxygen at all sample sites

Although the results could be beneficial in highlighting early trends and in the identification of areas that are optimal for sampling, the sporadic nature of sampling as well as the limited data

collected did not enable trends in the results to be identified, and the absence of supporting data precluded the conclusion of there being no observable trends such as seasonal or event-generated variability.

4.4 Discussion

This evaluation has not provided an adequate contextual framework in which analysis can be conducted on the data gathered in order that it may be used to inform management activities and future monitoring endeavours.

It is clear that there is need for a comprehensive monitoring plan at the SCMR that clearly states the procedures and protocols that must be upheld at every stage of the water quality monitoring programme. This plan should include procedures for collection and analysis as well as database management and reporting methods. Greater coordination is required for monitoring activities where a schedule for collection of samples is implemented. A clear decision on sample frequency, time of collection and sample sites should be reached so that there is a standardised procedure that can easily be followed by members of the evaluation team. At all sites a compilation of these procedures and protocols should be made available to persons involved in the process. This will provide a reference document for all whose efforts and interests are vested in such a programme and should be regularly updated when new and more applicable methods are implemented. Careful thought must be placed into the design of monitoring programmes to ensure the information adequately represents the true state of conditions within the MPA.

This evaluation was successful in highlighting some shortcomings in the implementation of water quality monitoring in the SCMR. We can learn from them. The data limitations indicate the changes that need to be made in the structure and procedures of such an undertaking that are necessary to provide meaningful data and information. These changes include building greater institutional memory, more extensive training and the importance of having access to fully trained staff with sufficient equipment to produce accurate and useful results. The ability of this indicator to evaluate the management objective was good, with the exception of these flaws in data quality.

5 LOCAL MARINE RESOURCE USE PATTERNS (S1)

5.1 Background

The location of the SCMR near to the borders of three countries makes it susceptible to illegal activities, one of the biggest being poaching. This illegal removal of living resources, continues to be a major problem at the SCMR.. The reserve covers approximately 125 km^2, and this size makes it difficult for the Fisheries Department to monitor these illegal activities. Illegal fishing within the SCMR by both Belizeans and foreigners may be the single most important problem that can restrain management of the reserve. The national fisheries and reserve-specific regulations will both need to be strictly enforced to prevent further illegal fishing and poaching activities within the reserve. The main reason for the problem persisting is lack of MPA finance, lack of staff and inadequacy of the operational inputs necessary to do the work (e.g. fuel).

5.2 Method

A series of surveys were conducted to determine the level of poaching in the SCMR. The fishers targeted were from the buffer communities of the Sapodilla Cays Marine Reserve that are members of a Cooperative, mainly the Rio Grande Cooperative. Some coastal communities targeted were Punta Gorda, Punta Negra, Sarteneja, Monkey River and Placencia. In addition to

this, the four community rangers were interviewed since, like the fishermen, they comprise an integral part of the reserve. Since the user zones in the SCMR are still being drafted and have yet to be gazetted, it creates a situation where it is difficult to address problem areas and enforce regulations. The following are the results of the survey conducted with the different fishermen.

5.3 Results

The majority of the fishermen (64%) that took part in this survey stated that they fished within the SCMR. Many of these persons (77%) believed that poaching did take place within the conservation area where the main items taken where lobster (32%), conch (45%) and turtle and turtle eggs (23%). These results are illustrated in Figure 5.1.

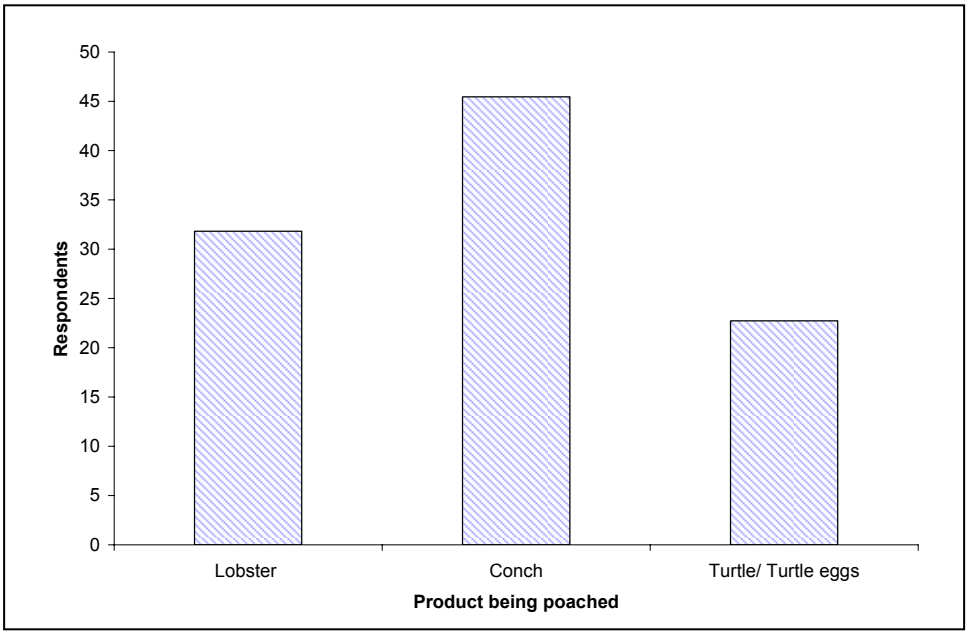


Figure 5.1 Resources taken by poachers

Many of the target species that are caught have not reached maturity and this has been the basis of many of the warnings issued and arrests made within the SCMR. The fishermen stated that this activity mainly takes place at night when no patrols are taking place within the conservation area. Many of the respondents also believe that the poachers mainly originate from Honduras (73%) and to a lesser extent Guatemala (27%). The majority of the fishermen believe that the resources are taken to Honduras (73%) while others have stated that Guatemala (23%) and Belize itself (5%) are the end points for the illegal catch. This is illustrated in Figure 5.2.

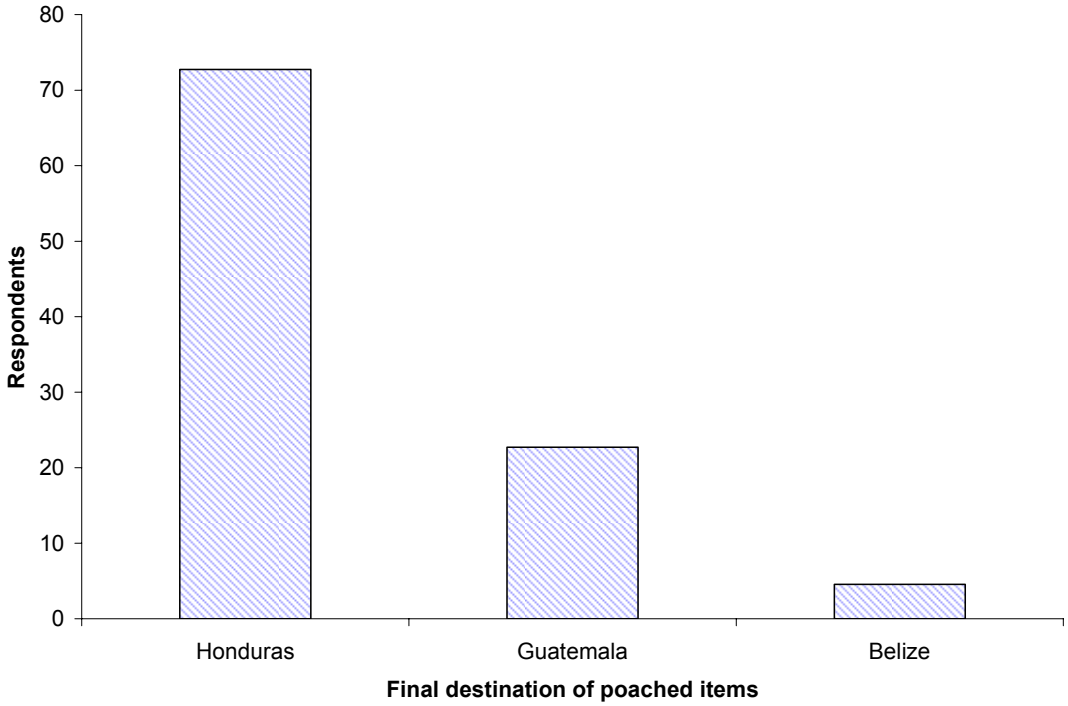


Figure 5.2 Alleged final market of resources poached from the SCMR

A number of suggestions were given on how to reduce the incidence of poaching activities or to eradicate them all together. These included an increase in the number of enforcement patrols in the area and formalisation of user zones for the conservation area.

5.4 Discussion

Poaching continues to pose a major threat to the natural resources within the SCMR. Additionally these actions have significant bearing on the social climate of the area. Stakeholders who have a vested interest in the area and are dependent on the resources found there may feel disadvantaged by the uncontrolled harvesting of local resources by foreign nationals. In such a situation local users are deprived of many of the benefits from these resources. It is believed by many of these respondents that more can be done to safeguard this conservation area so that local stakeholders realise some of the benefits and are not left solely with the responsibility of trying to restoring marine ecosystems that were impacted by illicit activities. There is a need for additional enforcement within the SCMR. This proves to be a difficult task due to the unique location of the reserve, its shear size and limited capacity of government and non governmental agencies charged with management of the reserve. Perhaps a more collaborative approach to monitoring the area should be utilised where limited capacity may be overcome by sharing resources and experience.

This evaluation was successful in highlighting the ability of the management agencies to curb poaching activity in the SCMR. The need for additional manpower and equipment has also been highlighted which brings to bear the need for greater stakeholder involvement in this endeavour. The ability of this indicator to evaluate the management objective was good.

6 DISTRIBUTION OF FORMAL KNOWLEDGE TO THE COMMUNITY (S14)

6.1 Background

This is a measure of the degree of awareness of information generated by the scientific community held by stakeholder and user groups about MPA use and ecosystem impacts. The data generated by evaluating this indicator can contribute to improving scientific understanding of local ecosystems and to facilitate interactions with stakeholders by ensuring that they have confidence in the scientific information. It can also facilitate accurate communication and data collection by ensuring that managers, scientists and stakeholders use the same terms (Pomeroy et al. 2004).

Despite the fact that MPAs are not solely a product of social processes, their implementation may have great social ramifications (Mascia 2004). They act as management tools that involve a process of resource allocation and regulation which has the potential to shape the political, social and economic construct of the communities that depend on areas that have been placed under protection. It is imperative that goals and objectives, and the potential impact of MPA systems on wider society be clearly understood. By doing so, collaborative efforts can be made between official management bodies and communities in order for the benefits of an MPA to be recognised. This can only come from the realisation that social processes have as much impact on marine systems as biological and physical variables (Mascia 2004). The success of an MPA relies not only on the human decision making process but the management system's ability to influence changes in human behaviour. In order to do this, management bodies must not only seek to improve the public's understanding of environmental and social sustainability (CERMES 2005b) but to understand the social cultural, political and economic variables that influence individual choice and behaviour. Once these factors have been accounted for there is a greater potential to use this information to ascertain where and when participatory approaches may be most effective. More importantly, consideration of these factors provides a better guide to managers as to how information dissemination and environmental education may impact on the public's perception of resource use and availability as well as on behaviours that may affect the viability of marine resources and their related ecosystems.

It is hoped that an educated public will be able to recognise the correlation between their behaviour and how these actions affect marine ecosystems. This understanding is necessary from both an economic and social standpoint. The fact remains that the livelihoods of many members of public are indelibly intertwined with marine resources and therefore affected by their use and viability. In light of this it should be a matter of public interest that these resources be used in the most sustainable manner possible. In order to bring across this point, the dynamic that exists between natural resources and the potential effects of human behaviour must be understood. Faulty perceptions have the potential to encourage harmful behaviours which in turn reduce the level of MPA success. It is important for the management organisation to recognise where the knowledge gaps lie and what the prevailing perceptions of resource users are in order to design interventions to fill the information gaps, involve the communities in management of its resources as well as to evaluate the changes that may result from these processes (Pomeroy et al. 2004). This information may also serve to determine what audiences need to be targeted.

Having knowledge of the target audience will guide methods of dissemination as well as the content of educational material which facilitates a meaningful interaction with all stakeholders. Scientific information must be distributed in such a manner that the target audience has full

understanding of the message which is being conveyed. Level of exposure to previous information as well as the level of formal education will have great bearing on the terminology that should be used and the methods that are employed for this transfer of information. The level to which management bodies attempt to reach and involve their individual target audience, include them in the management process and address their concerns will determine the level of confidence that the stakeholders will have in the information that is presented.

6.2 Methods

The evaluation of this indicator was done through the assessment of various documents by members of the evaluation team. These documents included:

- External Evaluation of COMPACT Education Project
- Focus Group report for the COMPACT Education Project
- Original survey results for TASTE 2002-2003
- Survey and analysis of Guatemalan Tour Operators and fishers as wells as Honduran Fishers who received workshop presentation from TASTE.

6.3 Results

Although TASTE is a small community organisation with limited funding and human resources at its disposal, it has endeavoured to use environmental education as a management tool in the SCMR. In this regard the organisation has been able to disseminate a significant amount of formal knowledge to its stakeholders during its six years of existence. One of its most recent and successful endeavours has been its involvement in the Community Management of Protected Areas Conservation Programme. This Programme represents a joint initiative between the Global Environment Facility Small Grants Programme (GEF SGP) and the United Nations Foundation (UNF) which seeks to increase the effectiveness of biodiversity conservation in globally significant protected areas through community-based initiatives (http://sgp.undp.org).

This project entitled '*SCMR: Creating Awareness of the Importance of a Marine Reserve in Coastal Communities of the Toledo District,*' focused on increasing the awareness and understanding of, and concern about, potential threats to the Belize barrier reef and more specifically the SCMR One of its primary objectives was to make the linkages between the condition and health of the reef system and human activities explicit and place this information within a local and global context (Cho-Ricketts 2005). This was achieved through the involvement of 560 youths from the Toledo District from both primary and secondary institutions. Not only was this project designed to promote and demonstrate the conservation value of the SCMR to these students but it also focused on building capacity within TASTE. This was achieved through a SGP project which was simultaneously implemented allowing this small NGO the opportunity to undertake such an endeavour through the provision of technical and institutional capacity (Cho-Ricketts 2005).

The results of this project were assessed through various methods which included interviews, the review of relevant documentation and consultation with project personnel. It was found that the project had been highly successful. There was stakeholder involvement to various degrees at each stage of the project and this endeavour provided the opportunity for exposure of large numbers of young people to the Belize Barrier Reef System, many of whom had never had this experience before. This experience provided the spring board for fostering stewardship among future users and creating a base of influence for current users through the edification of these

youth. Surveys conducted indicated that the retention of this knowledge was generally high and that many of these students displayed enthusiasm for participating in future conservation efforts as well as a genuine concern for the environment. This undertaking was so successful that there have been requests for the continuation of such a programme within the Toledo District as well as the integration of certain aspects of environmental education into the school curriculum. In light of this, TASTE has sought to attain additional funding in this regard, to expand the programme to a national level and to incorporate adult education initiatives.

The success of the COMPACT project provided the impetus for the implementation of a second such undertaking which has yet to be evaluated. For the second undertaking, the focus was placed on adult education in villages throughout the Toledo District and dissemination of information to science clubs in five focus schools. The adult education component was carried out through a series of workshops delivered to various interest groups. Preliminary feedback from this exercise indicated that the knowledge base for most of the participants was very small and many were unaware of various aspects of the marine environment as well as efforts that had been implemented to manage and conserve the ecosystems within the SCMR. Field study among members of the science clubs and adult participants was received with as much enthusiasm as it had been for the youth in the previous project. Participants were involved in Benthic Macro-invertebrate studies as well as the basic facts as it pertained to monitoring and practical science (Nightingale, 2006).

Outside of these projects the environmental educational material distributed by TASTE has been inconsistent and sporadic. The frequency with which any information is distributed depends largely on the availability of funding which is almost always project based. Since 2005 TASTE has only delivered a small number of adult workshops and the school education programme has yet to be realised. Delivery of information to stakeholders has been impeded largely by lack of funds and weak organisational structure of the NGO (Nightingale, 2006).

6.4 Discussion

The COMPACT project highlighted the ability of TASTE-SCMR to undertake efficient and effective environmental education programmes. The enormous success of this first project proved that with adequate institutional capacity and technical assistance TASTE is fully capable of realising its conservation goals and objectives. This is the case with many NGOs whose will to carry out their mandate far outstrips their technical capability to do so. Without external assistance or the continuous collaborative effort from other agencies, small community based organisations such as TASTE will never be able to fully attain their management goals and objectives. There is a need for greater assistance from relevant government agencies in this regard as well as increased efforts in lobbying for funding for such activities. Without external support, both in the area of financial support and human resources, TASTE will continue to struggle to reach their widely scattered and diverse stakeholder audience. Additionally, the organisation must continue to include the youth in these activities. Not only are they edified by these experiences but they also form a base of influence that may have a positive effect on the behaviour of current users.

This evaluation was aimed at assessing two management objectives. There was disparity in way this indicator was able to accomplish this task for each of these. In the first instance, the evaluation failed to highlight whether a Tri-National understanding of the SCMR as a trans-boundary area; its goals and objectives, regulations and care was established. However, their

ability to establish regional education and outreach programs and the factors that impeded their ability to do so were highlighted. This assessment was able to clearly show the level of success of previous programmes and in this regard was able to successfully evaluate the management objective. Care must be taken in the selection of an indicator for the evaluation of any management objective. These indicators are often used as multi-pronged tools for the purpose of assessing several objectives. In such cases participants in this process must ensure that these tools used address each goal adequately and are not biased towards the assessment of one particular objective.

7 EXISTENCE AND ADEQUACY OF ENABLING LEGISLATION (G5)

7.1 Background

This is a measure of the formal legislation in place to provide the MPA with a sound legal foundation so that the goals and objectives of the MPA can be recognised, explained, respected, accomplished and enforced. The purpose of this indicator is to ensure that the MPA management plan is supported by adequate legislation in order for its successful implementation (Pomeroy *et al.* 2004). The implementation of a MPA inevitably means placing restrictions on resource use to ensure the viability of the resource base and to safeguard all related ecosystems. Without the provision of a strong statutory base which provides the legal framework in which to ensure that there are policies that adequately speak to conservation efforts, the benefits of such areas may never be realised.

Management agencies need to have their conservation goals and objectives backed by appropriate legislation so that resource users who contravene existing regulations may recognise the consequences of such actions. Such legislation not only encompasses the enforcement aspect of MPA management but provides guidelines under which educational programmes, monitoring and scientific endeavours may be undertaken. It should clearly define the roles of all parties involved in the management of the area, adequately stipulating exactly where relevant mandates lie, as well as make explicit the activities that are permissible within the conservation area. A failure to provide such a legal construct deprives the management agencies of the legal teeth required to realise MPA success. In Belize, legislation relevant to MPA and Marine Reserves may be found in Chapter 210, Section 14 of the revised Fisheries Act of 2000. Regulations specifically for the SCMR are in draft and hence subject to further change.

7.2 Method

Members of the evaluation team collected and analysed legislation and documents that contained legal findings relevant to the assessment of this indicator. These included the revised Fisheries Act of 2000 as well as draft legislation concerning the SCMR and its zoning to be completed by the Belize Fisheries Department. Relevant legislation was compared to the goals and objectives of the MPA in order to discern whether these were adequately addressed under the current statutory framework.

7.3 Results

The current legislation relevant to the management of MPAs in Belize is contained within the revised Fisheries Act of 2000. This law highlights the discretionary approach that is taken in the implementation of marine conservation areas. The final decision for their implementation rests with the Minister of Agriculture and Fisheries where he considers that such methods are necessary (Government of Belize, 2000). According to section 14 of the Act:

> "The Minister may, where he considers that extraordinary measures are necessary, by Order published in the *Gazette*, declare within the fishing limits of Belize and as appropriate any adjacent land, to be a marine reserve."

Outside of the discretion of the Minister, the legislation does not require that he consult any other ministry, governmental organisation or NGO in the process of making this decision. Conditions under which the situation may be considered extraordinary have also been left to the discretion of the Minister, as the legislation fails to provide alternate or explicit conditions under which the declaration of a MPA may be made. There are four main objectives outlined in section 14 of the Act for the establishment of a marine reserve (Government of Belize, 2000):

- To afford special protection to the aquatic flora and fauna of such areas and to protect and preserve the natural breeding grounds and habitats of aquatic life
- To allow for the natural regeneration of aquatic life in areas where they have been depleted
- To promote scientific study and research in respect of such area
- To preserve and enhance the natural beauty of such areas

A licence from the Fisheries Administrator is required to conduct any activities within the marine reserve. This places the Fisheries Department in a position of management of the area as they are responsible for regulating the activities within the conservation area. Provision is made for the control of dredging in the SCMR under the Mines and Minerals Act of 1998. Permission to do this can only be gained through a license obtained from the Office of Petroleum Geology (Nightingale, 2004).

These legal instruments make provision for many of the conservation goals and objectives outlined in the SCMR management plan. However legislation related to waste management as well as zoning of the conservation area has not yet been implemented. In recognition of this, the Fisheries Department has begun drafting legislation that speaks directly to the implementation of user zones. These should include zoning maps, activities that are permissible within each zone, as well as GPS coordinates for these areas. At the time of this evaluation, the draft SCMR regulations were not publicly available for analysis.

7.4 Discussion

The Fisheries Division has recognised the need for user zones within the reserve in order to reduce user conflict and protect the resources that are housed therein. However no mention has been made of the plan to draft any such legislation to address the issue of waste management in the area. As an area that is a popular tourist site and commonly used by fishermen, the impact of the waste generated and how it is treated and disposed of has serious implications on the health and viability of the ecosystems in the area. Its potential to alter water quality, dependent on the severity of the situation, may also have some impact on human health. This scenario has the ability to affect the economic viability of the conservation area. Legislation for any MPA needs to be robust and comprehensive enough that it has the ability to adequately address all major issues that can potentially undermine the success of the MPA. Failure to do this reduces the amount of legal leverage of agencies charged with management of the conservation area when the existing regulations do not adequately address all of the conservation, economic and social needs of the area. Additionally, mechanisms need to be developed that are capable of recognising

when existing legislation and corresponding regulations no longer address current concerns and need to be amended to reflect the true needs of the MPA.

This indicator sought to address three management objectives and its ability to do this varied for each. The assessment highlighted the absence of waste management legislation and the Fisheries Department's efforts to address the absence of a legal instrument as it pertains to the implementation of user zones in the SCMR. In this regard the evaluation of the management objectives was good. However no mention was made of the ability of legislation to address poaching within the conservation area. Therefore this evaluation was unable to highlight the success with which these documents were being used in addressing this particular illicit activity. Again care must be taken to ensure that the evaluation tools are structured in such a way that they address all of the management objectives.

8 LEVEL OF TRAINING PROVIDED TO STAKEHOLDERS IN PARTICIPATION (G11)

8.1 Background

This indicator is a measure of the amount and effectiveness of capacity-building efforts to empower stakeholders with knowledge, skills and attitudes to participate in MPA management. To participate effectively in MPA management, stakeholders need to be empowered to have greater awareness about the needs for and functions of the MPA. Therefore they need to be equipped with knowledge, skills and attitudes to prepare them to carry out new tasks and meet future challenges (Pomeroy et al. 2004). By doing this stakeholders are better able to make informed choices about how they carry out activities within the conservation area which may encourage more sustainable use of local resources. In this way local groups are more empowered and capable of contributing to MPA management in a meaningful way.

The action of each stakeholder is directly related to the level of success of a MPA. Training and education activities provide an opportunity to alter behaviour, attitudes and perceptions about MPA management in a way that may improve the effectiveness of management processes and bring groups charged with safeguarding the integrity of such areas closer to achieving their management goals.

8.2 Methods

The evaluation of this indicator was done through administering a survey to 24 stakeholders from various groups (Appendix 1). The objective of this assessment was to determine the level of training that had been provided to stakeholders in participation in various management activities. The various groups that took part in this exercise included the Advisory Committee, the Fisheries Department, members of the general public, various donor agencies, TASTE-SCMR and fishers. The evaluation team comprised students from the Toledo Campus of the University of Belize. The data collected were entered into a sheet developed by staff of TASTE- SCMR for assigning point scores to responses and for further analysis. The results of this evaluation are highlighted below.

8.3 Results

Most of the participants (91%) in this survey were familiar with the work undertaken by TASTE. Many of the respondents had some knowledge of the management plan for the area, but 4% stated that they had very little knowledge of the plan, while 22% reported some basic knowledge.

About 52% had a "good amount" of knowledge and 13% were fully aware of its existence. These results are illustrated in Figure 8.1.

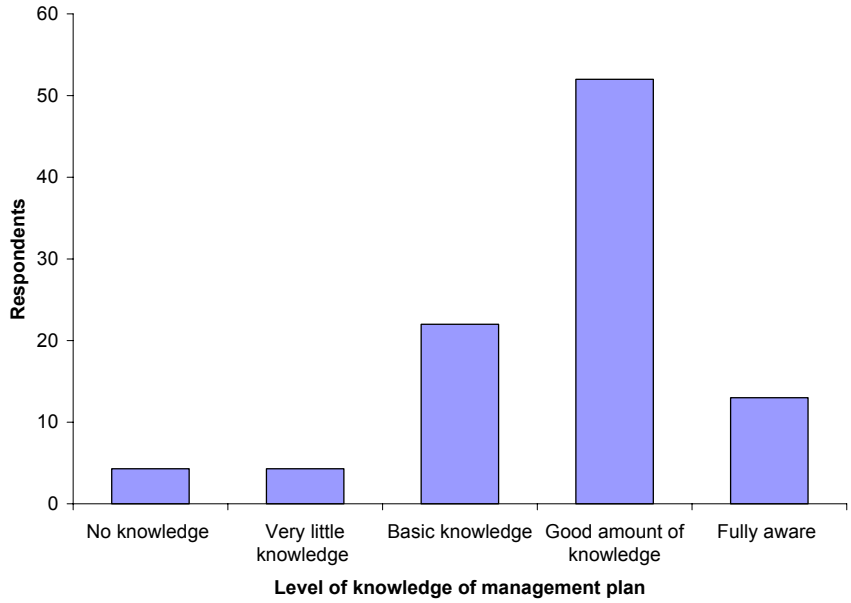


Figure 8.1 Level of knowledge of management plan

Most the respondents stated that they received some form of training from TASTE. The most common types of training received were related to conflict resolution (44%) and capacity building (44%). Other types of instruction included board members roles and responsibilities (30%) and outreach educational programmes (26%). Many of the respondents who had participated in these training exercises stated that they did indeed receive some benefits from their involvement. Most of the benefits seen were on a personal level (22%) though some participants did receive some professional (9%) and educational (13%) benefits from training. Seventeen percent claimed to receive all of the above benefits from these sessions. The level of participation in training activities and the benefits received are illustrated in Figure 8.2.

The majority of participants (74%) believe that training has both enabled them to make better decisions as well as allowed them the opportunity to become more actively involved in organisation. Nine percent of respondents did not share this sentiment. Many persons (67%) regarded the level of training received to be satisfactory, while 13% disagreed and felt that improvements could be made. However despite such efforts to solicit stakeholder participation, many interviewees (87%) agree that NGOs such as the Toledo Institute for Development and Environment (TIDE), TASTE and the Sarstoon Temash Institute for Indigenous Management (SATIM) could make a greater effort to engage stakeholders in management decisions.

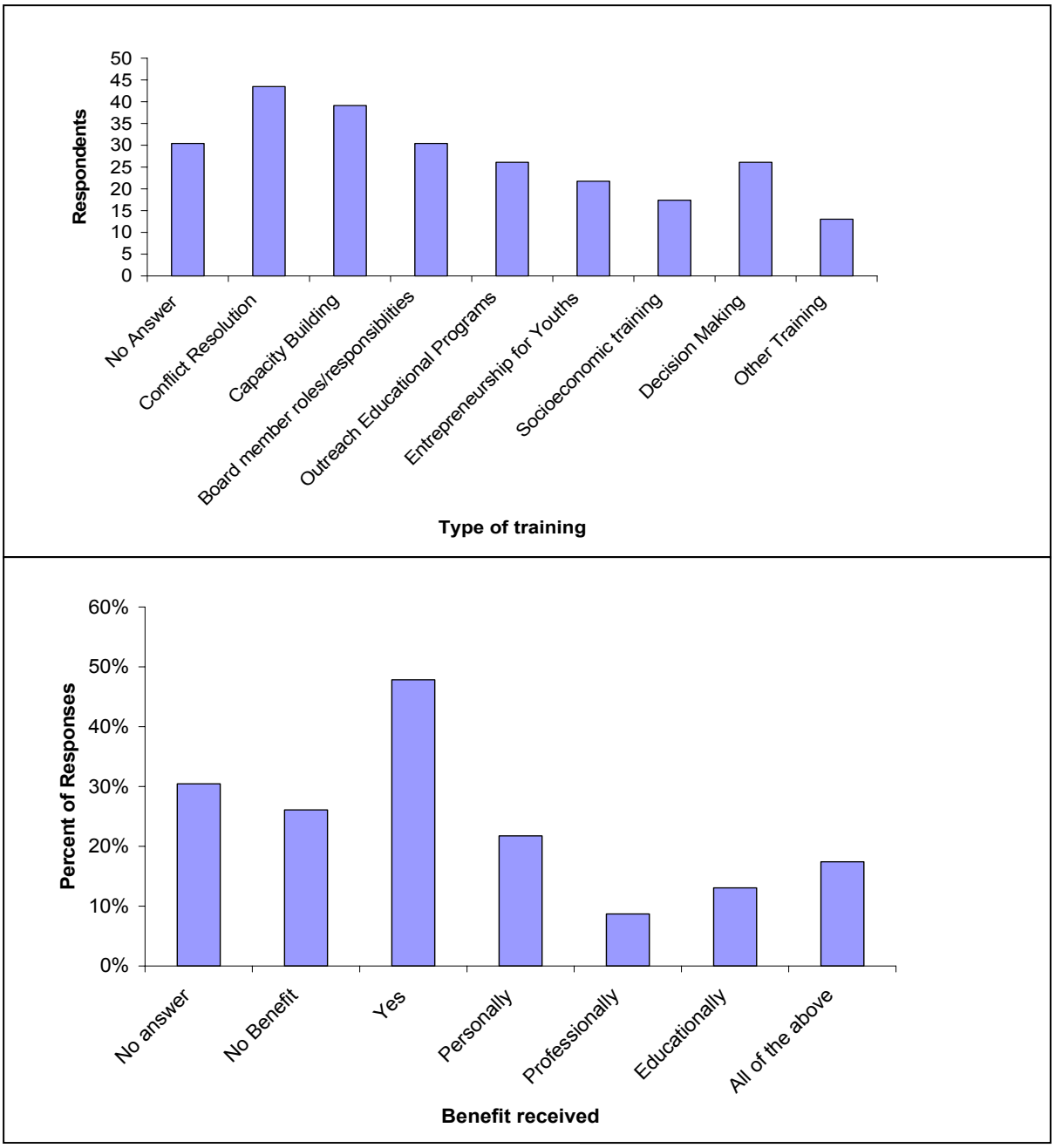


Figure 8.2 Training activities and benefits

Participants in this exercise expressed their desire to see an improvement in the management of TASTE-SCMR achieved through improvements in leadership of the organisation. They believe this is a necessary step towards enabling the organisation to grow in such a way that they can become fully operational and achieve the capability to play a larger role in the management of the SCMR. Many persons agree that more funding is necessary to achieve this and to realise additional training opportunities for TASTE-SCMR staff. Additionally recommendations have been made for the empowerment of youth through encouraging greater involvement in the conservation and management efforts for the reserve.

8.4 Discussion

There are two major themes for this evaluation, that management provided by TASTE needs to be improved and the recognition that the organisation is doing what it can within the constraints to which it is subject. Despite limited resources TASTE has engaged some of its stakeholders in training activities aimed at education and developing skills needed to participate in the management process and to make informed decisions about resource use within the SCMR. However there is a need for additional training opportunities both for the staff of the organisation and for stakeholders. By training stakeholders, NGOs are able to increase the human resource base by developing a cache of skilled persons capable of improving the institutional capacity and functioning in various areas of management where such training is needed. Stakeholders in turn are able to feel included in the management of the reserve fostering a sense of stewardship. Such an endeavour opens up channels for active participation which may not only increase the transparency and accountability of the NGO but develop an appreciation for the unique difficulties that are intrinsic to natural resource management. Additionally, the potential for compliance with the regulations of the MPA may improve.

The indicator used for this evaluation was able to show the extent to which stakeholders participated in the management and decision making processes as well as the factors that affected them from playing a more active role. However the integration of stakeholders into management activities that are of a sensitive nature requires careful consideration, selection and evaluation of persons chosen to perform these tasks. The indicator chosen was able to adequately evaluate the corresponding management objective.

9 LEVEL OF STAKEHOLDER PARTICIPATION AND SATISFACTION IN MANAGEMENT PROCESSES AND ACTIVITIES (G12)

9.1 Background

One of the factors that determine the success of any MPA is the level of active stakeholder participation in the management and planning processes. By integrating participatory management strategies into existing management frameworks it allows coastal resource stakeholders an opportunity for their views, concerns and suggestion to be freely communicated with the assurance that they will be given serious consideration in any management, policy or planning decisions that are made. By fostering partnerships between formal management agencies and resource users it gives all involved a sense of ownership and responsibility. Such sentiments garner support for management efforts and increase the sustainability of the MPA. All parties must be assured that there are benefits to be had from supporting and sustaining protected areas in order to increase the level of compliance with the policies and regulations that are implemented to maintain its viability. It is imperative from a standpoint of effective resource management to be able to gauge both the level of stakeholder participation in the management process as well as the level of satisfaction with existing management strategies and activities.

The involvement of stakeholder participation in the management process in Belize has not been an easy task. Complex organisational procedures, inherent to this management role have acted to separate local communities from the decision making process (Finch, 2006). The most common method of inclusion of these members in a formal fashion is through the board of the NGO involved in co-management of the conservation area. Despite this, it is difficult to ensure that representatives on these boards can truly represent the many issues of their respective communities. It is also difficult to determine the level of success in communicating relevant

issues to the many stakeholders within the area they represent. In many cases the influence of the board on the decision making process is minimal where they are informed of decisions rather than actively taking part in the decision making process. Their power is therefore minimal and often limited to activities such as hiring staff. However the problems with stakeholder participation may be more fundamental than these, especially at the community level. These include the intrinsic complexities of defining community and the identification of key stakeholders (Finch 2006). Law in Belize dictates that each MPA must have a local advisory committee which is mandated to make policy decisions for each reserve. However, some of these do not possess a clear understanding of their role in MPA management. In recent times TASTE-SCMR has endeavoured to involve stakeholders in the decision making process. In this regard the organisation has formed a management team which will hold the responsibility for assisting with day to day issues as well as decisions pertaining to the reserve.

This evaluation seeks to ascertain the level of satisfaction and the current level of participation in various aspects of the management process. This assessment targeted a wide cross section of stakeholders affiliated with the SCMR and affected by the management decisions in regard to this conservation area.

9.2 Methods

Members of the evaluation teams conducted surveys targeted towards a wide cross section of stakeholders. The various stakeholders targeted included the staff of TASTE, the Fisheries Department and various donor organisations as well as members of the Board of Directors, the Advisory Committee and various NGOs, members of the public in Punta Gorda as well as youths, fishers, teachers and community members from areas in close proximity to the SCMR. Results of this survey were analysed by the staff of TASTE using Microsoft Excel to conduct simple statistical analysis. Forty four surveys were conducted in total. The survey instrument used is illustrated in Appendix 2.

9.3 Results

The majority of respondents (91%) claimed to have some knowledge of the work undertaken by TASTE. Many of these have been involved in the management activities of the organisation. The most popular forms of participation found were through workshops (71%), various training sessions (48%) and providing services for the organisation (29%). Very few respondents have been involved in research or monitoring endeavours or the decision making process. Figure 9.1 illustrates the ways in which the respondents have been involved in the management activities of TASTE.

Many of the participants have been involved in various aspects of TASTE. Most of these persons have been involved with the organisation since its inception in 2000. This is illustrated by the fact that approximately 33% of all respondents have participated in such activities for as many as 6 years. Much of this involvement has been recent, where 17% have only contributed within the last two years and 19% for less than a year. These results are illustrated in Figure 9.2.

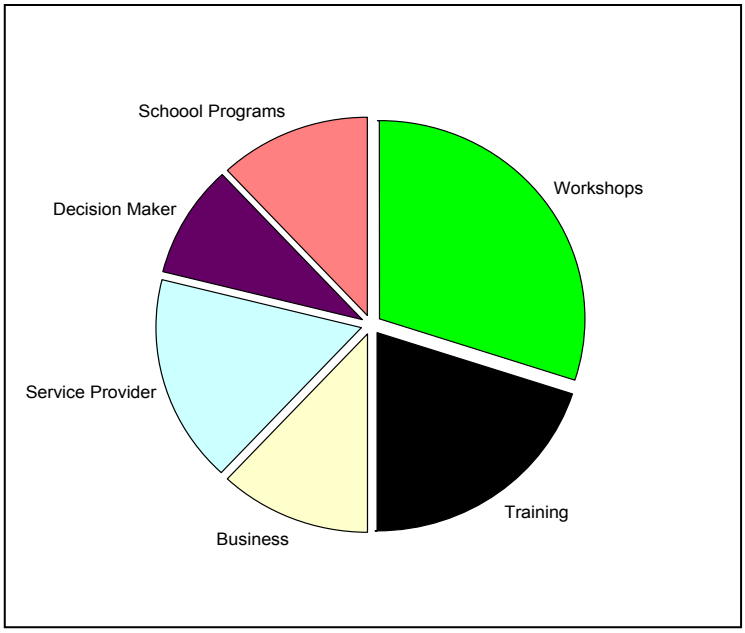


Figure 9.1: Types of activities undertaken by respondents

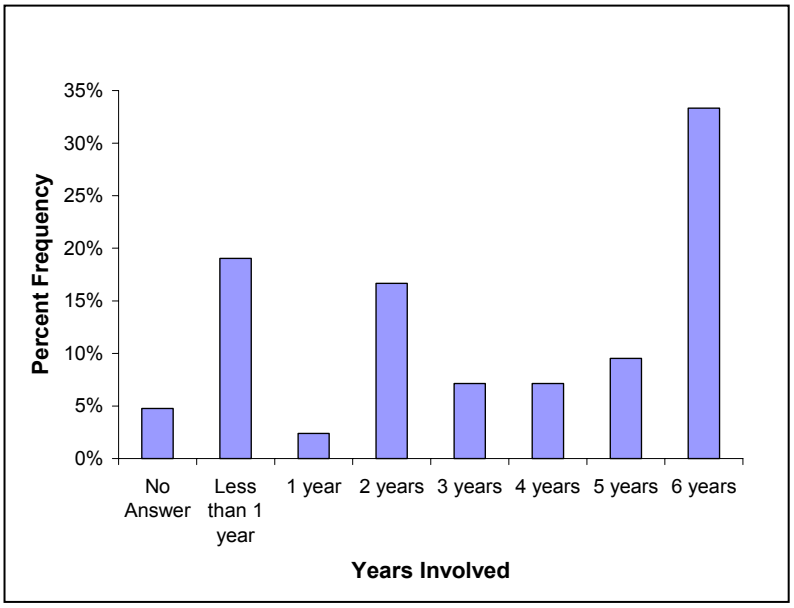


Figure 9.2: Duration of participation in management activities

Most of the respondents had some knowledge of the management goals for the SCMR and were confident that TASTE-SCMR had effectively met these goals. However though the ability of TASTE-SCMR to undertake these tasks was perceived to be high, some participants believed that the ability to achieve these goals was being impeded by lack of institutional capacity, lack of funding and time constraints. Some of the respondents believe that TASTE-SCMR is doing the best that they can in light of the severe constraints that they are often forced to work with. Despite this, some participants believe that there have been improvements in the organisation. However, some respondents have also stated that many of the goals of the NGO have not been

reached, that more citizen involvement is needed in the management process, that members could carry out management activities in a manner that is more expedient and that more emphasis needs to be placed on improving the way in which information is disseminated to stakeholders.

Many respondents believe that finance (12%), stakeholders (24%), communication with stakeholders (12%) and management of the conservation area (19%) were being neglected most by TASTE. Other aspects of management that needed to be addressed were empowerment of stakeholder groups and effectively dealing with transboundary issues. Despite this the majority of all respondents (60%) are satisfied with the management efforts of TASTE-SCMR. This being said, there is still a need for more funding in order that the organisation can effectively carry out its mandate. Participants have stated that more efforts should be placed into lobbying the government in this regard as well as the involvement of youth in its management activities. Other suggestions for improvement to optimise the satisfaction of stakeholders in management processes included greater stakeholder involvement (50%), more effective communication with all stakeholders (24%), improvements in the financial stability of the organisation (12%) as well as improvements in current management activities (12%).

The most common sentiment that has been repeated by many of the respondents has been the need to address the unstable financial situation that this organisation faces as well as the immediate need for more effective communication to the large and diverse group of stakeholders. Some respondents believe that due to the financial constraints and limited institutional capacity of the organisation consideration should be given to amalgamating or greater collaboration with other NGOs such as TIDE or Friends of Nature (FON) where a combined effort may improve their ability to realise greater management effectiveness.

9.4 Discussion

Like many small NGOs, TASTE-SCMR has struggled with limited institutional capacity and funding while attempting to effectively carry out their management responsibilities. Their situation is also characterised by some unique difficulties where they currently collaboratively manage the SCMR with the understanding that a co-management agreement will be reached in the future. As such it has left this organisation in a position where it struggles to identify its role in the management of the conservation area while the Fisheries Department retains the authority to carry out the day to day management (Finch, 2006). These constraints as well as their tenuous and poorly defined place in the management process have impeded their ability to implement and sustain activities that would move them closer to achieving management goals in order that they may fulfil their mandate as well as meet their obligations to stakeholders. However questions remain as to the capacity of TASTE-SCMR to take on additional responsibility inherent in co-management without a restructuring of roles and relationships with the Fisheries Department. Nevertheless stakeholder satisfaction is directly influenced by the ability of the management organisation to effectively carry out its role. Although there has been some success for TASTE in this regard, many of the respondents agree that much more needs to be done. Perhaps a more collaborative approach to management must be taken where true co-management is honoured by the Fisheries Department. In this way TASTE can be allowed to play a more active role in the management process. On the other hand, partnering or amalgamating with larger, better funded and more experienced NGOs may result in an increase in the ability of TASTE to take on a larger role in the management process.

This indicator was chosen to evaluate two management objectives. In the first instance the assessment failed to highlight whether TASTE or the SCMR staff had taken any steps towards implementing or increasing multi-stakeholder meetings. In this instance the indicator was unable to accurately assess the management objective. Care must be taken to tailor the evaluation to assess all the parameters of the management objectives. By doing this, questions are more focused and are able to extract the information that is necessary to gauge the level of success in achieving the corresponding goals and objectives. However the assessment was able to highlight the extent to which stakeholders have participated in management activities as well as how satisfied they were by the recent management efforts of TASTE.

10 LEVEL OF STAKEHOLDER INVOLVEMENT IN SURVEILLANCE, MONITORING AND ENFORCEMENT (G13)

10.1 Background

This indicator provides a measure of the number of stakeholders who have participated in patrolling or other surveillance and monitoring activities (Pomeroy *et al.* 2004). The implementation of any MPA will inevitably lead to the formulation of regulations and legislation to ensure the protection of resources and related ecosystems which it encompasses. Such legal structures are absolutely necessary if there is to be any statutory basis under which the coastal and marine environment can be safeguarded. The adherence to such regulations in almost all cases requires the development of an enforcement programme which includes surveillance and monitoring activities. Ideally such programmes should be implemented in the early stages of the establishment of a MPA and should include preventative law enforcement measures which consist of explanations and warnings for first or minor offences.

The SCMR lies in a critical area in the Gulf of Honduras. Being equidistant from three countries presents a number of unique enforcement issues. Without a consistent presence in the SCMR, the continued practices of illegal fishing, poaching by foreign nationals and unhealthy tourism will continue. There are a number of international organisations operating at a tri-national level including the Mesoamerican Barrier Reef System (MBRS), Mesoamerican Biological Corridor (MBC) and Tri-national Alliance for the Gulf of Honduras (TRIGOH). These organisations are trying to facilitate a regional and tri-national approach to the management of the Mesoamerican Barrier Reef. Recently, through the hard work of the MBRS, an agreement was signed between Belize, Guatemala and Honduras that will make important headway in the harmonisation of fisheries, tourism and protected areas laws between the three countries. These agreements are very important and historic. They also put the pressure on signatories to start to intensify their enforcement abilities. The SCMR would also be an important part of the Belize-Guatemala-Honduras Ecological Park proposed by the Organisation of the American States (OAS) during talks on the Belize/Guatemala territorial differendum. Additional rangers will go a long way in creating more successful enforcement of these tri-national agreements (Garcia 2007).

Enforcement and its associated activities are often expensive and time consuming. The larger the conservation area, the more difficult it becomes to conduct enforcement activities in a manner that is both efficient and effective. The involvement of stakeholders which may include community members, increases the institutional capacity of the agency responsible for enforcement of the MPA and increases the effectiveness of surveillance and monitoring activities. Sharing the burden of responsibility in this regard may also bring to bear the influence of social pressure or the weight of applicable bylaws which may be more respected than those

implemented from agencies outside of the community structure. Increased participation of stakeholders in the enforcement process provides them with more ownership over the MPA which should result in an overall improvement in enforcement and a decrease in violations (Pomeroy *et al.* 2004). At present the Fisheries Department has the sole responsibility for this aspect of MPA management.

10.2 Methods

A personal account of recalled events and documents provided the results below.

10.3 Results

The effectiveness of enforcement, surveillance and monitoring efforts within the SCMR has been severely inhibited in the recent past by limited institutional capacity. This has mainly been as a consequence of high staff turnover and insufficient funds to conduct regular patrol operations. The result has been an increase in the susceptibility of the conservation area to illegal activities.

Efforts to rectify this situation were addressed under a Community Ranger Project funded by NOAA. The Community ranger project reflected desire for the implementation of the agreements already reached about the Gulf of Honduras Region, especially in regard to creating more established and rigorous enforcement and monitoring procedures in the SCMR (Garcia 2007). This project sought the direct involvement of community user groups in creating the 'presence' needed to confront the problems of illegal fishing and poaching.

The project was intended to double the current enforcement capabilities by doubling the staff size. It was also meant to build on existing and planned projects by creating an on the ground staff that can serve to educate the public about the reserve. Through this endeavour, TASTE was provided with the means and opportunity to employ four rangers to work in the MPA. Though the aim was to directly assist members of the SCMR staff, stakeholder involvement was restricted to the observation and reporting of illegal activity by fishers as they went about their own activities. The exercise was aimed at establishing an effective reporting system to official park rangers for the purposes of intervention on their part. It was felt that the direct involvement in this process would result in a noticeable increase in community support for enforcement efforts. The Fisheries Department was not in full agreement with this arrangement and all activities in this regard were discontinued.

Subsequent to this action community rangers have been allowed to take part in standard patrols and joint patrols at other marine reserves. However the inability of stakeholders to actively participate in patrol operations and receive data that are collected from surveillance activities make it difficult for members of the organisation and affiliated stakeholders to truly contribute to this aspect of management or use the information gathered as the basis for any future management activities. However, opportunities for stakeholder involvement still exist. Partners of TASTE such as TIDE and FON will facilitate a series of training workshops to local stakeholders where participants learn about the different methodologies used in the MPAs which co-manage. Training will be provided in coral reef ecology, fish identification and SCUBA. This will be done in an effort to equip these stakeholders with the skills necessary to fully participate in monitoring activities.

10.4 Discussion

Although it is clear that lack of institutional capacity has impeded the ability of the SCMR staff to effectively undertake enforcement, surveillance and monitoring within the reserve, very few attempts have been made to include stakeholders in these activities outside of the Community Ranger Project. In doing this, management agencies in the SCMR have passed up a viable means of increasing capacity to improve their operations and to build partnerships with community members who may have greater influence on resource users. Not only may community members be better able to relate to resource users in their area but they have the potential to become the eyes and ears of the enforcement agencies who will have added numbers to their efforts. Greater numbers will lead to greater presence which may in turn translate into fewer opportunities for violations to occur.

In order for this to be successful, however, stakeholders must truly feel they are a part of the management process as well as understand the personal benefits to them in safeguarding the very resources they utilise. By fostering a sense of ownership, assistance in enforcement operations may be attained through a sense of civic duty to protect what helps to sustain them. However in order that stakeholders can function effectively in this capacity, training opportunities must be made available. This should include training in enforcement procedures and monitoring techniques. Additionally enforcement agencies must ensure that all participants have a clear understanding of applicable laws as well as their role in the enforcement operations.

Greater efforts should not only be made in collaboration between the management agencies and various stakeholder groups but also in soliciting funding to make these opportunities feasible. The availability of funding increases the ability of current enforcement agencies to provide adequate training to facilitate collaboration between groups.

This evaluation was able to highlight both the need for the establishment and enforcement of user zones in the SCMR as well as the benefits that could be had from involving stakeholders in enforcement operations. However it failed to determine the level of stakeholder involvement in the establishment of regulations, whether they had lobbied for the implementation of such legislation and to what degree of success. Again there may have been a need for a modification of the evaluation tools and criteria so as to ensure that the assessment of each objective was given equal weighting and the parameters that pertained to each were adequately evaluated.

11 ENFORCEMENT COVERAGE (G15)

11.1 Background

Enforcement coverage is a measure of the number of surveillance and monitoring patrols undertaken by MPA staff during a given time period and in a specified area. This information is used to review the consistency of patrol activities and is a necessary prerequisite for assessing trends in violations or non-compliance since the latter is generally measured as the number of violations per patrol effort. It is also useful in determining how well the MPA management is meeting the goal of surveillance, monitoring and enforcement (Pomeroy *et al.* 2004).

11.2 Methods

Evaluation of this indicator was accomplished through the assessment of enforcement patrol records. These included records from the Belize Defence Force (BDF) infantry and police in order to determine the amount of coverage of current enforcement operations by each of these agencies.

11.3 Results

The day to day management of the SCMR is the responsibility of the Belize Fisheries Department. As such this department is responsible for coordination of daily patrols within the reserve. This is done in collaboration with the Maritime Wing or the Coast Guard. A reserve manager, biologist and rangers, all appointed under the Fisheries Ordinance, are mandated to carry out surveillance of the reserve and enforce all relevant regulations within the conservation area. The Police patrols and BDF/ Maritime wing, which are also enforcers of the Fisheries Laws, assist the reserve staff in surveillance and enforcement activities. SCMR reserve staff also utilise the experience of fisheries officers stationed on Hunting Caye and in Punta Gorda. Joint patrols are organised with these units on a regular basis. The Police/ Maritime wing are informed of all reserve regulation prior to every patrol. This is necessary due to the constant rotation of officers at Hunting Caye.

Enforcement is a priority at the SCMR given its Trans-boundary location. Nonetheless collaborations are in place between TIDE, the Fisheries Department, TASTE (, and FON to do more joint patrols. Plans also exist to utilise the skills and experience of fishermen of the area on conducting patrols.

Patrol frequency and enforcement coverage are limited by lack of fuel. This is due to the fact that each conservation area is entitled to a specific amount of fuel per month. The way in which this amount is determined for each site was not determined by this evaluation.

The areas patrolled include, but are not limited to, White Reef, Elbow, Franks Cay, Nicholas Cay, Northeast Cay, and Seals Cay. Routine patrols are also made in the channels within the reserve.

Plans have been put into place for a complete collaborative effort between TASTE and FON. This joint effort may lead to the formation of a new organisation which will be known as Southern Environmental Alliance (SEA). It is hoped that through this joint effort enforcement coverage will improve by running all enforcement operations from a centralised location. Patrols will cross and include areas of great concern that are not currently patrolled and fished heavily by foreign nationals.

11.4 Discussion

TASTE has realised that current enforcement operations have had limited success. Compounding this problem is the fact that insufficient amounts of fuel have limited the range of enforcement coverage. As a result, several areas heavily utilised by poachers have minimal security measures in place for the protection of local resources. Collaboration and the centralisation of enforcement operations present a real opportunity to not only increase the range of coverage through an increase in manpower and resources but it may allow authorities to effectively tackle areas hardest hit by illegal activity. This merging of enforcement activities and inclusion of fishermen allows patrols to be carried out at all times and more effectively. This is not to say that this will replace patrols conducted by governmental organisations. Further collaboration and shared responsibility increase the likelihood that these operations will have some positive impact on MPA success.

Although the evaluation highlighted that current enforcement activities were having little effect on poaching in Belize fishing grounds, the level of influence that these activities were having on these activities could not be determined. The indicator was moderately successful in the

assessment of the management objective. However mention was made of the fact that current patrol paths may not be able to reach key target areas.

12 GENERAL DISCUSSION AND CONCLUSIONS

12.1 Evaluation Summary

Table 12.1 summarises the results of the indicators evaluated in this exercise. It also illustrates the level of success of each indicator in evaluating the management objectives that they were chosen to assess. Each indicator is ranked from good to bad where good indicates that the objectives have been evaluated, moderate that they have provided some indication as to whether the objectives are being achieved and to what degree, and poor where the indicator failed to measure the parameters associated with the relevant objectives.

Table 12.1 Evaluation summary of the performance indicators chosen for the SCMR

Indicators	Results summary	Objective	Ability of indicators to evaluate management effectiveness
B8 Water quality	The nutrient levels were well below national standards for fresh water at all sites. The highest readings for both nutrients and faecal coliform both found at the South Negril River mouth. Results at the Tobago Cays Marine Park (TCMP) were spurious due to a failure to follow monitoring procedures and protocol. Sample collection frequency at the SCMR was inconsistent. Greater training needed for TCMP, and modification of parameters and protocol needed at the SCMR.	Establish and maintain a reef restoration programme **(NMP)**.	**Good -** Evaluation was able to highlight the successes and shortcomings of the ongoing programme. Water quality monitoring is in its inception stage at the SCMR. Modification need to be made to procedures and protocol to make this monitoring successful. Additional training for staff is also necessary. It is yet to be seen if it will lead to the implementation of other reef restoration programmes. The evaluation highlighted the deficiencies in current programmes.
S1 Local marine resource use patterns	-Poaching of commercial species is a major concern within the SCMR (lobster, conch, turtle) -Most of this activity is believed to be carried out by foreign nationals (Honduras, Guatemala) -Relevant authorities are aware of poaching but current enforcement operations have had limited success (most	Eliminate poaching in Belize fishing grounds and the NCRPS	**Good -** Was able to highlight the limited success that has been seen in response to poaching within the SCMR. Also highlighted the need for additional

Indicators	Results summary	Objective	Ability of indicators to evaluate management effectiveness
	poaching occurs after patrol hours at of the NMP, NCRPS or the activities that impacted on the MPA. Need for a more comprehensive educational programme that is tailored to its target audience.		
S14 Distribution of formal knowledge to community	-TASTE has delivered considerable amount of formal knowledge to the community but it has been erratic due to lack of core funding for organisation support -Participated in a highly successful COMPACT education project aimed at youth -560 youths from schools in the Toledo District took part in the initial stage and the programme was replicated for adults and selected science clubs -Since then, dissemination of environmental education information has been sporadic	Establish Tri-National understanding of the SCMR as a transboundary area; its goals and objectives, regulations and care	**Poor-** Has failed to highlight whether or not this understanding was established or if this information was included in any of the environmental education endeavour undertaken
		Establish regional education and outreach programs	**Good-** Highlighted the need and the impediments that have hindered the implementation of regional outreach programmes. These included human resources and funding.
G5 Existence and adequacy of enabling legislation	-Legislation relevant to the management of MPAs is under the Fisheries Act -Conservation areas are implemented via a discretionary approach -Waste management as well as the implementation of user zones are not addressed under relevant legislation	Establish and enforce zoning	**Good**- Highlighted the absence of legislation relevant to the implementation of user zones as well as plans by the Fisheries Department to rectify this.
		Eliminate poaching in Belize fishing grounds	**Moderate**- Has indicated that legislation that related to the elimination of poaching in the SCMR has been address through the need for licence to conduct specific activities within the conservation area

Indicators	Results summary	Objective	Ability of indicators to evaluate management effectiveness
	-Fisheries Department is currently drafting legislation for the zoning of the park	Establish waste management practices and regulations.	**Good**- This evaluation has emphasised the fact that there is a absence of laws and regulations that addresses waste management issues in the Cayes. It has also relayed the need for its immediate implementation to safeguard ecosystem health and viability.
G11 Level of training provided to stakeholders in participation	-91.3% familiar with work TASTE is doing -Fair amount of knowledge of management plan -< 50% in all cases received training in conflict resolution, roles and responsibilities of Board members, outreach education -Satisfactory level of training -Stakeholders should be more involved in management decisions	Include community stakeholders in management decision-making processes	**Good –** The assessment has shown the extent to which participants have been involved in the management processes and the training that was made available to them to enable further participation. The benefits that participants derived and the need for additional training opportunities were also discussed.
G12 Level of stakeholder participation and satisfaction in management processes and activities	-Many respondents have been involved in the management activities of the organisation -Lack of institutional capacity and funding have impeded the ability of the TASTE to fulfil management goals -Performance is satisfactory in light of constraints -Majority of respondents satisfied with management efforts	Organise and implement multi-stakeholder meetings once per year to review progress	**Poor –** The evaluation has failed to ascertain whether any such meetings have taken place or if any measures have been taken to achieve this.
		Include community stakeholders in management decision-making processes	**Good-** The assessment has highlighted the extent to which stakeholders have participated in management activities and as well as how satisfied they are by what is currently being done by the organisation. Suggestions for improvements have also been made.
G13 Level of stakeholder involvement in surveillance, monitoring and enforcement	-Effectiveness of enforcement operations have been severely inhibited by limited institutional capacity -SCMR staff stakeholder involvement was restricted to the	Establish and enforce zoning	**Good-** The need for the establishment and enforcement of user zones has been highlighted
		Eliminate poaching in Belize fishing grounds	**Good-** The benefits of involving stakeholders to reduce the incidence of poaching has been explored as well the progress made in this regard.

Indicators	Results summary	Objective	Ability of indicators to evaluate management effectiveness
	observation and reporting of illegal activity by fishers -Partners of TASTE will facilitate a series of training workshops to local stakeholders where participants learn about the different methodologies used in the MPAs which they co-manage	Establish waste management practices and regulations	**Poor-** No correlation has been drawn between stakeholder involvement and the establishment of these regulations and practices. The evaluation has failed to determine of stakeholders have lobbied for such legislation or the success of any such activities.
G15 Enforcement coverage	-Enforcement is a priority at the SCMR given its Trans- boundary location -The areas patrolled include but is not limited to White Reef, Elbow, Franks Cay, Nicholas Cay, Northeast Cay, and Seals Cay. Routine patrols are also made in the channels within the reserve. -Collaborative effort between TASTE and Friends of Nature (FON) planned -Formation of a new organisation which will be known as Southern Environmental Alliance (SEA) -Improve in all enforcement operations through operating from a centralised location	Eliminate poaching in Belize fishing grounds	**Moderate-** Very little information has been given as to the influence that enforcement coverage has had on eliminating poaching in Belize fishing grounds. Mention is made of the fact that current patrol paths may not be able to reach key target areas.

12.2 Lessons learned

At the terminal workshop held in Punta Gorda, Belize participants in the MPA management effectiveness project assembled to discuss both the products and process of the evaluation. From discussions held on the outcome for each study site involved in this venture, the lessons learned from each stage of the process were discussed and main lessons as well as the site to which they were relevant were determined. The main lessons gained from this project are discussed in the sections below. Following each lesson statement is its explanation that applies in most cases to

all three MPA sites in the project. The lessons generated entirely from the other sites, but not from the SCMR, are placed at the end.

12.2.1 Lessons learned from the SCMR

MPA managers appreciate the importance of evaluating current management strategies

The process of evaluating management effectiveness in order to implement adaptive management techniques is a new process for all of the study sites involved in this project. Though in theory the evaluation of current administrative practices seems to be a logical step in order to improve the management of any conservation area, managers are often so entangled in the day to day operations of running the MPA that processes like these become secondary. However this evaluation exercise has enabled MPA managers to fully appreciate its importance in improving the effectiveness of the management area. They have recognised its potential as a tool to promote transparency and accountability within organisations charged with the responsibility of maintaining these areas. This process may in fact foster greater trust in management organisations to fulfil their mandate by stakeholders who ultimately have a vested in these areas.

Reasonable capacity is needed in order to conduct in-house evaluations

In order to conduct the evaluation of some of the indicators a team effort was required at each stage of the process. Examples of this may be seen in the assessment of the socio-economic indicators in the NMP as well as the water quality indicator at all three sites. In some instances the availability of additional persons capable of conducting the evaluation would have improved the competency with which the assessment process was conducted. It is important to recognise that inadequate staff or the absence of persons with the skills and experience required for more technical aspects of the evaluation has the potential to undermine the efficiency of the exercise as well as the accuracy of the final outputs. Even though there may be some aspects of management that may need to be reviewed, it is pointless to undergo the assessment process if weak institutional capacity impedes the efficiency with which data is assimilated, analysed and presented. Such a decision will ultimately result in a waste of time and financial resources that may have been better spent elsewhere.

Capacity building should take place during the evaluation process

The business of running MPAs within developing countries is a difficult and daunting task. Managers must undertake tremendous tasks in the face of inadequate institutional capacity, limited funding and inconsistent assistance from government agencies. Lack of capacity has the capability to cripple both the management of the area as well as the effectiveness of the evaluation. It is important therefore that measures to build capacity within the organisation are undertaken during the assessment process. These measures may include opportunities for training in technical aspects of the process, report writing and presentation skills. In this way some of the cost of the evaluation process may be deferred by decreasing reliance on external assistance to conduct in-house exercises that can be carried out by available personnel. However the level of institutional capacity that was expected to be built during the course of this project was not realised. This was exemplified in the Tobago Cays Marine Park (TCMP) in the implementation of its water quality monitoring programme. Despite efforts at training staff to carry out monitoring procedures, a lack of experienced persons severely affected the accuracy of the data collected (Pena 2006). Greater effort is needed in this area.

Begin with what can be managed by the organisation

Due the fact that such an undertaking has never been attempted before, management agencies run the risk of overestimating what can be accomplished within the constraints of their limited resources. There are so many aspects of management that need to be thoroughly assessed that prioritising evaluation needs may be a difficult task. Rather than run the risk of overlooking vital areas that are in need of evaluation, managers may attempt to take on more than their resources can adequately handle. The result is improper evaluation of management goals and objectives that produce outputs that are unable to guide future management decisions or create a foundation on which subsequent evaluation exercises can be built.

Confidence gained through the evaluation increases willingness to learn, adapt and improve management

Initiating evaluation exercises may often be met with some scepticism**.** Stakeholders may fail to see how such an evaluation will differ from various studies that have undoubtedly taken place in the past. Additionally, management agencies may be unsure of their ability to see such a process through to its completion and truly apply the information gained in a way that will have a meaningful effect on future park management. The training, financial assistance and outputs generated as a result of this process may serve to alleviate some of the doubts and develop a confidence in the management agency's ability to effectively conduct its own evaluations. Managers and stakeholders are able to see first hand the benefit that may be gained from the information gathered in this exercise and allowed practical experience with how it may positively influence management. Continued assessment that is built on this premise creates a reference point from which future evaluations may be conducted and a quantifiable avenue by which progress may be measured. With a viable way in which the effectiveness of various aspects of the MPA can be presented, the need for changes can be justified and measures to implement them can be formulated. The ability to see the potential positives of such a process has encouraged many of the participants to learn more about the evaluation exercise and give serious consideration to adaptively managing natural resources. Stakeholders have had the opportunity to learn more about the MPAs in their areas and as a result now feel the need to be more involved and active in its management.

There is need to repair links between MPA objectives and its activities

Some disparity has been recognised between the MPA objectives that have been outlined for these conservation areas and the management activities that are taking place. Often what is being done in practice has no practical application to the mandates that have been envisaged for the conservation area. Many factors may be responsible for this disparity, the major culprit being lack of necessary resources to carry out the functions necessary to meet these objectives. Another factor may be the lack of clearly defined objectives, especially when these are abstract and unspecific. This provides little guidance to those placed in charge of the MPA. It is important that the reasons behind the implementation of conservation areas not be forgotten. Careful decision making is necessary to ensure that all available resources are allocated to this end.

Weak culture of evaluating management needs to be overcome by the process

A weak organisational culture to evaluate management effectiveness exists at both a national and international level. As a result organisations have failed to see the benefits that can be gleaned by identifying problem areas in the management process as well as innovative ways in which

management may be improved. Stakeholders have been deprived of the opportunity to effectively participate in the management process and influence decisions that are made about the conservation areas and how the resources encompassed within them are dealt with. Consequently, inappropriate and ineffective management methods may continue while the benefits that may be derived from implementing appropriate conservation efforts in these areas may never be seen. Implementing evaluation methods which may lead to improved institutional capacity, attract funding for management undertakings as well as pinpoint changes that may be necessary may provide the fodder needed to catalyse change in the current status quo which can impede the success of regional MPAs.

A distinction needs to be made between the marine park and the management organisation

When an evaluation is being conducted for a particular site, distinctions need be made on whether the evaluation is being done on the management body and or on the MPA itself. In some cases they are one and the same, but in the case of the Negril Marine Park (NMP), the management body, Negril Coral Reef Preservation Society (NCRPS), is distinct from the conservation area. When reporting on the results of the assessment it is important to explicitly state what the information that is being presented refers to.

Questionnaires should be pre-tested on a sub sample of target group

In order to assess the effectiveness of questionnaires in the evaluation process, it may be pertinent to determine how effective they will be by pre- testing on a sub sample of the larger target population. Though this process may be time consuming it will be able to assess whether or not this evaluation tool can solicit the desired information from the target group. It will also serve to highlight whether the questionnaire is applicable to the target group and if the questions and terminology used are easily understood. Additionally this period will provide the interviewer with some practical experience enabling them to practice techniques on how to approach and extract the information needed from the respondent without adding bias to the interview.

It is important to ensure that there is a clear understanding of evaluation requirements

In order to ensure that there is some clear understanding of the outputs that should be generated for each indicator there must be an appreciation of what each one seeks to measure and how it is ultimately related to the MPA objective. The outputs represent quantifiable information that must be represented in such a way that it is reflective of the level to which MPA objectives are being met and can be accurately interpreted by management bodies so as to effectively inform future management decisions. The accuracy of the evaluation depends on the extent to which those given responsibility for this task understand the process of the evaluation and how it leads to the expected product. Only then can the desired outputs have a greater probability of accurately reflecting the level of success achieved by the management process and suggest the changes that may be necessary in order for effective management to be realised. During the evaluation of many of the governance indicators in the NMP, members of the evaluation teams were often unsure of how to conduct data collection, analysis and reporting although examples of each stage of the evaluation were presented in the guidebook (Roach 2007).

Necessary to present and validate results to communities and stakeholders

It is important to present the results from the evaluation exercise to the communities and the stakeholders. Many of these were vital sources of information and will be willing to be more cooperative in future studies if they are informed of the results of the study. In effect this effort

may offer a way in which to reduce respondent fatigue especially in those areas that will need to be accessed for information in the future. This creates a sense of ownership and involvement for community members and stakeholders who will be made to feel included in the evaluation process. It creates an avenue to improve the transparency and accountability of the management agency as the public is kept abreast of management activities, the effectiveness of these actions as well as plans to improve existing methods. Such a forum will allow participants the opportunity to offer suggestions thereby creating an avenue for information exchange as well as a means by which stakeholder participation in the management process can be enhanced. Additionally, it gives the evaluation teams a means by which to verify their results and identify any errors in the information that was collected that may affect the accuracy of the results.

Feedback from the evaluation helps all participants to learn collectively and build capacity

The terminal workshop held at the end of the evaluation process enabled participants in the management effectiveness project to discuss the challenges involved in the management of each of the MPAs as well as their experience with management effectiveness evaluation process. It provided an opportunity for collective discussion of the important lessons that could be derived from the experience, management methods used at particular conservation areas that could be incorporated at other sites as well as propose recommendations for adaptive management. With the knowledge that some sites had resources and expertise that were lacking at other MPAs it gave those present a chance to create a network were skills and knowledge could be transferred and shared, providing prospects to build capacity for future management activities and management effectiveness evaluations.

Target audience should have bearing in survey design

Surveys are only as effective as their ability to extract the desired information from the targeted audience. When designing this evaluation tool the relevance of the questions to the receiving audience should be considered. If the questions cannot be easily understood or have no bearing on the potential respondents they will fail to provide any information that may be useful for management purposes.

Evaluation process may increase the availability of secondary data

The evaluation process was based primarily on the collection and analysis of available secondary data. Where none was available baseline studies were conducted. These processes served to locate secondary data relevant to management evaluation that may have been previously overlooked as well as provide baseline data on which future evaluations could build on.

Important to ensure that the budget is adequate and realistic

Adequate finances are necessary to effectively conduct the task required to carry out some aspects of the evaluation. When planning evaluation activities all aspects of the process should be carefully considered so as to determine the costs that may be incurred, if they can be deferred and if it is at all feasible to undertake the evaluation. Failure to do this results in a waste of finances and effort when the evaluation cannot be completed or has to be delayed until additional funding can be found.

Positive recognition may be achieved through the evaluation process

From this process it was realised that positive recognition was gained at the effort to evaluate current management practices for the purpose of improving the management organisations and

enhancing conservation efforts. In the NMP some donor agencies interviewed were impressed by the attempt to evaluate the ways in which resources were managed. To many stakeholders this signalled that the NCRPS was serious about its mandates and dedicated to the sustainable development of the area (Roach 2007). Such dedication not only inspires public trust in the abilities and competency of the management bodies but may also motivate donor agencies to be more willing to fund future conservation efforts.

Ensure that timelines are realistic and flexible

When creating a schedule for such an undertaking reasonable timelines in which the evaluation and analysis can occur must be determined. The process should be conducted in an expedient manner but it must also take into consideration unexpected delays and should be flexible enough to accommodate them without compromising the integrity of the project.

Management organisations made aware of stakeholder perception of current management

Management agencies are allowed are provided with an opportunity in which they can view how their management efforts are being perceived by stakeholders and members of the general public. Whether management has allowed for an equitable and fair distribution of resource use or if disparities are perceived by the public can be determined. Each stakeholder has the capacity to affect the success of a-MPA. By trying to determine if the needs of the stakeholders are being accommodated within the management system and if educational methods are having any effect on behaviours, strategies can be formulated to address these issues. It must be noted that management agencies may never have the approval of all of its stakeholders and though conservation efforts must be sensitive to the needs and culture of all stakeholder groups, it should never be compromised to the extent that conservation efforts becomes secondary.

Water quality monitoring requires access to a competent laboratory

It is critical to have access to a fully functioning and certified laboratory in order for water quality results to be accurate. Samples must be subjected to specific conditions prior to testing in addition to being analysed within a 24 hour time frame. Outside of this samples cannot be used for analysis due to the microbiological content of the sample and the nature of its constituents which may change drastically outside of this time frame. The situation at the TCMP has resulted in an inability to use the results procured for management purposes which has resulted in a waste of scarce and important resources and the efforts of the collection and evaluation teams (Pena 2006).

12.2.2 Additional lessons from other sites

The lessons below were not generated from the SCMR evaluation, but appreciating the situation at other MPAs in the region, is a step towards information sharing and establishing mechanisms for collaboratively building capacity through MPA networks rather than external intervention only.

Stronger science training or external support needed as part of the evaluation

During the evaluation of some of the indicators it is important to remember that the terminology and the process of data collection and analysis may require the technical services of someone that possesses a scientific background. While training for some indicators may be provided and the assessment successfully undertaken, technical expertise and experience may be necessary for others. Such was the case for water quality in TCMP where data collection was compromised by

lack of a scientific background by the evaluation team. Participants were unable to understand the necessity of particular protocol or see the need to implement important procedures in the collection of samples**.** If such a background does not exist among current staff, measures should be taken to contract to competent persons outside of the management organisation for more technical aspects of the assessment.

Training needed in data analysis and report writing

In order to improve the accuracy and quality of the outputs generated, training may need to be provided in the areas of data analysis and report writing. In this way a standardised method of reporting can be formulated where information is accurately represented and clearly understood by target audiences. Training in data analysis may be necessary especially when this process requires the use of certain analytical software such as SPSS or specialised equipment.

12.3 Adaptive management

Adaptive management presents an opportunity by which systematic learning as well as scientific research may be integrated into natural resource management (Berkes et al. 2001). By attempting to change the paradigm of traditional resource management, emphasis is placed on incorporating research into conservation action. These policies are treated as experiments where managers are able to adapt and learn from experience (Holling1978; Walters 1986). In this way the barriers between research and management are eliminated.

Founded in the field of industrial operation which was developed in the 1950s it was not until the 1970s that it was adapted as a resource management technique (Johnson 1999). Since this period, the idea of adaptive management has gained popularity and has been applied to a diverse set of issues ranging from the management of toxicants to the restoration of wetlands and coastal habitats (Johnson 1999). It is grounded in the fact that although the management of natural resources takes place in an atmosphere of uncertainty where the environments are not static and interactions between people and ecosystems are unpredictable, effective resource management is still necessary. More importantly, it highlights the fact that conservation efforts cannot be suspended until it is felt that there is a great enough understanding about the ecosystem or a large enough store of knowledge. Actions should be taken in this environment of uncertainty bearing in mind that human dependence on natural systems, development within fragile ecosystems and declines in the abundance of valued biota are pressing issues (Lee, 1999).

Adaptive management is also based on the premise of social and institutional learning where emphasis is placed on the need for feedback from the environment to have the ability to inform policy (Berkes at al. 2001). There is acknowledgement of the fact that proposed solutions are ephemeral, inherently inadequate and incapable to deal with all aspects of natural resource management. Learning by intent is imperative due to the very nature of ecosystems which are dynamic and where changes are multifaceted and poorly understood. Effectively, learning does not only occur on the basis of management success but also as a result of its failures. It is important that what is learnt can be translated into changes in management approach where new and innovated methods can be employed based on the experiences undergone in the process. This learning process however is based on the premise that these experiences can be remembered long enough to result in an evolution of the management system in response to its current inability to produce a desired outcome. This brings the issue of adequate institutional memory to centre stage where documentation of decisions, evaluation of results and appropriate responses to

the evaluation must be undergone for institutional learning to be realised and made able to influence policy (Hilborn 1992).

Management of natural resources occurs against a backdrop of dynamic processes where it may be difficult to distinguish between the effects of management strategies and concurrent changes in the natural environment (Lee 1999). These constant fluctuations in causal factors, responsible for ecosystem change, may create a situation in which superstitious learning based on erroneous connections between cause and effect can be made (Lee 1999). A scientific, research-based approach which exposes management strategies to the rigors of experimentation may provide a means by which greater understanding of the complexity of natural systems can be realised. Despite its experimental nature an explicit vision or model of the ecosystem is necessary if organisations are to manage adaptively (Lee 1999; Crosby et al 2000). This should include clearly defined management goals and objectives as well as response indictors for evaluation (Crosby et al. 2000). This vision or model provides a baseline against which change can be measured (Lee 1999).

Although the adaptive management approach shows promise there have been many shortfalls that have impeded the success with which it can be implemented (Johnson 1999). It has been proven that the process can be both costly and slow (Johnson 1999). The benefits of a research based approach are likely to result in a gradual understanding of ecosystem and the social dynamic, where the ways in which management does and does not affect outcomes are determined over time (Lee 1999). This has to be viewed against the backdrop of the short term goals of many bureaucratic systems as well as the immediate needs of stakeholder groups to whom managers have a social obligation. Additionally, many management agencies may be resistant to change and unwilling to undertake long term policies that appear too risky and costly (Johnson 1999). Ironically, knowledge of the combined social, economic and ecological systems is always incomplete. By undertaking this management approach there must be a shift in the status quo where it is understood that ecosystems cannot be maintained within a single optimal state. Rather an attempt should be made at maintaining optimal management capacity by endeavouring to create more resilient management systems and encouraging greater flexibility in management institutions (Johnson 1999). Perhaps there is a need to apply adaptive management practices not only to the resources but to the institutions that are charged with safeguarding them as well (Johnson 1999).

12.3.1 General recommendations

The evaluations conducted at the three MPAs have highlighted the importance of conducting regular assessments of management strategies to determine effectiveness and to guide change. The managers who have participated in this process have gained greater appreciation of the potential benefits that can be gleaned from frequent self appraisal. It is a means by which information can be provided that creates a reference point of where management is relative to the original objectives stipulated for the conservation area. By locating that point, it is more feasible to chart a course towards the fulfilment of mandates that have been outlined for the MPA. Perhaps this will create a shift in the paradigm of evaluation from that of an opportunity to assign blame to that of an occasion to evaluate current strategies and justify the need for necessary change.

The experiences with the evaluation of water quality in the TCMP and the SCMR highlight the need to integrate such appraisal mechanisms at the inception of new management activities. The

deficiencies in the monitoring programme, the need for external support and the importance of having explicitly stated goals and protocols can be applied to all aspects of management. The earlier these insufficiencies are identified, the sooner modifications can be made to the process. This will enable management agencies to make wise choices as it relates to the allocation of time and resources.

When choosing evaluation tools one must be mindful of the importance of ensuring that these tools encompass all facets of the management activities - biophysical, governance and socio economic. In this study there has been a tendency to lean towards the assessment of the governance aspect. There may be several reasons for this trend which are beyond the scope of this report. Perhaps the framework in which these appraisals can be conducted already exists. If so there would be little need for extensive training, there would be accessible sources of secondary data for assessment and little or no additional equipment would be required. These factors aid in the reduction of evaluation costs. Additionally, it may be thought that enhancing administrative functions will result in a top down effect where an improvement will be seen in all facets of management. Whatever the true reason, care must be taken in the selection of performance indicators so that any appraisal conducted can provide a holistic view of management activities which adequately addresses all aspects of the conservation efforts.

Furthermore effective evaluations are only as good as their ability to influence change in MPA management. Significant time, effort and expense are often essential for in house assessments. The primary goal of this process is to highlight where management has fallen short or where methods used can be improved to increase the success of the MPA. It is a guide, providing the information required to keep activities focused in order to realise conservation goals. It may serve to highlight the need for adjustments to these goals so that through the evolution of management objectives, conservation efforts can be enhanced and sustainable development can be achieved. However information without action achieves nothing. If the bureaucratic power to address management issues and develop means by which they can be addressed does not lie in the hands of those charged with management of the area, then those that hold this power need to recognise the important role they play in MPA success. Greater support is needed from those in a position to facilitate change if administrative organisations are to be able to manage adaptively.

Recommendations for ways in which adaptive management can be integrated into the study sites were made by those present at the terminal workshop held in Punta Gorda, Belize (Pena and Roach 2006). Suggestions were based on the results of the evaluations, the experience in management of the respective MPAs and the learning experience which resulted from dialogue with all who were present. Site recommendations from this workshop and subsequent communication are outlined below.

12.3.2 Sapodilla Cayes Marine Park

In the Belize workshop the priority area identified for the SCMR for adaptive management was communication and dissemination of environmental education material. Environmental education material though thought to be generally good has been found to be sporadically distributed. This is largely due to the inability of TASTE to acquire the funding necessary to develop a comprehensive educational programme. However it has been found that the organisation has done well considering the its financial and human resources constraints. The COMPACT project has highlighted the ability to undertake such an endeavour when given the resources to do so. However both the staff of TASTE and stakeholders feel that more can be

done to educate and communicate with their large and diverse stakeholder audience. In response to this need TASTE will endeavour to augment existing activities through increasing the frequency with which information is disseminated by implementing a schedule for distribution. Educational material will take the form of newsletters, brochures and stakeholder surveys. The logistics of this endeavour will be determined for the adaptive management trials after consultation with other stakeholder groups and management agencies within the SCMR.

13 REFERENCES

Berkes, F., R. Mahon, P. McConney, R. Pollnac and R. Pomeroy. 2001. Managing small scale fisheries: Alternate directions and methods. International Development Research Centre (IDRC). Ottawa, Canada.

CERMES. (2005a). Report on the inception training workshop for enhancing the management effectiveness of the Tobago Cays Marine Park, St. Vincent and the Grenadines. Union Island 19-20 December 2005. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No.1.25pp.

CERMES. (2005b). Socioeconomic monitoring and fisheries management planning for the Negril Marine Park.26pp.

CERMES. (2006a). Report on the inception training workshop for enhancing the management effectiveness of the Negril Marine Park, Jamaica.26-27January 2006. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No.2. 31pp.

CERMES. (2006b). Report on the inception training workshop for enhancing the management effectiveness of the Sapodilla Cayes Marine Reserve, Belize.4 -5 February 2006. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No.3. 26pp.

Cho-Ricketts, L. 2005. External Evaluation of Compact Projects: The Sapodilla Cayes marine Reserve: Creating Awareness of the Importance of a Marine Protected Area in Coastal Communities of the Toledo District. Toledo Association for Sustainable Tourism and Empowerment (TASTE) and Community Management of Protected Areas Conservation Programme (COMPACT). Final Draft. 25pp.

Finch, J.2006. Negotiating Influence: The experience of three local NGOs in Marine Resource Co-Management in Southern Belize. MSc Thesis. The University of Montana.113pp.

Garcia, C. 2007. Report on the Community ranger Programme at the SCMR. Toledo Association for Sustainable Tourism and Empowerment.

Government of Belize.2000. Fisheries Act.

Hilborn, R. Can fisheries agencies learn from experience? *Fisheries*, 17(4), 6-14.

Holling, C.S., ed. 1978. Adaptive environmental assessment and management. Wiley, London, UK

Hartshorn, G., Nicolait, L., Hartsthorn, L., Bevier, G., Brightman, R., Cal, J., Cawich, A., Davidson, W., DuBois, R., Dyer, C., Gibson, J., Hawley, W., Leonard, J., Nicolait, R., Weyer, D., White, H. and Wright, C. (1994). Belize Country Environmental Profile. A field study. United States Agency for International Development. 151 pp.

Johnson, B.L. 1999. Introduction to the special feature: adaptive management- scientifically sound, socially challenged? Conservation Ecology 3 (1): 10 [online] URL: http://www.consecol.org/vol3/iss1/art10 (assessed 27 July 2006).

Lee, K. N. 1999. Appraising the adaptive management. Conservation Ecology 3(2): 3. [online] URL: http://www.consecol.org/vol3/iss2/art3 (accessed 27 July 2006).

Mascia, M. (2004). Social Dimensions of Marine Reserves. Marine Reserves: A Guide to Science Design and Use. Island Press Washington D.C.

Ministry of Agriculture and Fisheries of Belize (1995). Belize Barrier Reef Complex: Nomination for Natural World Heritage Site. 34 pp. + annexes + maps.

Nightengale, J. 9th November, 2006. Personal Communication. 59th Gulf Caribbean Fisheries Institute Conference, Princess Hotel, Belize.

Pena, M. 2006. Report on Management Effectiveness at the Tobago Cays Marine Park (TCMP), St. Vincent and the Grenadines. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No. 5. 59 pp.

Pena, M and D. Roach. 2006. Report of the Workshop on MPA Evaluation Products and Process, Punta Gorda, Belize, 4 November 2006. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No. 4. 47pp.

Perkins, J. and Carr, A. (1985). The Belize Barrier Reef: status and prospects for conservation management. Biological Conservation 31: 291-307.

Pomeroy, R. S, John, E. Parks and L. M. Watson. 2004. How is your MPA doing? A Guidebook of Natural and Social Indicators for evaluating Marine Protected Area Management Effectiveness. The World Conservation Union (IUCN). Gland, Switzerland.230pp.

Roach, D. 2007. Report on Management Effectiveness at the Negril Marine Park (NMP), Jamaica. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize Report No. 7. 68pp.

Stoddart, D.R., Fosberg, F.R. and Sachet, M.H. (1982). Cays of the Belize barrier reef and lagoon. Atoll Research Bulletin 256. (Unseen).

Walters, C.J. 1986. Adaptive management of renewable resources. McGraw- Hill, New York, NY, USA.

Young, E. (1994). Sapodilla Cays Marine Reserve. Draft Management Plan. Fisheries Department, Ministry of Agriculture and Fisheries, Coral Cay Conservation Ltd. Unpublished.

14 APPENDICES

Appendix 1: Governance survey used to determine level of training provided to stakeholders in participation in the SCMR

Toledo Association for Sustainable Tourism and Empowerment

53 Main Middle Street
P.O. Box 18
Punta Gorda
Toledo
Belize Central America

Phone: 722-0191
Fax: 722-2070
E-mail: taste_scmr@btl.net

The purpose of this survey is to find out the level of training provided to stakeholders in participation. This survey is absolutely confidential. The information gathered will be analyzed and a summary will be available upon request. The persons being surveyed involve: Advisory Committee, Fisheries Department, General Public, Donor Agencies, TASTE-SCMR and Fishers.

1. Contact Information (not obligatory, but may be helpful for future reference).

Name: _____

Phone Number: _____

Address: _____

2. Are you familiar with the work TASTE is doing?
____ Yes No _____

3. Please explain what TASTE does?

_____

_____

_____

4. What type of training have you received from TASTE?

_____ Conflict Resolution

_____ Capacity Building

_____ Board Members Roles and Responsibility

_____ Outreach Educational Program

_____ Entrepreneurship for Youths

_____ Socio Economic

_____ Decision Making

5. If so, how have these trainings benefited you?

_____

_____

_____

_____

6. Do you think that receiving these trainings help you make better decisions and also allow you to become more actively involve in the organization?

____ Yes _____ No

7. Do you think that the level of training received was satisfactory?

_____ Yes _____ No

8. Do you think that organizations such as TIDE, TASTE, and SATIM should have stakeholders more engaged in management decisions? If so, why?

_____

_____

_____.

9. How could others not involved in the activities of the SCMR get involved?

_____

_____

_____.

10. Is there anything else, you want to comment?

_____

_____

_____.

Thank you

Appendix 2: Governance survey used to determine the level of stakeholder participation and satisfaction in management processes and activities

Toledo Association for Sustainable Tourism and Empowerment

53 Main Middle Street
P.O. Box 18
Punta Gorda
Toledo
Belize Central America

Phone: 722-0191
Fax: 722-2070
E-mail: taste_scmr@btl.net

This survey is being conducted as a means of evaluating the level of stakeholder participation and satisfaction in TASTE management processes and activities. Your confidentiality as a participant will be ensured. The range of those being surveyed will include individuals from: TASTE; SCMR; the Board of Directors; the Advisory Committee; the Fisheries Department; donor agencies; other NGO's; fishers; teachers; youth; villagers; tour guides; businesses, Government officials; and the general public. A summary of our analysis will be available upon request.

1) Contact Information (not essential, but helpful for follow-up or clarification purposes, if needed.)

Name: _____

Mailing Address: _____

_____

Phone Number(s):_____

_____

Email address:_____

2) Do you know TASTE and the work they do?

___ Yes ___ No

3) How have you been involved with TASTE?

___ Workshops

___ Trainings

___ Business

___ Vendor

___ Service Provider

___ Decision Maker

___ School Programs

Please elaborate: _____

_____

_____

4) How long have you been involved with TASTE? Explain: _____

_____

_____

5) What do you perceive are the management goals for the SCMR?
(Sapodilla Cayes Marine Reserve)

_____

_____

_____

_____

_____

6) Do you believe TASTE has effectively met these goals?

___ Yes ___ No

Please elaborate: _____

_____

_____

7) What do you think is being neglected?

_____

_____

_____

_____

8) Are you satisfied with TASTE management?

___ Yes ___ No

If you answered NO, please explain:_____

_____

_____

9) How could TASTE improve so that participation and satisfaction is optimal?

_____

_____

_____

10) Have we missed anything? Comments please:

_____

_____

_____

We thank you for your participation.

Appendix 4

Roach, D. 2006. Learning from evaluating MPA management effectiveness. Unpublished MSc research project manuscript. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados. 89pp.

Learning from Evaluating MPA Management Effectiveness

A Research Paper

Submitted in Partial Fulfilment of the Requirements for the Degree of
Master of Science

in

Natural Resource and Environmental Management

of

The University of the West Indies

Donna Lynette Patricia Roach
2006

Natural Resource and Environmental Management
Centre for Natural Resource and Environmental Management
The University of the West Indies
Cave Hill Campus
Barbados

Natural Resource and Environmental Management
Centre for Resource Management and Environmental Studies
University of the West Indies

ABSTRACT

Learning from evaluating MPA management effectiveness

DONNA ROACH

Little is known about the level of effectiveness of current management strategies associated with Caribbean MPAs. This study forms part of a larger joint project implemented by the Centre for Resource Management and Environmental Studies (CERMES) and funded by the National Oceanic and Atmospheric Administration (NOAA) Coral Reef Grant Association to evaluate MPA management effectiveness at three MPAs with the Caribbean region. The chosen sites were the Negril Marine Park (NMP), Jamaica; Tobago Cays Marine Park (TCMP), St. Vincent and the Grenadines, and Sapodilla Cayes Marine Reserve (SCMR), Belize. Inception workshops were held at each of the sites to train all participants in the evaluation methodology outlined in the guidebook "How is Your MPA Doing?", to decide on the management goals and objectives to be assessed and to increase the overall institutional capacity of the management bodies. This research paper focuses primarily on the results obtained from the evaluation of management objectives for the NMP. The preliminary results of the evaluations for the NMP as well as lessons learnt from both the process and product for all sites have been discussed. Recommendations for adaptive management have also been outlined. This study highlights the need for greater conservation communication and financial management for the NMP, a comprehensive educational programme at the TCMP as well as training in enforcements systems for park rangers. An improvement in the dissemination of environmental education for the SCMR has also been recommended. The lessons learnt from these evaluations will provide some baseline data where there is none, and also give an indication of the effectiveness of current management strategies and their ability to achieve the predetermined conservation and development goals.

Keywords: effectiveness, evaluating, learning, lessons, management, MPA

ACKNOWLEDGEMENTS

My utmost gratitude goes first and foremost to God who has given me the strength and patience to complete this journey. To Dr. Patrick McConney, my supervisor, for his unrelenting faith and patience, it was greatly appreciated. To NOAA whose financial support made this project possible. To the fine staff at NCRPS, without whose assistance this paper would not be possible and whose support and laughter made my trip to Negril truly memorable. To Tanya Staskiewicz, David Gill and Kali Douglas whose moral support, technical assistance and occasional cussing kept me in the right direction. To Maria Pena for cheering me on in Belize and making many moments of this write up bearable. To Neetha Selliah whose infectious humour and words of wisdom brought a much needed measure of sanity and kept me grounded and last, but certainly not least, to my mother who deserves this degree more than I do.

TABLE OF CONTENTS

Citation
Roach, Donna. 2006. Report on Learning from Evaluating MPA Management Effectiveness. Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados.89pp

Disclaimer
This report was prepared by the Centre for Resource Management and Environmental Studies (CERMES) under Coral Reef Conservation Grant NA05NOS4631049 from the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce. The statements, findings, conclusions and recommendations are those of the author and do not necessarily reflect the views of NOAA or the U.S. Department of Commerce.

1 INTRODUCTION

1.1 Marine protected areas

A steady decline in biological diversity and productivity in many coastal areas, precipitated in part by anthropogenic factors, has lead to the recognition of the need to protect and sustainably use traditionally exploited marine resources. Factors such as overfishing, increased population growth, development and physical alterations to coastlines have placed great stress on fragile marine ecosystems (Sobel and Dahlgren 2004). This stress often pushes such systems beyond their natural thresholds resulting in a decline in ecosystem health and viability. However, many countries still attach great social, cultural and economic importance to marine resources. Consequently, many coastal areas remain heavily populated and used while competition for limited space and finite resources result in user conflict and a complex mixture of uses to be managed (McConney 2004). This trend has continued in the face of conventional single species based management approaches which have had little success in protecting marine ecosystems (National Research Centre 2001). In the face of this dilemma the need for a management approach that is both holistic and integrated in nature has been recognized (IUCN 2004).

As a result many countries are opting to use marine protected areas (MPAs) as the management tool of choice for the conservation of coastal and marine resources (National Research Centre 2001). The use of MPAs has increased throughout the Caribbean region as well as globally; signaling the understanding of the need for a shift from a single species management approach to an ecosystem one. Of the seventeen insular countries and territories in the Lesser Antilles and Central Caribbean biogeographic zones, inclusive of Belize and Turks and Caicos, seventy five MPAs have been identified (Geoghegan 2001). The IUCN (1992) describes an MPA as "any area of the intertidal or subtidal terrain, together with its overlying water and associated flora and fauna, historical or cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment." Such areas possess the potential to enhance marine resource management through an ecosystem based approach to conservation. In addition to this they may represent a means by which interagency cooperation can be realized along with the development of policies in which the spatial heterogeneity of marine habitats and the need to preserve marine ecosystem structure is recognized (National Research Centre 2001).

MPAs are implemented for a myriad of reasons and differ in size, management structure and management and conservation goals (Sobel and Dahlgren 2004). Although there has been some success in the use of MPAs, many question their efficacy (National Research Centre 2001). In the Caribbean region many of these conservation areas are very small and located in coastal areas where the human impacts are heavily felt (IUCN 2004). In areas such as the Hol Chan, Belize and the Parque de Este in the Dominican Republic, conservation areas are located in crowded coastal zones where adjacent communities exhibit a high level of dependency on the MPA (Geoghegan *et al* 2001). Additionally many developing countries face the daunting task of managing such areas with limited institutional capacity, inadequate funding and in some cases an inadequate legislative framework limiting the benefits that may be obtained from the implementation of MPAs.

What has resulted however is an understanding that if MPAs are to be effective they must be viewed within the broader context of coastal, ocean and watershed management. In this way the importance of their relationship with other uses within the coastal and marine area will be taken

into account (IUCN, 2004). This need has lead to the evolution of the concept of Integrated Coastal and Ocean Management (ICM) which acknowledges the linkages that exist among inland uses and the environments that they have the potential to affect (IUCN, 2004). It is a multi purpose tool that is intended to address the potential impacts of development, user conflicts and the interrelationships between physical processes and human activities with the aim of promoting linkages among sectoral, coastal and ocean activities (Cincin-Sain and Knecht, 1998).

However effective management for MPA in many countries continues to be elusive. Often the designation of a site as a MPA bears no resemblance to the reality of the level of protection that they afford (Sobel and Dahlgren, 2004). In the Caribbean there has been a movement towards a more participatory form of management in an effort to improve the efficiency of current management structures (Geoghegan and Renard, 2002). This movement has been brought about by the failure of many MPAs to realize conservation objectives, the negative impacts that they have had on some stakeholders as well as severe conflicts that have been generated or exacerbated by their implementation. Increasingly the task of managing MPAs within the Caribbean has begun to encompass social and economic goals in addition to environmental sustainability and conservation (Geoghegan and Renard, 2002). Conservation areas such as Soufriere Scotts Head in Dominica and the Soufriere Marine Management Area in St. Lucia have implemented programmes to address this where they have sought to enhance the livelihoods and mitigate the negative impacts of management on disadvantaged stakeholders (Geoghegan *et al* 2001).

The development and management of MPAs require significant investment of time, finances and expertise. Their impacts may not only be felt on the ecosystems that they are aimed at conserving but on the stakeholders and in some cases communities whose economic and social structures may be influenced by management of coastal and marine areas (Garaway and Esteban 2003). In light of this there has been an increasing need to justify MPAs in a manner that is quantifiable in order to satisfy those that have social, commercial, development and planning interests in coastal areas. The use of solely ethical and scientific arguments for their implementation has failed to convince many of why they may be necessary even in the face of growing threats to marine ecosystems (Salm and Clark, 2000). For these reasons there is a need for management policies, conservation goals and potential economic and social benefits to be explicitly stated. Additionally it is important that managers and stakeholders have some means by which the efficacy of such areas can be measured, to evaluate whether conservation goals area being met, if improvements to ecosystem viability and biodiversity are being seen as well as if any benefits are to be gleaned. Now more than ever there is a need for performance measurement indicators that are capable of evaluating the quality of management and assess the performance of the MPA (IUCN 2004).

1.2 MPA Effectiveness Evaluation Project

Three MPAs within the region were chosen for an in-depth study into the implementation of practical evaluation methods; Tobago Cays Marine Park, St. Vincent and the Grenadines; Negril Marine Park, Jamaica, and Sapodilla Cayes Marine Reserve, Belize. In collaboration with the Centre for Resource Management and Environmental Studies, University of the West Indies, the managers and stakeholders at the three MPAs were able, through participatory approaches, to facilitate stakeholder involvement and adaptive management. In doing so it ensures that based on the lessons learnt and the skills gained through training, continuous monitoring of project

progress and evaluation and interpretation of results will that best practices can be institutionalised (McConney 2005).

This project was made possible through a NOAA Coral Reef Grant Association (CERMES 2006a). There were two specific objectives for this project (McConney 2004);

- "To conduct participatory management effectiveness research and evaluations by training at least 30 people across three MPA sites in the Grenadines, Jamaica and Belize in management effectiveness evaluation and adaptive management."
- "To improve MPAs in the region by monitoring national and regional-level outcomes from evaluations and adaptive management as documented in widely shared lessons learned from the project, combined with training and communication materials for graduate coursework, further research, management and policy."

Comprised of four main components, the overarching goal of this project was to promote and institutionalize enhanced and adaptive coastal management practices achieved through applied research and interdisciplinary training (CERMES 2006a). Not only will the lessons gleaned from this initiative serve to inform and improve management at the three study sites, but they may take on a regional perspective acting as a guide for countries that wish to do similar assessments and adopt similar management approaches. Such an endeavour also creates the opportunity for information to be gathered on some aspects of the effectiveness of co management strategies. Two of the sites, NMP and SCMR, have adopted co management agreements while the management of the TCMP has expressed interest in pursuing such an agreement.

1.3 Research Objectives

The goal of this MSc research project is to conduct management effectiveness evaluation by using appropriate and measurable indicators in an effort to determine if management efforts are responsive to the needs and objectives that have been set out for the three chosen MPAs and in particular Negril Marine Park.

The specific objectives addressed in this report are:

- To evaluate management effectiveness at the MPA study sites in collaboration with the local evaluation teams, paying special attention to the Negril Marine Park and the comparative analysis of water quality at all sites.
- To determine the lessons learned from the evaluation processes and products at the MPA study sites, with emphasis on key lessons that are relevant to training.

To recommend adaptive management initiatives for the MPA study sites based on the lessons learned from the evaluation of management effectiveness

Through joint analysis and interpretation of the data that has been gathered via participatory research it is hoped that the lessons learnt at each stage of the evaluation process will be highlighted and used in such a way that it results in improvements in the MPA. As part of an overarching project which evaluates the management processes at the three targeted MPAs, the outcomes at the NMP will be considered within a broader context where comparative analyses may be conducted on research efforts and outcomes at each site. As a research assistant to the NMP, assigned tasks included the collection of information where data gaps existed, the

evaluation and verification of completed assessments for the relevant indicators as well as the compilation of all information gathered.

1.4 Study Sites

1.4.1 Tobago Cays Marine Park (TCMP), St Vincent and the Grenadines

Located at the southern end of St. Vincent and the Grenadines, the TCMP is contained within the Grenadines island chain. The park covers an area of approximately 15km^2 and encompasses the five uninhabited island of Petit Rameau, Petit Bateau, Jamesby, Baradal and Petit Tabac which enclose a sand bottom lagoon as well as the island of Mayreau (Pena *et al* 2006). The conservation area's islands, reefs and shallows can be found mostly within the 10 fathom depth contour and are of extreme ecological, economical, social and cultural significance to St. Vincent and the Grenadines (McConney 2005). A site map of TCMP is displayed in Figure 1.1.

The process of providing formal protection in this area began as early as 1987 when the Government of St. Vincent and the Grenadines began to establish the Tobago Cays Marine Conservation Area. The focus at this time was primarily on that of fisheries management. As such the boundaries of the conservation area are outlined in the Fisheries Regulations of 1987 (Pena *et al* 2006). Further to this initiative the decision was taken to upgrade the status of this area to that of a national park where there would be a broader focus which incorporated and emphasized tourism development as well as resource conservation. This area was previously privately owned by the Tobago Cays Holding Company Limited. However arrangements to purchase this site were finalized in 1999 under the condition that it would remain as a national park is afforded the full protection that was associated with this designation (Pena *et al* 2006). To facilitate this change the French Government provided technical cooperation for establishment of the marine park, a Marine Parks Board was established, Marine Park Regulations instituted and a Park manager was officially appointed.

The TCMP contributes greatly to the tourism earnings of the St. Vincent and the Grenadines. It is the most frequented watercraft anchorage in the area, attracting significant numbers of nautical visitors, overnight tourists as well as day excursionists (Pena *et al* 2005). Despite this, accurate data on the numbers of persons that visit the Cays have not been reported in annual tourism statistical reports of the St Vincent and the Grenadines Ministry of Tourism and Culture. Though the first management plan for the TCMP was drafted in 1998 and revised in 2000 it has yet to given government approval. In lieu of this other plans continue to be drafted. Additionally much of the objectives outlined in the revised management plan of 2000 remain largely unimplemented (Heyman *et al* 1998).

In an effort to effectively manage this area, consideration was given to delegating management responsibility to a private foreign investor. After much protest, management remained under government control (McConney *et al* 2005). Though the desire to see that the management and decision making processes for the conservation area remain in local hands serves to highlight the importance of the area to the stakeholders in the TCMP, limited institutional capacity and weak financial stability has impeded many management efforts. A small field staff along with the local board of management struggle to adequately manage a marine area used heavily for nautical tourism as well as economic and recreational purposes for locals (McConney *et al* 2005). This situation continues despite the numerous projects and proposals on the Tobago Cays.

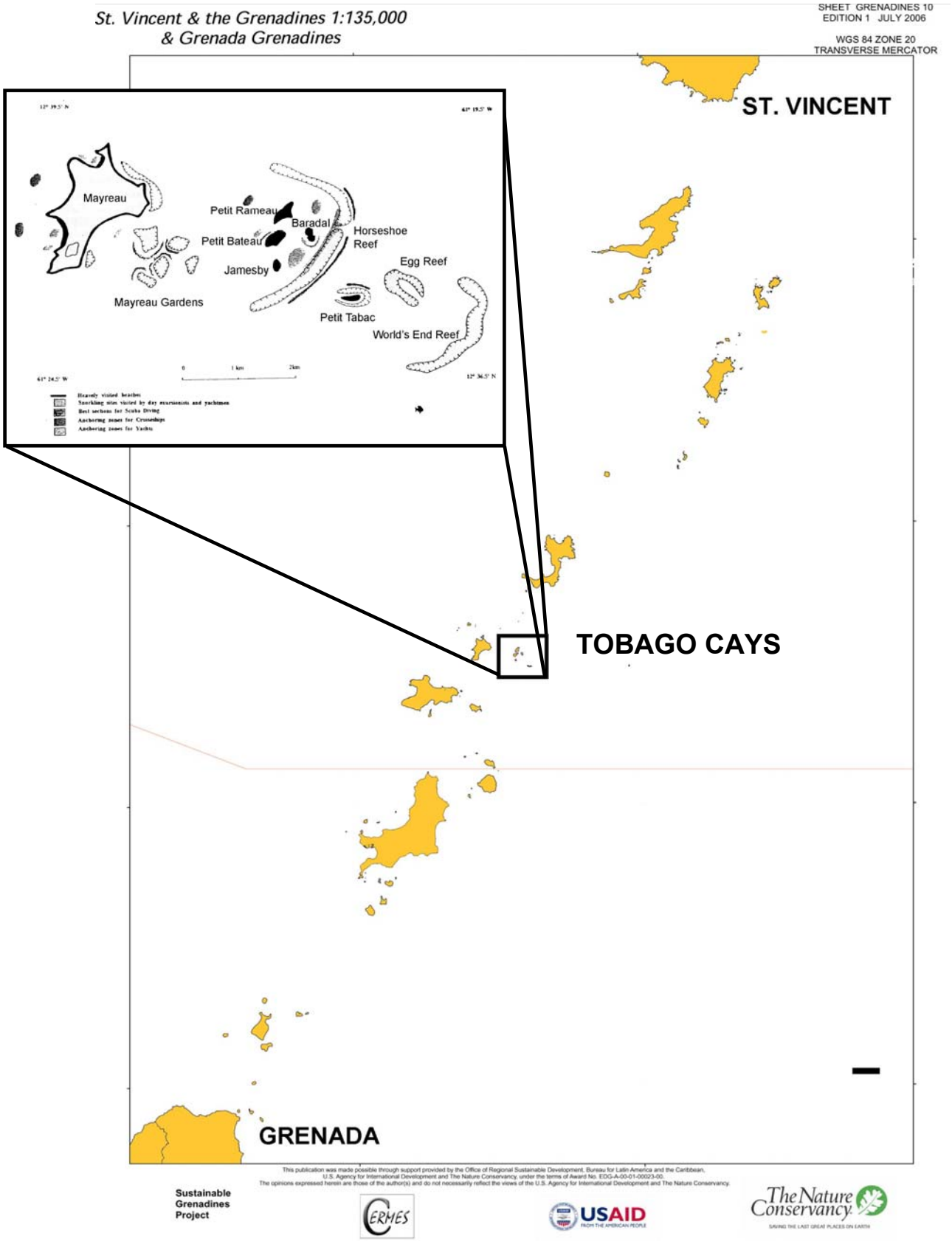


Figure 1.1 Map of the Tobago Cays Marine Park within the Grenadines

1.4.2 Negril Marine Park (NMP), Jamaica

Located on the west coast of Jamaica, Negril has grown from the remote and largely inaccessible community of farmers and fishers that is was in the 1960's, to become the third largest resort area on the island. As its reputation for a tourist destination of choice grew, rapid and ad hoc development occurred to both facilitate and take advantage of the surge in visitor arrivals. This has resulted in an area that is marked by a high density of tourist facilities which cater to both short and long stay visitors. Approximately seventy water sports operators and a similar number of tourist and recreational facilities have been identified along the major beach areas by the Negril Coral Reef Preservation Society (NCRPS) in 1997.With a resident population that exceeds 5000 persons as well as large numbers of commuters into the region, this coastal area is intensely used for a myriad of purposes by a variety of people. Fast paced development and continued population growth, over fishing as well as natural phenomena has had serious implications on marine environmental health. As a result there has been a notable decline in the health of coral reefs, increased sedimentation due to physical development and dredging as well as excessive nutrient loading from inadequately treated wastewater and agrochemicals.

The recommendation to designate this site as a Marine Protected Area was made as early as the1960's by Dr.Thomas Goreau. It was not until 1998 that the Negril Marine Park (NMP) was legally established under the Negril Marine Park Order by the government of Jamaica. Sitting in an area that is off the coast of the parishes of Hanover and Westmoreland, its coastal boundary is approximately 33km and the park covers an estimated area of 160 km^2 (NCRPS, 2002).

Bordered by 13 fishing communities, the NMP is divided into eight zones which have yet to be officially demarcated (McConney *et al* 2005). A site map for the study area is displayed in Figure 1.2. Management of the NMP is the responsibility of the NCRPS, a non profit organisation which was established in 1990 in response to concerns about the damage to and general decline in health of the coral reefs in the area. A key player in the promotion of the establishment of the existing NMP, authority for management was granted through a co-management agreement from the Natural Resources Conservation Authority (NRCA). It is hoped that the establishment of this area will enable the conservation of the natural coastal and marine resources in a manner that affords them full protection so as to maintain their health and integrity while still allowing for sustainable economic and social development (Thacker and Hanson, 2003).

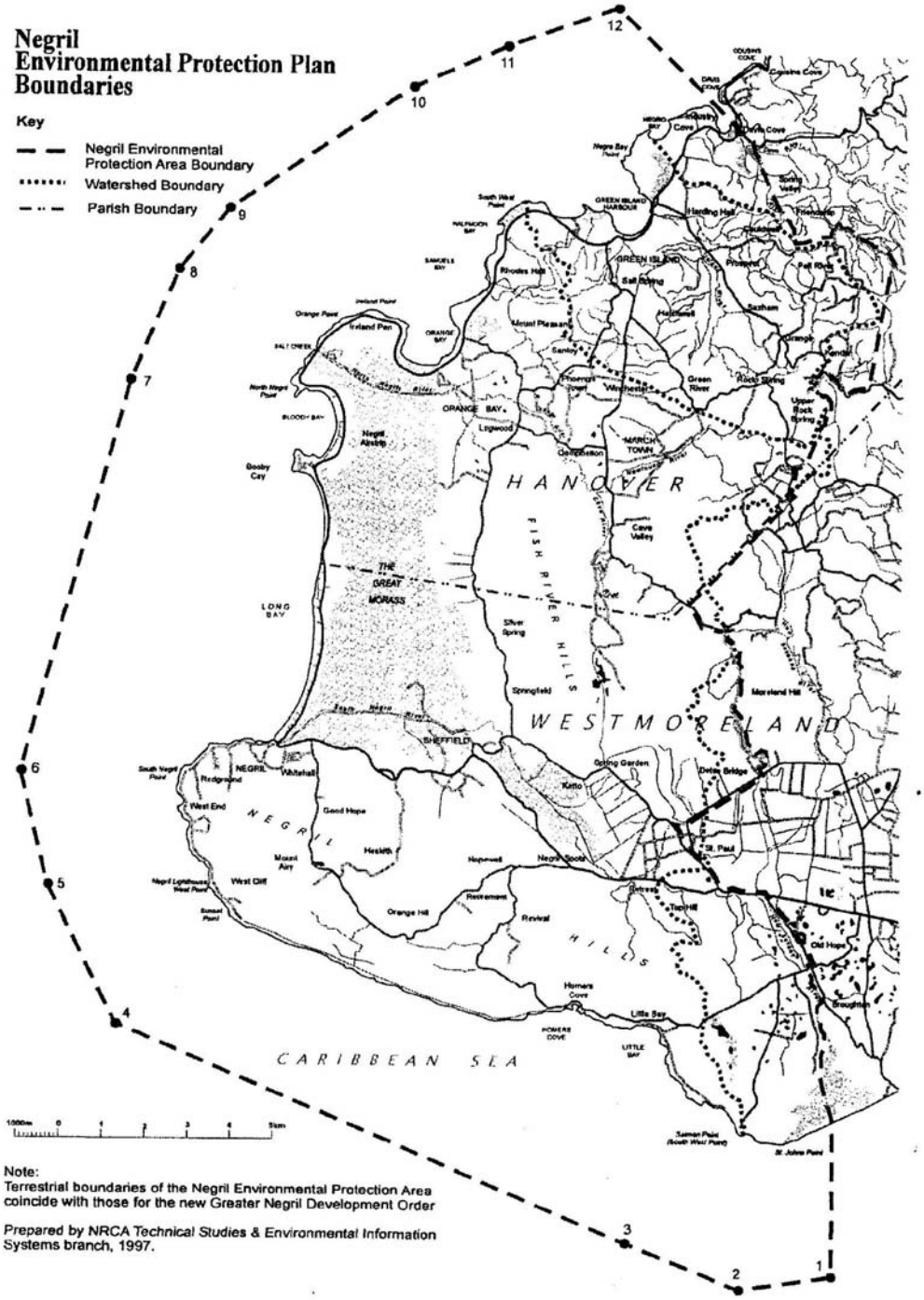


Figure 1. 2 Map of the Negril Marine Park, Jamaica

1.4.3 Sapodilla Cayes Marine Reserve (SCMR), Belize

The SCMR forms the southern terminus of the Belize Barrier Reef and covers an area of approximately 119km^2. Its boundaries extend from Tom Owen's Cay in the north east to Seal Cay in the North West to Ragged Point in the South East. The reserve encompasses a total of 12 mangrove and sand cays (McConney *et al* 2005). Officially declared a marine reserve in 1996 through Statutory Instrument 117 under the Fisheries Act of Belize this area has been given the designation of a World Heritage Site. A site map for the reserve is displayed in Figure 1.3.

This site is heavily used for fishing where temporary camps are set up on many of the cayes by fishermen that are based in the neighboring communities; Monkey River, Punta Negra and Punta Gorda (McConney *et al* 2005). Additionally Hunting Cay has been used as the unofficial port of entry for persons arriving from Honduras and Guatemala. The SCMR though a part of Belize is equidistant from Honduras, Guatemala and Belize which makes it ideal for exploitation from persons in the three regions. In addition to local fishing activities this site also receives a considerable amount of tourists some of whom have been reported to participate in illegal fishing activities. These factors may have severe implications on the health and viability of local marine ecosystems. Despite this there is little documented information concerning the type and extent of fishing and tourist activities within the reserve.

The Toledo Association for Sustainable Tourism and Empowerment (TASTE) has been delegated some of the management responsibility for the reserve through a co-management agreement signed in 2001 (McConney *et al* 2005). Though non-profit in nature and small in size this association has been steadily working on increasing their capacity to effectively manage the SCMR. Since 2001, the co- management agreement has been updated, granting this association greater responsibility for the marine reserve (McConney *et al* 2005). A management plan has been drafted for the area but has yet to be approved by the Belizean government and signed into law (Nightingale pers comm 2006). However direct responsibility for surveillance and the enforcement of existing regulations for the SCMR lies with the reserve manager, biologist and rangers all of whom are fisheries officers appointed by the Fisheries Department (McConney *et al* 2005).

1.5 Report Outline

The next chapter describing the methodology used precedes a series of self contained and integrated chapters that present the background, methods, results and discussion for each of the management effectiveness indicators. This is followed by an extended chapter containing a summary, conclusions and recommendations. The evaluation summary highlights the success of each indicator in determining the effectiveness of the MPA goals and objectives. The lessons that were learnt during this process are highlighted with a discussion and recommendations for adaptive management at the study sites. References are listed with four appendices providing information on results of the socio- economic evaluation and the lessons learnt at all sites both from the product and during the process with copies of the two survey instruments used.

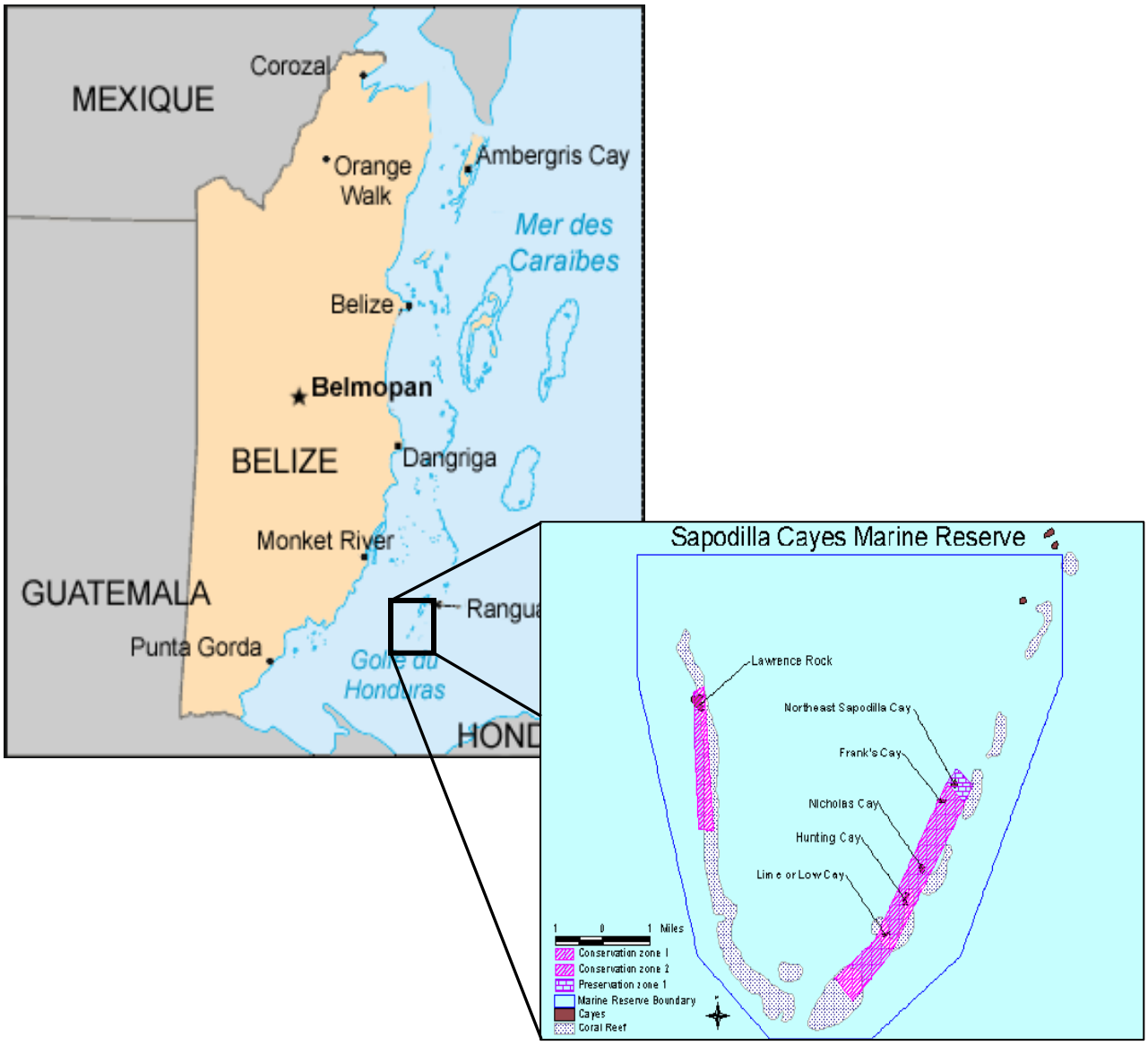


Figure 1. 3 Map of the Sapodilla Cayes Marine Park, Belize

2 METHODOLOGY

Multi-stakeholder inception training workshops were held at each of the three study sites (CERMES 2005a, CERMES 2006a, and CERMES 2006b). These stakeholders were identified through a brief stakeholder analysis and included participants drawn from MPA management bodies, relevant government agencies and organisations, various NGOs, informal civil society groups and funding agencies. Each of these persons was introduced to the marine effectiveness evaluation methodology adapted from the guidebook "How is your MPA doing?" written by Dr. Robert Pomeroy and others (2004). During the two day training sessions held at each MPA,

participants were trained in the use of the methodology. Using both the text and worksheets that were provided, the goals and objectives of the MPA were aligned to those in the guidebook.

In the case of TCMP where no goals and objectives for the conservation area have been explicitly agreed to, relevant ones were determined for the evaluation exercise (Pena *et al* 2005). Through a process of discussion and open voting goals and objectives that were deemed most relevant as well as most feasible to evaluate were selected (Pena *et al* 2005). These goals and objectives that were specific for each study site were then used to identify overlapping goals and objectives in the guidebook as well as their associated indicators that would be used in the evaluation process. Similar processes were undertaken at the NMP and SCMR, but using their written management planned as the source documents. The ones selected for the NMP are outlined in Table 2.1.

These indicators have been divided into three broad categories; biophysical, socioeconomic and governance in order to cover all aspects of MPA management (Pomeroy *et al* 2004). The indicators chosen for each site were thoroughly examined and prioritized after which the selection of the final set of indicators was conducted (CERMES 2006a). Due to the unique nature of each MPA and the management challenges that each has to face there was some variation in the type and number of indicators that were finally selected. Ten indicators were selected for the Sapodilla Cayes Marine Reserve, eight for the Negril Marine Park and thirteen for the Tobago Cays Marine Park (CERMES 2006a). The indicators selected for each of these sites are outlined in Table 2.2.

Table 2. 1 NMP goals and objectives and the indicators selected for the evaluation

Management Goals Relating to NMP	NMP Objectives	Indicator Selected for Evaluation
Achieve the mission of the NMP through coordination of management programmes.	**1.1** Accountability and transparency of administration and financial systems	**G2** Existence of a decision making and management body
	1.4 Develop an active volunteer programme to assist Marine Park staff	**G6** Availability and allocation of MPA administrative resources **G12** Level of stakeholder participation and satisfaction
	1.6 Ensure that staff has the training, equipment and materials to facilitate their jobs	**G6** Availability and allocation of MPA administrative resources
Create and maintain an awareness and understanding within the community, among the tourist population and throughout the international arena on the purpose, goals and objectives of the NMP and the EPA.	**7.1** Keep the public aware of the status of the park through its educational programmes and media recesses	**S14** Distribution of knowledge to community
	7.4 Assist local groups and support their efforts with the understanding of the need for balanced well rounded community	**S3** Level of understanding of human impacts on resources **S14** Distribution of knowledge to community

Table 2.1 continued

Management Goals Relating to NMP	NMP Objectives	Indicator Selected for Evaluation
Develop and implement a financial sustainability plan which will ensure that adequate funds are available to manage the Negril Marine Park in a way that fulfils the objectives of the management plan.	**5.1** Generate sufficient income to support the maintenance and sustainability of the park	**G6** Availability and allocation of MPA administrative resources **G12** Level of stakeholder participation and satisfaction
	5.2 [Through fundraising efforts] Heighten community awareness of the importance of financial sustainability as it relates to the protection of the coral reef ecosystem which is the tourism product	**[NEW]** Success of fundraising strategies (revenue and diversity of sources) that for part of the management plan).
Create and maintain an awareness and understanding within the community, among the tourist population and throughout the international arena on the purpose, goals and objectives of the NMP and the EPA.	**7.1** Keep the public aware of the status of the park through its educational programmes and media recesses	**S14** Distribution of knowledge to community
	7.4 Assist local groups and support their efforts with the understanding of the need for balanced well rounded community	**S3** Level of understanding of human impacts on resources **S14** Distribution of knowledge to community
Protect natural resources within the Marine Park , conserve existing biodiversity and wherever possible restore damaged ecosystems	Establish and maintain a reef restoration programme	**B8** Water quality **B9** Area showing signs of recovery

Source: CERMES 2006a

When the final selection process was complete factors relating to carrying out the evaluation of each of the indicators are determined. This included the necessary human and financial resources that would be required, estimated timelines for completion, equipment needs, and the necessary skill levels of members of the evaluation teams as well as what outputs would be generated and the target audience that would be receiving this information. The methods by which data were collected, processes, teams that were needed and reporting methods for each indicator were informed by the guidebook. Though it was intended that most of the information would be taken from secondary sources, provisions had to be made for the collection of primary data to evaluate some of the chosen indicators. An example of this includes initial water quality analysis in the Tobago Cays Marine Park, where no water quality analysis had been conducted before. The entire data collection process took place within an eight month period spanning from March to October, 2006.

Gaps in data for the each MPA were resolved through surveys and research into relevant background information for each indicator. This was conducted by members of the evaluation teams as well as the research assistant assigned to the NMP. This process was conducted through the collection of available secondary data as well as interviews with relevant persons who may

have had some insight into past and current management practices. All data was entered into an appropriate database, in particular data that had been gathered through surveys . Quantitative data, including simple descriptive analysis using the Statistical Package for Social Sciences version 11 and in Microsoft Excel. Following this the results were taken through a process of individual and collective interpretation by the researchers and stakeholders to determine the linkages between the MPA objectives and the indicators chosen for the evaluation. Through collaboration with various parties that have been involved in the evaluation process, participants were able to share their views and experiences at the various stages of the evaluation process so as to determine the lessons learnt during the exercise and how these lessons will influence future evaluation exercises and management practices.

Table 2.2 Management effectiveness indicators and the MPAs to which they were applied

MPA	Evaluation indicators linked to MPA goals and objectives
Sapodilla Cayes Marine Reserve	***Biophysical*** 1. B4 Composition and structure of the community 2. B8 Water quality ***Socioeconomic*** 1. S14 Distribution of formal knowledge to the community 2. S1 Local marine resource patterns ***Governance*** 1. G5 Existence and adequacy of enabling legislation 2. G11 Level of training provided to stakeholders in participation 3. G12 Level of stakeholder participation and satisfaction in management processes and activities 4. G13 Level of stakeholder involvement in surveillance, monitoring and enforcement 5. G14 Clearly defined enforcement procedures 6. G15 Enforcement coverage
Negril Marine Park	***Biophysical*** 1. B8 Water quality 2. B9 Area showing signs of recovery (total habitat level) ***Socioeconomic*** 1. S3 Level of understanding of human impacts on resources 2. S14 Distribution of formal knowledge to community ***Governance*** 1. G2 Existence of a decision-making and management body 2. G6 Availability and allocation of MPA administrative resources 3. G12 Level of stakeholder participation and satisfaction in management processes and activities 4. [New] Success of fundraising strategies (revenue and diversity of sources) that form part of the business plan

Table 2.2 cont'd

MPA	Evaluation indicators linked to MPA goals and objectives
Tobago Cays Marine Park	***Biophysical***
	1. B1 Focal species abundance (marine)
	2. B8 Water quality
	Socioeconomic
	1. S2 Local values and beliefs about marine resources
	2. S3 Level of understanding of human impacts on resources
	3. S7 Material style of life
	4. S9 Household income distribution by source
	Governance
	1. G2 Existence of a decision-making and management body
	2. G3 Existence and adoption of a management plan
	3. G6 Availability and allocation of MPA administrative resources
	4. G9 Degree of interaction between managers and stakeholders
	5. G12 Level of stakeholder participation and satisfaction in management process and activities
	6. G14 Clearly defined enforcement procedures
	7. G15 Enforcement coverage

Source: CERMES 2006a

After gathering, generating and interpreting the results of the evaluation for each study site, researchers and representatives from each MPA attended a joint terminal workshop on November 4th, 2006 where the preliminary results of the evaluations were presented. Based on these results as well as the personal experience of each of the participants with both the evaluation process and in the management of each area; key lessons learnt and recommendations for adaptive management for the study sites were determined. This exchange of knowledge was incorporated in the presentation on the progress of the overall project at the 59th Gulf and Fisheries Institute conference in Belize City, Belize (Roach et al in prep). Based on the experiences of the evaluation process and the lessons learned, training materials will be formulated and produced as a final output of the project.

For this report only the results from the evaluation process conducted for the Negril Marine Park have been discussed at any length. Collection of all data from this process was conducted from July to August 2006. This process was facilitated by the NCRPS who partnered with CERMES on this project. Members of this organisation provided access to background information, submitted documentation on evaluations that they had undertaken as well as participated in the data entry and statistical analysis where necessary. The Project schedule is outlined in the Table 2.3.

A comparative analysis of the water quality indicator has been done for the three study sites. This is one of the common indicators for the three MPAs in this project. The methodology used for collection, sampling, laboratory analysis, and reporting at each site is analyzed as well as, available results, equipment and current standards that these results are being evaluated against. It is hoped that through this analysis suggestions can be made for a standardized methodology

for these areas for each step of the water quality monitoring programme as well as common water quality standards to make future analysis and comparison between these sites easier and more effective. It will also serve to provide a set of attainable standards for areas that currently have no national marine water quality standards taking into account ecosystem health and integrity as well as recreational use and human health. The methodology used in the evaluation of each indicator is discussed in detail in the following sections of this report.

Table 2.3 MPA Management Effectiveness Project Schedule

	D	J	F	M	A	M	J	J	A	S	O	N
Inception Workshops	x	x	x									
Field Data Collection				x	x	x	x	x	x	x	x	
Evaluation Workshops												x
GCFI Presentation												x

3 WATER QUALITY (B8)

3.1 Background

Water quality is an abiotic and biotic measure of the ambient environmental parameters present within the water column (Pomeroy *et al* 2004). Quality is determined by the evaluation of measured quantities and parameters which are compared to predetermined standards, objectives or criteria. These parameters may include, *inter alia*, temperature, salinity, oxygen content, turbidity, bacteria and other particulate matter. Water quality is a key indicator of ecosystem health and a limiting factor to the biological processes within organisms, populations and habitats (Pomeroy *et al* 2004). Affected by both natural processes and human activity it has serious implications for the health and viability of biological communities and the economic sustainability of coastal areas.

3.1.1 Negril Marine Park, Jamaica

The decline in water quality and its subsequent effect on the marine ecosystems in the Negril area was recognized in the early 1990's due to a marked decline in coral reef health and the appearance of macroalgal blooms. Rapid and ad hoc development in the 1970's and 1980's to facilitate the surge in visitor arrivals to the area coupled with continued population growth, the absence of proper waste treatment facilities, overfishing and direct recreational impacts had serious implications for the health of the marine environment and its associated ecosystems. However the cause of this decline was not well understood in its initial stages. Although it was recognized that direct human activity had great bearing on declining reef health, no emphasis was placed on the role that land based sources of pollution on the water quality and its influence on community shifts from that where coral predominated to where there was a preponderance of macro algae. Similar studies in Hawaii, the Florida Keys and Bermuda pointed to the indirect effects of increased nutrient loading from sewage, fertilizers and top soil loss as the mechanism underpinning bottom up controls of reef structure and shifts away from corals towards macro algae (Lapointe *et al* 1997). Though this ecosystem shift is gradual it has great bearing on the biological, economic and social integrity of coastal systems resulting in a reduction in biological diversity and economic viability.

Land based pollution is now considered to be the single most important threat to the marine environment of the Caribbean and has the potential to impede the sustainable use of coastal resources (UNEP 1994). This makes the situation in the Negril Marine Park (NMP) a difficult one, as the potential sources of pollutants from the catchment area that feed into the Negril Morass and associated marine systems, are numerous and diverse. The effects of land use within upland areas as well as the waste it generates are often not immediately apparent. Nevertheless land use is a key determining factor of water quality within the NMP. Land use within the catchment area ranges from residential use to industrial activity and agriculture of various scales. Pollutants arrive into the coastal zone via diffused seepage, several fresh water outfalls, run off as well as the two main rivers that enter this area, the North and South Negril Rivers.

The continued dispersal of macroalgal blooms on the reef systems throughout Long bay in 1991 created the impetus for discussion of the impact of sewage inputs and nutrient enrichment on water quality (Goreau 1992). In response to this, EU funding was obtained for the design of a central sewage collection and treatment facility to service the Negril area and address the increase in sewage input resulting from surge in tourism development (Lapointe *et al* 2002). However in addition to the fact that a very small percentage of the population within the Negril area is connected to this system, its limited design features were predicted to result in the escalation of nutrient pollution in the South Negril River as well as downstream reefs in Long Bay and West End (Lapointe *et al* 2002). Such an increase would exacerbate the problem of nutrient enrichment which had already been observed in the same area from various anthropogenic sources, such as those from agrochemicals used in agriculture further inland (Goreau 1992).

In order to foster a better understanding of the nature of the land based sources of pollution as well as to monitor the status of the water quality in the area and the health of the reef systems a monitoring program was initiated in October 1997 (Lapointe *et al* 1997). The main goal of this program was to determine the potential impacts of land use on groundwater and rivers within the Negril Environmental Protection Area (NEPA) as well as on the coral reefs within the NMP. This initiative signalled a step toward wholesale watershed management, which acknowledges the fact that the current land practices had much to bear on the integrity of the NMP and only through managing and monitoring activities within the watershed would there be a chance for effective management.

At present fresh water sample sites are being monitored for nitrates, ammonia and phosphates. Samples are taken from streams and rivers inland, which eventually drain into the near shore marine environment, by rangers from NCRPS. Sample collection is done mostly on a monthly basis but may be affected by weather or amount of funding available for this endeavour. Since the inception of the water quality monitoring programme, three shallow marine sites have been added to the original 27 inland ones. However marine water quality analysis is an expensive undertaking due to the high dilution factor which requires highly sensitive equipment to produce accurate measurements. Samples are therefore sent to the National Water Commission in Montego Bay for analysis.

From its primary focus of water quality monitoring for the purpose of protecting the coral reefs and associated marine life in the NMP, there has been recognition of the need to expand water quality programs to encompass those parameters that have bearing on human health and safety. Though not incorporated in the monitoring program being carried out by NCRPS; the National Environmental Protection Agency, the National Water Commission and more recently the Negril

Area Environmental Protection Trust (NEPT) have incorporated the testing for the presence of coliform bacteria into their respective studies. As the third largest resort town on the island and an area that sees a lot of local use it is important that not only ecosystem health and integrity be monitored but that the health of persons who use this area be considered. If human health is compromised through the use of these waters it has the potential to undermine the economic viability of the coast.

Jamaica is currently one of the participants in the Caribbean for the Blue Flag Campaign. As such participating properties must conduct activities stipulated under the five broad criteria. These criteria include water quality monitoring where participants are required to conduct tests for the presence and concentration of coliform bacteria. The appearance of coliform bacteria indicates the presence of sewage within the water column and the possibility that other pathogens may also be present. To date two beaches in the Negril area have been Blue Flag certified. NEPT has assumed the responsibility of programme coordinator for this campaign in Jamaica and collects samples for testing at various sites along within the NMP on a bimonthly basis.

3.1.2 Tobago Cays Marine Park, St. Vincent and the Grenadines

One of the major factors that may affect water quality within the TCMP is the improper disposal of liquid and solid waste. Much of this waste originates from the large number of yachts and recreational vessels that traverse as well as anchor within the conservation area. There are currently no management measures in effect to guide the proper disposal of waste from these vessels. Additionally, no sewage collection or treatment facilities exist within St. Vincent and the Grenadines capable of handling liquid waste generated by yacht users and none of these vessels are required to be equipped with holding tanks. Biological surveys conducted in TCMP have suggested that high mortality rates in particular coral species may have resulted from factors such as pollution from yachts anchored in the area as well as high water temperatures (Heyman *et al* 1988). High nutrient levels caused by pollution are thought to have resulted in a shift in community structure to that of high algal density resulting in greater mortality of many coral species (Heyman *et al* 1988).

Additionally these factors may have resulted in increasing the susceptibility of these coral to disease. In spite of this yacht charter companies have failed to develop a uniform policy with respect to the disposal and treatment of liquid waste (Pena *et al*, 2006). Many persons within the yachting industry are of the opinion that the sewage generated and disposed of by the small number of persons living on onboard yachts should not have a significant impact on water quality or ecosystem health within the TCMP (Pena *et al*, 2006). However, studies conducted at Young Island concerning the impact of sewage generated by this sector have produced alarming results about the effect of this sewage on water quality (Pena *et al*, 2006). The situation is no different with regards to solid waste disposal. Collection is often done by "boat boys" with inappropriately disposal due to the unavailability of onshore waste receptacles at the main yachting centres. This situation is exacerbated by the fact that the carrying capacity, as it relates to number if yachts anchored within the lagoon at any one time, is always exceeded. The carrying capacity for this area has been estimated at 50 boats. With the exception of a few weeks in autumn the lagoon sees more than the recommended number for this site. At the height of the season, as many as 80 to 100 boats may anchor overnight in the Tobago Cays (Pena *et a*l, 2006).

Water taxi operators have also been identified as contributors to declining water quality in the TCMP. Spills during refueling exercises; poor engine maintenance as well as the use of harmful cleaning agents and equipment all have serious implications on the ecosystem health and

viability. Many of these operators visit the Tobago Cays during their day trips as well as provide services to the yacht users. It has been found that despite adequate knowledge on the effects improper operational practices as well as the measures that need to be put in place to become more environmentally friendly, these practices still continue (Pena *et al* 2006). In light of this the Sustainable Grenadines Project has recognised the need to increase capacity building of water taxi operators, in an effort to reduce their impact on the environment. To facilitate this endeavour training workshops as well as educational material on "sustainable green boat" practices have been undertaken.

Despite these concerns and clear knowledge of the activities that may affect water quality within the TCMP there is currently no documented information on marine water quality for the conservation area. Despite the fact that biological and environmental monitoring as well as waste management policies are outlined in both the draft TCMP management Plan of 1998 and the revised plan of 2000 no water quality monitoring has ever been conducted in this area. The Central Water and Sewage Authority (CWSA) and the Environmental Health Department (EHD) have only conducted monitoring exercises for potable water for comparison against World Health Organisation (WHO) standards. Though monitoring of marine water was included in the EHD plan of 2000 and undertaken in 2001 lack of institutional capacity to undertake follow through monitoring has impeded further progress (Pena *et al* 2006).

Through the MPA Management Effectiveness project the Fisheries Division of St. Vincent and the Grenadines has attempted to develop a marine water quality monitoring programme in collaboration with the TCMP office. This project is intended to provide some baseline data for the TCMP on which further monitoring as well as sound management decisions can be made (Pena *et al* 2006).

3.1.3 Sapodilla Cayes Marine Reserve, Belize

Little is documented on the types of activities in the SCMR, the duration and intensity with which they are undertaken in the context of their impact on the marine water quality and ecosystem health. Though fishing is a common activity in this area by populations juxtaposed to the reserve, this site is also known for its illegal fishing activities by foreign nationals. The conservation area is visited by a number of tourists throughout the year. No water quality monitoring has been conducted at this site by TASTE until recently and though a monitoring plan has been drafted it currently awaits approval from the Belizean Government. The SCMR however is one of the monitoring sites in the Meso-American Barrier Reef Systems Project (MBRS). Current water quality monitoring undertaken by TASTE has been facilitated through funding provided by PACT. These results will be used in the assessment of this indicator for the SCMR.

TASTE has drafted a monitoring programme for the area which has been submitted to the government for approval. This plan outlines the reasons why this facet of the programme is necessary for natural resource management and is intended to solicit support, financial and technical for this undertaking.

3.2 Methods

3.2.1 Negril Marine Park

One of the primary objectives of the water quality monitoring programme is the assessment of spatial and temporal variation of the concentrations of nutrients, salinity and chlorophyll a from

various testing sites within the monitoring network. The spatial pattern of the testing sites takes into consideration various land use practices within the Negril watershed as well as shallow and deep reef systems in the NMP.

Water samples were taken from approximately 27 sites across the Negril Environmental Protected Area on a monthly basis (LaPointe *et al* n.d.). These sites included areas that were upstream and downstream of various known land use types as well as to account for the geographical variability within the NEPA. Sample stations included several small creeks as well as points along North and South Negril rivers, Green Island River, Davis River and Cabarita River. Additionally in order to measure the impact that the operations of the Negril Sewerage Treatment Works was having on the receiving environment, six sites along the South Negril River were selected to determine if significant nutrient enrichment results from the treatment system.

These samples were collected into sterilized Nalgene bottles after which they were refrigerated in the dark until they could be transported to the laboratory at NCRPS. After filtration through a 0.45µm membrane filter or a precombusted 0.45µm GF/F filter which was used. The filtrate from this exercise was frozen until it was ready to for analysis. Each collected sample was tested for ammonium, nitrate, nitrite, soluble reactive phosphorous concentrations and salinity. Analysis of nutrients is done using a Hach Model DR 2000 spectrophotometer, while salinity is determined with a hand held Bausch and Lombe refractometer (LaPointe *et al* n.d.).

Before the implementation of the water quality monitoring programme, preliminary water quality tests were conducted. These tests had shown that although nutrient content of fresh water samples was relatively high, they could be easily and accurately read from the laboratory equipment available at NCRPS. Marine samples contained much lower levels. More specialized equipment was therefore required for analyses of the latter which could not be done at the organisation's laboratory. They were previously shipped overseas for analysis at the Habor Branch Oceanographic Institution Laboratory in Florida to be analysed using a Bran and Luebbe TRACS Analytical Console (LaPointe *et al* n.d.). At present testing by conducted at the National Water Commission laboratory in Montego Bay All results that were obtained were compared to national water quality standards for marine and fresh water. These standards are outlined in Table 3.1.

Samples taken by the NEPT were from six marine sites within the NMP. These samples were collected in sterilised bottles by a member of the NEPT staff on a bimonthly basis. Sample collection was conducted in the morning. The times at which sampling was conducted were dependent on of a boat to the organisation. Once collected these bottles were refrigerated and then sent to the National Environmental Protection Agency's laboratory in Kingston. Tests were conducted for nitrate and phosphate concentration as well as the presence of faecal coliform and total coliform. All results are compared to Blue Flag water quality standards and posted on the organisation's web site for public viewing. Results are also sent to the Blue Flag Committee as part of their obligations to the programme in order to retain status as national coordinator and to ensure that all sites meet standards for Blue Flag certification.

Table 3.1 Jamaica fresh water quality standards

Parameter	Measured As	Standard Range	Unit
Nitrates	(NO_3)	0.10 – 7.5	mg/L
Phosphates	(PO_4)	0.01- 0.8	mg/L

Source: National Environmental Planning Agency

All water quality sample collection that took place at the NMP occurred prior to the MPA management effectiveness project. Data used in this analysis were taken from secondary sources based on results collected over a significant time periods for both the NCRPS and NEPT. Due to the extensive data set compiled by the NCRPS this analysis will focus on the sample points along the two major water ways that enter the NMP; the South and North Negril rivers. Samples have been collected on a monthly basis since 1997. However, this assessment will highlight trends seen over the seven year period spanning from 1999 to 2005. The monitoring programme undertaken by NEPT has not been conducted as long as that by NCRPS. Data used in this analysis resulted from sampling conducted on a bimonthly basis from December 2003 to June 2006.

3.2.2 Tobago Cays Marine Park

Due to the fact that no water quality monitoring had ever been conducted in the TCMP all rangers as well as selected employees of the St. Vincent Fisheries Division were trained in water collection techniques for both nutrient and microbiological parameters. These included the collection of nitrates and phosphates as well as faecal and total coliforms (Pena *et al* 2006). Training was carried out in a one day session by a Reef Check certified scientist where participants were instructed in sterilisation techniques for collection equipment, chain of custody procedures as well as preservation and storage of the samples before analysis (Pena *et al* 2006). The boat driver was also present and trained in boat handling techniques as well as methods to avoid contamination of samples with fuel during sample collection. Rangers were trained in the use of La Motte test kits which were to be used in the analysis of samples for nitrates and phosphates (Pena *et al* 2006).

Sampling was conducted within a five month period between May and September 2006 once per month in the morning (Pena *et al* 2006). Collection took place at four predetermined sites; the inner and outer regions of Horseshoe reef, Petit Bateau and Petit Tabac. These sample sites are also the areas in which ongoing Reef Check monitoring is conducted. After collection, samples were stored on ice and transported by aircraft from TCMP to Kingtown to be collected by the Fisheries Division for further transfer to the Bureau of Standards for analysis. Dates at which sampling was conducted were determined by the Fisheries Division and were dependent on the availability of staff at the Bureau of Standards to conduct the analysis. Management of TCMP were subsequently informed of the days on which sampling could be conducted (Pena *et al* 2006).

Nitrate and phosphate concentrations in collected samples were determined using Merck test kits. Microbiological analysis to determine the presence of total coliforms, faecal coliforms *Escherichia coli* and heterotrophs were conducted using the membrane filter technique (Pena *et al* 2006). Results were measured against Blue Flag water quality standards. The standards for the water quality parameters tested are outlined in Table 3.2.

Table 3.2 Blue Flag water quality standards

Parameter	Standard
Total Coliform	<250/100ml in a minimum 75% of samples taken over a period of a year
Faecal Coliform	<100/100 ml in minimum 75% of samples taken over a period of a year
Nitrates	0.6 mg/l
Phosphates	0.1mg/l

Source: Pena et al. 2006

3.2.3 Sapodilla Cayes Marine Reserve

With funds received from the Protected Areas Conservation Trust (PACT) small grants programme TASTE- SCMR was able to purchase water quality equipment for the purpose of executing a water quality monitoring programme for the area. This equipment included a HACH Portable LDO meter (hydro lab), HACH Colorimeter, laptop, and sample collection equipment (sample bottles, pocket pH meter etc). Three staff members received training in data gathering and analysis from members of the Belize Fisheries Department. The exact schedule formulated for this undertaking as well as the precise methodologies used in the collection and analysis of water samples were not available for this report.

3.3 Results

3.3.1 Negril Marine Park

Highest nitrate concentrations were generally found in the upstream areas with the exception of 2005 where there was a sharp rise in nitrate levels at the point of effluent discharge. During this period the concentration of this nutrient increased ten fold from a 2004 average of 0.038mg/L to 0.31mg/L. The 2004 average seen for this site was the lowest recorded during the time period that samples were collected. Due to the fact that concentrations of nitrogen in most cases are higher upstream than downstream of the sewage treatment plant the data suggest that the sources are land based in origin and may be as a result of land use activities further inland. However the significant fluctuation in concentration levels in the effluent discharge could not be lnked to any specific events.

There is greater variability in ammonia concentration than nitrates in the same area. Highest concentrations are always seen at the point of effluent discharge with the lowest readings generally recorded in downstream and upstream areas. Values peak in the area of effluent discharge and return to pre- effluent levels in areas closer to the coast. In some cases samples collected further inland and further seaward of the sewage outfall had readings that were as much as ten times less than those seen at the point of effluent discharge. This may suggest that even though some of the ammonia detected may be a result of land based activities, much of this nutrient may occur in this area as a result of the release of sewage effluent.

Like ammonia, phosphate levels are also highest at the point of sewage effluent discharge. Levels of phosphates are higher than those of nitrates but significantly lower than ammonia concentrations found across sites during the sample period. Upstream values for this variable are slightly higher than those seen at the river bottom suggesting that some of the nutrients seen are as a result of land based activities. This is illustrated in Figure 3.1.

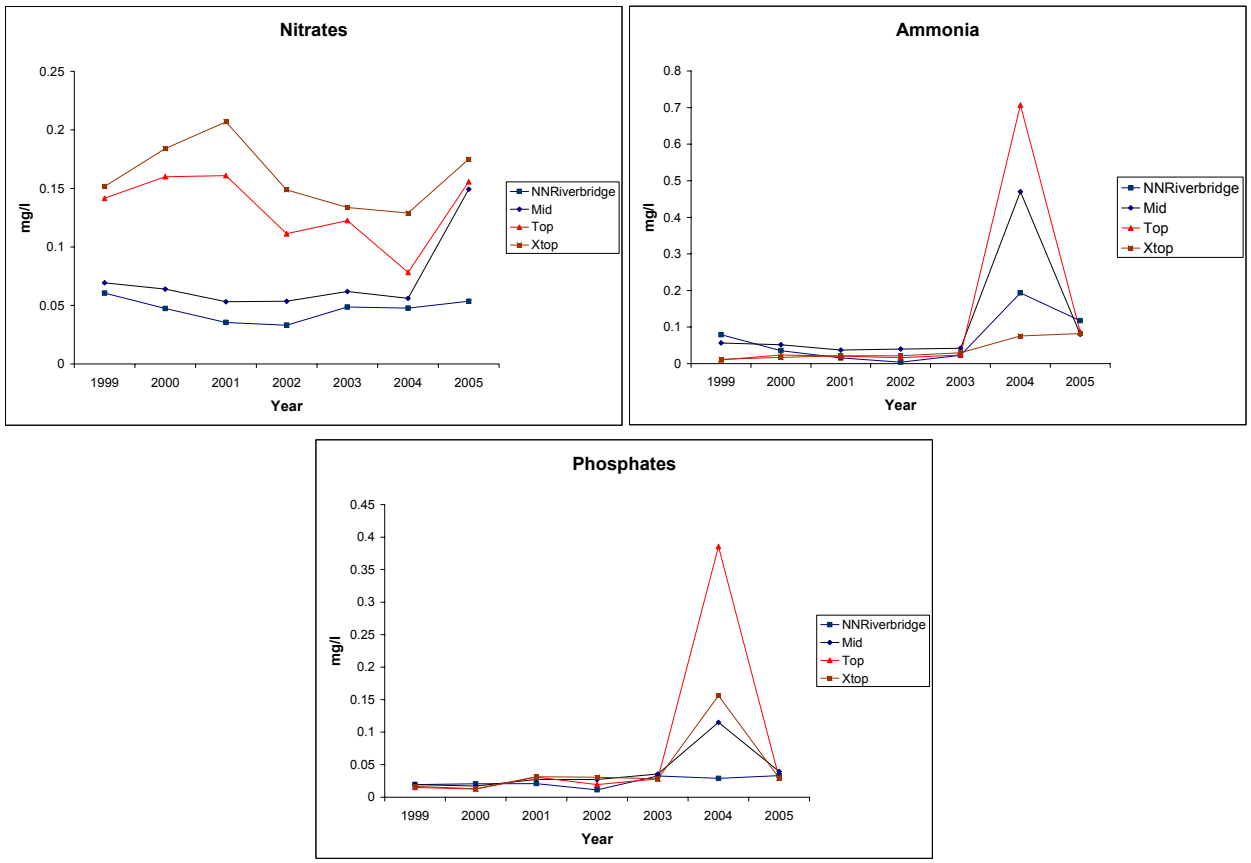


Figure 3.1 Nitrate, ammonia and phosphate levels at the North Negril River sample sites

In the North Negril River nitrate concentrations are highest at the extreme top and decline gradually as the sample sites get closer to the coast. This trend suggests that land based activities may be the primary source of nutrient enrichment. Although there is very little variation in nitrate concentration at any site within the sample period there is a significant surge in nutrient concentration for all areas in 2004. Increases are 1-2 times higher in 2004 than in any of the previous years. Nutrient levels return to average readings in 2005. At this stage concentrations are as high as 5.6 times greater than annual averages for 2004. This trend is seen in samples measured for ammonia and phosphate concentration for the same sample period.

There is no significant variation in ammonia concentration at the sample sites seen with the exception of the 2004 measurement which was as much as eight times the year's average. For example ammonia levels in 2004 were recorded at 5.89mg/L and returned to a value of 0.005 mg/L the following year. The highest recorded readings were measured in November. Phosphate concentrations were recorded as high as 7 times the yearly average in 2004 and fluctuated very little throughout the rest of the sample period. Nitrates were the nutrient seen in the highest amount as opposed to ammonia which was the predominating nutrient in the South Negril River. This is illustrated in Figure 3.2.

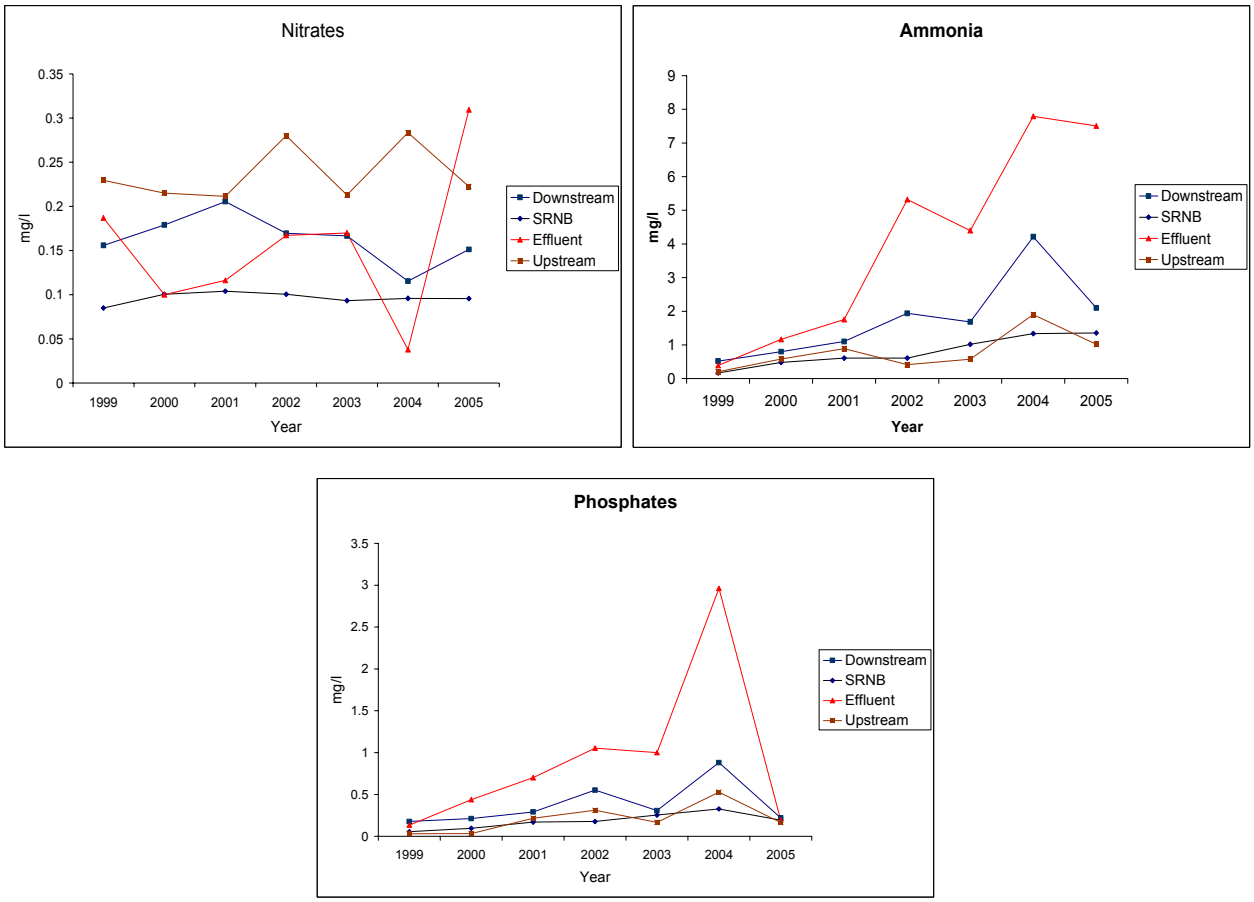


Figure 3.2 Nitrate, ammonia and phosphate levels at the South Negril River sample sites

Faecal coliform counts fluctuated often throughout the sample period of December 2003- July 2004. No temporal patterns could be seen from the data that was collected making it difficult to correlate with any timed or recorded events. However at the South Negril River Bottom, coliform counts frequently exceeded prescribed Blue Flag standards suggesting that the water in this area is unsuitable for sea bathing. However measurements taken in the Norman Manley Sea Park (NMSP) upstream and downstream areas were almost always in keeping with water quality standards. They were few exceptions to this trend. Two significant peaks were seen in the upstream area were counts were recorded at 170cfu and 280cfu in September 2004 and April 2005 respectively. In the downstream area one peak was seen were readings were taken at 130cfu in the August 2005. Such peaks in the NMSP areas may be due to isolated rainfall events. The results are illustrated in Figure 3.3.

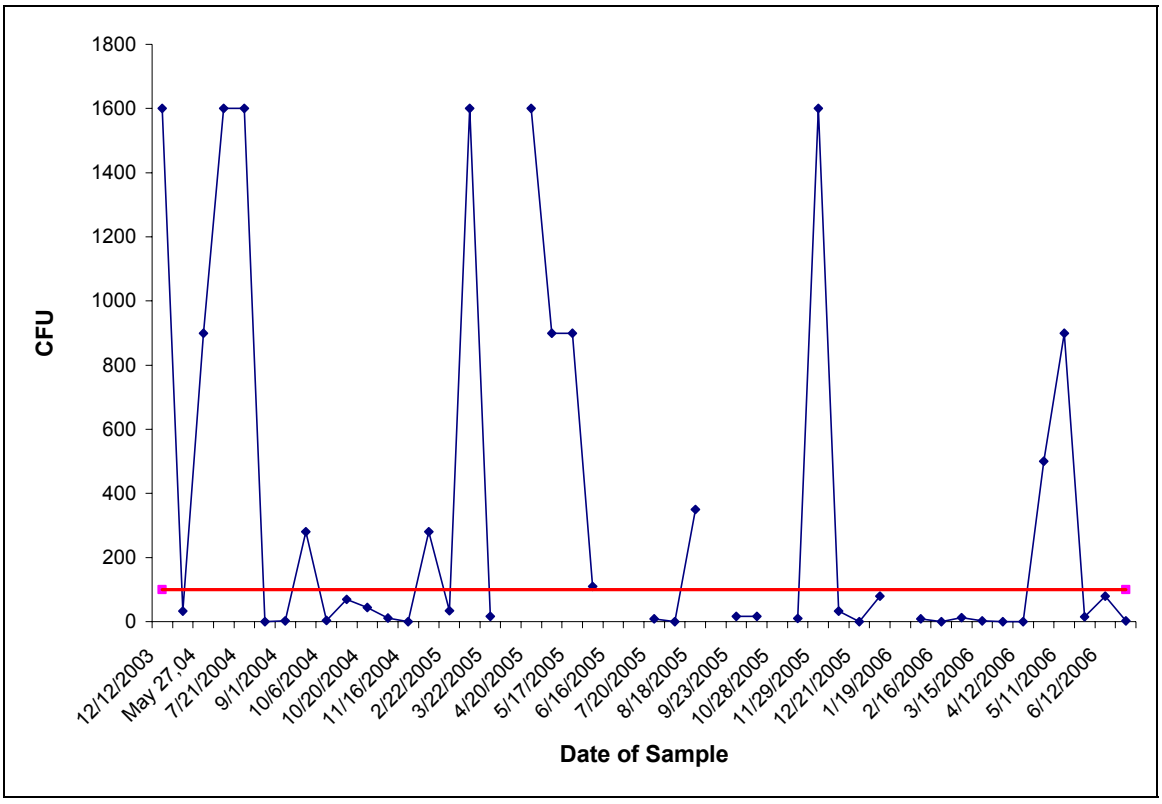


Figure 3.3 Coliform Forming Units (CFUs) at the North Negril River sample sites

3.3.2 Tobago Cays Marine Park

There was a general failure of the evaluation team to follow water quality monitoring protocol in both the collection and analysis of samples. Though a training session was held in which proper procedures for the process were demonstrated in order to ensure the accuracy of the results, failure follow protocol has led to data that is incorrect. Temperatures recorded fall significantly below what they should be in tropical waters and salinity far exceeds what is typical of sea water. Temperatures as low as 19.1 degrees Celsius indicated that water temperatures were only taken at the laboratory prior to testing and not at the actual sample site. Salinity was recorded at values as high as 42ppt. Samples taken at Petit Bateau showed high heterotrophic bacteria counts and total coliform counts and was the only site where the presence of faecal coliform was confirmed. Total coliform counts were high at Horseshoe Reef and some heterotrophic bacteria were found. No faecal coliform was confirmed for this area. These results are not surprising given the high amount of yachts that are usually anchored within the inner section of Horseshoe reef and in close proximity to Petit Bateau. Surprisingly in one of the samples heterotroph counts were high for Petit Tabac which is the area thought to have least by human activity. However no significant amount of data has been collected for TCMP to be able to identify any trends in water quality or to state with some degree of accuracy the factors that may influence the results.

Further to this however no records were made of the amount of boats in the vicinity of the sample site at the time of collection or the types of human activity taking place and the intensity with which it was being carried out. No mention is made of weather conditions and no tidal calendars have been included. The data have been presented within a vacuum with no contextual

framework to allow those conducting the analysis to correlate results with any specific events. Of greatest concern however is the failure of the laboratory to analyse samples within a time frame that would ensure some degree of accuracy. In some instances the samples were allowed to sit for periods exceeding 24 hours before analysis. Due to changes in the biochemistry of the samples after this period the level of accuracy of the readings will be significantly reduced rendering all results unusable.

3.3.3 Sapodilla Cayes Marine Reserve

The water quality monitoring programme at SCMR like that of TCMP is still in its inception stages and like its Vincentian counterpart is aimed at providing baseline data. Due to the early stages of the programme and equipment that could be obtained with the funding available monitoring has been restricted to physiochemical parameters only. No microbiological testing or nutrient analysis has been conducted at this stage. However though these results may be beneficial in highlighting early trends and in the identification of areas that are optimal for sampling, the sporadic nature of sampling frequency as well as the limited data collected does not enable trends in the results to be identified. Like TCMP no records have presented of human activities in the area in the past or at the time that sampling was conducted. No information on weather or tidal patterns has been provided making it impossible to correlate results with any specific event.

3.4 Discussion

The water quality monitoring programme in NMP has been an ongoing process for close to a decade. Extensive experience and training in monitoring techniques and analysis has allowed the management body to accumulate comprehensive data that has the ability to inform policy. The monitoring programme has also been able to evolve over time in response to a move from ecosystem to watershed monitoring. In that way the sources and nature of pollutants that may have an impact on ecosystem health in the NMP can be accurately identified and assessed. Management becomes more informed and capable of focusing efforts and limited resources on priority areas which have the most potential of undermining ecosystem health and viability. It has also enabled the NCRPS to assess the impacts of the sewage treatment facility on the NMP by implementing monitoring prior to its existence in order to document the changes in water quality caused by its operational practices.

The problem lies with the fact that although the NCRPS possesses a great wealth of knowledge about the sources and nature of the threats to the MPA it has limited ability to remedy the situation and implement the changes, both engineered and bureaucratic, that is needed. Land use practices from outside of the NMP have the potential to undermine the management efforts within the MPA. In addition to this many of the properties within the NMP are not connected to the sewage treatment facility. Much of the sewage is disposed of via sinkholes or septic tanks. In some cases these disposal and treatment systems are inappropriately located and may result in the contamination of coastal waters. Additionally the sewage treatment facility only treats to secondary level. The tertiary stage that is needed to polish the effluent and remove nutrients has not been implemented despite promises to do so if it was found that treatment exacerbated nutrient loading (Lapointe *et al* 1997). Sadly in spite of the wealth of knowledge and expertise held by the staff of NCRPS as well as the clearly define goals and structure of the water quality monitoring programme and access to a certified laboratory, little practical application of the resources is being used to enact change. Community shifts from coral to macroalgae are still

being documented. Research and monitoring of any aspect of the management strategies may become pointless if there is evidence and justification to address major issues but no avenue through which this can be done.

Such is not the case at TCMP or the SCMR whose water quality monitoring programmes are still in their inception stages. There is need at both of these sites for a comprehensive monitoring plan that clearly states the procedures and protocols that must be upheld at every stage of such an undertaking. This plan should include procedures for collection and analysis as well as data base management and reporting methods. For the TCMP there is a need for greater access to a certified laboratory so that samples can be analysed in an expedient and efficient manner. It is clear that greater and more extensive training is required for members of the evaluation team where the importance of monitoring process is made explicit. Perhaps regular evaluation should be done for members of the evaluation team to assess their competence and to ensure that the integrity of the samples is not compromised by lack of understanding of procedures or failure to adhere to stipulated protocol. If scientific training in this regard is not possible consideration should be given to contracting external expertise either at an advisory level or to carry out the sample collection, analysis and reporting processes.

A comprehensive and detailed water quality monitoring plan is also needed at the SCMR. Greater coordination is required for monitoring activities where a schedule for collection of samples is implemented. A clear decision on sample frequency, time of collection and sample sites should be reached so that there is a standardised procedure that can easily be followed by members of the evaluation team. At all sites a compilation of these procedures and protocols should be made available to persons involved in the process. This will provide a reference document for all whose efforts and interests are vested in such a programme and should be regularly updated when new and more applicable methods are implemented.

A point of reference or a set of standards to which results may be analysed against is an important aspect of any monitoring programme. Jamaica is the only country out of the three locations that possesses its own set of national water quality standards, for both fresh and marine water. In addition to national standards Jamaica is a participant in the Blue Flag Programme where several of its beaches have been given Blue Flag certification including those within the NMP. The Negril Environmental Area Protection Trust has conducted water quality sampling at several areas within the NMP for the purpose of the Blue Flag Programme. In the absence of national water quality standards and for the purpose of this project, all results collected at TCMP were to be compared to Blue Flag water quality standards. For Caribbean beaches the Blue Flag standards have been adopted from the LBSP Protocol of the Cartegna Convention. Recommendations from the Pan American Health Organisation/ World Health Organisation (PAHO/WHO) are used when defining bathing water quality and there limit values (http://www.blueflag.org). These water quality standards are some of the least stringent ones used. They fall far below the requirements that are outlined in the United States Environmental Protection Agency (USEPA) or the European Union (EU) standards. Many developing countries have sought to model national standards after these international ones. In most cases this has only served to provide unrealistic goals that cannot be realised within the limited resource capabilities of these countries. The use of Blue Flag standards as a measure of water quality for each of these MPAs not only provides requirements that seek to safeguard both ecosystem and human health but provides limit values that are easier to attain than those proposed by other international bodies. Their use creates an opportunity to standardise water quality monitoring on

a region wide basis for easy comparison which could be applicable in a number of Caribbean states. The programme provides the additional benefits of environmental education to raise awareness and a free flow of information on water quality within certain areas which may catalyse management actions in areas where immediate intervention may be necessary.

The common trend here is the need for greater support from government agencies that have the ability to bring about the changes necessary for improvements in water quality. The collection of quality information that can justify these actions is not enough. However careful thought must be placed into the design of monitoring programmes to ensure the information adequately represents the true state of conditions within the MPA.

This evaluation was successful in highlighting the extent to which the management bodies at each MPA were able to establish and maintain a reef restoration programme. Through this process the shortcomings in the implementation of such programmes in the TCMP and the SCMR were emphasised. These data indicate the changes that need to be made in the structure and procedures of such an undertaking that are necessary to provide meaningful data. These include greater institutional memory, more extensive training and the importance of having access to competent staff and equipment to produce accurate results. The ability of this indicator to evaluate the management objectives was good, using the NMP as a benchmark.

4 LEVEL OF UNDERSTANDING OF HUMAN IMPACTS ON RESOURCE (S3) AND DISTRIBUTION OF FORMAL KNOWLEDGE TO THE COMMUNITY (S14)

4.1 Background

Despite the fact that MPAs are not solely a product of social processes, their implementation may have great social ramifications (Mascia 2004). They act as management tools that involve a process of resource allocation and regulation which has the potential to shape the political, social and economic construct of the communities that depend on areas that have been placed under protection (Mascia 2004). It is imperative that goals and objectives, and the potential impact of such systems on wider society be clearly understood. By doing so, collaborative efforts can be made between official management bodies and communities in order for the benefits of an MPA to be recognised. This can only come from the realisation that social processes have as much impact on marine systems as biological and physical variables (Mascia 2004). The success of an MPA relies not only on the human decision making process but the management system's ability to influence changes in human behaviour. In order to do this, management bodies must not only seek to improve the public's understanding of environmental and social sustainability (CERMES 2005b) but to understand the social cultural, political and economic variables that influence individual choice and behaviour. Once these factors have been accounted for there is a greater potential to use this information to ascertain where and when participatory approaches may be most effective. More importantly, consideration of these factors provides a better guide to managers as to how information dissemination and environmental education may impact on the public's perception of resource use and availability as well as on behaviours that may affect the viability of marine resources and their related ecosystems.

The NCRPS has sought to use environmental education and the distribution of information on the NMP not only as a management tool but as a method of retaining transparency in the management process. It is hoped that an educated public will be able to recognise the correlation between their behaviour and how these actions affect marine ecosystems. This understanding is

necessary from both an economic and social standpoint. The fact remains that the livelihoods of many members of public is indelibly intertwined with marine resources and therefore affected by their use and viability. It light of this it should be a matter of public interest that these very resources be used in the most sustainable manner possible. In order to bring across this point the dynamic that exists between natural resources and the potential effects of human behaviour must be understood. Faulty perceptions have the potential to encourage harmful behaviours which in turn reduces the level of MPA success. It is important for the management organisation to recognise where the knowledge gaps lie and what the prevailing perceptions of resource users are, in order to design interventions to fill the information gaps, involve the communities in management of its resources as well as to evaluate the changes that may result from these processes (Pomeroy *et al*. 2004). This information may also serve to determine what audiences need to be targeted.

Having knowledge of the target audience will guide methods of dissemination as well as the content of educational material which facilitates a meaningful interaction with all stakeholders. Scientific information must be distributed in such a manner that the target audience has full understanding of the message which is being conveyed. Level of exposure to previous information as well as the level of formal education will have great bearing on the terminology that should be used and the methods that are employed for this transfer of information. The level to which management bodies attempt to reach and involve their individual target audience, include them in the management process and address their concerns will determine the level of confidence that the stakeholders will have in the information that is presented.

Previous studies carried out by Pena *et al* in 2005 on socio-economic monitoring and fisheries management planning for the NMP, have suggested that many of the members of the communities within the EPA are dissatisfied with the amount of information that they receive on the MPA (CERMES 2005b). Several individuals feel that there is a lack of communication as well as a failure to properly inform community members on management issues. These studies also show that although local knowledge is consistent with scientific findings pertaining to resource decline, that there has been a failure to recognise that current practices have contributed to this trend (CERMES 2005b). This situation may be a reflection of a failure to correlate human impacts with resource decline.

These two indicators seek to access what knowledge gaps exist within various groups of stakeholders within the EPA as well as the effectiveness of the information distribution systems that have been implemented by management bodies. This is done through the evaluation of two NMP MPA objectives which aim to:

1. Keep the public up to date and aware of the status of the park through its educational programmes and media recesses
2. Assist local groups and support their efforts with the understanding of the need for a balanced, well rounded community.

4.2 Methods

In order to determine the level of understanding of various user groups in the NMP of the potential influence of human impacts on the natural environment, surveys were administered to various groups of persons within the MPA. In addition to assessing the level of understanding these forms were also used to evaluate the effectiveness of the dissemination of information from

the NCRPS to these groups. These surveys were aimed at a wide cross section of persons. These included members of various settlements within the NMP, tourism workers who commute daily from outside the EPA as well as a number of tourists.

Surveys were conducted in ten communities across the EPA. A copy of this form may be found in Appendix I. The communities targeted were: Orange Bay, Green Island, Sheffield, Mount Airy, Negril, Homer's Cove, Little Bay, Salmon Point, Broughton and Davis Cove. In addition to this, the surveys were administered to two hundred tourists within the Negril area and 100 tourism workers who commuted from outside of this area.

The information gathered from this exercise was entered into Microsoft Excel and the Statistical Package for Social Sciences version 11 (SPSS) to be analysed. The results of this analysis are outlined below and are presented by stakeholder group.

4.3 Results

4.3.1 Community Members

Most of the respondents within communities knew about the NMP (96%). In many cases (25%), persons could not pinpoint what year they had first learnt of its existence. Similarly the majority of respondents also knew of NCRPS (96%) a large portion (21%) of whom were made aware within the 1995-1997 time period.

Seventy-two percent of all participants were aware of some form of environmental education material that was distributed by the management organisation. This material was largely received in the form of brochures (31%), posters (30%) and via meetings (29%). Very few persons received information in the form of dramatized materials or skits (2%). In most cases the environmental message that was received provided information pertaining to the protection of the coastal and marine environment (43%). Other topics that were frequently seen included waste management and pollution issues (8%) and sustainable fishing practices (6%).

It was felt by many of those that were aware of the educational material that the delivery of the information was effective (88%) and was having an impact on people within the communities (69%). A large number did not share this sentiment and felt that the environmental education was having minimal to no impact on persons within the NMP (29%). It was felt that the knowledge gained through access to this information had led to an increase in the awareness of environmental issues especially those that related to the marine environment. Improvements were also seen in the areas of waste disposal. This was exemplified by a marked increase in the frequency of sustainable environmental practices within the different communities. Although the majority of participants thought that the environmental education was effective both in its message and delivery, many recognised that there was still room for improvement. Recommendations for enhancement included greater dissemination of information through workshops, an increase in the use of electronic and print media, synergism with community groups and resource user organisations as well as the improvement and continued development of environmental education material. Respondents have also requested an increase in the amount of educational programmes offered to members of the community.

The general feeling among participants was that activities that took place within the NMP were having some impact on the natural environment. Seventy- four percent conceded that these events may have had a positive or negative impact on the area while 26% felt that these activities had no impact on the MPA. When asked to provide examples of such activities, improper waste

management practices (19%), destruction of coastal and marine ecosystems (13%), the staging of large social events on the coast (11%) as well as recreational activities within the marine area (11%) were some of the most frequent responses. The most common impacts that resulted from a number of the activities highlighted was a depletion of coastal resources (28%), and pollution of the marine environment resulting largely from the improper waste disposal practices (8%). The results outlined in this section are illustrated graphically in Appendix II. Table 4.1 highlights the problems respondents felt affected five major groups of resources within the NMP and solutions offered to rectify or mitigate further impacts.

Many of the respondents had clear ideas of what problems affected a number of marine resources in the NMP. The fact that many were able to make recommendations on how these could be resolved attests to the fact that there is some understanding of human impacts on the natural resources within the MPA. It also bears testimony to that fact that there is an understanding of the ramifications that these impacts may have on the coastal environment. However there were still some who did not fully appreciate the importance of, and need to protect, certain resources. This was especially so for seagrasses where a number of respondents suggested that they be removed. Seagrasses were viewed as a nuisance and eyesore that sullied the appearance of the seabed, taking away from the swimming experience of persons who utilised the area.

Most of the participants in this exercise were male (71%) many of whom (27%) fell into the 41-50 year range. Very few of those interviewed attained an education beyond secondary level and the majority of respondents attended either primary (31%) or secondary institutions (48%). Many persons had resided within the NMP in excess of 15 years. It was found that the best ways in which information could be disseminated throughout the communities was via television, flyers/posters, radio or local newspapers. In addition to this the majority of respondents expressed their willingness to attend a workshop where the results of the evaluation would be discussed (87%).

Table 4.1 List of problems given by respondents & solutions offered to rectify or mitigate further impacts.

Natural Resource	Problems	Suggested Solutions
Beaches	Sedimentation	Prohibit the removal of vegetation
	Improper solid waste disposal	Law Enforcement, Placement of garbage receptacles, Environmental Education, Cleaning staff for beach area
	Erosion	Engineered structures to reduce erosion
	Improper sewage and chemical waste disposal	Education, Restrict the use of certain chemicals, Phasing out the use of pit toilets
	Sand mining	Law enforcement

Table 4.1. continued

Natural Resource	Problems	Suggested Solutions
Sea grass	Clearing of sea grass beds	Public education
	Destruction as a result of chemical pollution	No suggestions
	Destruction due to recreational activities (boats and jets skis)	Zoning for recreational activities
Mangroves	Improper sewage and chemical waste disposal	Law enforcement, Public education,
	Removal of vegetation	Law enforcement, Public education, Infrastructural development restrictions for wetland areas.
	Destruction by insects	No suggestions
	Improper solid waste disposal	Law Enforcement, Placement of garbage receptacles, Environmental Education
Reefs	Improper sewage and chemical waste disposal	Education, Restrict the use of certain chemicals, Phasing out the use of pit toilets
	Breaking of parts of the reef	Law enforcement
	Sedimentation	Prevent vegetation removal in wetland areas
	Anchor Damage	Law enforcement
	Unsustainable fishing practices	Restrict fishing in reef areas, Prohibit fishing within the MPA, Education of fishermen on importance of the reef, Greater Law Enforcement and the implementation of fines
Fisheries	Landing of small or juvenile fish	Environmental education, Increase in mesh size for fishing nets, Law enforcement
	Overfishing	Environmental education, Law enforcement, Prohibit fishing on the reefs, Prohibit fishing within the MPA
	Chemical pollution	Restriction of the use of certain chemicals

4.3.2 Tourism Workers

Seventy percent of all tourism workers interviewed had prior knowledge of the existence of the NMP. Many of these attained this information prior to 1998 when the park was officially declared an MPA. Several persons also knew of the existence of NCRPS (55%). Although many persons had first heard of the organisation within the last ten years, 35% received this news within the 2004-2006 time period.

Seventy-six percent of the tourism workers have some awareness of the environmental education material distributed by the NCRPS. The most common ways in which it was received was

through the use of brochures (60%), through other methods that were not specified such as personal dialogue and email (20%) and via flyers/posters (10%). Forty five percent of the material received related to general environmental protection and conservation, 30% about the need for coral reef conservation, 15% to solid waste management practices and a further 10% to marine pollution. Other topics covered included the need for zoning within the NMP and the implementation of user fees for the MPA. The majority of the respondents (88%) conceded that the delivery of the environmental message was effective where 84% thought that it had some impact on people within the NMP. Noticeable impacts included an improvement in waste disposal practices and increase in the awareness of environmental issues as well an increase in knowledge of MPA regulations. However, like the community members, the tourism workers did recognise a need for improvement in both delivery and content of the information. The main issue identified was a need for greater dissemination of information to the public and various resources user groups as well as a greater effort at promoting environmental education through a range of different avenues. Forty-five percent of respondents felt that dissemination could be improved through an increase in public education and meetings, 30% felt that it should be incorporated into the school curricula while 10% suggested that it be done through the production of televised programmes.

This stakeholder group also felt that activities within the NMP were having an impact on the natural environment. Fifty three percent felt that there was some impact while 36% felt that there was no impact all. These activities included illegal dumping (12%), beach parties and large social gatherings (10%) as well as unsustainable fishing practices (6%). The most common impacts that resulted from these activities included pollution of the marine environment (12%), destruction of reef ecosystems (6%), loss of biodiversity and beach erosion. The only positive impact sited was cleaner beaches which resulted from an improvement in waste management practices.

Many of the problems with the marine resources observed within this group of participants bore great similarities to those that were sited among community members. However, there was a better understanding of ecosystem interactions and the ramifications of human activity on the coastal environment than seen in the previous group. Many persons saw the correlations between beach erosion and coral reef destruction as well as the importance of sea grass and wetland habitats and the harm in removing critical species types. The most common example was that of the parrot fish which was recognised as an important species within coral reefs ecosystems and one which contributed to the sand budget in marine systems. The only addition to the problems with resources within the NMP was that of vehicles driving along the foreshore which had been recognised as an activity that exacerbated beach erosion. Unlike the community members, most of the suggestions dealt with issues pertaining to the removal of solid waste material from coastal areas and an enforcement system which would encourage a reduction in illegal dumping as well as more sustainable waste disposal practices.

Most of the respondents (42%) fell in the 21-30 year age range and had attended at least secondary (59%) and post secondary institutions (31%). Many of them (22%) had resided within the NEPA in excess of 30 years. From the surveys it was found that the majority of participants thought that the best method to get environmental education to them was via television (30%) and at the workplace (23%). However 86% of the respondents stated that they were willing to attend any workshop where the results of the evaluation would be discussed providing. The level of attendance was dependent on the date of the workshop and its location.

The general sentiment from the tourism workers was that NCRPS was not a visible organisation. This was surprising since they have been delegated management responsibility for such a large and complex area in which many of the persons interviewed work. Many felt that there needed to be greater promotion of the organisation as well as increased efforts directed toward the dissemination of environmental education.

4.4 Tourists

Unlike the community members and the tourism workers very few of the tourists had any knowledge of the existence of the NMP or of the NCRPS. Ninety four percent stated that they had no knowledge of the MPA while 92% had no knowledge of the managing organisation. The few that were aware had only received this information within the last two years with 50% only becoming aware of the NMP in 2006 and 83.54% only hearing of the NCRPS within the 2004-2006 time period. The majority of tourists (64%) were not aware of any of the activities that had an impact on the natural environment of the NMP. Similarly there was almost no knowledge of any problems that would affect the natural resources within the MPA.

Most of the tourists had attended up to tertiary level education where 78% had attended university. Like the two previous groups television was sited as the most popular way that information could reach these individuals (56.2%). Other popular choices included flyers/posters (17.7%), email/internet (11.8%), newspapers (10.8%) and radio (10.3%). Due to the fact that most of the visitors were only in Jamaica for a limited time 90% of individuals stated that they were unwilling or unable to attend any meeting were the results of the evaluation would be discussed.

4.5 Discussion

Both the community members and the tourism workers that took part in this exercise displayed some knowledge of the issues that affected the natural resources within the NMP as well as problems that were directly related to resources in the marine environment. However many of the responses placed great emphasis on solid waste issues such as illegal dumping as well as the pressures fishermen were placing on fish stocks and coral reef ecosystems. It is because the relationship between the unsustainable practice of illegal dumping and the aesthetics of the beach environment is highly visible that the relationship may be immediately apparent. Similarly fishermen are seen regularly making use of certain marine resources and a correlation may be drawn between unsustainable extractive methods and the destruction of a particular resource. Other cause and effect relationships are less straightforward and the interactions more complex. The effects of land based activities or improper sewage treatment and disposal although discussed in some educational material is not as visible as issues surrounding solid waste or fisheries practices, even though they may be just as destructive. It is because of this that they are easier to pinpoint as primary offenders to the sustainability of marine resources and may have been highlighted with the frequency seen in this evaluation.

Although respondents appeared to have some knowledge of coastal resources and their importance some members of the communities failed to recognise the significance of particular resources. This was exemplified by the frequent suggestions for the removal of seagrass beds. Educational material must be mindful of the fact that the importance of all marine resources is highlighted and the focus is not placed on the status of particular ecosystem. The health of one system is related to the health of other resources within the marine environment. Educational

information needs to ensure that this interrelatedness is highlighted so that the importance and necessity of each one is given equal weighting. Comments were made by both the community members and the tourism workers on the wording of educational material where some found that this material was difficult to read. Greater consideration should be given to the level of education of the target audience, where the literacy level and past exposure to environmental material is considered. Care must be taken that the terminology used and the format of material can be properly understood by the receiving audience. A failure to do this reduces the effectiveness of the information being delivered and diminishes the likelihood of increasing awareness to important issues.

Although a fair number of persons from among community members and tourism workers had knowledge of the existence of NCRPS there seemed to be a high level of uncertainty of the role they played and the programmes and projects implemented during their tenure. As a management organisation that has responsibility for the use and allocation of the resources of such a diverse group of stakeholders, they must ensure that they are visible and accountable to these persons at all times. Being visible and ensuring that those affected by MPA management feel involved and are informed of management issues and the status of marine resources increases the confidence of the stakeholders in the management body and its ability to effectively fulfil its mandate. The generation of this information to the public may foster feelings of inclusiveness and empowerment that may encourage positive behavioural changes.

On the contrary the knowledge base for tourists appears to be very small. Very few are aware of the existence of the MPA or its management body. The Negril area is the third largest resort town in Jamaica and reputed to generate more income than Ocho Rios or Montego Bay (Outokon, 2001). The potential impact of that this group may have on the MPA may be significant. The fact that so few know of the regulations that apply to such an area means that their behaviour may have the potential to undermine the goals and objectives put in place for its protection. This must be addressed with immediate effect so that this group is made aware of the issues that affect the NMP and are subject to the same rules and enforcement that all other groups of resource users are bound to.

The common thread between each of these groups is a need for more information. An informed and included group has a greater chance of making educated decisions and that may influence behavioural change and increase the potential of MPA success. Perhaps there is a need for new and more creative approaches to information dissemination that caters to the various level of education and literacy that will be found in such a diverse group of stakeholders. Certainly such an approach must be applied to foreign visitors in order to protect the very resources that draw them to these shores. Greater use should be made of both print and electronic media to convey these messages and keep the public informed and up to date on issues pertaining to management, the status of resources in the NMP and the role they have to play in both of these arenas.

This evaluation has provided some baseline and additional data on the how well members of the public are being kept up to date with the status of the MPA. However it is unclear from the analysis whether the management body was able to assist and support the efforts of local groups with the understanding of the need to create a well balanced, well rounded community. Therefore this assessment was partially successful in ascertaining how effective the management strategies implemented to achieve the respective objectives has been. It has served to highlight some of the information gaps in the educational material generated and how effective it has been in influencing the behaviour of stakeholders in the NMP. What was also identified were the groups

where more efforts are needed to inform and update them on management performance, their role in MPA success and the regulations that apply to certain activities and resources in the NMP. Due to the subjective nature of environmental and social sustainability that is highlighted in the second management objective, information pertaining to this may be hard to quantify using the indicator that was chosen. The evaluation has failed to indicate whether this MPA objective and its related goals are being achieved. For future assessments there may be a need to simplify the terms of this objective to make evaluation simpler or make use of another indicator that may be more capable of measuring the parameters laid out in the management objective.

5 EXISTENCE OF A DECISION-MAKING AND MANAGEMENT BODY (G2)

5.1 Background

The establishment of MPAs requires the implementation of an institutional and legal framework which provides the administrative structure within which the processes of management planning, creation of rules and regulations and enforcement maybe carried out effectively. Each of these functions is absolutely necessary if the goals and objectives of such systems are to be realized. The primary function of these areas is at the protection of target species as well as to safeguard critical habitats that occur within its boundaries (Berkes *et al* 2001). In many cases absolute restriction of human activities is not done, but regulations to restrict different types of activities, the times of year at which they are conducted and the amount of harvesting of resources that is allowed, are stipulated. It is because MPAs by their very nature will result in the restriction of activities that some degree of enforcement and resource management is necessary.

The role of managers of these systems should be recognized within legal text that expresses the statutory basis by which their authority and mandate to make management decisions must be upheld. In many cases the designation of protected areas is done after considerable human development has taken place and there has already been significant anthropogenic impact on the environment. In spite of this the maintenance of ecosystem health and sustainability cannot be considered within a vacuum. In many protected areas, management bodies need to strike a balance between the protection of the environment and allowing sustainable economic and social development to continue. The challenge for managers lies not only in how to manage coastal resources but on how to effectively use the information about, and represent the interests of, a diverse group of stakeholders (Berkes *et al* 2001).

For any management body to be able to function effectively there must be clear knowledge of the goals and objectives that such an entity has set for the establishment of a protected area system. These objectives will steer the decision making and enforcement process in a way that will maintain transparency and accountability as well as consider equitable solutions that incorporate all players that have vested interest in the area. Participatory approaches to the management process have been found to increase the success with which MPA's can be managed. This may be done through the consultation of these persons during the management process or the formal incorporation of their representatives into the management system. Management bodies within government agencies responsible for environmental management and protection work within bureaucratic limitations, with stringent budgets and limited institutional capacity. Often times they are the regulating and management agencies responsible for protected areas. However this is not their sole function. Limited funds and expertise must be spread across a wide cross section of environmental concerns of which natural resource management is just a small part. This is especially so in developing countries where given the tight budgetary situation environmental

concerns are viewed as an impediment to development possibilities and opportunities for economic gain (Figueroa, 2002).

Nevertheless many of these countries, such as Jamaica, are signatory to international environmental agreements and as such must uphold the political obligations that have been stipulated (Figueroa, 2002). Despite the weak economies in many developing countries, these multilateral agreements have acted as the impetus for the designation and proper management of protected areas. It is this atmosphere that has set the stage for the incorporation of co-management agreements for protected areas not only in the NMP but across the Jamaican landscape. Co-management can be defined as the sharing of power and responsibility between the state and resource user groups in the management of natural resources (Pinkerton, 1989). NGOs that have actively sought the delegation of management for these areas provided the Jamaican government with a prospect of new resources, increased institutional capacity and funding that was otherwise inaccessible to government agencies. In addition to this provision had been made for co-management partnerships between state agencies and various types of resource user groups within various policy documents of the Natural Resource Conservation Authority. This allowed this organisation the legal framework within which delegation of certain management functions to NGOs could be made (Figueroa 2002). The legal mandate for management of the NMP has been delegated in such a fashion to the National Environmental Planning Agency and the Negril Coral Reef Preservation Society. This method is hoped to improve the management of the area which is critical to the success of any MPA.

It must be noted that there are different degrees to which co management many be applied and even in arrangements such as that seen in the NMP; the management body is not always given the responsibility to make management decisions. This disparity may have serious implications how effective management can be when there is dissociation of these two important functions. The evaluation of this indicator highlights the bodies responsible for the management of the NMP as well as their mandates to make relevant management decisions.

5.2 Methods

This indicator was evaluated through the collection and analysis of existing documents from NCRPS. Provision of these documents was facilitated by Elsa Hemmings, Administrative Manager of the NCRPS, for them to be analysed by Erwin Caine, a NCRPS director. Additional analysis was conducted by the research assistant assigned to the NMP.

The aim of this evaluation was to list as well as provide a narrative description of each the various groups within the NMP that were responsible for management of the area. This narrative should include a description of their mandate to make management decisions with regards to the MPA (Pomeroy *et al* 2004).

5.3 Results

The National Environmental and Planning Agency represents an amalgamation of three pre-existing state agencies; the Natural Resource and Conservation Authority (NRCA), the Town and Country Planning Department (TCPD) and the Land and Development Utilization Commission (LDUC). Resulting from the work of the Government of Jamaica Modernization Programme this agency became operational on April 1, 2001. It is the lead agency with respect to environmental protection and planning with responsibilities which include natural resource management and enforcement of environmental legislation. One of the agency's primary

responsibilities include the maintenance of a system of national parks and protected areas while enforcing environmental laws and regulations that have been outlined under six legal acts. In addition to these, the activities and management strategies of the organisation are guided by a number of environmental policies. The Acts that make up the legislative mandate as well as the policies that guide the processes within NEPA are outlined in Table 5.1.

Provisions were made in the legislative mandate of the NEPA for the allocation of co-management agreements for resource user groups that expressed interest in managing protected areas. Section six of the NRCA Act of 1991 allows the Authority to delegate any of its functions, with the exception of the drafting of regulations, to parties that are deemed fit to do so (Romulus 1996). These parties may include any agent, member or officer of the Authority chosen to share responsibility for management functions. Delegation for the management of the NMP was granted to the NCRPS in 2002 after a successful bid and the submission of a management plan for the area to the Authority (Lapointe *et al* 2002). However NEPA remains the decision making body in the management structure for the NMP.

The NCRPS was established in September 1990 in response to a significant decline in reef health and degradation of the reef systems in the Negril area (Blackman 2005). In response to immediate threats to ecosystem health a local NGO was born, initiated by a group of dive operators who had witnessed this decline. It is a non profit NGO whose focus is the conservation of reef ecosystems through the implementation of engineering and educational strategies aimed at increasing public awareness and mitigating boat and anchor damage. A mooring buoy project was launched in 1991 where 35 state of the art devices where anchored (Lapointe *et al* 2002).

The primary mission of the organisation is the protection of coral reef ecosystems through public education, research, training, monitoring and lobbying as well as the creation of marine protected areas (Thacker *et al* 2003). Environmental education has been used as a management tool by the NCRPS and is exemplified through the creation of the Junior Ranger Programme where young people graduate with basic proficiency on environmental issues and strategies (Romulus1996). The organisation also has an extremely comprehensive coral reef and water quality monitoring program and has created a design for a resource use zoning programme for the NMP.

Table 5.1 Legislative instruments which guide the processes within NEPA

Legislative Mandate of NEPA	Policies Guiding the Operations of NEPA
The Natural Resources Conservation Authority Act;	Jamaica National Environmental Action Plan (JaNEAP) 1999-2002
The Town and Country Planning Act;	National Physical Plan
The Land Development and Utilization Act;	Policy for Jamaica's System of Protected Areas – 1997
The Beach Control Act	Biodiversity Strategy and Action Plan (Draft)
The Watershed Protection Act	Watershed Management Policy (Draft)
The Wildlife Protection Act	Beach Policy for Jamaica (Draft)
The Natural Resources Conservation Authority Act	Jamaica National Environmental Action Plan (JaNEAP) 1999-2002

Source: National Environmental and Planning Agency, 2006

The NMP was declared as a protected area in April 1998 and NCRPS received official responsibility for the management of this area when the proposed management plan drafted for the NMP was approved in 2002. The management plan contained the main goals and objectives of the organisation. NCRPS was declared an agent of NRCA where legal grounds for management responsibilities were outlined in a delegation instrument used in this arrangement. The responsibilities of the state, obligations and functions of the NCRPS, procedures for implementation, sub delegation arrangements and reporting and terminating procedures are stipulated within this document (Thacker *et al* 2003). This instrument is valid for a term no longer than five years after which it may be renewed by the NEPA with the consent of the NCRPS.

The organisation is comprised of a board of directors as well as administrative and field staff. This board consists of 22 members who represent a variety of stakeholder groups and business houses. Each member is elected to a position by previous members and will serve in that capacity for a period of one year. Decisions are made through a democratic process where each member may vote on any resolution, which will only be approved through the unanimous decision of its members. Board meetings are held on a monthly basis where matters pertaining to funding, implementation of management programmes and updates on the status of ongoing projects are discussed. Any major decisions that pertain to the NMP or the NCRPS must receive the approval of the board of directors before it is implemented.

The Negril Area Protection Trust (NEPT) came about as a result of the NCRPS workshop of 1993 where the impact of land based sources of pollution on reef health was highlighted. The recognition that poorly treated sewage and unsustainable agricultural and land use practices had such a great impact on marine ecosystems provided the impetus for a conceptual shift from ecosystem management to whole water shed planning for the Negril area. The shift in the paradigm of natural resource management embraced the idea that single ecosystems did not exist or function within a vacuum and that the coastal environment was a large complex system comprised of a nexus of linkages capable of transmitting impacts for one point to another. In order to facilitate such a shift, the formulation of a local advisory committee began at the 1993 workshop which would later lead to the creation of NEPT. This organisation is comprised of sixteen other organisations and agencies and was officially established in 1994.

NEPT became the environmental umbrella organisation for the Greater Negril Area and was delegated as the Local Advisory Committee for Parks and Protected Areas under the NRCA Act. No.9, 1991 (Romulus 1996). The mandate for the NEPT at this time included working towards the establishment of the Negril Green Island Environmental Protection Area as well as drafting the Negril Environmental Protection Plan. The plan contains the role and functions of all organisations responsible for management within the EPA. At present this body holds the responsibility for the environmental protection and ensuring sustainable development within the EPA through the promotion of environmental education, the management of Parks and Protected Areas, monitoring as well as the solicitation of funding for local environmental projects and activities. The current management structure of the NMP is highlighted in Figure 5.1.

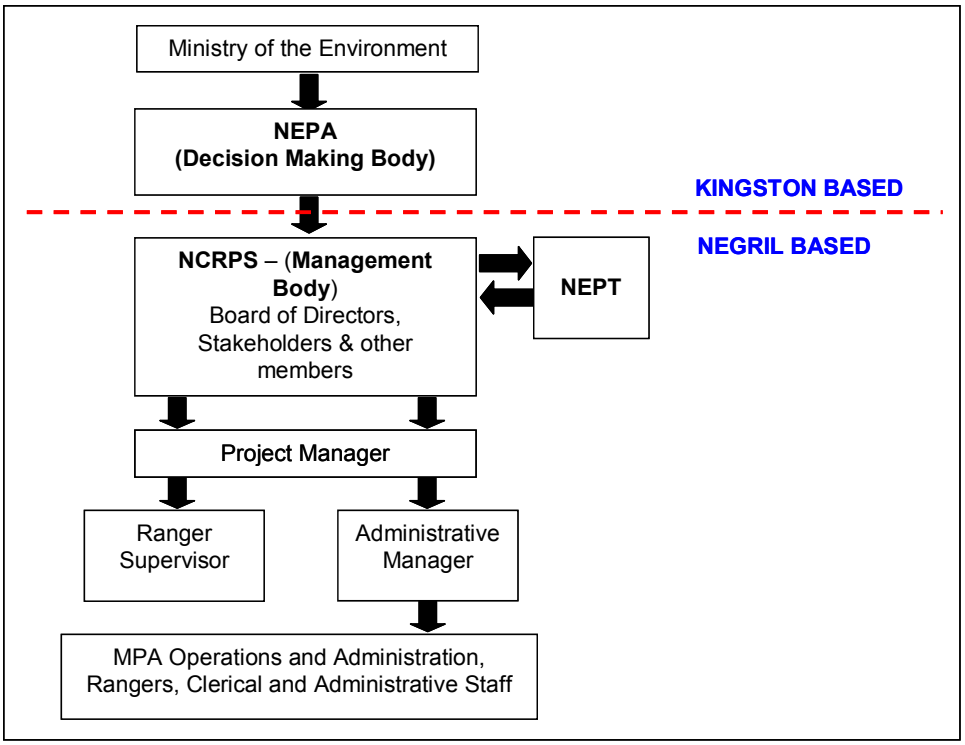


Figure 5.1 Current Management structure of the NMP

5.4 Discussion

Management effectiveness is a critical factor in MPA success. It can only occur through the establishment of truly capable management bodies that have the legal framework and the governmental support to carry out the functions that are necessary to realize the goals and of the NMP. The use of co- management to realize these goals has several benefits. Among these are the decentralization of power and authority to resource user bodies that will be directly affected by any strategies implemented and any restrictions which will be enforced. The ability to play a meaningful role in the decision making process is especially important to these groups. State agencies benefit through reduced challenges to their authority and shared as opposed to sole responsibility for protected area management.

In the Jamaican context however, the problem lies with the failure of state agencies to make genuine efforts towards true co management (Figueroa, 2002). There has been a tendency to delegate state functions and authority, leaving small and inadequately equipped NGOs with the sole responsibility for management. This is not how the system was designed to work. These NGOs, such as NCRPS, which are small and non-profit in nature usually lack the institutional capacity and the financial stability to rise to such an overwhelming challenge. The NCRPS cannot on its own realize effective management of such a large social, political and geographically diverse area in the NMP. Government agencies need to uphold both their political and financial obligations to these resource user groups. This includes honouring the amendments made in the regulations for the collection of user fees as well as disbursing management fees in a timely manner as long as proper documentation of managements efforts have been recorded and submitted for approval.

In addition to this provisions should be made in delegation contracts that support effective enforcement measures that can be carried out by the management bodies. For the most part these agencies must rely on other government groups to carry out enforcement measures such as the powers of arrest. Patrols conducted by park rangers are not always done in the presence of representatives of these agencies such as the Marine Police. It is not always possible for video or photographic evidence to be gathered at the time that these transgressions are taking place. Additionally the organisations must then rely on the discretion of these agencies to determine whether or not they consider these crimes of sufficient importance that they warrant arrests. These factors have the ability to undermine any enforcement strategies that would implemented upon the establishment of management agencies.

The institutionalisation of adequate co- management strategies in Jamaica will take some time. Management is currently conducted in an environment where there is a history of authoritarian structures that promote the disempowerment of people who are not accustomed to being encouraged to take responsibility for their environment (Figueroa, 2002). However recent experience has signalled a need for a framework that supports genuine co- management efforts and greater political and financial support for delegated NGOs as opposed to assigning sole responsibility for protected areas to organisations such as the NCRPS.

The evaluation was unable to indicate whether there was accountability or transparency in the financial and administrative systems, or the extent to which this management objective was being achieved. There was a need to tailor the assessment process in order to evaluate the parameters that were relevant to this specific objective. The evaluation steps outlined in the guidebook provide a guide by which the process can be carried out. However, each MPA has different objectives and each evaluation team has different capabilities. By bearing these factors in mind when devising strategies for the assessment process it increases the effectiveness of the indicator to adequately assess site specific objectives and effectiveness of management in a particular MPA.

6 AVAILABILITY AND ALLOCATION OF MPA ADMINISTRATIVE RESOURCES (G6)

6.1 Background

The ability, with which an NGO is able to meet its management goals and objectives, is directly related to its ability to access the administrative resources to do so. Once obtained the manner in which they are allocated among various organisational tasks determines the capability of the management team to administer and complete specific activities (Pomeroy *et al* 2004). Such resources include the time that is available in which to adequately complete management tasks, current institutional capacity and accessible financial resources. The resources must be carefully balanced and crossed referenced with the long term strategic goals of the NGO. Consideration must also be given to how these goals will be able to increase the potential with which management strategies may be effective.

NGOs often work within limited budgets where a significant portion may be derived from the donations and grants of funding agencies. Given the mandate to manage complex and dynamic environments, a variety of activities must be employed in order to realize conservation efforts and effect necessary change. This responsibility may involve the implementation of several activities. It is imperative therefore that all administrative resources are carefully monitored and

allocated. It is essential that they are directed to where they would have the greatest impact in a timely and appropriate manner. Managers must have a full understanding of the nature of the activities to be undertaken so as to make informed decisions relating to the skill and experience of the staff needed to conduct specific tasks or the amount and type of training that must be employed, budgetary requirements and equipment needs.

6.2 Methods

Information was gathered through the analysis of existing documents made available by NCRPS. The documents included personnel records, budgets, the operations plan and equipment inventory/assets. Erwin Caine, a NCRPS director, led the analysis of this indicator with the administrative resources being provided by NCRPS. Further analysis into planned management programmes, equipment and financial needs and the allocation of resources was done by the research assistant using the information contained in the 2006-2007 Operations Plan. The facilitation of access to the relevant documents was made possible by Else Hemmings, administrative manager for NCRPS.

6.3 Results

Table 6.1 highlights the management programmes NCRPS seeks to implement, the available and required budget for each programme as well as the equipment necessary to complete relevant tasks. Staff requirements are also outlined for each undertaking. These results have been adapted from the 2006-2007 Operations Plan for the NCRPS.

NCRPS has attempted to undertake several programmes which it deems relevant to the goals and objectives laid out in its management plan. Allocation of resources in each case has been determined through careful consideration of unique project requirements as well as specialised skills that may be necessary. In all cases the budgetary requirements have been outlined and account for every aspect of the programmes. Where appropriate the staff requirements for each programme as well as the specific responsibilities that will be undertaken and duration of each task has been approximated. However the equipment requirements for specific tasks are not always clear. Although mention has been made of the expected project outputs for each initiative, whether this equipment is available, if additional equipment is necessary and any further costs that may be incurred was not explicitly stated. What is apparent however is the urgent need for additional staff with the necessary skills and experience to carry out project activities. For several of the initiatives, the training of staff members has been taken into account to ensure that each team member is equipped with the skills needed to carry out specific tasks. Several programmes such as Disaster Preparedness and Emergency Management have included training workshops and the preparation of training material for MPA staff.

The greatest number of staff as well as the largest portion of the required budget has been allocated to administrative functions. These functions require an amount of JA$17,703,058 to be carried out effectively, which accounts for approximately 57% of the total budget. This total can be justified by scope of administrative functions which play a major role in all of the proposed programmes. These range from proposal writing to development of databases, correspondence and the hiring of additional staff when necessary. These activities play a major part in most of the initiatives. In spite of this the cost is absorbed within the allocated budget for NGO administration

The Visitor Management (5.4%), Resource Management (4.4%), Education (4.2%) and Financial Stability Programmes (3.1%) require a substantial amount of the total budget in order to be to be implemented. Adequate trained personnel will be required to ensure that all programmes are brought about in an efficient and expedient manner. In many cases additional staff will have to be hired or contracted to perform specialized tasks.

The Visitor Management (5%), Resource Management (4%), Education (4%) and Financial Stability Programmes (3.1okjkjhnkjn%) require a substantial amount of the total budget in order to be to be implemented. Adequate trained personnel will be required to ensure that all programmes are brought about in an efficient and expedient manner. In many cases additional staff will have to be hired or contracted to perform specialized tasks.

Lobbying (0%) and Public Relations (0.2%) were allocated smaller portions of the total budget. Though a select few persons were sited as being needed for these initiatives, persons capable of carrying out duties that are unique to each programme need to be hired or contracted.

Table 6.1 Management programmes, current allocation of resources and projected resource needs of NCRPS

Programmes	Staff Requirements		Equipment Requirements		Budget Allocated (Jamaican$)	
	Available	Required	Available	Required	Budget Required	Budget Available
Administration	Project Manager, Administrative Assistant, Accountant	Executive Director, Director of Scientific Programmes/Assistant Park Manager, Education Officer Rangers (level one) Gift Shoppe Manager, Project Manager Administrative Manager, Accountant	Office Equipment Office Supplies, Pick up Truck	Office Equipment Office Supplies Pick up Truck	17,073,058	1,919,537
Disaster Preparedness and Emergency Management	Project Manager, Ranger Corps (Head Ranger and 3 rangers)	Project Manager, Education Officer Ranger Corps Non MPA Staff Required Members of ODPEM Members of Red Cross	First Aid Equipment, Oxygen Cylinder	First Aid Equipment Stretcher Boards Oxygen Cylinder etc. (A complete list of equipment that is required will be available after ODPEM training workshops have been administered)	210,000	0
Education	Project Manager Rangers	Project Manager, Development Advisor, Park Manager, *Education Committee, *Interview Committee, **Non MPA Staff Required** Consultant, Graphic Artist, NEPA Staff		Marine Park brochures/ map Posters Newsletters	1,259,000	0

Table 6.1 continued

Programmes	Staff Requirements		Equipment Requirements		Budget Allocated (Jamaican$)	
	Available	**Required**	**Available**	**Required**	**Budget Required**	**Budget Available**
Enforcement	Project Manager Rangers	Project Manager, Ranger Corps, Assistant Manager, Development Advisor, Non MPA Staff Required NEPA Staff	2 Boats, 1 Pickup Truck	Boats, Vehicles, Enforcement Manuals, Ticket Booklets	550,000	0
Financial Stability	Project Manager Administrative Manager NCRPS Board Members	Project Manager Administrative Manager NCRPS Board Members NEPT Board Members **Non MPA Staff Required** Development/ Marketing Consultant	Promotional Material	Promotional Material	921,000	0
Lobbying	Project Manager	Project Manager Education Officer Development Advisor **Non MPA Staff Required** *Scientific Advisory Council		Fact sheet for staff and board (based on the results of research and to be used for discussion with stakeholders	0	0
Public Relations	Project Manager	Project Manager Education Coordinator Development Advisor			60,000	0

Table 6.1 continued

Programmes	Staff Requirements		Equipment Requirements		Budget Allocated (Jamaican$)	
	Available	**Required**	**Available**	**Required**	**Budget Required**	**Budget Available**
Research and Monitoring	Project Manager Rangers	Project Manager Ranger Corps Development Advisor **Non MPA Staff Required** Scientific Advisory Council	Laboratory Equipment Sampling Equipment 2 Boats Vehicle Diving equipment Recording devices **(Laboratory unable to test marine samples due to high dilution factor)**	Laboratory Equipment Sampling Equipment Research Boat Vehicle Diving equipment Recording devices	765,000	0
Resource Management	Project Manager Rangers	Project Manager Rangers Development Advisor			1,326,000	0
Sustainable Community Development		**Non MPA Staff Required** Development Consultant			180,000	0
Visitor Management	Project Manager Rangers	Project Manager Development Advisor Rangers **Non MPA Staff Required** Scientific Advisory Council Development Consultant	Dive and snorkel equipment	Dive and snorkel equipment Mooring buoy Maps	1,626,000	0
Zoning	Project Manager Rangers	Project Manager Rangers Education Officer **Non MPA Staff Required** Graphic Artist Development Consultant		Brochures/ Maps Zoning Maps Demarcation Buoys	300,000	0

6.4 Discussion

There are two major and readily apparent variables that limit the capacity of the management team to be able to effectively administer and complete a number of activities within the NMP. These are the glaring lack of funding available to implement each programme as well as limited institutional capacity. The only programme in the Operations Plan that has an existing budget is the Administrative Programme. For all others there are no amounts stated for existing budget allocations. This is one of the main reasons why the NCRPS has emphasised that the focus of their Operations Plan will be on attaining financial stability. So dire are the financial straits that that a failure to immediately act on this problem will have serious implications on their decision to accept or reject the offer to renew the contract to remain the official delegated body for management of the area. Not only does it affect the NGO's ability to remain operational but it also affects its capability to carry out effective management and implement programmes or activities that will increase the success and viability of the NMP.

Directly related to this is the lack of institutional capacity. Without proper funding the additional staff that need to be hired or contracted who have the necessary skills and expertise to carry out tasks unique to each programme where there skills will be needed, will not be possible. Some of the staffing needs may be addressed through creative processes such as the soliciting volunteers or providing internships for students. These options have recently been explored. Volunteers have been accepted from the Peace Corp Programme which contracts out volunteers for a specified time period. The structure of this programme provides the participants with incentive to carry out work required in an efficient and professional manner. However, volunteers may not be as reliable as fulltime staff that are provided with financial incentive to carry out their duties. In addition to this, investments may have to be made in training each new group of volunteers to carry out particular task when they may not feel the kind of obligation of hired staff to see there activities through to the end.

In the operations plan, allocations for budget and staff are outlined. The Administrative Programme due to its pervasive and broad based nature has been allotted the largest portion of the required total budget of JA$30,002,511 ($476,230.33 USD). Each undertaking encompasses some administrative functions which have been accounted for in that budget. Visitor Management, Resource Management and Education have all been given the largest portion of the budget after the Administrative Programme. Each speaks in some manner to the underlying goals and objectives of the NMP. The first addresses the issue of carrying capacity and identifying the number of visitors that can be facilitated in the NMP without having adverse effects on the environment. Resource management encapsulates one of the main purposes of the formulation of the protected area which is the conservation of natural resources through monitoring, and enforcement of MPA regulations. The Education programme seeks to make stakeholders aware of environmental issues, their impact on the NMP as well as enlighten them on the roles they may play in coastal conservation through addressing the their knowledge, attitudes and perceptions in a way that may lead to behavioural change. It is not clear however if some of the strategies in the Visitor Management Programme are intended to generate income in addition to disseminating knowledge, given the large amount of funding allocated to the community based educational tours.

Surprisingly, not as much of the budget has been geared towards the main goal of financial stability. However the NCRPS has sought to involve the board members of both their organisation as well as those of NEPT which is represented by several organisations. This

attempt at a combined effort to tackle a problem that has plagued both organisations as well as outside assistance in marketing and programme development may increased the probability of the formulation of effective strategies to address the issue as well as increased lobbying power to state agencies for promised financial assistance. Perhaps given the stagnating financial situation of the NGO and its ability to cripple the organisation entirely more funding and more persons should be directed towards this endeavour.

In situations such as the one that faces NCRPS it is difficult to gauge the management priorities of the NGO and say definitively how they fit into the long term strategic plans of the organisation solely based on current funding, staffing and budget allocations. Though proposed activities and budget requirements may give some indication as to the desire management direction of the NGO, current resource allocation does not present a representative picture. This is largely due to the fact that current allocation of administrative resources is done in a reactive manner rather than proactive one where resources may not be allocated based on long term objectives but on the immediate needs of the NGO. This has and will continue to impede the effectiveness of the management body and the capability with which they can achieve management objectives.

The ability to evaluate the management objectives linked to the indicator varied significantly from one objective to another. Although the financial constraints that impeded management could be deduced from the results, the assessment failed to give any indication of the amount of effort placed in the development of an active volunteer programme and whether any such attempts have been successful. The appraisal of staffing, training and equipment needs was moderate. In this case it presented a picture of what was needed but failed to highlight what resources the NCRPS already possessed, the quantities in which they could be found and the present condition of any equipment. The assessment also emphasised the need for the organisation to hire additional staff while highlighting the conditions which impeded this process. Suggestions for alternate methods such as volunteers were put forward. The indicator selected for this evaluation process was appropriate for the assessment of the related management goals and objectives. However the lack of information obtained at the time that the research was conducted impeded the scope of the evaluation and reduced the ability of the indicator to successfully gauge the effectiveness of the management strategies in all areas.

7 SUCCESS OF FUNDRAISING STRATEGIES (REVENUE AND DIVERSITY OF SOURCES) THAT FORM PART OF THE BUSINESS PLAN [NEW]

7.1 Background

One of the recurrent challenges of many NGOs is in establishing ways in which they can sustain and support themselves financially. These organisations are generally supported in large part by donations and grants from funding organisations or municipal bodies. Many have sought to diversify their sources of income as a means of changing the funding status quo that generally typifies these NGOs. This donor- grant relationship creates a dependency on project grants and government subsidies. As a result financial support is often reliant upon donor preferences and fund availability. In addition donor funds are earmarked for particular projects or for limited cycles where donors often attach very specific limitations on how money can be spent (Davis 2004). In many cases these funds are meant only to finance activities that are specific to the project or programme and are not intended to assist with ongoing operational and core expenses. Institutional or organisational development is not a priority for donor agencies that place more

emphasis on the project activities for the NGO and not on sustaining the organisation itself (Davis, 2004). This creates a problem for NGOs which are generally non- profit in nature and may have great difficult meeting their day to day operational expenses. In some cases NGO's are forced to undertake projects where the project priorities may not be aligned with their long term strategic plans but provides a viable source of funding. This situation may be pronounced in developing countries where there is little scope for attaining local funds. Political preferences, social issues which are given higher priority and the discretionary income of the general population may impede local philanthropy (Davis 2004).

Solely depending on external funding as a means of attaining capital, places NGOs in a tenuous financial situation. This has the potential to undermine the sustainability of such organisations and reduce the ability with which those that manage marine parks can do so. Ultimately it has serious implications on the success of protected areas. Diversification of income generating activities is the only way that NGOs such as NCRPS can realize financial independence and stability. In addition to this it would allow them the freedom to determine their own programmatic priorities irrespective of donor preference (Davis 2004). In recognition of this many NGO's have sought to implement money making ventures in their management strategies so as to strengthen their financial base and to achieve enough income to at least be able to finance ongoing operational costs.

When the NMP was first envisaged it was thought that it would be supported by the National Parks Trust Fund. This fund was started as part of project initiated by the Jamaican government and the US AID PARC organisation. The first phase of the project included the establishment and provision of funding for the management of the Montego Bay Marine Park (MBMP) and the Blue and John Crow Mountain National Park (B&JMNP) (NCRPS n.d.). The second phase was to include funding for the establishment and management of the NMP. This phase was cancelled due to budgetary constraints. Since that time the fund has not experienced the growth that was expected and at present is only able to meet part of the financial needs of the MBMP and the B & JMNP. Funding for NMP management was also expected in the form of the implementation of user fees. The Minister of the Environment signed an amendment to the park regulations which made provision for its implementation. The user fees were seen as long term source of income for the management of the NMP. As it currently stands there has been limited support for the NMP by the Jamaican government. Although provision has been made in section 3.1 of the delegation instrument for the disbursement of management fees from NEPA since 2002 the first instalment of these fees was only granted in the first quarter of the 2006-2007 financial year. No real collaborative effort has been made towards the implementation user fees. In addition to government support and donations from various agencies, the NCRPS has outlined several fundraising ventures they had hoped to implement to offset the cost of operations. These included the sale of boat moorings, setting up of a gift shop; community based educational tours and other fundraising and marketing strategies such as Bingo nights and more aggressive proposal and grant writing for funds. It was originally thought that the park would be able to operate without the need for grant funding. However, in the absence of the Park Trust, outstanding management fees as well as the failure to implement the user fees, NCRPS is forced to depend on donor funds and the expected income from the initiatives listed above to effectively manage the NMP.

Financial sustainability is essential to the general operations of the NGO and has great bearing NCRPS ability to effectively manage the area as well as to implement strategies that may

improve current management. It is imperative therefore for organisations such as this to evaluate their current financial situation in an effort to predict how it may impact on the viability and effectiveness of the organisation. This study seeks to evaluate the success of the various fundraising strategies and activities that may have been incorporated into the business plan and annual operation plan for the NCRPS. The level of success will be measured based on projected and received revenue as well as resources obtained from various sources that are needed to run the NMP.

7.2 Methods

A team from the National Environmental and Planning Agency (NEPA) conducted an audit of the financial strategies of the NCRPS. This audit included an evaluation of the fundraising strategies of the organisation for the fiscal years 2004-2005, 2005-2006 and the first quarter of 2006-2007. The audit team consisted of Bernard Blue who led the evaluation and Rupert Price from NEPA's internal audit department. Elsa Hemmings of NCRPS provided the documentation for the analysis.

The audit covered the period April 2004 to March 2006. Staff interviews were carried out as part of the evaluation and several records were examined during the analysis. These included the Operations Plan, the Business Plan, Income statements as well as correspondence from donors.

The main objectives of the audit were as follows:

1. To assess whether the fund raising activities embarked on were sound and productive
2. To ascertain whether projected objectives were achieved

The audit was carried out on May 17-18, 2006 after which a report of the findings was submitted by the audit team. The report was collected and analysed by the research assistant assigned to the NMP. Below is a summary of the results presented by the auditors.

7.3 Results

A review of the operational plan of the NCRPS was conducted. It disclosed that the organisation intended to generate a minimum of US$300,000.00 (approximately J$19,500,000.00) in revenue, to support basic operating costs in the years 2004-2006. The proceeds were to be realized from the following sources:

- User fees
- Government Support and
- Grants

The amount projected to be raised from each source was not determined by the audit. The operations plan indicated that the NCRPS also aimed, to raise US$793.65 (approximately J$50,000.00) to seed a Marine Park Trust Fund by December 2005 via the under mentioned sources:

- Retail sales of souvenir items
- Community-based educational tourism
- Private and Corporate donations
- Fund raising events (e.g. Bingo Party)

Table 7.1 illustrates the proposed income generating events outlined in the Business Plan and an indication of the level of their success.

Table 7.1 Proposed income generating events and their level of success

Proposed Fundraising Activities	Level of Success of Fundraising Activity
User Fees	**None**-Provision has been made for the implementation of user fees through amendments made to the park regulations by the Minister of the Environment. These have yet to be brought into force.
Management Fees	**None**- These were to have been provided by the regulatory agency NEPA upon receipt and verification of activities that have been carried out by the NCRPS. These fees are still forthcoming.
Gift Shop	**Little**- Though the physical space for the gift shop had been provided for at the NCRPS headquarters no formal arrangements have been made for its set up within the building. However some souvenir items such as novelty T- shirts and Polo shirts have been sold. No indication of the level of sales and demand for these items has been determined by this study.
Sale of Mooring Buoys	**Little**- According to the Business Plan equipment is available for sale and installation of buoys upon request. Personnel at the NCRPS are trained to do such installations. So far approximately six buoys have been requested, sold and installed by various hotels in the area.
Community Based Educational Tours	**None**- This initiative has yet to be launched. It is unclear from this study how much planning has gone into this programme and how soon or if it will still be initiated.
Fundraising/ Marketing of the park	**Moderate**- Most of the generated income for the NCRPS comes in the form of grants from various donor organisations. These funds are used for programmatic activities as well as core and operational costs. These initiatives have had a fair share of success and have managed to keep the organisation operational and able to carry out many of its management functions. Fundraising ventures have been marginally successful and have included such events as Bingo Night.

It should be noted however, that the implementation and success of these plans could not be substantiated or analysed, as no supporting documents or reports on the various ventures undertaken were presented on request, for examination, during the audit review exercise (Blue 2006).

Nevertheless the perusal of several Income Statements of fundraising ventures, embarked on by NCRPS revealed that the entity was successful in surpassing its set target of J$19,500,000.00 by J$10,429,336.18 (over 53%) achieving an actual intake of J$29,929,336.18. It is to be noted however, that the Income Statements submitted were unaudited (Blue 2006).

7.4 Discussion

In the absence of some of the documents that were requested during the evaluation the auditors have suggested that the NCRPS streamline its administrative management structure, by

implementing measures to synchronize its administrative functions with the accounting functions. For instance, information pertaining to sources and receipts of funding should be documented. Additionally, proper records, inter alia: minutes of meetings, correspondence including commitment letters, details on seminars, and records of educational events provide substantive support for accounting entries and improve transparency (Blue 2006). The lack of appropriate documentation has bearing on the accuracy and effectiveness of the evaluation. In fact it was impossible to comment with any authority on the soundness or sustainability of the fundraising strategies employed by the NCRPS or on the level of commitment of donors to the organisation, due to the absence of the relevant documents (Blue 2006).

It is clear that many of the income generating ventures that had been proposed have not done well enough to support the operational functions of the NCRPS. However the report suggests that the financial situation of the NGO is a good one in light of the fact that projected income generation was exceeded by a substantial sum (53%). These facts viewed solely as they are stated, have the potential to be misleading and may suggest that the NCRPS is doing better financially than it actually is. The figures calculated in the evaluation were aggregated sums and gave no clear indication of how much each activity contributed to the total sum or what percentages were being used for project activity as opposed to core operations needed to keep NCRPS functioning effectively. This information does not contain the relevant details on which to make informed management decisions and required changes to and diversification of financial strategies implemented. It is imperative that the financial records highlight the sources of funds, how much each contributes to various management functions and the viability of each source. By doing this managers will be better able to pinpoint where changes need to be made to financial strategies and where more creative thinking is required to increase income generation. The success of each strategy can then be measured, and informed decisions on whether or not the strategies are benefiting the organisation will be more expedient.

The NCRPS had stated that due to the dismal financial situation they are unwilling and in some cases unable to implement new financial strategies due to the capital that would be necessary for start up costs (NCRPS 2002). In making this decision however greater efforts need to be placed into making pre-existing programmes more lucrative. This may include improved and creative marketing strategies. This is not to suggest that the possibility of seeking alternative strategies that may be better suited to the institutional capacity, marketing capability and business skills of the employees should be dismissed.

There is a need to utilise a committee or project team whose focus is solely on formulating, lobbying for and maintaining existing lucrative income generating strategies. General accounting is still necessary to maintain a high level of accountability and transparency, but accounting for and auditing in-hand finances is not enough. Pursuing lucrative donor grants as well planning and implementing incoming earning strategies is crucial to the sustainability of NCRPS and should be a priority for the organisation. Additionally, government agencies need to honour their financial obligation to the organisation. The failure of these agencies to release funds in a timely manner has placed greater strain on fundraising activities to generate the funds that are necessary to keep NCRPS afloat.

This evaluation has served to highlight some of the shortcomings in the financial management of the organisation that have lead to a perpetuation of this situation. Although the aggregation of financial data may have been misleading, a review of financial documents and interviews with staff have confirmed their continual struggle to attain the monetary resources necessary to make

this aspect of management more effective. However although the deficiencies in finances were highlighted, the evaluation failed give any indication of whether the stakeholder awareness of financial stability was heightened. It is therefore impossible to say with any certainty whether this management objective has been achieved or comment definitively on the success of its implementation. Perhaps it would have been prudent to select another indicator which had the ability to accurately assess level of success in realising the management objective or to tailor the evaluation process so that it would be able to extract the necessary information to determine the effectiveness of this management strategy. The ability of the indicator to evaluate the management objective can be concluded as being unsatisfactory or poor.

8 LEVEL OF STAKEHOLDER PARTICIPATION AND SATISFACTION IN MANAGEMENT PROCESSES AND ACTIVITIES (G12)

8.1 Background

One of the factors that determines the success of any MPA is the level of active stakeholder participation in the management and planning processes. By integrating participatory management strategies into existing management frameworks its allows coastal resource stakeholders an opportunity for their views, concerns and suggestion to be freely communicated with the assurance that they will be given serious consideration in any management, policy or planning decisions that is made. By fostering partnerships between formal management agencies and resource users it gives all involved a sense of ownership and responsibility. Such sentiments garner support for management efforts and increase the sustainability of the MPA. All parties must be assured that they are benefits to be had from supporting and sustaining protected areas in order to increase the level of compliance with the policies and regulations that are implemented to maintain its viability. It is imperative from a stand point of effective resource management to be able to gauge both the level of stakeholder participation in the management process as well as the level of satisfaction with existing management strategies and activities.

Since the designation of the NMP as a MPA in 1998, agencies responsible for the management of the area have incorporated environmental education into their management strategies. Through the promotion of environmental education and awareness it is hoped to increase stakeholder participation as well as encourage sustainable resource use and environmental practices. Despite these efforts recent studies have highlighted the fact that many of these stakeholders consider governmental and non governmental organisations as having the primary responsibility for the management of the NMP (Pena *et al* 2005). Many perceive themselves as having very little influence on management. This is largely due to lack of communication between management agencies and members of the communities within the NEPA. Ineffective communication methods and an inadequacy to inform stakeholders about management issues have hindered active stakeholder participation (Pena *et al* 2005). It is absolutely necessary that management agencies invest in mechanisms through which stakeholders may be empowered to participate, be informed of management issues and have an opportunity to effect changes where there are necessary.

Stakeholder groups within the Negril environmental protection area (NEPA) are numerous and diverse. Resource use within this area is just as varied. Management processes and activities are therefore perceived differently and affect groups in different ways due to the unique nature and issues of each group. Previous studies have sought to ascertain an opinion on the management of the NMP from various members of the communities within the NEPA. This study seeks to solicit

the views of members of the management agencies, regulatory bodies as well as various funding and donor organisations which are often viewed as having the most knowledge and influence over the management process.

8.2 Methods

The evaluation of this indicator was done through the formulation of surveys which were aimed at obtaining information on participation and level of satisfaction with past and current management strategies from a selected group of stakeholders. This stakeholder group included the 22 members of the NCRPS board of directors, representative members of various member organisations and regulatory agencies as well as funding and donor organisations.

Survey forms were drafted and administered by June Masters and Tenile Grant of the Fisheries Division to the predetermined stakeholder groups. A copy of this survey instrument maybe found in Appendix III. Information on each of these groups and previous methods and levels of stakeholder participation was to be obtained via documentation at NCRPS which was to be facilitated by the former director of the organisation, Carl Hanson. Interviews were conducted via phone where possible. In some instances survey forms were faxed or emailed to selected participants who could not facilitate telephone interviews and the forms were then returned upon completion.

These surveys were aimed at determining the type of organisations that contributed to efforts made by NCRPS as well as the type and frequency of participation of each interviewee. Methods of participation were divided into contributions, lobbying and fundraising. This exercise was also geared towards establishing the level of satisfaction that each participant had with current activities and the level of funds raised by the NCRPS. The awareness that each organisation had of current, past and future activities of the NCRPS was also brought into question in addition their willingness to support any future endeavours of the organisation. Participants were also encouraged to give suggestions for activities that may help to increase the financial sustainability and management effectiveness of the NCRPS. Data from these forms were collected by the research assistant and analysed using SPSS version 11 and Microsoft Excel applications where appropriate.

8.3 Results

The most common method of participation in the management process and activities of the NCRPS were done through contributing (82%) to the organisation. Of this percentage, 32% participated using this method only. This was the most frequent method seen among all three groups. The least popular method was through lobbying at 32% where 7% of this group used this method only. The highest figures for lobbying were seen among members of the board of directors of the NCRPS. No lobbying was carried out by any of the funding organisations. Fundraising was done by 46% of the respondents where 10% used this approach only. None of the member organisations that were interviewed engaged in fundraising activities, while 26% of the board members of the NCRPS acknowledged participating in this way. These results are illustrated in Figure 8.1. Most of the respondents (89%) claimed to have knowledge of the needs, financial and otherwise, of the organisation.

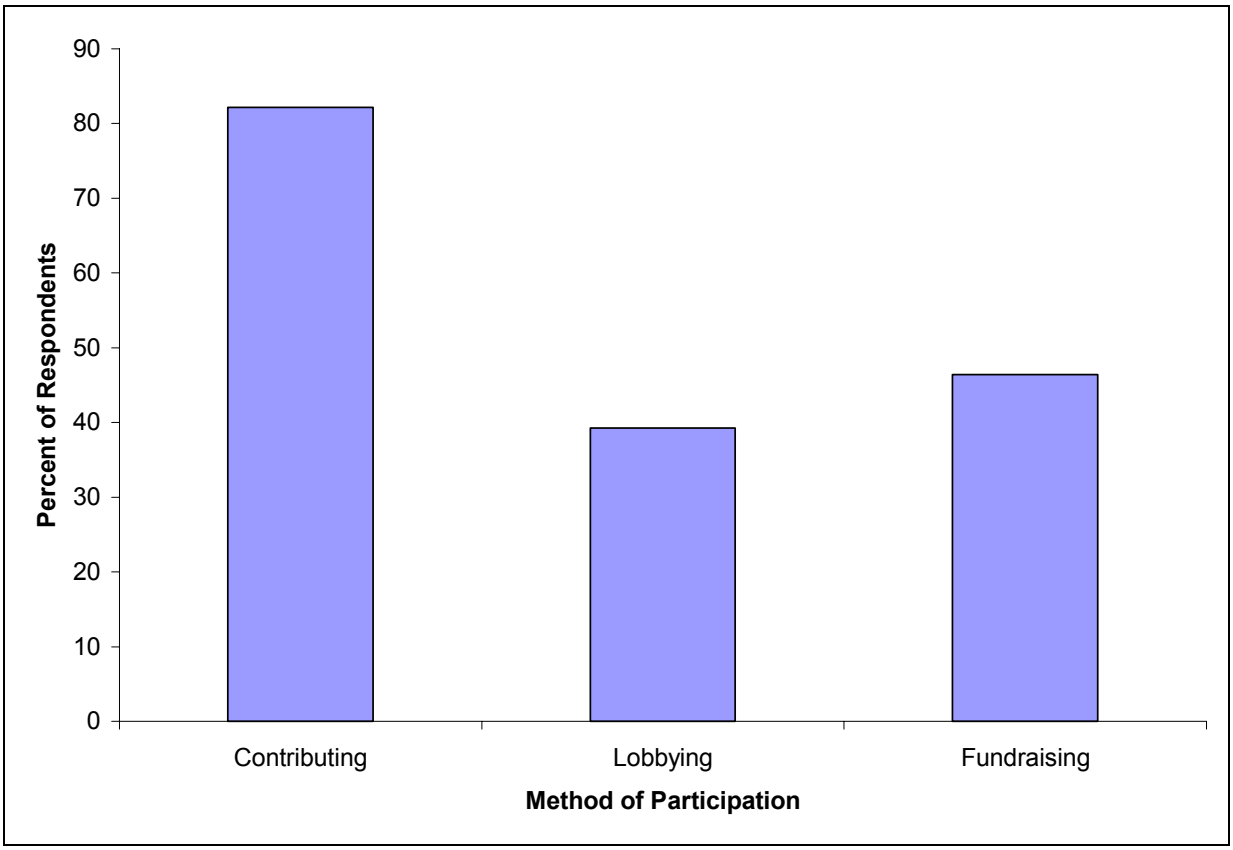


Figure 8.1 Methods of participation of stakeholders of NCRPS

Many persons stated that they participated in management activities on a regular or continuous basis (35). Several respondents only engaged in such activities when there was a scheduled meeting or planned event (25%). In some cases participation only occurred occasionally (21%). Some respondents lent assistance only when it was requested (10%) and very few only took part on rare occasions (7%). This is illustrated in Figure 8.2.

Almost all of the respondents had an idea as to what activities had been undertaken by NCRPS since its inception. There were no conclusive responses on any recent developments geared towards an improvement on management of the NMP. Most persons mentioned ongoing projects that had started prior to 2005. The most popular responses were projects that have been highly publicised such as the installation of the mooring buoys, the water quality monitoring programme and patrolling of the marine area by park rangers. Although NCRPS had been seen as having a lead role in many of the activities that had been undertaken to improve park management some respondents saw the organisation as having only a participatory role in projects undertaken and initiated by other organisations.

When given an opportunity to make suggestions on possible activities that may be implemented to improve management a wide range recommendations were made. Many of these suggestions related to improvements in financial stability. Respondents wanted to see a greater effort directed towards strengthening the financial base of NCRPS through fundraising activities or increased governmental support of management efforts. Other recommendations included restructuring of the board to improve the efficiency with which it operates, more comprehensive educational programmes integrated into schools as well as targeting fishers, greater lobbying for support

from regional organisations and state agencies and the promotion of alternative livelihoods for fisher folk.

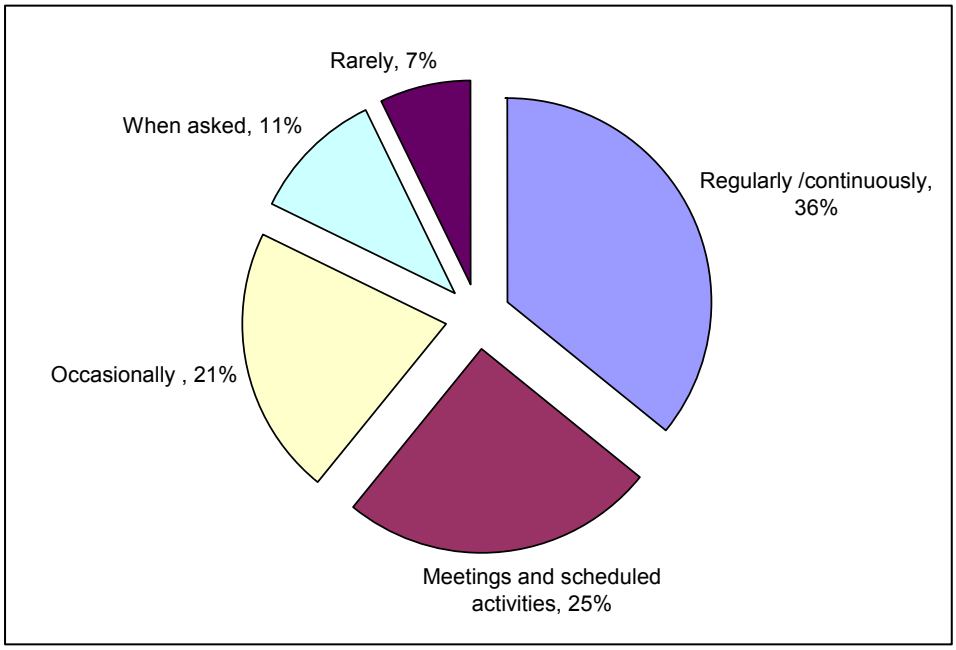


Figure 8.2 Frequency of participation by stakeholders of NCRPS

The majority of the respondents (89%) were not satisfied with the amount of fundraising activities undertaken by the organisation. Suggestions for improvements in this ranged from community based social events such as stage shows and Bingo games to the provision of income generating marine research activities such as research diving. Many persons were in favor of the implementation of user fees for the NMP and thought that greater efforts should be directed towards lobbying for this cause. All interviewees expressed their willingness to support any fundraising activities undertaken by the organisation in the future.

Several methods where used to promote NCRPS in the communities of the various respondents. Many of these included word of mouth where informal discussions were held with community or social groups. However formal meetings with fishermen and presentations to community organisations were also used to advocate the efforts undertaken by NCRPS. Presentations to various organisations such as Negril TPDCO and international conferences such as Gulf and Caribbean Fisheries Institute conference were also used as sited promotion. Other forms of advocacy included the distribution of flyers with information on the NMP and NCRPS as well as participation and support for various ventures undertaken by NCRPS that may have been publicised.

8.4 Discussion

From the results of the evaluation, as well as comments received from the interviewers, it would appear that there is some correlation between the type of relationship that existed between the stakeholders and NCRPS and the level of participation each had in management processes and activities. The more distant the relation between respondents and the organisation the lower the level of participation appeared to be. For example it was found that highest participation was often seen by members of the board of directors as opposed to donor and funding organisations.

These levels increased for the latter if members of these organisations held a place on the NCRPS board and declined significantly once their representative was voted out. This may suggest that holding a position within NCRPS fostered a greater sense of ownership and responsibility. Perhaps it is perceived that once this relationship was lost the level of obligation in the management activities was no longer expected or their influence on management decisions would not be as significant. In addition to this it is easier for smaller entities or individual participants to devote more time to higher levels of participation. This NGO is one of many recipients of donations and grants from large international donor agencies. These agencies issue monetary or other donations to several organisations in several areas. As a result of this they do not have the time or institutional capacity to dedicate as much human resources to assist in the management functions of each NGO that they sponsor.

Greater efforts must be made to promote continued participation among stakeholders in management activities. Care must be taken to avoid the alienation of former board members in the decision making process. Every stakeholder has the potential to be a tremendous asset or a threat to the viability of the MPA. Very often these persons are representatives of larger organisations who can lend financial assistance and increase the institutional capacity of the NCRPS. A loss of such resources can undermine NCRPS ability to meet current management objectives and hinder strides at creating new opportunities to increase management efficiency.

In addition to levels of participation, lack of financial stability may seriously affect the success of the NMP and retard NCRPS ability to orchestrate effective management of the area. Sole dependency on donor and funding organisations has not afforded NCRPS the opportunity to achieve a level of financial independence. Without a stronger financial base their very existence hangs in the balance not to mention their ability to realise means by which to enhance the success of the NMP. Additionally creative ways must be sought to rectify this situation and greater effort made to lobby for more governmental assistance. More importantly the organisation needs to find a way to continuously generate funds independent of donations and grants. A step in this direction may be through the implementation of user fees. The NCRPS has not been successful in achieving their goal of developing and implementing a financial sustainability plan that would ensure that adequate funds are available to manage the park.

This evaluation was able to give some indication that there were insufficiencies in the funds generated by the activities undertaken by the NCRPS. However no mention was made of the amount that each activity generated or their sustainability. The use of this indicator was unable to determine whether adequate income to support the maintenance of the NMP was being achieved or how far the NCRPS was achieving this objective. The use of this indicator was inappropriate for the evaluation as it failed to guide the evaluation teams to ask the questions necessary to determine the effectiveness of the management strategies geared towards the achievement of the relevant objectives. Perhaps the use of another indicator that can better guide this process may have been necessary for the evaluation. The ability of the assessment tool to gauge the management effectiveness was insufficient or poor.

9 GENERAL DISCUSSION AND CONCLUSIONS

9.1 Evaluation Summary

Table 9.1 summarises the results of the indicators evaluated in this exercise. It also illustrates the level of success of each indicator in evaluating the management objectives that they were chosen to assess. Each indicator is ranked from good to bad where good indicates that the objectives have been evaluated, moderate that they have provided some indication to whether the objectives are being achieved and to what degree, and poor where the indicator failed to measure the parameters associated with the relevant objectives. The level of success of the evaluation has been discussed in detail under the previous sections and has been summarised in the table below.

Table 9.1. Evaluation Summary of the performance indicators chosen for the NMP

Indicators	Results Summary	Objective	Ability of Indicators to Evaluate Management Effectiveness
B8 Water Quality	The nutrient levels were well below national standards for fresh water at all sites. The highest readings for both nutrients and faecal coliform both found at the South Negril River mouth. Results at the TCMP were spurious due to a failure to follow monitoring procedures and protocol. Sample collection frequency at the SCMR was inconsistent. Greater training needed for TCMP, and modification of parameters and protocol needed at the SCMR.	Establish and maintain a reef restoration programme **(NMP)**.	**Good -** Evaluation was able to highlight the successes and shortcomings of ongoing programmes. Water quality monitoring is in its inception stages at the TCMP and SCMR. Modification need to be made to procedures and protocol to make this monitoring successful. Additional training for staff is also necessary. It is yet to be seen if it will lead to the implementation of other reef restoration programmes. The evaluation highlighted the deficiencies in current programmes.
S3 Level of understanding of human impacts on resource **&**	Many community members and tourism workers knew of the existence of the NMP	Public kept abreast of status of the park.	**Good -** Was able to give a picture of what educational material was being received by a variety of stakeholders

Table 9.1 cont'd

Indicators	Results Summary	Objective	Ability of Indicators to Evaluate Management Effectiveness
S14 Distribution of formal knowledge to the community	and the NCRPS. Many also had knowledge of the activities that impacted on the MPA and the effect that these activities has on the coastal environmental. The majority of the tourist had no knowledge of the NMP, NCRPS or the activities that impacted on the MPA. Need for a more comprehensive educational programme that is tailored to its target audience.	Public's understanding of environmental and social 'sustainability' improved.	**Poor -** Unable to ascertain whether there was an increase in the understanding of this aspect by the public. Information concerning this is difficult to quantify given the subjective nature of environmental and social sustainability.
G2 Existence of decision-making and management body	The NCRPS has been delegated responsibility for the management of the NMP by the NCRPS under section 6 of the NRCA Act of 1991. This contract is valid for a period of five years after which it may be renewed at the agreement of both parties. The management structure for the NCRPS has been outlined in the management plan	Accountability and transparency of administrative and financial systems.	**Poor -** Results of the evaluation gave no indication of the current level of transparency and accountability in these systems.

Table 9.1 cont'd

Indicators	Results Summary	Objective	Ability of Indicators to Evaluate Management Effectiveness
G6 Availability and allocation of MPA administrative resources	Lack of funding and limited institutional capacity has impeded the implementation of most management programmes. Most funding and staff has been allocated to the administrative programme due to its pervasive nature. Volunteers have been suggested to rectify staff shortage. Need for greater financial stability for NCRPS to continue in its capacity as the management agency for the NMP.	Generate sufficient income to support the maintenance and sustainability of the park.	**Good -** Financial constraints impeding management activities and affecting park management were highlighted.
		Ensure that staff has the training, equipment and materials to facilitate their jobs.	**Moderate -** Presented more of a picture of what was lacking than what the organisation actually possessed, the quantities of materials and equipment and current condition. Lack of training opportunities for staff was highlighted.
		Hire additional staff as permitted according to funding availability and space.	**Moderate -** The need for additional staff was noted as well as factors that impeded this process such as inadequate finances to pay additional persons. Recommendations for alternate methods such as volunteers were noted.
		Develop an active volunteer programme to assist Marine Park staff.	**Poor -** It is unclear at how much effort was placed into the development and how successful any such attempts have been.
[NEW] Success of fundraising strategies (revenue and diversity of sources) that form part of the business plan to protect sustainable livelihoods	The NCRPS continues to struggle to management the NMP with limited financial resources. Aggregation of data may be misleading. There is a need to streamline administrative and financial activities.	[Through fundraising efforts] Heighten community awareness of the importance of financial sustainability as it relates to the protection of the coral reef ecosystem which is the tourism product.	**Poor -** Although deficiencies in finances were highlighted it was unclear of the level of the communities' awareness of the importance of financial stability.
G12 Level of stakeholder participation and satisfaction in management processes and activities	Most of the stakeholders are not satisfied with the level of fundraising activities undertaken by the NCRPS. They have failed to generate sufficient income to cover the organisations operational cost. Need to diversify income generating strategies, implement user fees and lobby government for promised management fees.	Generate sufficient income to support the maintenance and sustainability of the park.	**Poor -** Evaluation was able to highlight insufficiencies in the funds generated by activities undertaken by the NCRPS as well as level of satisfaction of the stakeholders in the activities that have been attempted previously. However the amount of funding raised by each activity, its sustainability and how far short of an achievable financial goal could not be determined was not determined.

9.2 Lessons learned

At the terminal workshop held in Punta Gorda, Belize participants in the MPA management effectiveness project assembled to discuss both the products and process of the evaluation. From discussions held on the outcome for each study site involved in this venture the lessons learnt from each stage of the process were discussed and main lessons as well as the site to which they were relevant to were determined. The main lessons gained from this project are discussed in the section below and summarised in tabular form in Appendix IV.

9.2.1 Appreciating evaluating management strategies

The process of evaluating management effectiveness in order to implement adaptive management techniques is a new process for all of the study sites involved in this project. Though in theory the evaluation of current administrative practices seems to be logical step in order to improve the management of any conservation area, managers are often so entangled in the day to day operations of running the MPA that processes like these become secondary. However this evaluation exercise has enabled MPA managers to fully appreciate its importance in improving the effectiveness of the management area. They have recognised its potential as a tool to promote transparency and accountability within organisations charged with the responsibility of maintaining these areas. This process may in fact foster greater trust in management organisations to fulfil their mandate by stakeholders who ultimately have a vested in these areas.

9.2.2 Institutional capacity for evaluations

In order to conduct the evaluation of some of the indicators a team effort was required at each stage of the process. Examples of this may be seen in the assessment of the socio-economic indicators in the NMP as well as the water quality indicator at all three sites. In some instances the availability of additional persons capable of conducting the evaluation would have improved the competency with which the assessment process was conducted. It is important to recognise that inadequate staff or the absence of persons with the skills and experience required for more technical aspects of the evaluation has the potential to undermine the efficiency of the exercise as well as the accuracy of the final outputs. Even though there may be some aspects of management that may need to be reviewed it is pointless to undergo the assessment process if weak institutional capacity impedes the efficiency with which data is assimilated, analysed and presented. Such a decision will ultimately result in a waste of time and financial resources that may have been better spent elsewhere.

9.2.3 Capacity building through evaluation

The business of running MPAs within developing countries is a difficult and daunting task. Managers must undertake tremendous tasks in the face of inadequate institutional capacity, limited funding and inconsistent assistance from government agencies. Lack of capacity has the capability to cripple both the management of the area as well as the effectiveness of the evaluation. It is important therefore that measures to build capacity within the organisation are undertaken during the assessment process. These measures may include opportunities for training in technical aspects of the process, report writing and presentation skills. In this way some of the cost of the evaluation process may be deferred by decreasing reliance on external assistance to conduct in house exercises that can be carried out by available personnel. However the level of institutional capacity that was expected to be built during the course of this project was not realised. This was exemplified in TCMP in the implementation of its water quality

monitoring programme. Despite efforts at training staff to carry out monitoring procedures, a lack of experienced persons severely affected the accuracy of the data collected Greater effort is needed in this area.

9.2.4 Undertake what can be managed

Due the fact that such an undertaking has never been attempted before, management agencies run the risk of overestimating what can be accomplished within the constraints of their limited resources. There are so many aspects of management that need to be thoroughly assessed that prioritising evaluation needs them may be a difficult task. Rather than run the risk of overlooking vital areas that are in need of evaluation managers may attempt to take on more than their resources can adequately handle. The result is improper evaluation of management goals and objectives that produce outputs that are unable to guide future management decisions or create a foundation on which subsequent evaluation exercises can be built.

9.2.5 Benefits of the evaluation process

Initiating evaluation exercises may often be met with some scepticism**.** Stakeholders may fail to see how such an evaluation will differ from various studies that have undoubtedly taken place in the past. Additionally, management agencies may be unsure of their ability to see such a process through to its completion and truly apply the information gained in a way that will have a meaningful effect on future park management. The training, financial assistance and outputs generated as a result of this process may serve to alleviate some of the doubts and develop a confidence in the management agencies ability to effectively conduct its own evaluations. Managers and stakeholders are able to see first hand the benefit that may be gained from the information gathered in this exercise and allowed practical experience with how it may positively influence management. Continued assessment that is built on this premise creates a reference point from which future evaluations may be conducted and a quantifiable avenue by which progress may be measured. With a viable way in which the effectiveness of various aspects of the MPA can be presented, the need for changes can be justified and measures to implement them can be formulated. The ability to see the potential positives of such a process has encouraged many of the participants to learn more about the evaluation exercise and give serious consideration to adaptively managing natural resources. Stakeholders have had the opportunity to learn more about the MPAs in their areas and as a result now feel the need to be more involved and active in its management.

9.2.6 Linking MPA objectives and activities

Some disparity has been recognised between the MPA objectives that have been outlined for these conservation areas and the management activities that area taking place. Often what is being done in practice has no practical application to the mandates that have been envisaged for the conservation area. Many factors may be responsible for this disparity, the major culprit being lack of necessary resources to carry out the functions necessary to meet these objectives. Another factor may be the lack of clearly defined objectives, especially when these are abstract and unspecific. This may result provides little guidance to those placed in charge of the MPA. It is important that the reasons behind the implementation of conservation areas not be forgotten. Careful decision making is necessary to ensure that all available resources are allocated to this end.

9.2.7 Cultivating a culture of management evaluation

A weak organisational culture to evaluate management effectiveness exists at both a national and international level. As a result organisations have failed to see the benefits that can be gleaned by identifying problem areas in the management process as well as innovative ways in which management may be improved. Stakeholders have been deprived of the opportunity to effectively participate in the management process and influence decisions that are made about the conservation areas and how the resources encompassed within them are deal with. Consequently inappropriate and ineffective management methods may continue while the benefits that may be derived from implementing appropriate conservation efforts in these areas may never be seen. Implementing evaluation methods which may lead to improved institutional capacity, attract funding for management undertakings as well as pinpoint changes that may be necessary in may provide the fodder needed to catalyse change in the current status quo which can impede the success of regional MPAs.

9.2.8 Differentiate between MPA and management body

When an evaluation is being done for a particular site, distinctions need be made on whether the evaluation is being done on the management body and or on the MPA itself. In some cases they are one and the same, but in the case of the NMP the management body, NCRPS, is distinct from the conservation area. When reporting on the results of the assessment it is important to explicitly state what the information that is being presented refers to.

9.2.9 Stronger science training for evaluation

During the evaluation of some of the indicators it is important to remember that the terminology and the process of data collection and analysis may require the technical services of someone that possesses a scientific background. While training for some indicators may be provided and the assessment successfully undertaken, technical expertise and experience may be necessary for others. Such was the case for water quality in TCMP where data collection was compromised by lack of a scientific background by the evaluation team. Participants were unable to understand the necessity of particular protocol or see the need to implement important procedures in the collection of samples**.** If such a background does not exist among current staff, measures should be taken to contract to competent persons outside of the management organisation for more technical aspects of the assessment.

9.2.10 Training needed in data analysis and report writing

In order to improve the accuracy and quality of the outputs generated, training may need to be provided in the areas of data analysis and report writing. In this way a standardised method of reporting can be formulated where information is accurately represented and clearly understood by target audiences. Training in data analysis may be necessary especially when this process requires the use of certain analytical software such as SPSS or specialised equipment.

9.2.11 Access to competent testing facilities

It is critical to have access to a fully functioning and certified laboratory in order for water quality results to be accurate. Samples must be subjected to specific conditions prior to testing in addition to being analysed within a 24 hour time frame. Outside of this samples cannot be used for analysis due to the microbiological content of the sample and the nature of its constituents which may change drastically outside of this time frame. The situation at the TCMP has resulted in an inability to use the results procured for management purposes which has resulted in a waste of scarce and important resources and the efforts of the collection and evaluation teams.

9.2.12 Evaluation of survey tools

In order to assess the effectiveness of questionnaires it may be pertinent to determine how effective they will be by pre- testing on a sub sample of the larger target population. Though this process may be time consuming it will be able to assess whether or not this evaluation tool can solicit the desired information from the target group. It will also serve to highlight whether the questionnaire is applicable to the target group and if the questions and terminology used are easily understood. Additionally this period will provide the interviewer with some practical experience enabling them to practice techniques on how to approach and extract the information needed from the respondent without adding bias to the interview.

9.2.13 Explicit requirements for evaluation

In order to ensure that there is some clear understanding of the outputs that should be generated for each indicator; there must be an appreciation of what each one seeks to measure and how it is ultimately related to the MPA objective. The outputs represent quantifiable information that must be represented in such a way that it is reflective of the level to which MPA objectives are being met and can be accurately interpreted by management bodies so as to effectively inform future management decisions. The accuracy of the evaluation depends on the extent to which those given responsibility for this task understand the process of the evaluation and how it leads to the expected product. Only then can the desired outputs have a greater probability of accurately reflecting the level of success achieved by the management process and suggest the changes that may be necessary in order for effective management to be realised. During the evaluation of many of the governance indicators in the NMP, members of the evaluation teams were often unsure of how to conduct data collection, analysis and reporting. Although examples of each stage of the evaluation were presented in the guide book

9.2.14 Presentation and validation of results

It is important that when results are completed from the evaluation exercise that they be presented to the communities and the stakeholders. Many of these were vital sources of information and will be willing to be more cooperative in future studied if they are informed of the results of the study. In effect this effort may offer a way in which to reduce respondent fatigue especially in those areas that will need to be accessed for information in the future. This creates a sense of ownership and involvement for community members and stakeholders who will be made to feel included in the evaluation process. It creates a avenue to improve the transparency and accountability of the management agency as the public are kept abreast of management activities, the effectiveness of these actions as well as plans to improve existing methods. Such a forum will allow participants the opportunity to offer up suggestion thereby creating an avenue for information exchange as well as a means by which stakeholder participation in the management process can be enhanced. Additionally it gives the evaluation teams a means by which to verify there results and identify any errors in the information that was collected that may affect the accuracy of the results.

9.2.15 Learning effectively and collectively through feedback

The terminal workshop held at the end of the evaluation process enabled participants in the management effectiveness project to discuss the challenges involved in the management of each of the MPAs as well as their experience with management effectiveness evaluation process. It provided an opportunity for collective discussion of the important lessons that could be derived from the experience, management methods used at particular conservation areas that could be

incorporated at other sites as well as propose recommendations for adaptive management. With the knowledge that some sites had resources and expertise that were lacking at other MPAs it gave those present a chance to create a network were skills and knowledge could be transferred and shared, providing prospects to build capacity for future management activities and management effectiveness evaluations.

9.2.16 Model survey tools for target audience

Surveys are only as effective as their ability to extract the desired information from the targeted audience. When designing this evaluation tool the relevance of the questions to the receiving audience should be considered. If the questions cannot be easily understood or have no bearing on the potential respondents they will fail to provide any information that may be useful for management purposes.

9.2.17 Increase in available secondary data

The evaluation process was based primarily on the collection and analysis of available secondary data. Where none was available base line studies were conducted. These processes served to located secondary data relevant to management evaluation that may have been previously overlook as well as provide baseline data on which future evaluations could build on.

9.2.18 Realistic and adequate budget needed

Adequate finances are necessary to effectively conduct the task required to carry out some aspects of the evaluation. When planning evaluation activities all aspects of the process should be carefully considered so as to determine the costs that may be incurred, if they can be deferred and if it at all feasible to undertake the evaluation. Failure to do this results in a waste of finances and effort when the evaluation cannot be completed or has to be delayed until additional funding can be found.

9.2.19 Recognition of positive steps

From this process it was realised that positive recognition was gained at the effort to evaluate current management practices for the purpose of improving the management organisations and enhancing conservation efforts. In the NMP some donor agencies interviewed were impressed by the attempted to evaluate the ways in which resources were managed. To many stakeholders this signalled that the NCRPS was serious about its mandates and dedicated to the sustainable development of the area. Such dedication not only inspires public trust in the abilities and competency of the management bodies but may also motivate donor agencies to be more willing to fund future conservation efforts**.**

9.2.20 Realistic and flexiable timetables

When creating a schedule for such an undertaking reasonable timelines in which the evaluation and analysis can occur must be determined. The process should be conducted in an expedient manner but it must also take into consideration unexpected delays and should be flexible enough to accommodate them without compromising the integrity of the project.

9.2.21 Awareness of stakeholder perception

Management agencies are allowed an occasion on which they are can view how there management efforts area being perceived by stakeholders and members of the general public. Whether management has allowed for an equitable and fair distribution of resource use or if disparities are perceived by the public can be determined. Each stakeholder has the capacity to affect the success of an MPA. By trying to determine if the needs of the stakeholders are being

accommodated within the management system and if educational methods are having any effect on behaviours strategies can be formulated to address these issues. It must be noted that management agencies may never have the approval of all of its stakeholders and though conservation efforts must be sensitive to the needs and culture of all stakeholders groups it should never be compromised to the extent that conservation efforts becomes secondary**.**

9.3 Adaptive management

Adaptive management presents an opportunity by which systematic learning as well as scientific research may be integrated into natural resource management (Berkes et al. 2001). By attempting to change the paradigm of traditional resource management, emphasis is placed on incorporating research into conservation action. These policies are treated as experiments where managers are able to adapt and learn from experience (Holling1978; Walters 1986). In this way the barriers between research and management are eliminated.

Founded in the field of industrial operation which was developed in the 1950's it was not until the 1970's that it was adapted as a resource management technique (Johnson 1999). Since this period, the idea of adaptive management has gained popularity and has been applied to a diverse set of issues ranging from the management of toxicants to the restoration of wetlands and coastal habitats (Johnson 1999). It is grounded in the fact that although the management of natural resources takes place in an atmosphere of uncertainty where the environments are not static and interactions between people and ecosystems are unpredictable, effective resource management is still necessary. More importantly, it highlights the fact that conservation efforts cannot be suspended until it is felt that there is a great enough understanding about the ecosystem or a large enough store of knowledge. Rather actions should be taken in this environment of uncertainty bearing in mind that human dependence on natural systems, development within fragile ecosystems and declines in the abundance of valued biota are pressing issues (Lee, 1999).

Adaptive management is also based on the premise of social and institutional learning where emphasis is placed on the need for feedback from the environment to have the ability to inform policy (Berkes at al. 2001). There is acknowledgement of the fact that proposed solutions are ephemeral, inherently inadequate and incapable to deal with all aspects of natural resource management. Learning by intent is imperative due to the very nature of ecosystems which are dynamic and where changes are multifaceted and poorly understood. Effectively, learning does not only occur on the basis of management success but also as a result of its failures. It is important that what is learnt can be translated into changes in management approach where new and innovated methods can be employed based on the experiences undergone in the process. This learning process however is based on the premise that these experiences can be remembered long enough to result in an evolution of the management system in response to its current inability to produce a desired outcome. This brings the issue of adequate institutional memory to centre stage where documentation of decisions, evaluation of results and appropriate responses to the evaluation must be undergone for institutional learning to be realised and made able to influence policy (Hilborn, 1992).

Management of natural resources occurs against a backdrop of dynamic processes where it may be difficult to distinguish between the effects of management strategies and concurrent changes in the natural environment (Lee 1999). These constant fluctuations in causal factors, responsible for ecosystem change, may create a situation in which superstitious learning based on erroneous connections between cause and effect can be made (Lee 1999). A scientific, research-based

approach which exposes management strategies to the rigors of experimentation may provide a means by which greater understanding of the complexity of natural systems can be realised. Despite its experimental nature an explicit vision or model of the ecosystem is necessary if organisations are to manage adaptively (Lee 1999; Crosby et al, 2000). This should include clearly defined management goals and objectives as well as response indictors for evaluation (Crosby et al. 2000). This vision or model provides a baseline against which change can be measured (Lee 1999).

Although the adaptive management approach shows promise there have been many shortfalls that have impeded the success with which it can be implemented (Johnson 1999). It has been proven that the process can be both costly and slow (Johnson 1999). The benefits of a research based approach are likely to result in a gradual understanding of ecosystem and the social dynamic, where the ways in which management does and does not affect outcomes are determined over time (Lee 1999). This has to be viewed against the backdrop of the short term goals of many bureaucratic systems as well as the immediate needs of stakeholder groups to whom managers have a social obligation. Additionally many management agencies may be resistant to change and unwilling to undertake long term policies that appear too risky and costly (Johnson 1999). Ironically, knowledge of the combined social, economic and ecological systems is always incomplete. By undertaking this management approach there must be a shift in the status quo where it is understood that ecosystems cannot be maintained within a single optimal state. Rather an attempt should be made at maintaining optimal management capacity by endeavoring to create more resilient management systems and encouraging greater flexibility in management institutions (Johnson 1999). Perhaps there is a need to apply adaptive management practices not only to the resources but to the institutions that are charged with safeguarding them as well (Johnson 1999).

9.4 Recommendations for Adaptive Management

The evaluations conducted at the three MPAs have highlighted the importance of carrying out regular assessments of management strategies to determine effectiveness and to guide change. The managers who have participated in this process have gained greater appreciation of the potential benefits that can be gleaned from frequent self appraisal. It is a means by which information can be provided that creates a reference point of where management is relative to the original objectives stipulated for the conservation area. By locating that point, it is more feasible to chart a course towards the fulfilment of mandates that have been outlined for the MPA. Perhaps this will create a shift in the paradigm of evaluation from that of an opportunity to assign blame to that of an occasion to evaluate current strategies and justify the need for necessary change.

The experiences with the evaluation of water quality in the TCMP and the SCMR highlight the need to integrate such appraisal mechanisms at the inception of new management activities. The deficiencies in the monitoring programme, the need for external support and the importance of having explicitly stated goals and protocols can be applied to all aspects of management. The earlier these insufficiencies are identified; the sooner modifications can be made to the process. This will enable management agencies to make wise choices as it relates to the allocation of time and resources.

When choosing evaluation tools one must be mindful of the importance of ensuring that these tools encompass all facets of the management activities; biophysical, governance and socio

economic. In this study there has been a tendency to lean towards the assessment of the governance aspect. There may be several reasons for this trend which are beyond the scope of this report. Perhaps the framework in which these appraisals can be conducted already exists. If so there would be little need for extensive training, there would be accessible sources of secondary data for assessment and little or no additional equipment would be required. These factors aid in the reduction of evaluation costs. Additionally it may be thought that enhancing administrative functions will result in a top down effect where an improvement will be seen in all facets of management. What ever the true reason, care must be taken in the selection of performance indicators so that any appraisal conducted can provide a holistic view of management activities which adequately addresses all aspects of the conservation efforts.

Furthermore effective evaluations are only as good as their ability to influence change in MPA management. Significant time, effort and expense are often essential for in house assessments. The primary goal of this process is to highlight where management has fallen short or where methods used can be improved to increase the success of the MPA. It is a guide, providing the information required to keep activities focused in order to realise conservation goals. It may serve to highlight the need for adjustments to these goals so that through the evolution of management objectives, conservation efforts can be enhanced and sustainable development can be achieved. However information without action achieves nothing. If the bureaucratic power to address management issues and develop means by which they can be addressed does not lie in the hands of those charged with management of the area, then those that hold this power need to recognise the important role they play in MPA success. Greater support is needed from those in a position to facilitate change if administrative organisations are to be able to manage adaptively.

Recommendation for ways in which adaptive management can be integrated into the study sites were made by those present at the terminal workshop held in Punta Gorda, Belize. Suggestions were based on the results of the evaluations, the experience in management of the respective MPAs and the learning experience which resulted from dialogue with all who were present. Site specific recommendations are outlined below.

9.4.1 Negril Marine Park

There is a need for greater conservation communication. In this way stakeholders gain knowledge on how they impact on the marine environment and are able to make informed choices about their behaviours. In addition to this greater communication creates transparency within the organisation and allows stakeholders to feel included in the management process; fostering a sense of ownership. NCRPS may facilitate this through holding regularly scheduled meetings between managers and stakeholders, increasing the frequency of public meetings, and the establishment of a comprehensive educational programme.

Ways in which financial management can be enhanced should also be carefully considered to maintain the viability of the management organisation and to create means by which to implement programmes that may enhance management.

9.4.2 Tobago Cays Marine Park

A comprehensive educational programme is required in the TCMP. The management agency in the NMP has had more extensive experience with some aspects of public environmental education. TCMP may draw upon this experience. One example of this is the Juniour Ranger Programme established by the NMP which may be implemented in the TCMP with the assistance of their Jamaican counterparts to enhance youth awareness and education.

Improvements may also be made to the TCMP brochure to make it more user friendly and appealing to read while ensuring that the information can be easily understood by a wide audience.

Training is needed in enforcement systems for the rangers responsible for patrolling the area. This includes detailed records of offenses committed within the MPA. More extensive training is also required for water quality monitoring where participants understand and have the capability of following stipulated procedures and protocol. Administrative staff needs to be instructed in ways in which to effectively carry out management functions. Training in data recording and reporting is may be prudent.

9.4.3 Sapodilla Cayes Marine Reserve

Environmental education material though thought to be generally good has been found to be sporadically distributed. Plans for the dissemination of educational materials should be formulated in order that community stakeholder interaction can be enhanced through regularly scheduled distribution of newsletters and brochures

10 REFERENCES

Agardy, T. 2000. Information for Marine Protected Areas. Scientific Societal Bulletin of Marine Science. 66(3): 875-888

Berkes, F., R. Mahon, P. McConney, R. Pollonac and R. Pomeroy. 2001. Managing small scale fisheries: Alternate directions and methods. International Development Research Centre (IDRC). Ottowa, Canada

Blackman, K. The Caribbean Coastal Co Management and Coral Regeneration Programme- 4C's Jamaica Project-Information for the Negril Marine Park's Fisheries Management Plan. MSc Thesis, University of the West Indies, Barbados.

Blue, B. 2006. Assessment report of the success of fundraising strategies undertaken by the Negril Coral Reef Preservation Society in the management of the Negril marine Park for the period 2004 to the first quarter of 2006. 2pp

CERMES. 2005a. Report on the inception training workshop for enhancing the management effectiveness of the Tobago Cays Marine Park, St. Vincent and the Grenadines. Union Island 19-20 December 2005. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No.1.25pp.

CERMES. 2005b. Socioeconomic monitoring and fisheries management planning for for the Negril Marine Park.26pp.

CERMES. 2006a. Report on the inception training workshop for enhancing the management effectiveness of the Negril Marine Park, Jamaica.26-27January 2006. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No.2. 31pp.

CERMES. 2006b. Report on the inception training workshop for enhancing the management effectiveness of the Sapodilla Cayes Marine Reserve, Belize.4 -5 February 2006. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No.3. 26pp.

Cincin-Sain, B., and Knecht, R.W. 1998. Intergrated Coastal Management: Concepts and Practices. Washington, D.C. Island Press.

Davis, L. 2004. The NGO Entrepreneur-Non Profit in Purpose; for Profit in Approach: Recognising the Limitations of Current Donor Funding.
http://www.isar.org (assessed 27 October 2006)

Figueroa, M. 2002. Comanagement and valuation of Caribbean coral reefs: A Jamaican NGO perspective. *World Fish Centre*. 182-191

Geoghegan,T., A. H. Smith and K. Thacker. 2001.Characterisation of Caribbean marine protected areas: An analysis of ecological, organisational and socio-economic factors. CANARI Technical Report No. 287

Geoghegan, T., and Y. Renard. 2002. Beyond Community Involvement: Lessons from the Insular Caribbean. *Parks* 12 (2): 16-25.

Goreau, T.J. 1992. Negril: Environmental threats and recommended actions. Water Quality Issues: Final Report.

Gunderson, L.1999. Resilience, flexibility and adaptive management: Antidotes for spurious certitude. Conservation Ecology 3(1): 7. [online] URL: http://www.consecol.org/vol3/iss1/art7/ (assessed 27 July 2006)

Heyman, A. M., T.J. Riegert, A. Smith, T. Shallow and J.R. Clark. 1988. Project Proposal: Development of the Tobago Cays National Park. Government of St. Vincent and the Grenadines and Organisation of American States. 97 pp.

Hilborn, R. Can fisheries agencies learn from experience? *Fisheries*, 17(4), 6-14

Holling, C.S., ed. 1978. Adaptive environmental assessment and management. Wiley, London, UK

IUCN.2004. Incorporating Marine Protected Areas into Coastal and Ocean Management: Principles and Guidelines. Gland: The World Conservation Union.

Johnson, B.L. 1999. Introduction to the special feature: adaptive management- scientifically sound, socially challenged? Conservation Ecology 3 (1): 10 [online] URL: http://www.consecol.org/vol3/iss1/art10 (assessed 27 July 2006)

Lapointe, B.E et al. 1997. Community Based Whole Water shed and Coastal Zone Management in Jamaica. Prepared for the proceedings at the 8th International Coral Reef Symposium. 8pp

Lapointe, B.E and K. Thacker. 2002. Community- based water quality and coral reef monitoring in the Negril Marine Park, Jamaica: Land-based nutrient inputs and their ecological consequences.

Lapointe et al. n.d. Negril water quality and coral reef monitoring. Negril Coral Reef Preservation Society (NCRPS). 10pp.

Lee, K. N. 1999. Appraising the adaptive management. Conservation Ecology 3(2): 3. [online] URL: http://www.consecol.org/vol3/iss2/art3 (assessed 27 July 2006)

Mascia, M. 2004. Social Dimensions of Marine Reserves. Marine Reserves: A Guide to Science Design and Use. Island Press Washington D.C.

McConney, P.2005. International Coral Reef Conservation Grant Proposal. Centre Resource Management and Natural Resource Studies, UWI. Cave Hill. Barbados.

NCRPS.n.d. Business Plan Negril Marine Park. Negril Coral Reef Preservation Society, Negril, Jamaica.

NCRPS. 2004. Operational Plan 2006-2007. Negril Coral Reef Preservation Society, Negril, Jamaica.

Nightengale, J. 9th November, 2006. Personal Communication. 59th Gulf Caribbean Fisheries Institute Conference, Princess Hotel, Belize.

Outokon, S. 2001. Case study of the Negril Environmental Protection Plan, Jamaica. CANARI Technical Report No. 284. 10pp.

Pena et al. 2006. Report on Management Effectiveness at the Tobago Cays Marine Park (TCMP), St. Vincent and the Grenadines. Draft. Presented at the Terminal Workshop of the CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. 4 November 2006.61pp.

Pinkerton, E., ed.1989a. Cooperative management of local fisheries: new directions forr improved management and community development. University of British Columbia Press, Vancouver, BC, Canada.

Pomeroy, R. S, John, E. Parks and L. M. Watson. 2004. How is your MPA doing? A Guidebook of Natural and Social Indicators for evaluating Marine Protected Area Management Effectiveness. The World Conservation Union (IUCN). Gland, Switzerland.230pp

Romulus, G. 1996. Towards the establishment of a management structure for a marine park and protected area in Negril, Jamaica. Prepared for presentation at the OECD/DAC Workshop on "Capacity Building in Environment," Rome. December 1996. 15pp

Salm, R.V. and John R. Clark. 2000. Marine and Coastal Protected Areas: A Guide for Planners and Managers. The World Conservation Union (IUCN). Gland, Switzerland.

Shindler, B. and K. Aldred Cheek. 1999. Integrating citizens in adaptive management: A prepositional analysis. Conservation Ecology 3(1): 9 [online] URL: http://www.consecol.org/vol3/issu1/art9/ (assessed 27 July 2006)

Sobel, J. and C. Dalgreen. 2004. Marine Reserves: A Guide to Science, Design and Use. Island Press Washington D.C.

Thanker, K and C.Hanson.2003.Negril Marine Park Management Plan.Negril Coral Reef Preservation Society.130p

UNEP. 1994. Regional overview of land based sources of pollution in the wider Caribbean region. Caribbean Environmental Program Technical Report 33. UNEP Caribbean Environmental Program. Kingston, Jamaica.

Walters, C.J. 1986. Adaptive management of renewable resources. McGraw- Hill, New York, NY, USA.

11 APPENDICES

11.1 APPENDIX I. Individual and Household Socio - Economic Monitoring Survey for NMP by NCRPS

April 2006 survey on the level of understanding of human impacts on resources in the Negril Marine Park and distribution of formal knowledge to the community by the NCRPS

This survey is being done by the NCRPS, the non-governmental organisation that manages the Negril Marine Park, so as to improve the Park. It addresses how people understand human impacts on resources in the NMP and the distribution of information to the community by the NCRPS. Any information you give cannot be traced back to you. You will not be personally identified in any reports. We will be sharing results from the whole survey with the public. After a few years you may be asked questions again to see if things have changed.

Date _____ Settlement _____
yyyy – mm – dd

Record questionnaire number, settlement, respondent identity and address on separate sheet
Write DK = do not know and NR = no response as appropriate by the question where necessary

---

This survey asks the head of the household about his or her opinions, and about other people in the household. I would like to speak to the head of the household or the person closest to head.

1. What is your relationship to the head of the household?
[ ] head of household
[ ] wife / husband of head
[ ] common law partner of head
[ ] child of head / head's spouse / head's partner
[ ] parent of head / head's spouse / head's partner
[ ] brother / sister of head / head's spouse / head's partner
[ ] other relative of head / head's spouse / head's partner
[ ] other (explain) _____

The Negril Marine Park stretches along the coast from the mouth of the New Savannah River, by Broughton, in the south to Davis Cove in the north … and out to sea for two miles from the coast. This is what it looks like on a map … and this is where we are now. Discuss if necessary.
[*SHOW MAP, KEEP NEARBY TO REFER TO, TELL PERSON THEY CAN KEEP IT AFTERWARDS]*

2. Have you heard about the Negril Marine Park before now?
[ ] yes … In about what year did you first hear of the NMP? _____
[ ] no

The Negril Coral Reef Preservation Society, or NCRPS for short, is the non-governmental organisation responsible for managing the Negril Marine Park along with the government.

3. Have you heard about the Negril Coral Reef Preservation Society, or NCRPS, before now?
[ ] yes … In about what year did you first hear of the NCRPS? _____
[ ] no

In order to better manage the NMP the NCRPS needs to know whether scientific and educational information is getting to the people who use the area and if the mechanisms for dissemination of information are effective.

4. Are you aware of any environmental educational information distributed by the NCRPS?
[ ] yes
[ ] no

5. If yes, how was the environmental education message delivered?

[ ] 1. Brochures	[ ] 4. Poster	[ ] 7. Meeting
[ ] 2. T.V.	[ ] 5. drama/skit	[ ] 8. Training
[ ] 3. Radio	[ ] 6. Workshop	[ ] 9. other_____

6. If yes, what was the message of the environmental education information? _____

7. Was the delivery of the message effective?

_____

_____

8. Do you feel that the educational information is having an impact on the people in the community? Yes___ No___

9. What type of impact is the environmental education having on people?

_____

_____

10. How can the environmental information be improved?

_____

_____

Question 9 should be directed to individuals who are able to provide the information. This includes Hotel Managers, Watersports Managers and Operators.

11. Do you feel that any events or activities are having an effect, positive or negative, on the natural environment of the NMP? Yes___ No___
12. What specific events or activities are having an effect on the natural environment of the NMP?

13. What changes in the natural environment of the NMP do you attribute to these threats?

14. Do you have guests who SCUBA or snorkel?

[ ] yes … How many per month? Scuba___ snorkel___
[ ] no

15. On this map of the NMP, can you please locate the primary locations where your guests SCUBA or snorkel?

16. Do you feel that these activities (including boat tour activities) have affected the natural environment of the NMP?

17. What changes happened as a result of these activities?

18. Thinking specifically about the marine resources of the park (beaches, seagrass, mangroves, reefs, fisheries), what are the three main problems that you have observed with these resources?

1.
2.
3.

19. What are the three main solutions that you recommend to solve the three problems?

Q18 Nature of problem	Q19 Recommended solution
1	
2	
3	

In order to relate your information to the 2001 national census and other studies that describe the Negril area we need to get some basic information on the household in which you live.

20. Sex of respondent *(observed)*

[ ] Male [ ] Female

21. What is your date of birth? _____

yyyy – mm – dd

22. Which is the last type of school that you attended?

[ ] 1. none [ ] 4. post-secondary / technical
[ ] 2. primary (all-age to 10y)[ ] 5. university
[ ] 3. secondary (past 11y) [ ] 6. Other _____

23. How long has the household been located in this settlement?

Years ago_____ Year date_____

24. Which is the best way to get information to you about the Negril Marine Park?

[ ] Television [ ] Radio
[ ] School [ ] Workplace
[ ] Flyers/posters [ ] Newspapers
[ ] Area liming spot [ ] Organisation (Name) _____
[ ] Other
[ ] meeting
[ ] workshop
[ ] training
(Please describe) _____

25. Is there anything else that you would like to say about the NMP that I have not asked about?

_____

_____

26. Is there anything you would like to know about the NMP? I will pass along your questions.

_____

_____

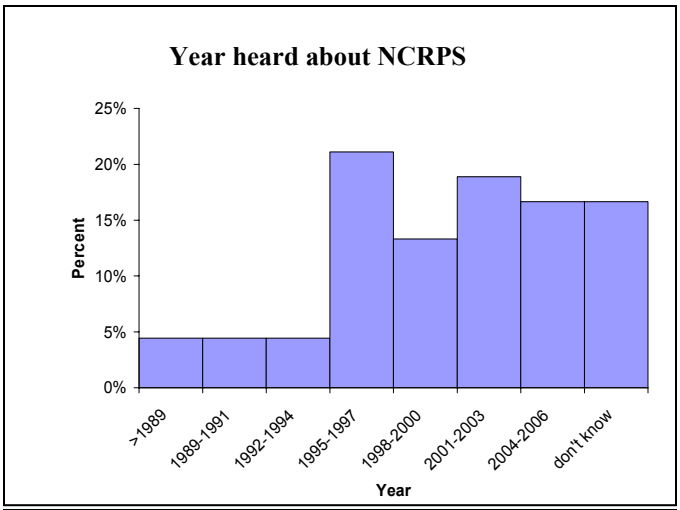
27. Would you attend the meeting where the results of the survey will be presented?

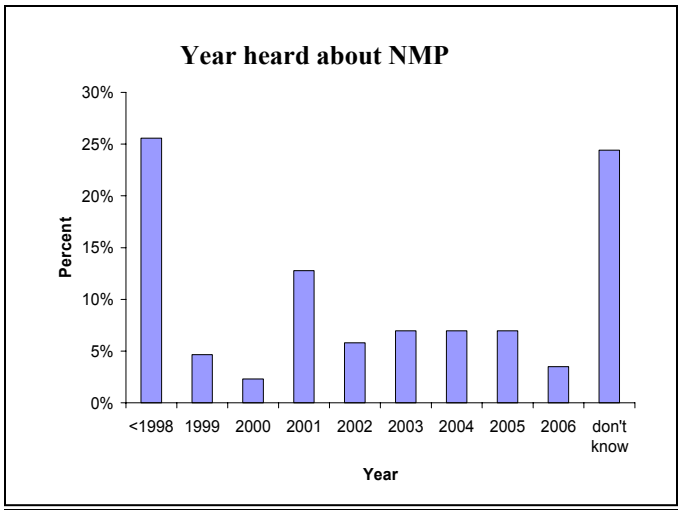
[ ] Y [ ] N

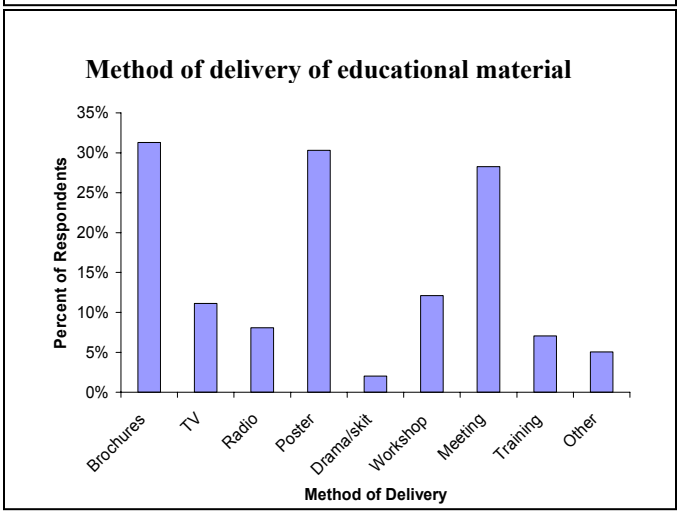
On behalf of the NCRPS — Thanks very much indeed for your assistance. Please keep the map

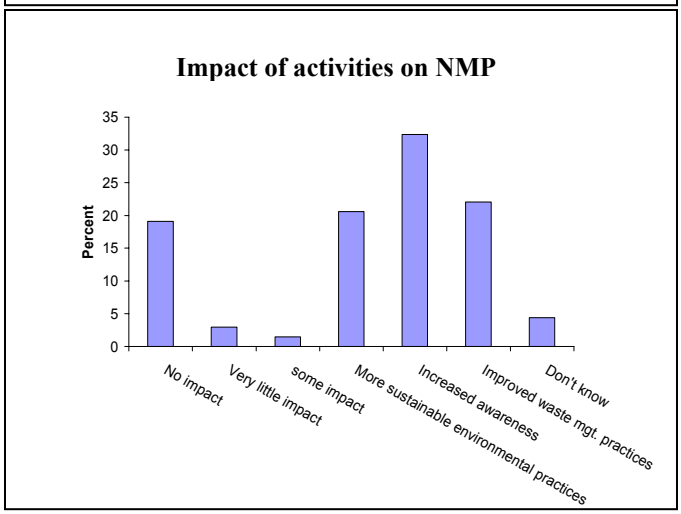
11.2 APPENDIX II. Results from Socio-economic Monitoring Survey

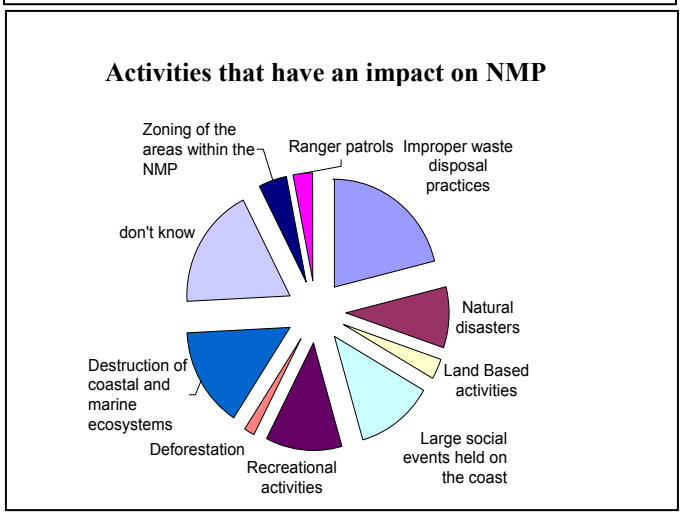
- **Community Members**

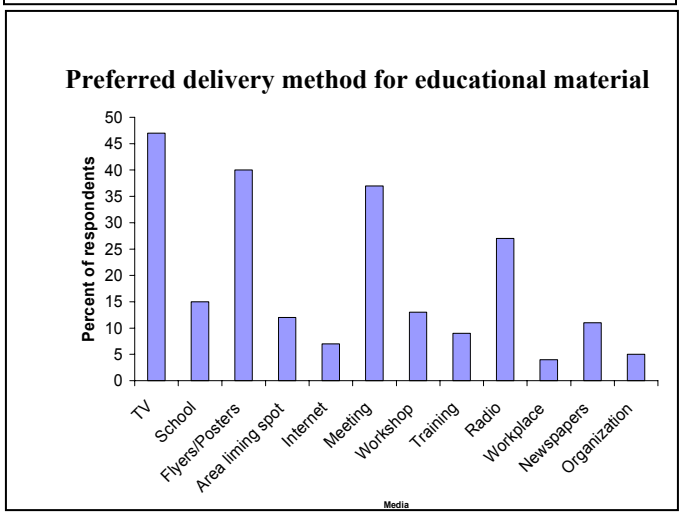




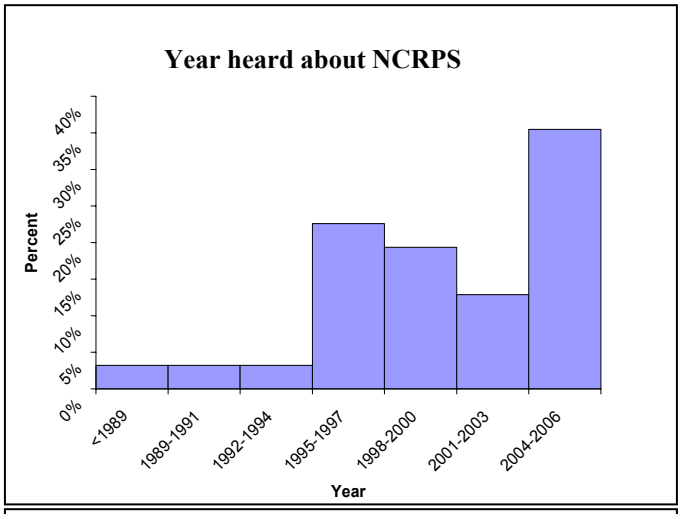


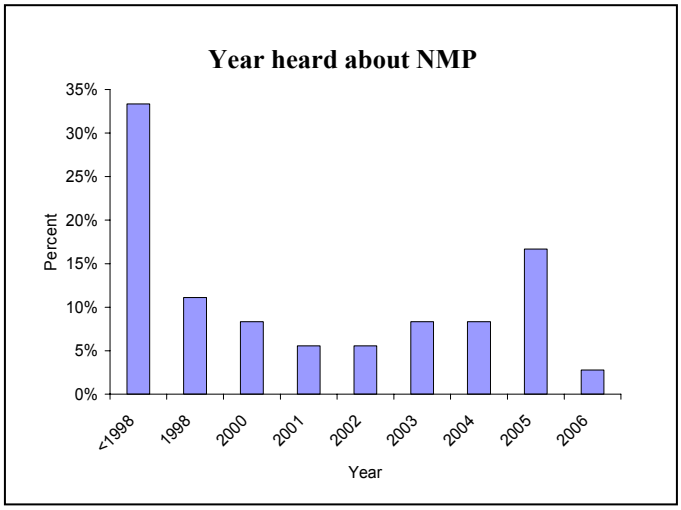


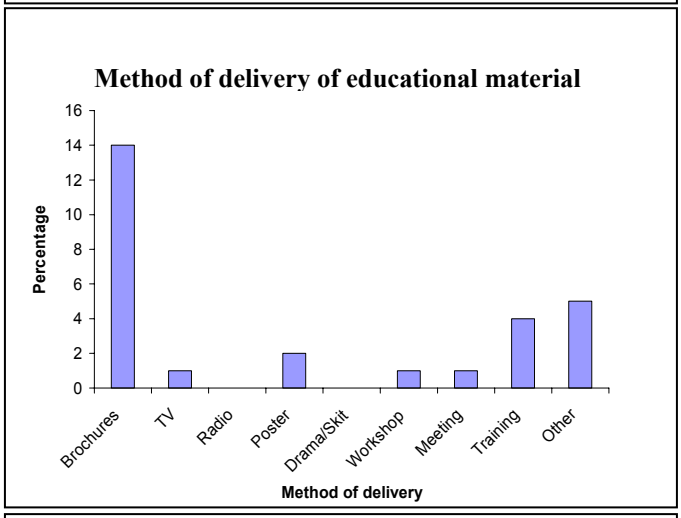


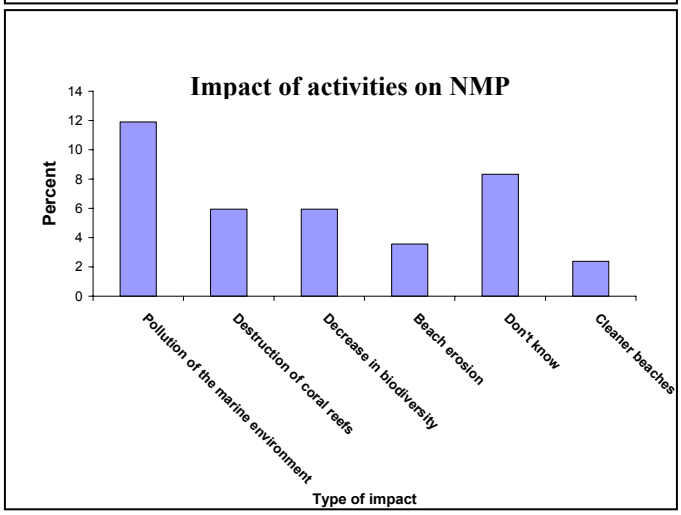


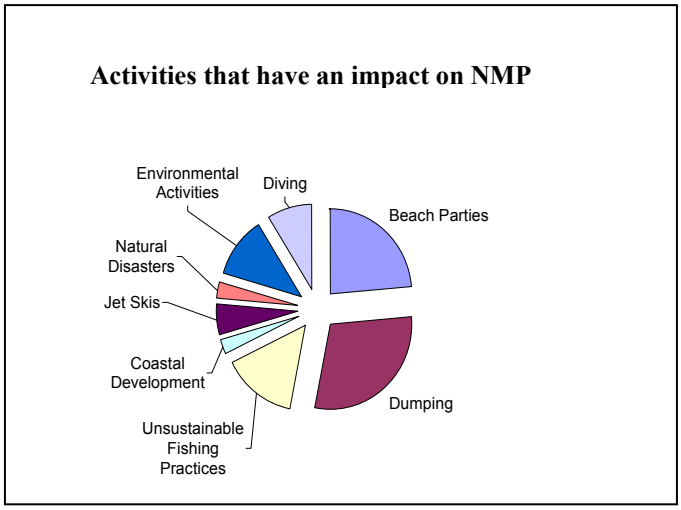
- **Tourism Workers**

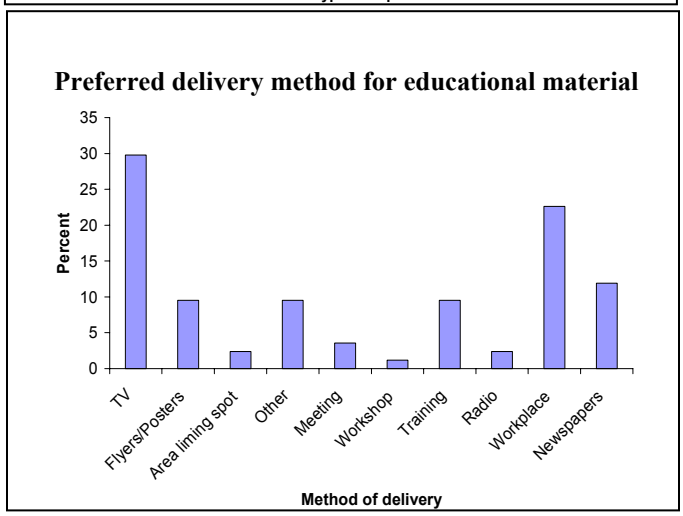




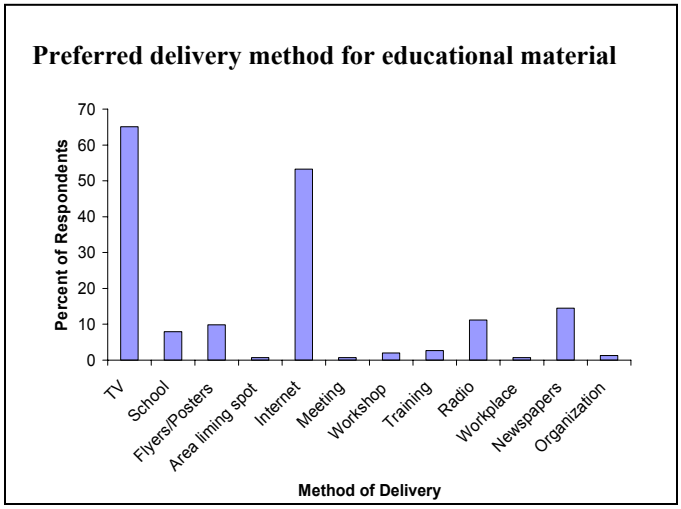








- **Tourists**


Preferred delivery method for educational material
Percent of Respondents
70
60
50
40
30
20
10
0
TV
School
Flyers/Posters
Area liming spot
Internet
Meeting
Workshop
Training
Radio
Workplace
Newspapers
Organization
Method of Delivery

11.3 APPENDIX III. Stakeholder Survey Form for Board Members. Regulatory Agencies and donor agencies for the NMP

Stakeholder Participation and satisfaction in management processes and activities of the Negril Coral Reef Preservation Society

Questionnaire

Please tick the appropriate box

1. Which Organization do you belong?

   NCRPS Board ☐ Member Organization ☐ Funding Organization ☐

2. If you belong to a member or a funding organization, please state organization

   ---

3. In what way do you participate in the management processes and activities of the NCRPS?

   Contributing ☐ Lobbying ☐ Fund-raising ☐

4. a. Do you know the needs (financial or otherwise) of the NCRPS?

   Yes ☐ No ☐

   b. How many times per year do you participate in the activities of the NCRPS?

   ---

5. What are the activities undertaken by the NCRPS since January 2005 to improve the management of the park?

   ---

6. What (other) activities would you want to see the NCRPS undertake to improve their management of the Negril Marine Park?

---

7. Are you satisfied with the level of funds raised by the NCRPS?

Yes ☐ No ☐ Don't know ☐

8. What (other) types of fund raising activities would you want the NCRPS to execute in order to build their financial capacity to manage the Negril Marine Park?

---

9. Will you support the NCRPS in future fund raising activities planned?

Yes ☐ No ☐ Don't know ☐

10. How do you promote the NCRPS in your Organization and/or Community?

11.4 APPENDIX IV. Lessons learnt during the evaluation process for all study sites

Lessons learned	B/A	NMP	TCMP	SCMR
MPA managers appreciate importance of evaluating management (transparency and accountability)	B	+	+	+
Better to have reasonable capacity to conduct in-house evaluations at the start	A	+	+	+
Good to design to build capacity through the evaluation	A	+	+	+
Better to start with what can manage and then build the evaluation	A	+	+	+
Gaining confidence through conducting the evaluation leads to greater willingness to learn, to adapt and to improve management	B	+	+	+
Need to repair poor links between MPA plan objectives and its activities	A	+	+	+
If there is a weak organisation (national, regional) culture of evaluating management, this needs to be overcome by the process	A			
When undertaking the evaluation distinguish between the marine park and management organisation	A			
In order to assess some bio-physical indicators requires access to stronger science training or external support as part of the evaluation	A		+	
TCMP staff training in data analysis and report writing necessary	A		+	
Water quality monitoring requires ready access to labs that are fully functional	A		+	+
Pre-testing of questionnaires on sub-sample required and testing of data analysis	A	+	+	+
Present and validate results to community and stakeholders (also addresses respondent fatigue)	A	+	+	+
Feedback from the evaluation team members at workshop to learn collectively and build capacity	A	+	+	+

Lessons learned	B/A	NMP	TCMP	SCMR
While planning the evaluation ensure there is understanding of the requirements to undertake the evaluation (especially the first time around)	A	+	+	+
Identify external technical assistance that may be needed during the evaluation process	A	+	+	+
In designing measurements for indicators note influence of target audiences on survey design	A			
Use the evaluation process to increase the availability of secondary data for analysis	A			
Ensure adequate and realistic budget is available to undertake the evaluation	A			
Positive recognition to the organisation undertaking the evaluation, e.g. donor agencies	B	+	+	+
Establish realistic timelines for evaluation with flexibility	A			
Management organisation gains knowledge on perception of stakeholders regarding its activities	B			

.

Appendix 5

Roach, D., M. Pena, P. McConney, R. Pomeroy, M. Baptiste, J. Nightingale and E. Hemmings. In press. Learning from evaluating MPA management effectiveness. Proceedings of the Gulf and Caribbean Fisheries Institute 59.

Learning from evaluating MPA management effectiveness

D. ROACH[1], M. PENA[1], P. McCONNEY[1], R. POMEROY[2],
M. SMALL[3], J. NIGHTINGALE[4] and E. HEMMINGS[5]
[1]*CERMES, University of the West Indies Cave Hill Campus, Barbados (dlproach@gmail.com)*
[2] *Dept. of Agricultural and Resource Economics, University of Connecticut-Avery Point, USA*
[3]*Tobago Marine Park, Union Island, St. Vincent and the Grenadines*
[4]*Sapodilla Cayes Marine Reserve, Belize*
[5]*Negril Marine Park, Negril, Jamaica*

In the Caribbean it is imperative to ensure that scarce coastal and marine space is used most efficiently and effectively for the purpose intended, among the several possible and competing uses. The number of 'paper parks' needs to be drastically reduced. Stakeholders need to know that Marine Protected Areas (MPAs) are achieving biodiversity, fisheries or other bio-physical objectives. They need to be convinced that socio-economic benefits and development will result from proper MPA management. For the above to occur there must be good governance from national policy and planning through to the community level. This is why evaluating MPA management effectiveness and instituting adaptive MPA management are critical. The work in progress that this paper reports upon is a project for enhancing management effectiveness at three MPAs in St. Vincent and the Grenadines, Jamaica and Belize. The MPAs are respectively the Tobago Cays Marine Park, Negril Marine Park and Sapodilla Cayes Marine Reserve. Training inception workshops were held to build stakeholder capacity to understand and undertake evaluations of MPA management effectiveness as set out in the guidebook 'How is your MPA doing?', and to decide on goals, objectives, indicators and local evaluation teams. Fieldwork was undertaken to measure the extent to which selected objectives were being achieved. Preliminary results of the evaluation, lessons learned from both the results and the process, and recommendations for adaptive management are reported on. Next steps include the implementation of new management measures and the preparation of teaching and training material to share the lessons learned.

KEY WORDS: effectiveness, evaluating, learning, lessons, management, MPA

RESUMEN

Aprendiendo de la evaluacion de la efectividad de manejo de AMP

En el Caribe resulta imperativo asegurar que el escaso espacio costero y marino sea utilizado de manera eficiente y efectiva para los propósitos previstos, entre los varios posibles y contendientes usos. El número de "parques de papel' necesita ser drásticamente reducido. Las partes interesadas necesitan saber que las APMs están logrando obtener biodiversidad, pesca u otros objetivos bio-físicos. Necesitan estar convencidos que beneficios socio-económicos y desarrollo resultaran del manejo apropiado del APM. Para que lo anterior suceda debe existir una buena gobernabilidad desde las políticas nacionales y planificación hasta el nivel comunitario. Es por ello que la evaluación de la efectividad del manejo de APM y la institucionalización de manejo adaptado de APM es crítica. El trabajo en progreso sobre el cual este escrito reporta es un proyecto para realzar la efectividad del manejo en tres APMs en San Vicente y las Granadinas, Jamaica y Belice. Las APMs son respectivamente el Parque Marino Cayo Tobago, Parque Marino Negril y Reserva marina Cayos Sapodilla. Talleres iniciales de capacitación fueron llevados a cabo para desarrollar la capacidad de las partes interesadas a fin de que puedan entender y realizar evaluaciones de manejo efectivo de APM como se establece en la guía 'How is your MPA doing?', y para decidir sobre las metas, objetivos, indicadores y equipos locales de evaluación. El trabajo de campo se llevó a cabo a fin de medir los logros alcanzados de objetivos seleccionados. Resultados preliminares de la evaluación, lecciones tanto de los resultados como de los procesos, y recomendaciones para manejo adaptado son reportados. Los pasos siguientes incluyen la implementación de nuevas medidas de manejo y la preparación de material de enseñanza y capacitación para compartir las lecciones aprendidas.

PALABRAS CLAVES: efectividad, evaluación, aprendizaje, lecciones, manejo, APM

INTRODUCTION

Three Marine Protected Areas (MPAs) within the region were chosen for an in-depth study into the implementation of practical evaluation methods; Tobago Cays Marine Park (TCMP), St. Vincent and the Grenadines; Negril Marine Park, Jamaica (NMP), and Sapodilla Cayes Marine Reserve (SCMR), Belize. In collaboration with the Centre for Resource Management and Environmental Studies (CERMES), University of the West Indies, the managers and stakeholders at the three MPAs were able, through participatory approaches, to facilitate stakeholder involvement and adaptive management. In doing so it ensures that based on the lessons learnt and the skills gained through training, continuous monitoring of project progress and evaluation and interpretation of results will that best practices can be institutionalised (McConney 2005).

This project was made possible through the NOAA Coral Reef Grant Association (CERMES 2006a). There were two specific objectives for this project (McConney 2005);

1. "*To conduct participatory management effectiveness research and evaluations by training at least 30 people across three MPA sites in the Grenadines, Jamaica and Belize in management effectiveness evaluation and adaptive management*."
2. "*To improve MPAs in the region by monitoring national and regional-level outcomes from evaluations and adaptive management as documented in widely shared lessons learned from the project, combined with training and communication materials for graduate coursework, further research, management and policy*."

Comprised of four main components, the overarching goal of this project was to promote and institutionalise enhanced and adaptive coastal management practices achieved through applied research and interdisciplinary training (CERMES 2006a). Not only will the lessons gleaned from this initiative serve to inform and improve management at the three study sites, but they may take on a regional perspective acting as a guide for countries that wish to do similar assessments and adopt similar management approaches. Such an endeavour also creates the opportunity for information to be gathered on some aspects of the effectiveness of co-management strategies. Two of the sites, NMP and SCMR, have adopted co-management agreements while the management of the TCMP has expressed interest in pursuing such an agreement.

METHODS

Multi-stakeholder inception training workshops were held at each of the three study sites (CERMES 2005a, CERMES 2006a, and CERMES 2006b). These stakeholders were identified through a brief stakeholder analysis and included participants drawn from MPA management bodies, relevant government agencies and organisations, various NGOs, informal civil society groups and funding agencies. Each of these persons was introduced to the marine effectiveness evaluation methodology adapted from the guidebook "How is your MPA doing?" written by Dr. Robert Pomeroy and others (2004). During the two day training sessions held at each MPA, participants were trained in the use of the methodology. Using both the text and worksheets that were provided, the goals and objectives of the MPA were aligned to those in the guidebook.

In the case of TCMP where no goals and objectives for the conservation area have been explicitly agreed to, relevant ones were determined for the evaluation exercise (Pena *et al*. 2005). Through a process of discussion and open voting goals and objectives that were deemed most relevant as well as most feasible to evaluate were selected (CERMES 2005b). These goals and objectives that were specific for each study site were then used to identify overlapping goals and objectives in the guidebook as well as their associated indicators that would be used in the evaluation process. Similar processes were undertaken at the NMP and SCMR, but using their written management planned as the source documents.

These indicators have been divided into three broad categories; biophysical, socioeconomic and governance in order to cover all aspects of MPA management (Pomeroy *et al.* 2004). The indicators chosen for each site were thoroughly examined and prioritized after which the selection of the final set of indicators was conducted (CERMES 2006a). Due to the unique nature of each MPA and the management challenges that each has to face there was some variation in the type and number of indicators that were finally selected. Ten indicators were selected for the Sapodilla Cayes Marine Reserve, eight for the Negril Marine Park and thirteen for the Tobago Cays Marine Park (CERMES 2006a). The indicators selected for each of these sites are outlined in Table 1.

All data were entered into an appropriate database, in particular data that had been gathered through surveys. Quantitative data, including simple descriptive analysis using the Statistical Package for Social Sciences version 11 and in Microsoft Excel. Following this the results were taken through a process of individual and collective interpretation by the researchers and stakeholders to determine the linkages between the MPA objectives and the indicators chosen for the evaluation. Through collaboration with various parties that have been involved in the evaluation process, participants were able to share

their views and experiences at the various stages of the evaluation process so as to determine the lessons learnt during the exercise and how these lessons will influence future evaluation exercises and management practices.

Table 1 Management effectiveness indicators and the MPAs to which they were applied

MPA	Evaluation indicators linked to MPA goals and objectives
Sapodilla Cayes Marine Reserve	***Biophysical*** 1. B4 Composition and structure of the community 2. B8 Water quality ***Socioeconomic*** 1. S14 Distribution of formal knowledge to the community 2. S1 Local marine resource patterns ***Governance*** 1. G5 Existence and adequacy of enabling legislation 2. G11 Level of training provided to stakeholders in participation 3. G12 Level of stakeholder participation and satisfaction in management processes and activities 4. G13 Level of stakeholder involvement in surveillance, monitoring and enforcement 5. G14 Clearly defined enforcement procedures 6. G15 Enforcement coverage
Negril Marine Park	***Biophysical*** 1. B8 Water quality 2. B9 Area showing signs of recovery (total habitat level) ***Socioeconomic*** 1. S3 Level of understanding of human impacts on resources 2. S14 Distribution of formal knowledge to community ***Governance*** 1. G2 Existence of a decision-making and management body 2. G6 Availability and allocation of MPA administrative resources 3. G12 Level of stakeholder participation and satisfaction in management processes and activities 4. [New] Success of fundraising strategies (revenue and diversity of sources) that form part of the business plan

Table 1 cont'd

MPA	Evaluation indicators linked to MPA goals and objectives
Tobago Cays Marine Park	***Biophysical***
	1. B1 Focal species abundance (marine)
	2. B8 Water quality
	Socioeconomic
	1. S2 Local values and beliefs about marine resources
	2. S3 Level of understanding of human impacts on resources
	3. S7 Material style of life
	4. S9 Household income distribution by source
	Governance
	1. G2 Existence of a decision-making and management body
	2. G3 Existence and adoption of a management plan
	3. G6 Availability and allocation of MPA administrative resources
	4. G9 Degree of interaction between managers and stakeholders
	5. G12 Level of stakeholder participation and satisfaction in management process and activities
	6. G14 Clearly defined enforcement procedures
	7. G15 Enforcement coverage

Source: CERMES 2006a

After gathering, generating and interpreting the results of the evaluation for each study site, researchers and representatives from each MPA attended a joint terminal workshop on November 4th, 2006 where the preliminary results of the evaluations were presented. Based on these results as well as the personal experience of each of the participants with both the evaluation process and in the management of each area; key lessons learnt and recommendations for adaptive management for the study sites were determined. Based on the experiences of the evaluation process and the lessons learned, training materials will be formulated and produced as a final output of the project.

TOBAGO CAYS MARINE PARK (TCMP), ST. VINCENT AND THE GRENADINES

Site Description

Located at the southern end of St. Vincent and the Grenadines, the TCMP is contained within the Grenadines island chain. The park covers an area of approximately 15km^2 and encompasses the five uninhabited island of Petit Rameau, Petit Bateau, Jamesby, Baradal and Petit Tabac which enclose a sand bottom lagoon as well as the island of Mayreau (Pena *et al*. 2006). The conservation area's islands, reefs and shallows can be found mostly within the 10 fathom depth contour and are of extreme ecological, economical, social and cultural significance to St. Vincent and the Grenadines (McConney 2005). A site map of TCMP is displayed in Figure 1.

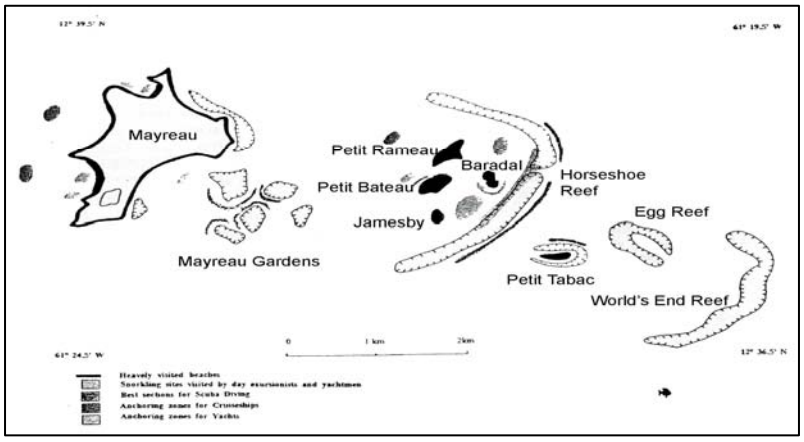


Figure 1. Site map of TCMP

RESULTS

Biophysical

Based on the results from the March 2005 Reef Check training survey, and the May and October 2006 surveys for this project, the coral reef systems at the four sites surveyed vary in condition but appear to be declining across all sites. The increasing NIA coverage observed at these locations is consistent with other scientific data which indicate that the Tobago Cays is undergoing a possible phase shift from coral to macroalage dominated communities (Comely *et al*. 2002). For the evaluation of water quality for the TCMP there was a general failure of the evaluation team to follow water quality monitoring protocol in both the collection and analysis of samples. Of greatest concern however, is the failure of the St. Vincent Bureau of Standards laboratory to analyse samples within a time frame that would ensure some degree of accuracy. In some instances the samples were allowed to sit for periods exceeding 24 hours before analysis. Due to changes in the biochemistry of the samples after this period the level of accuracy of the readings will be significantly reduced rendering all results unusable.

Socioeconomic

Mayreau and Union Island are the two closest inhabited islands to the TCMP. Socioeconomic surveys conducted at these sites have revealed that household size is generally small with a mean size of 2.2 and the residents enjoy a relatively high standard of living. Twenty different occupation types were identified during this study. Out of these twenty, the most common were the operation of water taxis (14%), business (11%) and sales (8%). Deterioration in the condition of the reefs in the Tobago Cays has been documented over the last eighteen years. This declined has been linked to a number of factors including storm damage, diseases, physical damage from fishing gear and boat anchors and localised pollution from visiting yachts and water taxis (Heyman *et al*. 1988; Smith *et al*. 1996; Comely *et al*. 2002; Deschamps 2000, Lizama 2005). Local knowledge appears to be consistent with the very limited scientific evidence available for the area . Local communities believe that the conditions of the marine resources in the TCMP have worsened in the past five years. The majority of respondents (74%) thought that human activities are damaging the TCMP whilst 26% thought they were not contributing to the damage. Additionally, many of the respondents had reasonable confidence in the ability of the TCMP to manage the Marine Park.

Governance

The TCMP Board was established in 1998 and is responsible for the day to day management of the TCMP and answers directly to the Administrative Head (Permanent Secretary) for the Ministry responsible for management (Prime Minister's Office) of the TCMP. The management activities undertaken by the TCMP office include those of administrative functions, enforcement and surveillance of the conservation areas and environmental education. Currently, the TCMP office lacks capacity and human resources to adequately and effectively manage the TCMP. Inadequate institutional capacity and lack of available funding has impeded their ability to effectively carry out and implement new programmatic activities and administrative functions. Enforcement coverage for surveillance purposes does not provide adequate coverage. There appears to be no formal document on enforcement guidelines and procedures for the TCMP. Additionally, interactions between TCMP staff and stakeholders seem to be limited although there has been a concerted effort to involve stakeholders in management decisions. Despite this the socioeconomic surveys conducted in Union island and Mayreau show that the majority of respondents (77%) consider themselves to be stakeholders in TCMP management although only 41% of these had participated in any process or activity related to management.

NEGRIL MARINE PARK (NMP), JAMAICA

Site Description

The Negril Marine Park (NMP) was legally established in 1998 under the Negril Marine Park Order by the government of Jamaica. Sitting in an area that is off the coast of the parishes of Hanover and Westmoreland, its coastal boundary is approximately 33km and the park covers an estimated area of 160km^2 (NCRPS, 2002). Bordered by 13 fishing communities, the NMP is divided into eight zones which have yet to be officially demarcated (McConney *et al*. 2005). A site map for the study area is displayed in Figure 2.

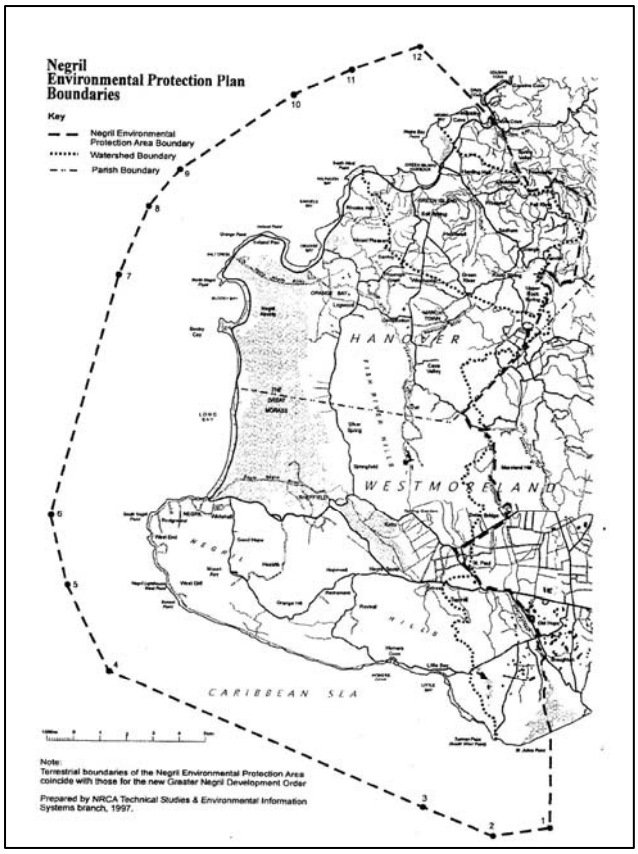


Figure 2 Site map of the NMP

RESULTS

Biophysical

The South and North Negril Rivers are major pathways of marine pollutants into the NMP. The development of a sewage treatment facility along the South Negril River water ways has lead to an exacerbation of nutrient loading in the area. This is due in part to the limited design features of the plant which does not provide the facilities needed for tertiary treatment which would result in polishing of the effluent and removal of nutrients. Faecal coli form counts are also highest at the mouth of the South Negril River. Water quality readings frequently exceeded prescribed Blue Flag standards suggesting that the water in this area is unsuitable for sea bathing. However, measurements taken in the Norman Manley Sea Park (NMSP) upstream and downstream areas were almost always in keeping with water quality standards. In spite of the wealth of knowledge and expertise held by the staff of Negril Coral Reef Preservation Society (NCRPS) as well as the clearly defined goals and structure of the water quality monitoring programme and access to a certified laboratory, little practical application of the resources is being used to enact change. Community shifts from coral to macroalgae are still being documented.

Socioeconomic

In the socioeconomic survey conducted in the NMP 94% of tourists interviewed stated that they had no knowledge of the MPA, while 92% had no knowledge of the managing organisation. Both the community members and the tourism workers that took part in this exercise displayed some knowledge of the issues that affected the natural resources within the NMP as well as problems that were directly related to resources in the marine environment. However many of the responses placed great emphasis on solid waste issues such as illegal dumping, as well as the pressures fishermen were placing on fish stocks and coral reef ecosystems. Comments were made by both the community members and the tourism workers on the wording of educational material where some found that this material was difficult to read. Greater consideration should be given to the level of education of the target audience, in relation to the literacy level and past exposure to environmental material. Many of the respondents also felt that environmental education was an important tool in mitigating activities that may have a negative impact on the NMP.

Governance

Delegation for the management of the NMP was granted to the NCRPS by the National Environmental Planning Agency (NEPA) in 2002 after a successful bid and the submission of a management plan for the area to the Authority (Lapointe *et al.* 2002). The NCRPS is responsible for the day to day management of the MPA. They have been given authority to carry out all management activities with the exception of the drafting of legislation. The management structure for the NMP is illustrated in Figure 3.

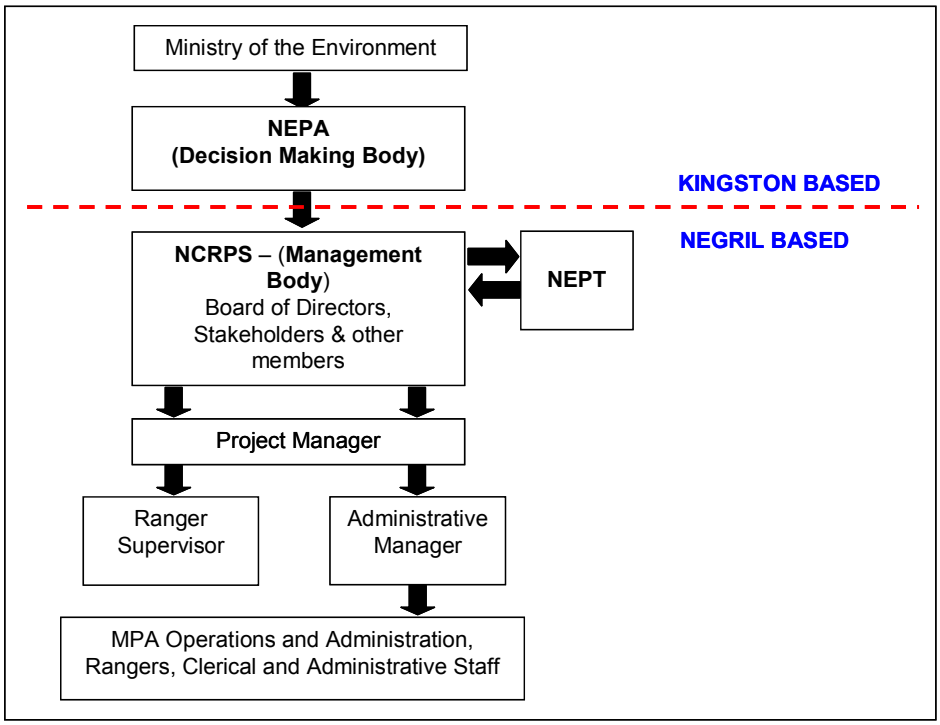


Figure 3 Proposed management structure for the NMP

The NCRPS proposed to implement nine major management programmes. These include programmes geared towards enforcement, financial stability, lobbying, public relations, research and monitoring, zoning, resource management, sustainable community development and visitor management. The greatest number of staff as well as the largest portion of the required budget has been allocated to administrative functions. These functions require an amount of JA$17,703,058 to be carried out effectively, which accounts for approximately 57% of the total budget. This total can be justified by scope of administrative functions which play a major role in all of the proposed programmes. There are two major variables that limit the capacity of the management team to be able to effectively administer and complete a number of activities within the NMP. These are the glaring lack of funding available to implement each programme, as well as limited institutional capacity. Many of the income generating ventures that had been proposed have not done well enough to support the operational functions of the NCRPS. In a survey administered to members of the Board of directors of the NCRPS as well as to its donor and regulatory agencies it was found that the majority of the respondents (89%) were not satisfied with the amount of fundraising activities undertaken by the organisation. Thirty five percent of the respondents stated that they participated in management activities on a regular or continuous basis. From the results of the evaluation, as well as comments received from the interviewers, it would appear that there is some correlation between the type of relationship that existed between the stakeholders and NCRPS and the level of participation each had in management processes and activities. The more distant the relation between respondents and the organisation, the lower the level of participation appeared to be. This may suggest that holding a position within NCRPS fostered a greater sense of ownership and responsibility. Perhaps it is perceived that once this relationship was lost the level of obligation in the management activities was no longer expected or their influence on management decisions would not be as significant.

SAPODILLA CAYES MARINE RESERVE (SCMR), BELIZE

Site Description

The SCMR forms the southern terminus of the Belize Barrier Reef and covers an area of approximately 119km^2. Its boundaries extend from Tom Owen's Cay in the north east to Seal Cay in the North West to Ragged Point in the South East. The reserve encompasses a total of 12 mangrove and sand cays (McConney *et al*. 2005). Officially declared a marine reserve in 1996 through Statutory Instrument 117 under the Fisheries Act of Belize this area has been given the designation of a World Heritage Site. A site map for the reserve is displayed in Figure 4.

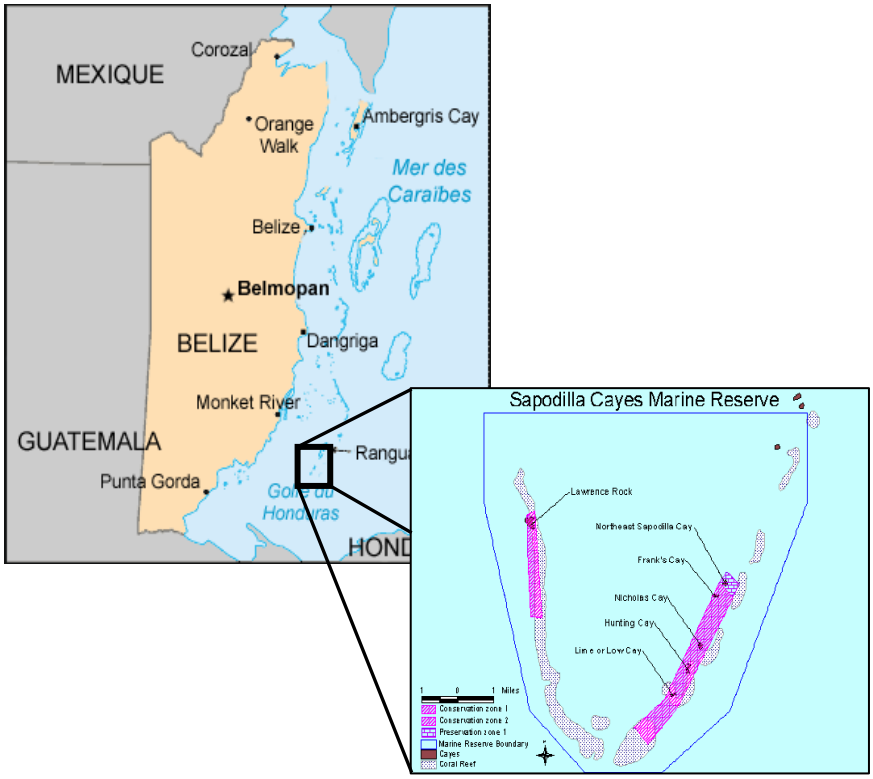


Figure 4. Site map of the SCMR

RESULTS

Biophysical

Hard coral cover and recruitment rates are apparently low at the SCMR. Commercial species have been heavily impacted. This site is heavily used for fishing where temporary camps are set up on many of the cays by fishermen that are based in the neighbouring communities: Monkey River, Punta Negra and Punta Gorda (McConney *et al*. 2005). Additionally, Hunting Cay has been used as the unofficial port of entry for persons arriving from Honduras and Guatemala. The SCMR, though a part of Belize is equidistant from Honduras, Guatemala and Belize, which makes it ideal for exploitation from persons in the three regions. In addition to local fishing activities, this site also receives a considerable amount of tourists, some of whom have been reported to participate in illegal fishing activities. These factors may have severe implications on the health and viability of local marine ecosystems. Despite this there is little documented information concerning the type and extent of fishing and tourist activities within the reserve. The water quality monitoring programme at SCMR, like that of TCMP, is still in its inception stages. Due to the fact that the water quality programme is in its early stages and the limited amount of that could be obtained with the funding available, monitoring has been restricted to physiochemical parameters only. No microbiological testing or nutrient analysis has been conducted at this stage.

Socioeconomic

There is little knowledge of local resource use patterns in the SCMR. The results of this evaluation are still to be analysed, but will provide baseline information on marine apace and resource use for the area. The Toledo Association for Sustainable Tourism and Empowerment (TASTE) has conducted some activities as it relates to the dissemination of environmental education material. Socioeconomic surveys carried out in the area have revealed that although the respondents thought the content was generally good the frequency with which they received this information was too sporadic.

Governance

The Toledo Association for Sustainable Tourism and Empowerment (TASTE) has been delegated some of the management responsibility for the reserve through a co-management agreement signed in 2001 (McConney *et al.* 2005). Though non-profit in nature and small in size this association has been steadily working on increasing its capacity to effectively manage the SCMR. Since 2001, the co-management agreement has been updated, granting this association greater responsibility for the marine reserve (McConney *et al.* 2005). A management plan has been drafted for the area but has yet to be approved by the Belizean government and signed into law (Nightingale personal communication 2006). However, direct responsibility for surveillance and the enforcement of existing regulations for the SCMR lies with the reserve manager, biologist and rangers, all of whom are fisheries officers appointed by the Fisheries Department (McConney *et al.* 2005). There is a greater need for stakeholder involvement in the management process in SCMR with more opportunities for training in different aspects of management made available. As it pertains to enforcement of regulations in the conservation area there are clear guidelines and protocols. These include protocols for approach, arrest as well as evidence collection. Enforcement coverage has been limited in this area however, due to lack of funding for operational costs.

LESSONS LEARNED

At the terminal workshop held in Punta Gorda, Belize participants in the MPA management effectiveness project assembled to discuss both the products and process of the evaluation. From discussions held on the outcome for each study site involved in this venture, the lessons learnt from each stage of the process were discussed. Some of the main lessons derived from these evaluations are discussed below.

Appreciating evaluating management strategies

The process of evaluating management effectiveness in order to implement adaptive management techniques is a new process for all of the study sites involved in this project. Though in theory the evaluation of current administrative practices seems to be a logical step in order to improve the management of any conservation area, managers are often so entangled in the day to day operations of running the MPA that processes like these become secondary. However this evaluation exercise has enabled MPA managers to fully appreciate its importance in improving the effectiveness of the management area. They have recognised its potential as a tool to promote transparency and accountability within organisations charged with the responsibility of maintaining these areas. This process may in fact foster greater trust in management organisations to fulfil their mandate by stakeholders who ultimately have a vested in these areas.

Benefits of the evaluation process

Initiating evaluation exercises may often be met with some scepticism. Stakeholders may fail to see how such an evaluation will differ from various studies that have undoubtedly taken place in the past. Additionally, management agencies may be unsure of their ability to see such a process through to its completion and truly apply the information gained in a way that will have a meaningful effect on future park management. The training, financial assistance and outputs generated as a result of this process may serve to alleviate some of the doubts and develop a confidence in the management agencies' ability to effectively conduct their own evaluations. Managers and stakeholders are able to see firsthand the benefit that may be gained from the information gathered in this exercise, and allow practical experience with how it may positively influence management. Continued assessment that is built on this premise creates a reference point from which future evaluations may be conducted and a quantifiable avenue by which progress may be measured. With a viable way in which the effectiveness of various aspects of the MPA can be presented, the need for changes can be justified and measures to implement them can be formulated. The ability to see the potential positives of such a process has encouraged many of the participants to learn more about the evaluation exercise and give serious consideration to adaptively managing natural resources. Stakeholders have had the opportunity to learn more about the MPAs in their areas and as a result now feel the need to be more actively involved in its management.

Undertake what can be managed

Due the fact that such an undertaking has never been attempted before, management agencies run the risk of overestimating what can be accomplished within the constraints of their limited resources. There are so many aspects of management that need to be thoroughly assessed that prioritising evaluation needs then may be a difficult task. Rather than run the risk of overlooking vital areas that are in need of evaluation managers may attempt to take on more than their resources can adequately handle. The result is improper evaluation of management goals and objectives that produce outputs that are unable to guide future management decisions or create a foundation on which subsequent evaluation exercises can be built.

Stronger science training for evaluation

During the evaluation of some of the indicators it is important to remember that the terminology and the process of data collection and analysis may require the technical services of someone that possesses a scientific background. While training for some indicators may be provided and the assessment successfully undertaken, technical expertise and experience may be necessary for others. Such was the case for water quality in TCMP where data collection was compromised by lack of a scientific background by the evaluation team. Participants were unable to understand the necessity of particular protocol or

see the need to implement important procedures in the collection of samples. If such a background does not exist among current staff, measures should be taken to contract to competent persons outside of the management organisation for more technical aspects of the assessment.

Presentation and validation of results

It is important that when results are completed from the evaluation exercise that they be presented to the communities and the stakeholders. Many of these were vital sources of information and will be willing to be more cooperative in future studies if they are informed of the results of the study. In effect, this effort may offer a way in which to reduce respondent fatigue especially in those areas that will need to be accessed for information in the future. This creates a sense of ownership and involvement for community members and stakeholders who will be made to feel included in the evaluation process. It creates an avenue to improve the transparency and accountability of the management agency as the public are kept abreast of management activities, the effectiveness of these actions as well as plans to improve existing methods. Such a forum will allow participants the opportunity to offer suggestions, thereby creating an avenue for information exchange as well as a means by which stakeholder participation in the management process can be enhanced. Additionally it gives the evaluation teams a means by which to verify their results and identify any errors in the information that was collected that may affect the accuracy of the results.

Explicit requirements for evaluation

In order to ensure that there is some clear understanding of the outputs that should be generated for each indicator; there must be an appreciation of what each one seeks to measure and how it is ultimately related to the MPA objective. The outputs represent quantifiable information that must be represented in such a way that it is reflective of the level to which MPA objectives are being met and can be accurately interpreted by management bodies so as to effectively inform future management decisions. The accuracy of the evaluation depends on the extent to which those given responsibility for this task understand the process of the evaluation and how it leads to the expected product. Only then can the desired outputs have a greater probability of accurately, reflecting the level of success achieved by the management process and suggest the changes that may be necessary in order for effective management to be realised. During the evaluation of many of the governance indicators in the NMP, members of the evaluation teams were often unsure of how to conduct data collection, analysis and reporting, although examples of each stage of the evaluation were presented in the guidebook

Awareness of stakeholder perception

Management agencies are allowed an occasion on which they can view how their management efforts are being perceived by stakeholders and members of the general public. Whether management has allowed for an equitable and fair distribution of resource use, or if disparities are perceived by the public, can be determined. Each stakeholder has the capacity to affect the success of an MPA. By trying to determine if the needs of the stakeholders are being accommodated within the management system and if educational methods are having any effect on behaviour and whether strategies can be formulated to address these issues. It must be noted that management agencies may never have the approval of all of their stakeholders; and though conservation efforts must be sensitive to the needs and culture of all stakeholders groups, it should never be compromised to the extent that conservation efforts becomes secondary.

SUGGESTIONS FOR ADAPTIVE MANAGEMENT

Recommendations for Adaptive Management

The evaluations conducted at the three MPAs have highlighted the importance of carrying out regular assessments of management strategies to determine effectiveness and to guide change. The managers who have participated in this process have gained greater appreciation of the potential benefits that can be gleaned from frequent self appraisal. It is a means by which information can be provided that creates a reference point of where management is relative to the original objectives stipulated for the conservation area. By locating that point, it is more feasible to chart a course towards the fulfilment of mandates that have been outlined for the MPA. Perhaps this will create a shift in the paradigm of evaluation from that of an opportunity to assign blame to that of an occasion to evaluate current strategies and justify the need for necessary change.

The experiences with the evaluation of water quality in the TCMP and the SCMR highlight the need to integrate such appraisal mechanisms at the inception of new management activities. The deficiencies in the monitoring programme, the need for external support and the importance of having explicitly stated goals and protocols can be applied to all aspects of management. The earlier these insufficiencies are identified the sooner modifications can be made to the process. This will enable management agencies to make wise choices as it relates to the allocation of time and resources.

When choosing evaluation tools one must be mindful of the importance of ensuring that these tools encompass all facets of the management activities: biophysical, governance and socio economic. In this study there has been a tendency to lean towards the assessment of the governance aspect. There may be several reasons for this trend which are beyond the scope of this report. Perhaps the framework in which these appraisals can be conducted already exists. If so there would be little need for extensive training; there would be accessible sources of secondary data for assessment; and little or no additional

equipment would be required. These factors aid in the reduction of evaluation costs. Additionally, it may be thought that enhancing administrative functions will result in a top down effect where an improvement will be seen in all facets of management. Whatever the true reason, care must be taken in the selection of performance indicators so that any appraisal conducted can provide a holistic view of management activities which adequately address all aspects of the conservation efforts.

Furthermore, effective evaluations are only as good as their ability to influence change in MPA management. Significant time, effort and expense are often essential for in-house assessments. The primary goal of this process is to highlight where management has fallen short or where methods used can be improved to increase the success of the MPA. It is a guide, providing the information required to keep activities focused in order to realise conservation goals. It may serve to highlight the need for adjustments to these goals so that through the evolution of management objectives, conservation efforts can be enhanced and sustainable development can be achieved. However, information without action achieves nothing. If the bureaucratic power to address management issues and develop means by which they can be addressed does not lie in the hands of those charged with management of the area, then those that hold this power need to recognise the important role they play in MPA success. Greater support is needed from those in a position to facilitate change if administrative organisations are to be able to manage adaptively.

Recommendation for ways in which adaptive management can be integrated into the study sites were made by those present at the terminal workshop held in Punta Gorda, Belize. Suggestions were based on the results of the evaluations, the experience in management of the respective MPAs and the learning experience which resulted from dialogue with all who were present. Site specific recommendations are outlined below.

Negril Marine Park

There is a need for greater conservation communication. In this way stakeholders gain knowledge on how they impact on the marine environment and are able to make informed choices about their behaviours. In addition to this, greater communication creates transparency within the organisation and allows stakeholders to feel included in the management process, fostering a sense of ownership. NCRPS may facilitate this through holding regularly scheduled meetings between managers and stakeholders, increasing the frequency of public meetings, and the establishment of a comprehensive educational programme.

Ways in which financial management can be enhanced should also be carefully considered to maintain the viability of the management organisation and to create means by which to implement programmes that may enhance management.

Tobago Cays Marine Park

A comprehensive educational programme is required in the TCMP. The management agency in the NMP has had more extensive experience with some aspects of public environmental education. TCMP may draw upon this experience. One example of this is the Junior Ranger Programme established by the NMP which may be implemented in the TCMP with the assistance of their Jamaican counterparts to enhance youth awareness and education. Improvements may also be made to the TCMP brochure to make it more user-friendly and appealing to read while ensuring that the information can be easily understood by a wide audience.

Training is needed in enforcement systems for the rangers responsible for patrolling the area. This includes detailed records of offences committed within the MPA. More extensive training is also required for water quality monitoring where participants understand and have the capability to follow stipulated procedures and protocol. Administrative staff needs to be instructed in ways in which to effectively carry out management functions. Training in data recording and reporting may be prudent.

Sapodilla Cayes Marine Reserve

Environmental education material though thought to be generally good has been found to be sporadically distributed. Plans for the dissemination of educational materials should be formulated in order that community stakeholder interaction can be enhanced through regularly scheduled distribution of newsletters and brochures.

The implementation of these strategies at each study site will serve to highlight the transition from the collection and evaluation of data to measure management effectiveness, to the practical use of this information to create change within the management system. In doing this the full cycle of the management effectiveness methodology can be seen and the benefits and challenges that may arise from this step can be used as lessons in how these strategies can be implemented and the approaches that are most appropriate for different conservation areas.

LITERATURE CITED

CERMES. 2005a. Report on the inception training workshop for enhancing the management effectiveness of the Tobago Cays Marine Park, St. Vincent and the Grenadines. Union Island 19-20 December 2005. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No.1. 25pp.

CERMES. 2005b. Socioeconomic monitoring and fisheries management planning for the Negril Marine Park. 26pp.

CERMES. 2006a. Report on the inception training workshop for enhancing the management effectiveness of the Negril Marine Park, Jamaica.26-27January 2006. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No.2. 31pp.

CERMES. 2006b. Report on the inception training workshop for enhancing the management effectiveness of the Sapodilla Cayes Marine Reserve, Belize.4 -5 February 2006. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No.3. 26pp.

Comely, J., M. Mason, K. Cordice and P. Raines. 2002. Tobago Cays marine biodiversity conservation project: Summary report. Coral Cay Conservation Ltd., London. 18pp.

Deschamps, A. 2000. Characterization of modern reefs using the Atlantic and Gulf Rapid Reef Assessment (AGRRA) protocol and digitized aerial photographs, Tobago Cays Marine Park, St. Vincent and the Grenadines. MSc thesis, Ottawa-Carleton Geoscience Centre and University of Ottawa. 196pp.

Heyman, A. M., T.J. Riegert, A. Smith, T. Shallow and J.R. Clark. 1988. Project Proposal: Development of the Tobago Cays National Park. Government of St. Vincent and the Grenadines and Organisation of American States. 97 pp.

Lapointe, B.E and K. Thacker. 2002. Community- based water quality and coral reef monitoring in the Negril Marine Park, Jamaica: Land-based nutrient inputs and their ecological consequences. Negril Coral Reef Preservation Society (NCRPS).

Lizama, D. T. and S. D. Mahon. 2006. Sustainable "green boat" practices for water taxi operators in the Grenadines. Caribbean Coastal Co-management and Coral Regeneration (4Cs) Programme, Sustainable Grenadines Project (SGP) and Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados. 36 pp.

McConney, P. 2005. International Coral Reef Conservation Grant Proposal. Centre Resource Management and Natural Resource Studies, UWI. Cave Hill. Barbados.

Nightengale, J. 9th November, 2006. Personal Communication. 59th Gulf Caribbean Fisheries Institute Conference, Princess Hotel, Belize.

Pomeroy, R. S, John, E. Parks and L. M. Watson. 2004. How is your MPA doing? A Guidebook of Natural and Social Indicators for evaluating Marine Protected Area Management Effectiveness. The World Conservation Union (IUCN). Gland, Switzerland. 230pp

Appendix 6

Pena, M and D. Roach. 2006. Report of the Workshop on MPA Evaluation Products and Process, Punta Gorda, Belize, 4 November 2006. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No. 4. 47pp.

CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica & Belize

Report of the Workshop on MPA Evaluation Products and Process, Punta Gorda, Belize, 4 November 2006

Centre for Resource Management and Environmental Studies (CERMES)
University of the West Indies, Faculty of Pure and Applied Sciences
Cave Hill Campus, Barbados

2006

CONTENTS

Citation
Pena, M and D. Roach. 2006. Report of the Workshop on MPA Evaluation Products and Process, Punta Gorda, Belize, 4 November 2006. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No. 4. 47pp.

Contact

Dr. Patrick McConney
Senior Lecturer, CERMES
UWI Cave Hill Campus
St. Michael, Barbados

Tel: 246-417-4725
Fax: 246-424-4204
Email: pmcconney@caribsurf.com
Web site: www.cavehill.uwi.edu/cermes

1 WELCOME, AIMS AND PROCESS

This workshop was held to review both the products and process of management effectiveness evaluation in the CERMES regional MPA-ME project (Appendix 1). Patrick McConney, the CERMES project manager, welcomed workshop participants and outlined the programme for the day (Appendix 2). The morning session was to review the project with presentations from the MPA ME evaluations at the Negril Marine Park (NMP), Jamaica; Sapodilla Cayes Marine Reserve (SCMR), Belize; and the Tobago Cays Marine Park (TCMP), St. Vincent and the Grenadines. The afternoon session would focus on looking more closely at the links between the MPA objectives and evaluation indicator results; lessons learned from the evaluation process and products; recommendations for adaptive management and the next steps including creation of teaching materials and other products. The workshop outputs would be incorporated into the Gulf and Caribbean Fisheries Institute (GCFI) presentation, on 9th November 2006 in Belize City, to be given by Donna Roach, CERMES graduate student. Consequently, part of the afternoon session would be dedicated to the structure and content of the presentation and paper.

Christina Garcia of the Toledo Association for Sustainable Tourism and Empowerment (TASTE) welcomed all to the workshop and extended a special welcome to Belize to overseas participants. Following this, workshop participants introduced themselves (Appendix 3). In addition to the project participants, visiting CERMES students were present. The meeting place was kindly made available by the Earthwatch Institute. TASTE, our host in Punta Gorda, co-manages the SCMR and provided all of the logistical support for the workshop.

Bob Pomeroy, of the University of Connecticut and adviser to the project, provided a brief overview of similar MPA-ME evaluation projects in SE Asia and the Pacific and indicated that the lessons and experiences learned from these projects as well as from the MPA-ME project in the Caribbean region would be included in a paper on overall experiences and lessons learned from the evaluations. He suggested a structure comprising regional patterns in measuring indicators, degree of indicator cost, reported challenges and limitations of the process and lessons learned from SE Asia, the Pacific and the Caribbean. Patrick McConney added that this workshop's contribution could focus on lessons learned with additional material from the individual reports. Participants agreed with Bob Pomeroy's suggestion to look at lessons learned at two levels: (1) benefits from the MPA-ME process, and (2) advice and tips in making the most of the MPA-ME process. This could be done at the local or site level, plus the regional and international levels.

After Patrick McConney provided a brief reminder of the overall regional MPA ME project in a slide presentation, the individual site presentations were made by the team members present.

2 EVALUATION OF TOBAGO CAYS MARINE PARK

An introduction to the Tobago Cays Marine Park (TCMP), St. Vincent and the Grenadines was given by Meritha Baptiste, TCMP Secretary. This consisted of general information on the establishment of the TCMP, location, size and park boundaries and activities within the park.

Maria Pena, CERMES Project Officer, presented current findings of the evaluation process (Appendix 4). The evaluations for each of the thirteen indicators for this site were presented giving a background, method of evaluation and results for each indicator followed by an overall

summary of lessons learned (Table 1). Participants were provided with copies of the draft TCMP MPA-ME report for reference during the workshop.

Table 1 Summary of TCMP-ME slide presentation

Indicator	Background	Method of evaluation	Results
B1 Focal species abundance	No clear monitoring plan and methods Limited scientific information of varying quality Evidence of deteriorating reefs in TCMP Implementation of Reef Check monitoring	Reef Check training: March 2005 4 survey sites 2 monitoring episodes: 18-19 May; 11 and 13 October 2006 TCMP alterations to Reef Check Data entry and analysis training	Data not thoroughly analysed to date Preliminary results indicate varying conditions of reef health and generally low hard coral cover
B8 Water quality	No documented information on marine water quality in the TCMP	All rangers (except chief ranger) and 2 SVG Fisheries Division personnel trained in water sampling methods for nitrates, phosphates and bacteria 4 sampling sites Monthly samplings: May-October 2006	Doubtful results Poor adherence to water collecting protocol Doubtful analysis by Bureau of Standards Data not thoroughly analysed to date
S2 Local values and beliefs about marine resources	Limited information on people's beliefs about marine resources in and around the TCMP Secondary data indicate declining resource conditions	70 individual surveys (Union Island and Mayreau): water taxi operators, dive shop owners, coastal cruisers and general public Presentation of results to interviewers Feedback from interviewers on survey process and lessons learnt Results to be presented to public	Declining condition of marine resources Numerous reasons given for declining condition of resources-overfishing given as main reason Management of marine resources in the TCMP is necessary Resources should not be exploited as needed Fair confidence that TCMP office can manage the TCMP
S3 Level of understanding of human impacts on resources	Limited information on this indicator	70 individual surveys (Union Island and Mayreau): water taxi operators, dive shop owners, coastal cruisers and general public Presentation of results to interviewers Feedback from interviewers on survey process and lessons learnt Results to be presented to public	Data to be analysed
S7 Material style of life	Limited data on trends in SVG	70 individual surveys (Union Island and Mayreau): water taxi operators, dive shop owners, coastal cruisers and general	Reasonably low home and land ownership Fairly high material style of wealth Majority of households are

Indicator	Background	Method of evaluation	Results
		public Presentation of results to interviewers Feedback from interviewers on survey process and lessons learnt Results to be presented to public	concrete structures with galvanized and tiled floors with electricity, television, refrigeration and stereos Major means of communication: televisions, telephones and computers
S9 Household income distribution by source	Sources of information: Population and Housing Census (2001); Canada-St. Vincent and the Grenadines Fisheries Development Project and Cooke (2005) TCMP-ME will provide preliminary baseline data for TCMP communities	70 individual surveys (Union Island and Mayreau): water taxi operators, dive shop owners, coastal cruisers and general public Presentation of results to interviewers Feedback from interviewers on survey process and lessons learnt Results to be presented to public	Mean household size is 2 20 different occupations noted as main line of work: most important in terms of number involved – water taxiing, business and sales 15 occupations of high importance in terms of household income: most important financially – business, watertaxiing and teaching
G2 Existence of a decision-making and management body	Numerous secondary data	Review of secondary data - Management plans for the TCMP - Relevant legislation - TCMP Board Meeting Minutes Key informant interviews - Clarification of Board structure	Informally adopted management plan Management structure outlined in the Marine Parks Act (1997) and Marine Parks (Tobago Cays) Regulations (1998) TCMP Board (established 1998) responsible for daily park management - comprises 11 members - directly answers to Prime Minister's office
G3 Existence and adoption of a management plan	Several management plans developed for the TCMP - None formally adopted - Cordice (1998; 2000) currently used to guide management - TCMP Board drafting new management plan	Review and narrative on the informally adopted management plan of Cordice (1998; 2000)	Specific management objectives for the TCMP not developed No resource and resource uses information Legislative authority for the TCMP lacks detail No map outlining boundaries and zones Detailed information on management authority is lacking No financial, training, monitoring and administrative plans New management being drafted is an improvement of 1998 and 2000 plans - Delays in drafting sections of plan

Indicator	Background	Method of evaluation	Results
G6 Availability and allocation of MPA resources	1998 management plan and draft of 2005 - Staffing and job responsibilities	TCMP staff interviewed - activities undertaken for TCMP management - environmental education - monitoring and evaluation - staff resources and training - budget and equipment available for management - record keeping	TCMP activities - Administration - Enforcement and surveillance - Education Human resources - Park Manager - 4 Rangers - Secretary - Office Attendant Administrative resources - 1 boat (old) - Dive equipment (new and in good condition) - Office equipment (new)
G9 Degree of interaction between managers and stakeholders	Limited information	Interviews with TCMP Manager and secretary - types of formal and informal interactions between the TCMP and its stakeholders - reasons for these interactions - number and location of meetings Review of Minutes on consultations	Meetings with stakeholders are not regularly scheduled Meetings are held when the need arises No records of meetings held prior to 2005 Recent interactions (2005-2006) - 3 consultations on proposed fee structure - OPAAL meeting - Scientific presentation on condition of reefs in TCMP
G12 Level of stakeholder participation and satisfaction in management processes and activities	Level participation and stakeholder satisfaction in TCMP management has never been evaluated	70 individual surveys (Union Island and Mayreau): water taxi operators, dive shop owners, coastal cruisers and general public Presentation of results to interviewers Feedback from interviewers on survey process and lessons learnt Results to be presented to public	People consider themselves to be stakeholders in TCMP management Low participation in management Low satisfaction with management
G14 Clearly defined enforcement procedures	Clearly defined enforcement procedures allow MPA enforcement staff to more effectively undertake their duties and resource users to be aware of consequences of non-compliance	1998 management plan and new draft examined TCMP staff interviewed - enforcement guidelines (formal and informal), to describe the guidelines and procedures, to determine if they are reviewed and updated periodically and if staff are trained in the guidelines and procedures, number of reported	No apparent formal document on enforcement guidelines and procedures for the TCMP Guidelines exist Rangers enforce speed and anchoring regulations, undertake general monitoring of the area and educate users about park regulations Rangers do not have power of

Indicator	Background	Method of evaluation	Results
		violations, number of successful prosecutions, number of attempted prosecutions and accessibility and availability of enforcement guidelines	arrest - Coast Guard and Special Services Unit
G15 Enforcement coverage	Number of surveillance and monitoring patrols undertaken by MPA staff during a given time period and in a specified area - consistency of patrol activities - prerequisite for assessing trends in violations or non-compliance	Interviews with TCMP staff - Patrol schedule - Temporal and spatial pattern of patrols - Types of infractions - Patrol routes - Area of patrol coverage Management plan (Cordice (1998; 2000) examined for patrol schedule and procedures	Procedures for enforcement coverage not outlined in management plan, its revision of 2000 and the draft plan of 2005 No patrol records Varied patrol schedule Infringements: spearfishing, out-of-season lobster harvesting, anchoring in restricted areas, speeding

Lessons learned from the TCMP evaluation included:

- TCMP office appreciates importance of evaluating management
- Reasonable capacity to conduct in-house evaluations
- Willingness to learn, to adapt and to improve management
- Poor links between plan objectives and activities
- Weak agency culture of evaluating management
- Lack of systems to assess some bio-physical indicators
- TCMP staff training in data analysis and report writing necessary
- Longer training sessions necessary to build expertise
- Stakeholders interested in TCMP but need to be encouraged to participate in management
- Public awareness of TCMP and its value should be enhanced
- Critical to build and sustain the capacity to learn collectively and adapt management
- Need for well-structured management and business plans for the TCMP
- Staff and administrative resources lacking
- Procedure needs to be adhered to (in case of enforcement coverage)

3 EVALUATION OF NEGRIL MARINE PARK

An introduction to the Negril Marine Park (NMP), Jamaica, was given by Elsa Hemmings, Negril Coral Reef Preservation Society (NCRPS). This introduction provided a background to the NCRPS (management body delegated co-management responsibility for the NMP) and the NMP. Donna Roach, CERMES MSc student presented current findings of the evaluation process (Appendix 5). The evaluations for each of the seven indicators for this site were presented giving a background, method of evaluation and results for each indicator followed by an overall

summary of lessons learned (Table 2). Participants were provided with copies of the draft NMP MPA-ME report for reference during the workshop.

Table 2 Summary of NMP-ME slide presentation

Indicator	Background	Method of evaluation	Results
B8 Water quality	Rapid tourism development in the 1970's and 1980's Absence of proper sewage treatment facilities until 2000 Recognition that land based sources pollution is a significant threat to the marine environment Continued diffusion of macro algal blooms throughout the Long Bay area NCRPS and NEPT monitoring	Monitoring programme- 21 land sample sites and 3 marine sites - salinity, nutrients and coliform bacteria Evaluation for project done for sample points along South and North Negril River	*South Negril River* -High nitrate and phosphate concentrations upstream suggesting land-based sources of pollution - High ammonia concentrations at effluent discharge point suggesting nutrients originate at treatment plant - Measurements taken at South Negril Mouth below Blue Flag bathing water quality standards *North Negril River* -High nutrient concentration upstream suggesting land-based sources of pollution
S3 Level of understanding of human impacts on resources S14 Distribution of formal knowledge to community		Surveys administered to three groups of stakeholders - tourism workers, tourists and community members	Community members and tourism workers had the most knowledge of the NMP and NCRPS Dissemination of environmental education was most effective amongst community members and tourism workers Some understanding of the results of human impacts on the environment (waste management)
G2 Existence of a decision-making and management body	Secondary data available	Review of existing documents provided by NCRPS	NCRPS and NEPT delegated management responsibility under NEPA Failure of state agencies to make genuine efforts towards true co-management Government agencies need to uphold both their political and financial obligations to these resource user groups
G6 Availability and allocation of MPA administrative resources		Secondary data review of documents made available by NCRPS - personnel records, budgets, the operations plan and equipment	6 management programmes to be implemented by NCRPS - administrative functions, financial stability, public relations, education, resource

Indicator	Background	Method of evaluation	Results
		inventory/assets	management and visitor management - lack of funding available to implement each programme and limited institutional capacity - small staff base
G12 Level of stakeholder participation and satisfaction in management processes and activities	Numerous and diverse stakeholder groups within the EPA Previous studies detailing the opinion of community members within the NEPA	Surveys administered to - management agencies - regulatory bodies - funding and donor organisations	Generally low frequency of stakeholder participation Majority claimed to have knowledge of the needs, financial and otherwise, of the organization Most common method of participation in the management process and activities of the NCRPS - contribution to the organization Low satisfaction with quantity of NCRPS fundraising activities
[New] Success of fundraising strategies (revenue and diversity of sources) that form part of the business plan		Analysis financial documents for the period of April 2004-March 2006 Analysis of financial records and correspondence from donors	Many proposed income generating ventures have been unsuccessful in supporting the operational functions of the NCRPS Current financial information could be misleading and may suggest that the NCRPS is doing better financially than in reality

Lessons learned from the evaluation included:

- Level of understanding of the requirements of the evaluation
- Level of technical assistance available during the evaluation process
- Data collection methods and techniques
- The influence of the target audience on survey Design
- Availability of secondary data for data analysis
- The need for economic incentives in the data collection and evaluation Process
- Training for members of the evaluation Team

- Importance of a strong financial base
- The influence of target audience on the formulation of educational materials

4 EVALUATION OF SAPODILLA CAYES MARINE RESERVE

Jack Nightingale and Christina Garcia, Toledo Association for Sustainable Tourism and Empowerment (TASTE), reported on the evaluation process and progress for the Sapodilla Cayes Marine Reserve (SCMR). In general TASTE was motivated by the inception training workshop and started the evaluation of ten indicators for the SCMR. However the evaluation process has been hampered for a number of reasons, one of which includes the loss of evaluation team members. Therefore the SCMR evaluation is not as advanced as the evaluations for the TCMP and NMP. It was noted that this evaluation is more of a self-evaluation unlike the evaluations for the TCMP and NMP which have both been external. A summary of the evaluation is provided in Table 3. See Appendix 6 for reports on indicators S 14, G5, and G11.

Table 3 SCMR-ME evaluation

Indicator	RESULTS SUMMARY
B4 Composition and structure of the community	Data for conch and lobster available from Fisheries (LAMP protocol) Decline in conch and lobster populations Team leader (Godwin Hughes) for B4 and B8 has data and report for the indicator Fishers need data
B8 Water quality	Infrequent sampling by CINVESTAV charged with monitoring and analysis for this indicator No results from CINVESTAV yet Data on physical parameters may be doubtful and inaccurate due to high turnover of staff. Monitoring needs to be improved With the establishment and implementation of a monitoring plan and new timeline for monitoring activities Fisheries staff will conduct ongoing monitoring
S1 Local marine resource use patterns	3 surveys returned, 20 required
S14 Distribution of formal knowledge to community	Information still being collected TASTE has delivered considerable amount of formal knowledge to the community but it has been erratic due to lack of core funding for organisation support TASTE can deliver formal knowledge - well-received workshop presentations - good retention of knowledge
G5 Existence and adequacy of enabling legislation	Department of Fisheries unwilling to share draft marine reserve regulations
G11 Level of training provided to stakeholders in participation	91.3% familiar with work TASTE is doing Fair amount of knowledge of management plan < 50% in all cases received training in conflict resolution, roles and responsibilities of Board members, outreach education Minority benefiting from training Satisfactory level of training Stakeholders should be more involved in management decisions

Indicator	RESULTS SUMMARY
G12 Level of stakeholder participation and satisfaction in management processes and activities	Analysis not complete
G13 Level of stakeholder involvement in surveillance, monitoring and enforcement	Surveys completed Analysis to be done
G14 Clearly defined enforcement procedures	Surveys completed Analysis to be done
G15 Enforcement coverage	Surveys completed Analysis to be done

5 LESSONS LEARNED FROM PRODUCTS AND PROCESS

Bob Pomeroy led this session. Participants were asked to consider the lessons learned from the evaluation process and products at the three sites. These were categorized as either a benefit (B) or advice/tip (A) and are summarised in Table 4. Each of the MPAs that experienced the lesson is marked (+). All but three lessons were shared by all three MPAs.

Table 4 Lessons learned from the MPA-ME process

Lessons learned	B/A	NMP	TCMP	SCMR
MPA managers appreciate importance of evaluating management (transparency and accountability)	B	+	+	+
Better to have reasonable capacity to conduct in-house evaluations at the start	A	+	+	+
Good to design to build capacity through the evaluation	A	+	+	+
Better to start with what can manage and then build the evaluation	A	+	+	+
Gaining confidence through conducting the evaluation leads to greater willingness to learn, to adapt and to improve management	B	+	+	+
Need to repair poor links between MPA plan objectives and its activities	A	+	+	+
If there is a weak organization (national, regional) culture of evaluating management, this needs to be overcome by the process	A	+	+	+
When undertaking the evaluation distinguish between the marine park and management organization	A	+	+	+
In order to assess some bio-physical indicators requires access to stronger science training or external support as part of the evaluation	A	-	+	-
TCMP staff training in data analysis and report writing necessary	A	-	+	-
Water quality monitoring requires ready access to labs that are fully functional	A	-	+	+

Lessons learned	B/A	NMP	TCMP	SCMR
Pre-testing of questionnaires on sub-sample required and testing of data analysis	A	+	+	+
Present and validate results to community and stakeholders (also addresses respondent fatigue)	A	+	+	+
Feedback from the evaluation team members at workshop to learn collectively and build capacity	A	+	+	+
While planning the evaluation ensure there is understanding of the requirements to undertake the evaluation (especially the first time around)	A	+	+	+
Identify external technical assistance that may be needed during the evaluation process	A	+	+	+
In designing measurements for indicators note influence of target audiences on survey design	A	+	+	+
Use the evaluation process to increase the availability of secondary data for analysis	A	+	+	+
Ensure adequate and realistic budget is available to undertake the evaluation	A	+	+	+
Positive recognition to the organisation undertaking the evaluation, e.g. donor agencies	B	+	+	+
Establish realistic timelines for evaluation with flexibility	A	+	+	+
Management organisation gains knowledge on perception of stakeholders regarding its activities	B	+	+	+

6 RECOMMENDATIONS FOR ADAPTIVE MANAGEMENT

Patrick McConney informed participants that a project sub-grant of up to US$1,500 could be made available from December 2006 to each project site for adaptive management based on the results of the evaluations. He encouraged participants to provide him with at least two activities that could be completed by mid-February 2007 for which the funds could be used. The following is a list of proposed activities for each site:

Proposed adaptive management activities

TCMP

- Improving TCMP brochure
- Training in MPA enforcement systems and patrol log book
- Training in water quality monitoring
- Training for administrative staff
- Determining how a Junior Rangers Programme could be implemented in TCMP

NMP

- Scheduling regular meetings between managers and stakeholders
- Increase number of public community meetings
- Establish a public education programme
- Improve financial management

SCMR

- Improve community stakeholder interaction through newsletters and brochures

7 PREPARATION OF GCFI PRESENTATION AND PAPER

Partick McConney asked participants to share their thoughts on the MPA-ME presentation to be made by Donna Roach at GCFI ,and on the accompanying paper for the GCFI Proceedings. It was decided that the presentation should comprise no more than15 slides as outlined below. See Appendix 7 for the slide show presented at GCFI on 9 November 2006.

GCFI slide presentation

1. Title slide
2. Introduction to MPA guidebook
3. Intro to regional project; funders
4. Objectives
5. TCMP
6. TCMP indicators
7. TCMP findings
8. NMP
9. NMP indicators
10. NMP findings
11. SCMR
12. SCMR indicators
13. SCMR findings
14. Lessons learned
15. Need for adaptive management

8 OTHER MATTERS

Some additional matters decided before closing the workshop were:

- Report of this workshop to be completed if possible in the week of 6-11 November and circulated to all participants.
- CERMES will assist TASTE in producing the SCMR MPA-ME evaluation report. TASTE will provide all indicator evaluation reports and background documents (electronic or hard copies) to Maria Pena or Patrick McConney, CERMES.
- Participants from the TCMP and NMP are to select their proposed adaptive management activities and communicate to Patrick McConney by 17 November after conferring with their MPA managers to ensure all relevant persons are in agreement with the activities.
- Timeline of MPA-ME project activities:
    - December 2006 – US$ 1,500 grant disbursement for adaptive management
    - January 2007 – site reports done; adaptive management activities in progress
    - Mid-February 2007 – completion of adaptive management activities
    - Early March 2007 – Terminal half-day or one-day MPA-ME meeting qt each of the three sites to share overall project accomplishments and products
    - December 2006-February 2007 – Educational and training material developed from lessons learned
    - March 31 – scheduled end of project and final report to NOAA

9 REFERENCES

Pena, M., M. Baptiste, P. McConney, B. Pomeroy, V. Dublin, L. Grant, S. Punnett, R. Goodridge, H. Joseph, A. Hanson, J. Alexander, S. Debique and O. Harvey. 2006. Report on management effectiveness at the Tobago Cays Marine Park (TCMP), St. Vincent and the Grenadines. Draft. Presented at the Terminal Workshop of the CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize, held at Punta Gorda, Belize, 4 November 2006. 61pp.

Roach, D. *et al.* 2006. Report on management effectiveness at the Negril Marine Park (NMP), Jamaica. Draft. Presented at the Terminal Workshop of the CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize, held at Punta Gorda, Belize, 4 November 2006. In prep.

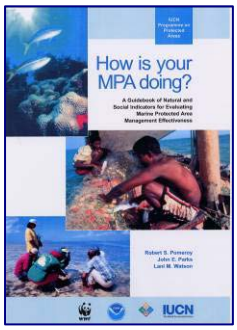
10 APPENDICES

Appendix 1: Project announcement

The Centre for Resource Management and Environmental Studies (CERMES) of the University of the West Indies (UWI) Cave Hill Campus is implementing a project to evaluate marine protected area (MPA) management effectiveness, and to learn lessons from this process, at three MPA sites in the Caribbean:

- Belize — Sapodilla Cayes Marine Reserve (other Belize MPAs already have similar projects planned)
- Jamaica — Negril Marine Park (currently doing a socioeconomic study which this should complement)
- St. Vincent and the Grenadines — Tobago Cays Marine Park (currently rearranging its management)

Why a project about MPA management effectiveness?



MPAs are important ecological, economic, social and cultural assets for Caribbean countries and beyond, partly due to their significance to tourism earnings in the region. Despite many projects and proposals, and good intentions, management authorities and small field staffs have struggled with very inadequate capacity to manage most MPAs in the region. This situation needs to be remedied immediately.

A recent guidebook entitled *"How is your MPA doing?"* sets out new methods for evaluating how a marine park is being managed. Bio-physical, socio-economic and governance indicators of MPA management are assessed using existing information, natural and social science surveys, and various other means of data collection.

What will actually be done from October 2005 to March 2007?

The summary specific objectives for this project funded by a NOAA Coral Reef Conservation Grant are:

1. To conduct participatory management effectiveness research and evaluations by training at least 30 people across three MPA sites.
2. To improve MPAs in the region by monitoring outcomes documented in lessons learned combined with training and communication materials for coursework, research, management and coastal policy.

The project has four main components:

- Inception site-specific training workshops in MPA management effectiveness and evaluation
- Participatory management effectiveness research and evaluations at the three MPA locations
- A terminal joint workshop on lessons learned and the consequent adaptation of management
- Production of training materials based on experiences of the process and on lessons learned

What are likely to be the main benefits from this project?

The goal is to promote and institutionalise improved and adaptive coastal management practices and policies in the Caribbean through use of applied research and interdisciplinary training. The project will contribute towards building capacity in MPA management effectiveness evaluation in the Caribbean. Project participants will assess MPA management effectiveness under three main headings:

1. Bio-physical … status of the resources, fish populations, water quality, environmental conditions, etc.
2. Socio-economic … value of the area to various users, culture, livelihoods, sources of income, etc.
3. Governance … achieving goals and objectives, capacity for management, stakeholder groups, etc.

Knowing the strengths and weaknesses of management in the past facilitates making improvements. Integration with the university's communications network, teaching and research programmes, curriculum development and other initiatives will add value to the project and its regional impact through sharing lessons learned and disseminating output products. Participatory and community-based approaches will facilitate stakeholder involvement and adaptive management to ensure that the best practices are institutionalized based upon the lessons learned and the skills acquired during the project or afterwards.

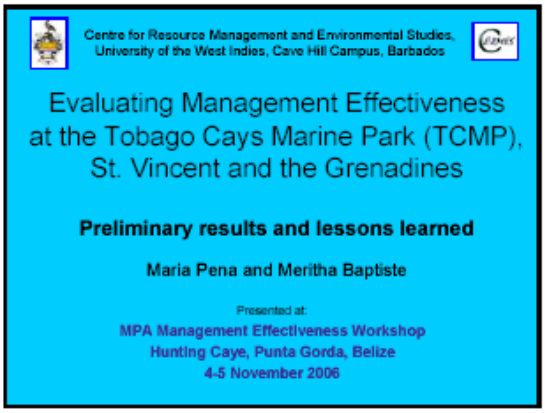
Appendix 2: Programme

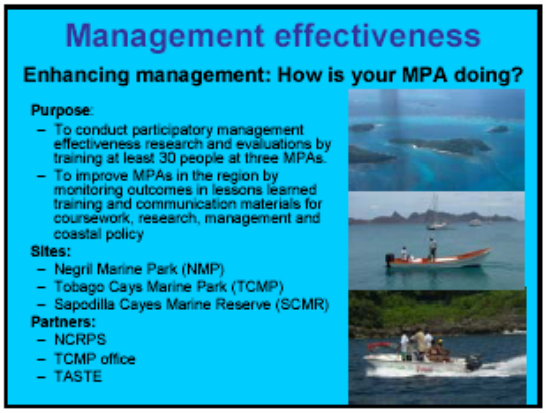
Time	**Activity**
Sat 4 Nov	
09:00 am	Workshop start with Welcome, aims, process, house-keeping etc.
09:15 am	Presentation1 (TCMP) and discussion on MPA sites and evaluation (45 min)
10:15 am	Presentation 2 (NMP) and discussion on MPA sites and evaluation (45 min)
11:00 am	Presentation 3 (SCMR) and discussion on MPA sites and evaluation (45 min)
11:45 am	Summary of key points and process for proceeding in the afternoon
12:00 noon	Lunch
01:00 pm	Compare evaluations, especially lessons and management recommendations
04:00 pm	Conclusions with preparation of the GCFI presentation and paper outline
05:00 pm	Close

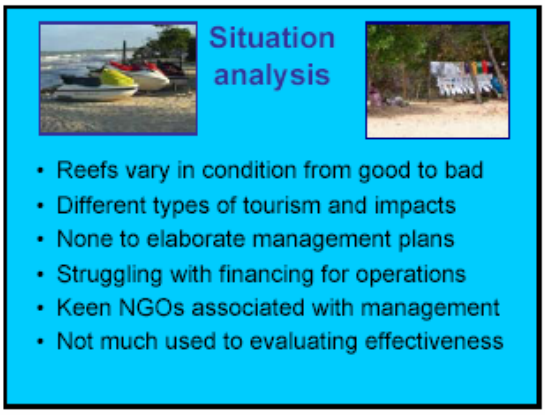
Appendix 3: Participants

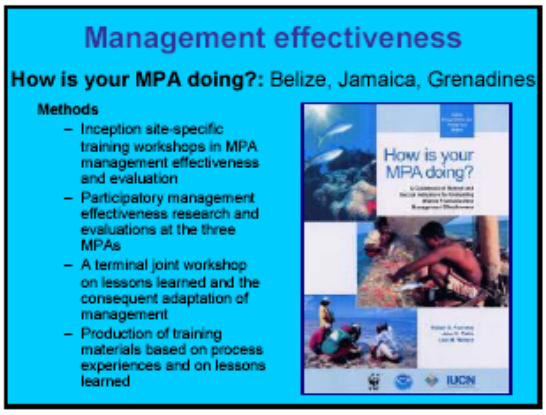
Name	Organisation	Contact phone
Elsa Hemmings	NCRPS, Jamaica	876-957-3735
Patrick McConney	CERMES, UWI	246-417-4725
Meritha Baptiste	TCMP, St. Vincent and the Grenadines	784-485-8191
Robert Pomeroy	University of Connecticut	860-405-9215
Donna Roach	CERMES, UWI	246-417-4316
Maria Pena	CERMES, UWI	246-417-4727
Jack Nightingale	SCMR, Belize	011-501-722- 0191
Christina Garcia	SCMR, Belize	011-501-722- 0191
Jason Guy	Fisheries Department, Belize	011-501-722- 0191
Dianna Frank	US Peace Corps	011-501-722- 0191
David Gill	CERMES, UWI	246-417-4316
Tanya Staskiewicz	CERMES, UWI	246-417-4316

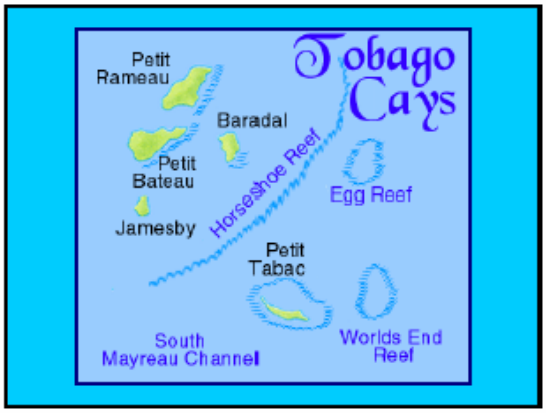
Appendix 4: TCMP ME evaluation slides



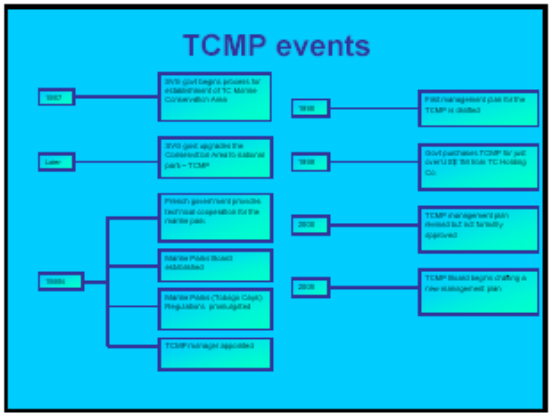








TCMP events



TCMP ME Goals and objectives

Goal

– *"To protect, conserve and sustainably utilise the natural resources of the Tobago Cays for future use"*

Objectives

– To promote the marine park as a tourist resort and attraction
– Ensuring that the park is managed along commercial lines
– Protect the biodiversity of the park
– To conserve the marine resources
– Public awareness and stakeholder participation
– Public education
– To protect sustainable livelihoods

Indicators

Relevant indicators identified	*Relevant indicators identified*
Biophysical	***Governance***
B1 Focal species abundance (marine)	G2 Existence of a decision-making and management body
B8 Water quality	G3 Existence and adoption of a management plan
Socioeconomic	G6 Availability and allocation of MPA administrative resources
S2 Local values and beliefs about marine resources	G9 Degree of interaction between managers and stakeholders
S3 Level of understanding of human impacts on resources	G12 Level of stakeholder participation and satisfaction in management process and activities
S7 Material style of life	G14 Clearly defined enforcement procedures
S9 Household income distribution by source	G15 Enforcement coverage

B1: Focal species abundance

Background

- No clear monitoring plan and methods
- Limited scientific information of varying quality
  - Quantitative assessments: French Mission for Cooperation (1995) and Deschamps *et al.* (2003)
- Evidence of deteriorating reefs in TC
  - Storm damage
  - White band disease
  - Physical damage
  - Sewage pollution (visiting yachts)
- Quantitative data essential for protection and management of TCMP
- Reef Check implemented
  - Baseline information for long-term monitoring to assess TCMP management efficiency

B1: Focal species abundance

Method: Reef Check

- Reef Check training: March 2005
  - 5 rangers
  - SVG Fisheries Division
- 4 survey sites
  - Horseshoe Reef (inner and outer reefs)
  - Petit Tabac
  - Petit Bateau
- 2 monitoring episodes: fish and invertebrates; benthic substrates; site description and socio-economic uses questionnaire
  - 18-19 May
  - 11 and 13 October
- TCMP alterations to Reef Check
  - Addition of supplementary indicator species (queen conch, bristle worms, West Indian sea egg
  - Socio-economic site description questions (turtle nesting beaches, turtle fishing and boat traffic)
- Data entry and analysis training

BI: Focal species abundance

Results

- Varying conditions of reef health
- Generally low hard coral cover
- Reef fish species diversity
  - Petit Bateau > Petit Tabac > H. Reef (inner) > H. Reef (outer)
- Highest macrolagae counts for H. Reef (outer)

B8 Water quality

Background

- Key determinant of community health and viability
- Many human activities affect water quality in the TC
  - Pollution from sewage and garbage from yachts
  - Non-environmentally friendly boating practices by water taxis
- No documented information on marine water quality in the TCMP

B8 Water quality

Method

- All rangers (except chief ranger) and 2 SVG Fisheries Division personnel trained in water sampling methods
  - Nitrates
  - Phosphates
  - Bacteria
- 4 sampling sites
  - Petit Bateau
  - Petit Tabac
  - Horseshoe Reef (inner and outer)
- Monthly samplings: May-October 2006
  - Collected in morning
  - Stored in ice
  - Transported by SVG Air to Fisheries Division
  - Analysed by Bureau of Standards, SVG

B8 Water quality

Results

- Poor communication between TCMP and SVG Fisheries Division
- Poor adherence to water collecting protocol
  - Physical conditions not recorded: sea surface temperature, current direction, weather, no. of boats in the area
- Doubtful analysis by Bureau of Standards
- Results to be analysed

S2 Local values and beliefs about marine resources

Background

- "how people make choices and take actions related to marine resource use and management based on their values and beliefs"
- Limited information on people's beliefs about marine resources in and around the TCMP
  - Secondary data indicates declining resource conditions

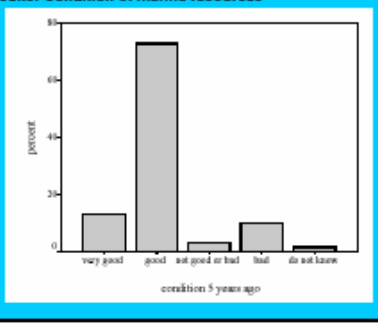
S2 Local values and beliefs about marine resources

Method

- Individual surveys
  - 70 persons interviewed: water taxi operators, dive shop owners, coastal cruisers and general public
  - Union Island and Mayreau
- Presentation of results to interviewers
- Feedback from interviewers on survey process and lessons learnt
- Results to be presented to public

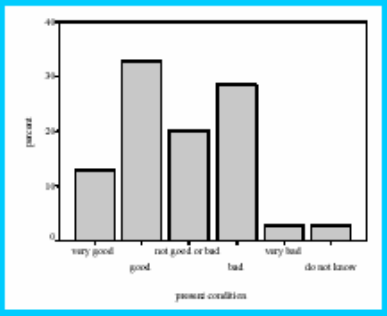
S2 Local values and beliefs about marine resources

Results: Condition of marine resources



S2 Local values and beliefs about marine resources

Results: Condition of marine resources



S2 Local values and beliefs about marine resources

- **Results: Reasons for declining condition of marine resources**

Response	% respondents (n = 70)
Overfishing	20
Lack of knowledge about marine resources	3
Hurricanes	6
Environmentally unfriendly boat and marine practices	8
Decline in reef health	8
Lack of stakeholder participation in management	3
Ineffective management by TCMP Board	3
Natural events, decline in reef health, overfishing, environmentally unfriendly practices	6
Overfishing, decline in reef health, dumping of garbage	3
Decline in reef health, erosion, overfishing	3

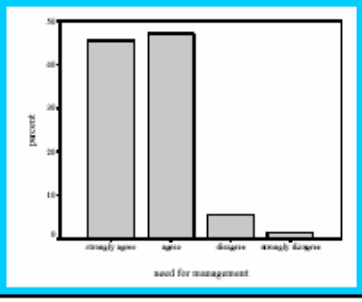
S2 Local values and beliefs about marine resources

•Results: Reasons for the improved condition of marine resources

	% respondents (n = 70)
Better TCMP management	40
Increase in abundance of fish and turtles	13
Improved education	6
Improved practices (environmental) of people	6
Not applicable	33

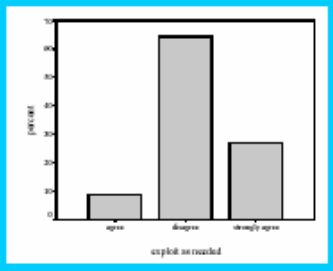
S2 Local values and beliefs about marine resources

- Results: Beliefs about marine resources



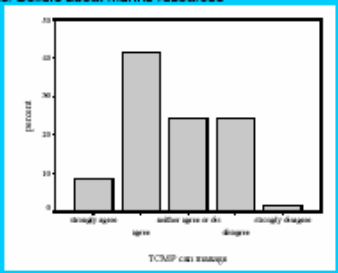
S2 Local values and beliefs about marine resources

- Results: Beliefs about marine resources



S2 Local values and beliefs about marine resources

- Results: Beliefs about marine resources



S3 Level of understanding of human impacts on resources

Background

- Degree to which local stakeholders understand basic relationships between living things (in this case marine resources and human beings), their environment and one another, and the impacts that human activities have on the natural environment
- Limited information on this indicator exists

S3 Level of understanding of human impacts on resources

Method

- Individual surveys
  - 70 persons interviewed: water taxi operators, dive shop owners, coastal cruisers and general public
  - Union Island and Mayreau
- Presentation of results to interviewers
- Feedback from interviewers on survey process and lessons learnt
- Results to be presented to public

S7 Material style of life

Background

- Wealth or economic well-being
- Determines the economic impact of the MPA on MPA communities
- Limited data

S7 Material style of life

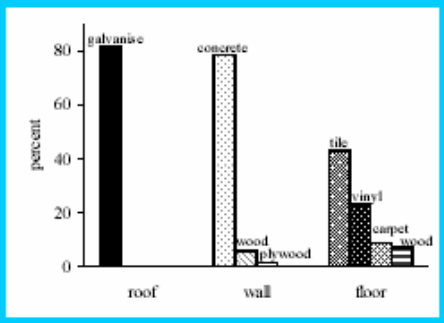
- **Method**
- Individual surveys
  - 70 persons interviewed: water taxi operators, dive shop owners, coastal cruisers and general public
  - Union Island and Mayreau
- Presentation of results to interviewers
- Feedback from interviewers on survey process and lessons learnt
- Results to be presented to public

S7 Material style of life

Results: Property ownership and possession of household appliances

	% respondents
Land	54.3
House	51.4
Electricity	95.7
Vehicle	14.3
TV	88.6
Telephone	77.1
Stereo	67.1
Washing machine	40.0
Refrigerator	87.1
Computer	34.3
Boat	37.1

Results: Household structural materials



S9 Household income distribution by source

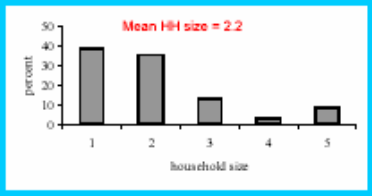
Background

- Primary sources of income for households in the MPA community
- Allows a MPA manager to better measure and understand the impacts of the MPA on households within the community
- Shifting sources of income may indicate whether the MPA is impacting positively or negatively on the community

S9 Household income distribution by source

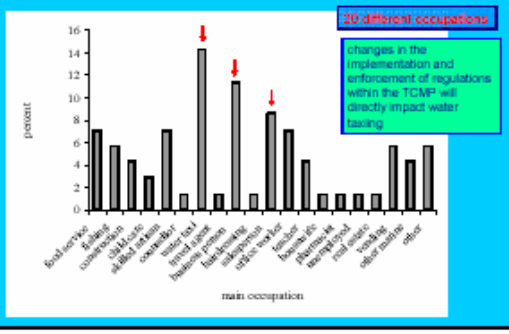
- **Method**
- Individual surveys
  - 70 persons interviewed: water taxi operators, dive shop owners, coastal cruisers and general public
  - Union Island and Mayreau
- Presentation of results to interviewers
- Feedback from interviewers on survey process and lessons learnt
- Results to be presented to public

S9 Household income distribution by source

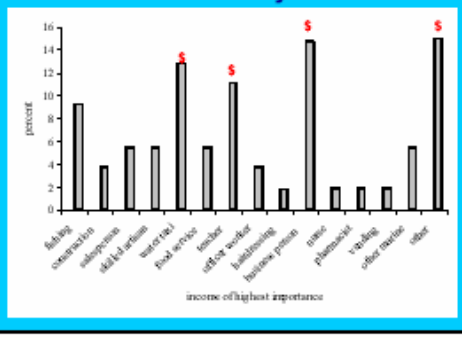


- may be increasing or high disposable incomes
  - small mean HH size
  - relatively high material style of life found in Union and Mayreau

S9 Household income distribution by source



S9 Household income distribution by source



G2 Existence of a decision-making and management body

Background

- identification of the management body
  - allows a MPA manager to better understand the range of management activities taking place in the area
  - be more effective in terms of management

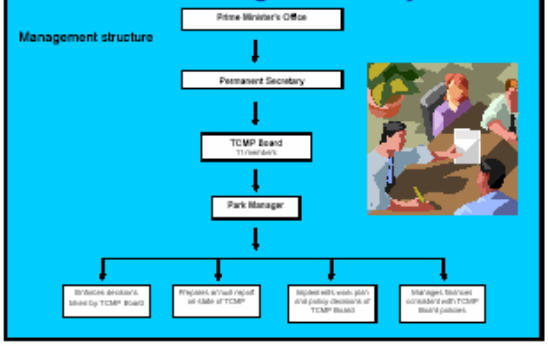
G2 Existence of a decision-making and management body

Method

- Review of secondary data
  - Management plans for the TCMP
  - Relevant legislation
  - TCMP Board Meeting Minutes
- Key informant interviews
  - Clarification of Board structure

G2 Existence of a decision-making and management body

Management structure



G3 Existence and adoption of a management plan

Background

- Knowledge of the existence of management plans for various activities is important to determining the overall impacts of management on the MPA, particularly governance
- Several management plans developed for the TCMP
  - None formally adopted
  - Cordice (1998; 2000) currently used to guide management
  - TCMP Board drafting new management plan

G3 Existence and adoption of a management plan

Method

- Review and narrative on the informally adopted management plan of Cordice (1998; 2000)
- The section of the management plan for which Mr. Dublin (TCMP Manager) has the responsibility for drafting for the current update by the TCMP Board was also evaluated

G3 Existence and adoption of a management plan

Results

- 1998 plan
  - introduction and mission statement
  - related legislation
  - boundaries and zones of the TCMP
  - buoy identification in the TCMP
  - specific rules
  - management structure
  - environmental monitoring and management policy
  - community and international relations
  - financial organization
- 2000 plan
  - updated information on boundaries and zones
  - general garbage/waste management policy
  - land use and potential impact from terrestrial sources policy
  - structure and operation of the Marine Parks Board
  - management structure of marine parks
  - enforcement and financial revisions

G3 Existence and adoption of a management plan

Results

- Specific management objectives for the TCMP not developed
- No resource and resource uses information
- Legislative authority for the TCMP lacks detail
- No map outlining boundaries and zones
- Detailed information on management authority is lacking
- No financial, training, monitoring and administrative plans
- New management being drafted is an improvement of 1998 and 2000 plans
  - Delays in drafting sections of plan

G6 Availability and allocation of MPA resources

Background

- Capacity of the management team to administer and complete MPA activities over time, based on the degree of access to and level of human, equipment and financial resources
- 1998 management plan and draft of 2005
  - Staffing and job responsibilities

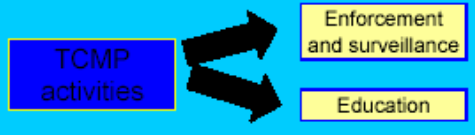
G6 Availability and allocation of MPA resources

Method

- TCMP staff interviewed
  - activities undertaken for TCMP management
  - environmental education
  - monitoring and evaluation
  - staff resources and training
  - budget and equipment available for management
  - record keeping

G6 Availability and allocation of MPA resources

Results



G6 Availability and allocation of MPA resources

Human resources
- Park Manager
- 4 Rangers
- Secretary
- Office Attendant

Administrative resources
- 1 boat (old): 20ft with 40hp Yamaha outboard engine
  - life jackets: need to be upgraded
  - GPS: need to be upgraded
  - no binoculars
- Dive equipment (new and in good condition)
  - wet suits (2)
  - snorkel and fins (6 pairs)
  - masks (6)
  - no SCUBA gear (usually rented)
- Office equipment (new)
  - computer
  - printer
  - telephone

G9 Degree of interaction between managers and stakeholders

Background

- A measure of the number of regularly scheduled meetings between MPA managers and staff and stakeholders to discuss compliance with MPA management plans

G9 Degree of interaction between managers and stakeholders

Method

- Interviews with TCMP Manager and secretary
  - types of formal and informal interactions between the TCMP and its stakeholders
  - reasons for these interactions
  - number and location of meetings
- Review of Minutes on consultations

G9 Degree of interaction between managers and stakeholders

Results
- Meetings with stakeholders are not regularly scheduled
- Meetings are held when the need arises
- No records of meetings held prior to 2005
- Recent interactions (2005-2006)
  - 3 consultations on proposed fee structure
  - OPAAL meeting
  - Scientific presentation on condition of reefs

G12 Level of stakeholder participation and satisfaction in management processes and activities

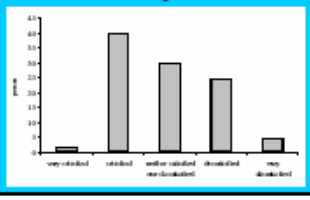
Background
- The active participation of stakeholders in the planning and management of a MPA can improve the success of the MPA. Furthermore, stakeholders are likely to feel ownership of and are more likely to support the MPA if they feel their views and concerns are being considered in the process
- Level of this participation and stakeholder satisfaction in TCMP management has never been evaluated

G12 Level of stakeholder participation and satisfaction in management processes and activities

Method
- Individual surveys
  - 70 persons interviewed: water taxi operators, dive shop owners, coastal cruisers and general public
  - Union Island and Mayreau
- Presentation of results to interviewers
- Feedback from interviewers on survey process and lessons learnt
- Results to be presented to public

G12 Level of stakeholder participation and satisfaction in management processes and activities

- Results
- People consider themselves to be stakeholders in TCMP management
- Low participation in management
- Low satisfaction with management



G14 Clearly defined enforcement procedures

Background
- Clearly defined enforcement procedures allow MPA enforcement staff to more effectively undertake their duties and resource users to be aware of consequences of non-compliance

Method
- 1998 management plan and new draft examined
- TCMP staff interviewed
  - enforcement guidelines (formal and informal), to describe the guidelines and procedures, to determine if they are reviewed and updated periodically and if staff are trained in the guidelines and procedures, number of reported violations, number of successful prosecutions, number of attempted prosecutions and accessibility and availability of enforcement guidelines.

G14 Clearly defined enforcement procedures

Results
- No apparent formal document on enforcement guidelines and procedures for the TCMP
- Guidelines exist
- Rangers enforce speed and anchoring regulations, undertake general monitoring of the area and educate users about park regulations
- Rangers do not have power of arrest
  - Coast Guard and Special Services Unit

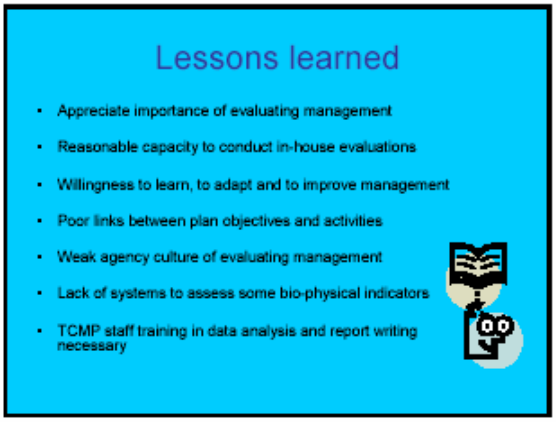
G15 Enforcement coverage

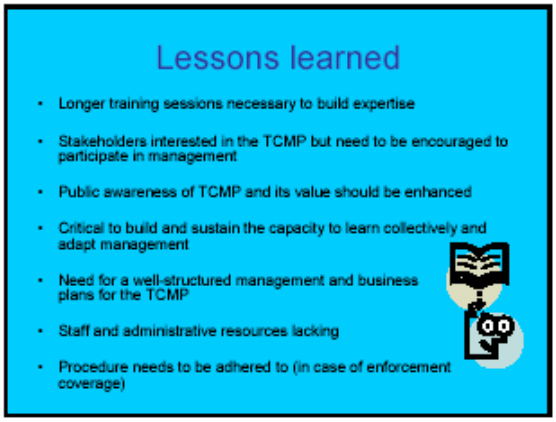
Background
- Number of surveillance and monitoring patrols undertaken by MPA staff during a given time period and in a specified area
  - consistency of patrol activities
  - prerequisite for assessing trends in violations or non-compliance

Method
- Interviews with TCMP staff
  - Patrol schedule
  - Temporal and spatial pattern of patrols
  - Types of infractions
  - Patrol routes
  - Area of patrol coverage
- Management plan (Cordice (1998; 2000) examined for patrol schedule and procedures

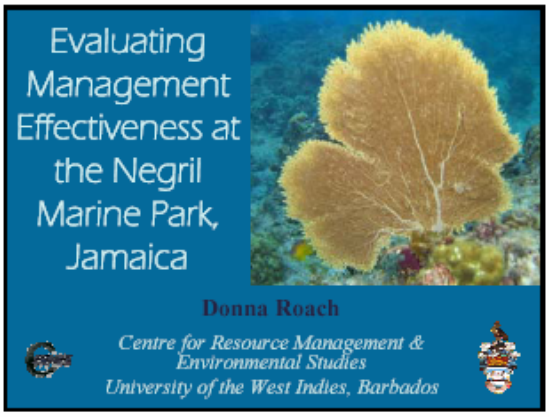
G15 Enforcement coverage

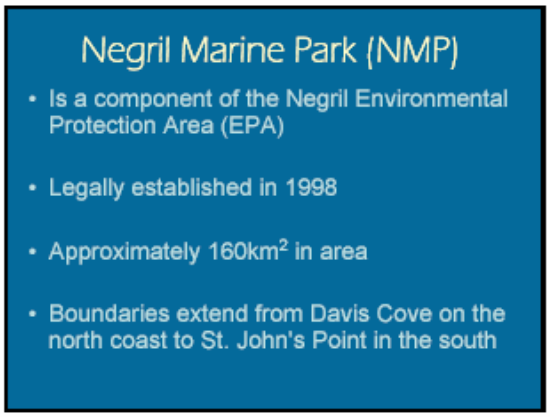
Results
- Procedures for enforcement coverage not outlined in management plan, its revision of 2000 and the draft plan of 2005
- No patrol records
- Varied patrol schedule
- Infringements
  - Spearfishing
  - Out of season lobster harvesting
  - Anchoring in restricted areas
  - Speeding

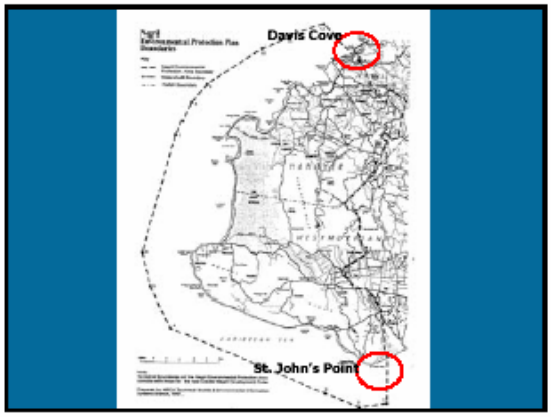

Lessons learned
Appreciate importance of evaluating management
Reasonable capacity to conduct in-house evaluations
Willingness to learn, to adapt and to improve management
Poor links between plan objectives and activities
Weak agency culture of evaluating management
Lack of systems to assess some bio-physical indicators
TCMP staff training in data analysis and report writing necessary


Lessons learned
Longer training sessions necessary to build expertise
Stakeholders interested in the TCMP but need to be encouraged to participate in management
Public awareness of TCMP and its value should be enhanced
Critical to build and sustain the capacity to learn collectively and adapt management
Need for a well-structured management and business plans for the TCMP
Staff and administrative resources lacking
Procedure needs to be adhered to (in case of enforcement coverage)

Appendix 5: NMP ME evaluation slides



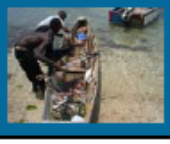




NMP Objective

To preserve the natural marine and coastal resources to protect their health and integrity while simultaneously allowing sustainable economic and social development within the Negril EPA

Socio-economic activities
- Tourism
- Fishing
- Farming



Evaluation Indicators

Biophysical	B8	Water quality
Socio-economic	S3	Level of understanding of human impacts on resources
	S14	Distribution of formal knowledge to community
Governance	G2	Existence of a decision-making and management body
	G6	Availability and allocation of MPA administrative resource
	[New]	Success of fundraising strategies (revenue and diversity of sources) that form part of the business plan
	G12	Level of stakeholder participation, and satisfaction in management process and activities

B8 Water Quality

NMP Management Objective
- Establish and maintain a reef restoration programme

Background
- Rapid tourism development in the 1970's and 1980's
- Absence of proper sewage treatment facilities until 2000
- Recognition that land based sources pollution is a significant threat to the marine environment
- Continued diffusion of macro algal blooms throughout the Long Bay area

B8 Water Quality

NCRPS

Objective
- To foster a better understanding of the nature of the land based sources of pollution
- To monitor the status of water quality and the health of the reef systems in the NMP

Methodology
- Monitoring programme set up in October 1997 at 21 land sample sites
- Samples tested for nutrients and salinity at NCRPS laboratory
- 3 marine sites added to monitoring programme
- Analysis conducted by the National Water Commission (NWC)
- Evaluation for project done for sample points along South and North Negril River

B8 Water Quality

NEPT

Objective

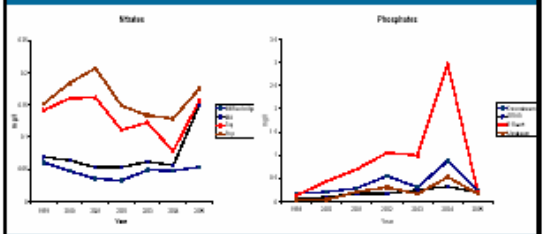
- To meet the water quality standards of the Blue Flag Beach Programme

Methodology

- Samples are collected at various marine sites
- Tested for nutrients and coliform bacteria
- Analysis conducted by NEPA

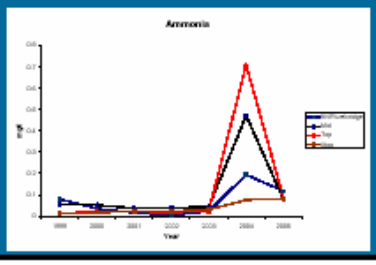
South Negril River

Nitrate and Phosphate concentrations highest upstream and at effluent discharge point suggesting that the sources of pollution are land based



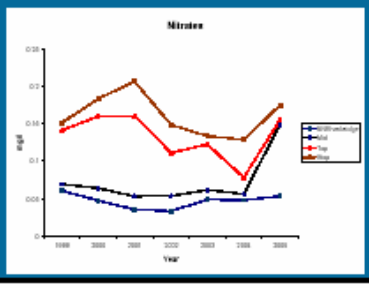
South Negril River

Ammonia concentrations highest at effluent discharge point suggesting that nutrients originates at the treatment plant



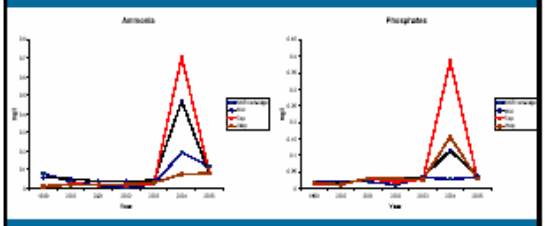
North Negril River

Nitrate concentrations greatest upstream suggesting land based sources of pollution

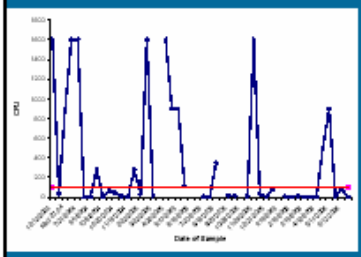


North Negril River

No significant variation seen in the concentration of phosphates and ammonia between sites



South Negril River Mouth



Measurements taken at South Negril Mouth below Blue Flag bathing water quality standards

Peaks in CFU counts maybe due to isolated rainfall events.

Measurements taken at the other sampling sites keeping with standards

Evaluation Indicators

Biophysical	B8	Water quality
Socio-economic	S3	Level of understanding of human impacts on resources
	S14	Distribution of formal knowledge to community
Governance	G2	Existence of a decision-making and management body
	G6	Availability and allocation of MPA administrative resource
	[New]	Success of fundraising strategies (revenue and diversity of sources) that form part of the business plan
	G12	Level of stakeholder participation, and satisfaction in management process and activities

S3 Level of understanding of human impacts on resource
S14 Distribution of formal knowledge to community

NMP Management Objectives

- To keep the public up to date and aware of the status of the park through its educational programmes and media recesses
- Public's understanding of environmental and social and 'sustainability' improved

Background

- Recognition of the impact of community on the NMP which determines the success of management policies
- Provides vital information on the characteristics of the target audience enabling them to formulate effective educational outreach strategies
- Gives the community a sense of ownership and increases transparency of the management process

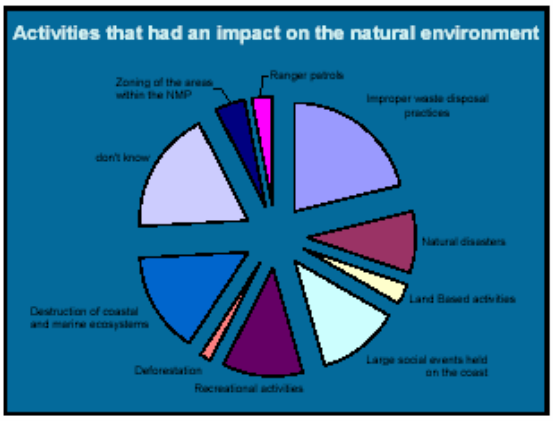
S3 Level of understanding of human impacts on resource
S14 Distribution of formal knowledge to community

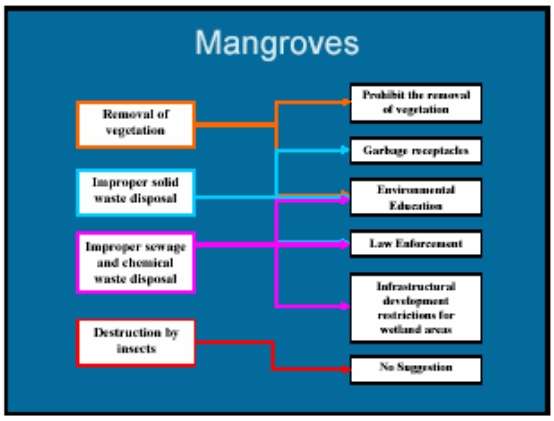
Method

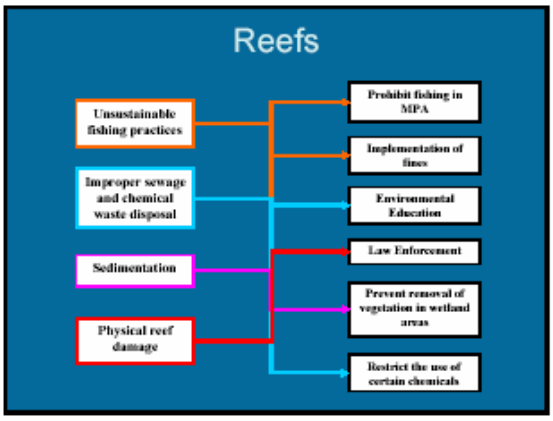
- Surveys administered to three groups of stakeholders:
  - Tourism Workers (87)
  - Tourists (203)
  - Community members (10 communities)

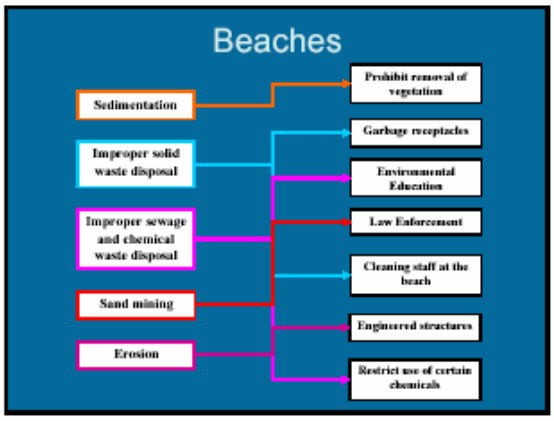
S3 Level of understanding of human impacts on resource
S14 Distribution of formal knowledge to community

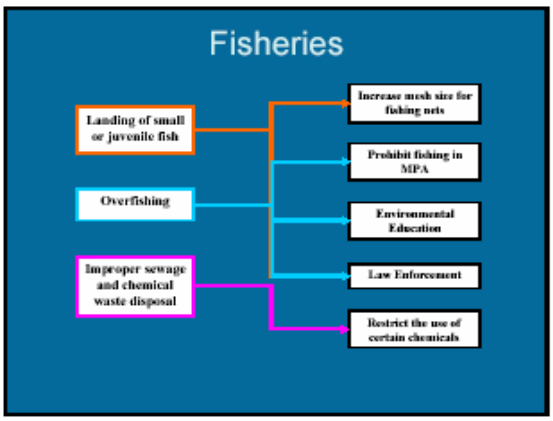
- Community members and tourism workers had the most knowledge of the NMP and NCRPS
- More then 90% of tourist had no knowledge of either
- The dissemination of environmental education was most effective amongst community members and tourism workers
- Most thought that environmental awareness had a positive impact on the natural environment of the NMP
- Both community members and tourism workers had some understanding of the results of human impacts on the environment (waste management)
- Some members of the communities failed to recognise the significance of particular resources (e.g. seagrass)
- Some community members and tourism workers found the educational material difficult to understand

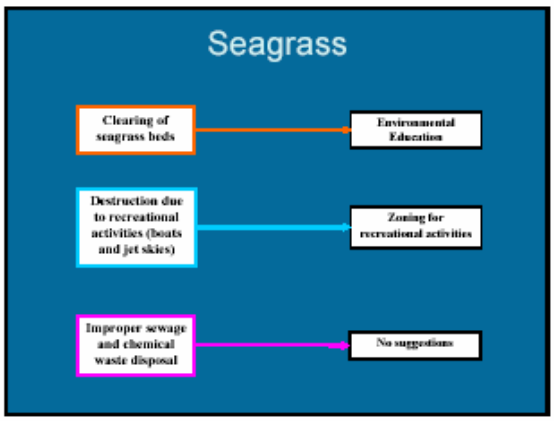

Activities that had an impact on the natural environment
Zoning of the areas within the NMP
Ranger patrols
Improper waste disposal practices
don't know
Natural disasters
Land Based activities
Destruction of coastal and marine ecosystems
Large social events held on the coast
Deforestation
Recreational activities


Mangroves
Removal of vegetation
Improper solid waste disposal
Improper sewage and chemical waste disposal
Destruction by insects
Prohibit the removal of vegetation
Garbage receptacles
Environmental Education
Law Enforcement
Infrastructural development restrictions for wetland areas
No Suggestion


Reefs
Unsustainable fishing practices
Improper sewage and chemical waste disposal
Sedimentation
Physical reef damage
Prohibit fishing in MPA
Implementation of fines
Environmental Education
Law Enforcement
Prevent removal of vegetation in wetland areas
Restrict the use of certain chemicals


Beaches
Sedimentation
Improper solid waste disposal
Improper sewage and chemical waste disposal
Sand mining
Erosion
Prohibit removal of vegetation
Garbage receptacles
Environmental Education
Law Enforcement
Cleaning staff at the beach
Engineered structures
Restrict use of certain chemicals


Fisheries
Landing of small or juvenile fish
Overfishing
Improper sewage and chemical waste disposal
Increase mesh size for fishing nets
Prohibit fishing in MPA
Environmental Education
Law Enforcement
Restrict the use of certain chemicals


Seagrass
Clearing of seagrass beds
Destruction due to recreational activities (boats and jet skies)
Improper sewage and chemical waste disposal
Environmental Education
Zoning for recreational activities
No suggestions

S3 Level of understanding of human impacts on resource
S14 Distribution of formal knowledge to community

- Need to emphasize the importance of **all** NMP resources
- Target audience must be considered before the formulation of educational material
- Efforts must be made to educate tourists on the NMP
- Need to modify the evaluation approach so as to address each of the management objectives that were to be assessed during this process.

Evaluation Indicators

Biophysical	B8	Water quality
Socio-economic	S3	Level of understanding of human impacts on resources
	S14	Distribution of formal knowledge to community
Governance	G2	Existence of a decision-making and management body
	G6	Availability and allocation of MPA administrative resource
	[New]	Success of fundraising strategies (revenue and diversity of sources) that form part of the business plan
	G12	Level of stakeholder participation, and satisfaction in management process and activities

G2 Existence of a decision-making and management body

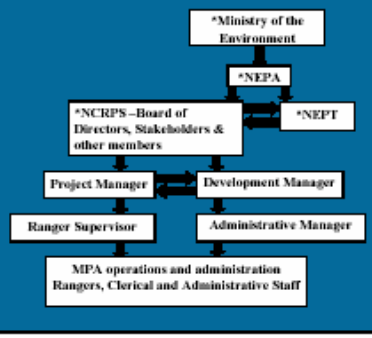
NMP Management Objectives

- Accountability and transparency of administrative and financial systems

Methods

- The review of existing documents provided by the management organization

Management structure of NCRPS



G2 Existence of a decision-making and management body

NEPA

- Responsible for environmental protection and planning, natural resource management and enforcement of environmental legislation
- Mandate includes the maintenance of a system of national parks and protected areas
- Section VI of the NRCA Act of 1991 allows for the delegation of its functions with the exception of the drafting of regulations.
- Delegation for management of NMP was officially granted to the NCPRS in 2002.

G2 Existence of a decision-making and management body

NCRPS

- Declared an agent of NRCA where legal grounds for management responsibilities were outlined in a delegation instrument used in this arrangement.
- This instrument is valid for a term no longer than five years
- The primary mission of the organization is the protection of coral reef ecosystems through public education, research, training, monitoring and lobbying as well as the creation of marine protected areas

G2 Existence of a decision-making and management body

NEPT

- Environmental umbrella organization for the Greater Negril Area and was delegated as the Local Advisory Committee for Parks and Protected Areas under the NRCA Act.
- Responsible for the environmental protection and ensuring sustainable development within the EPA
- Promotion of environmental education, management of Parks and Protected Areas, monitoring as well as soliciting funds for local environmental projects and activities.

G2 Existence of a decision-making and management body

- Problem lays with the failure of state agencies to make genuine efforts towards true co management
- Government agencies need to uphold both their political and financial obligations to these resource user groups
- Delegation contracts that support effective enforcement measures that can be carried out by the management bodies

G6 Availability and allocation of MPA administrative resources

NMP Management Objectives

- Generate sufficient income to support the maintenance and sustainability of the park
- Ensure that staff has the training, equipment and materials to facilitate their jobs
- Hire additional staff as permitted according to funding availability and space
- Develop an active volunteer programme to assist Marine staff

G6 Availability and allocation of MPA administrative resource

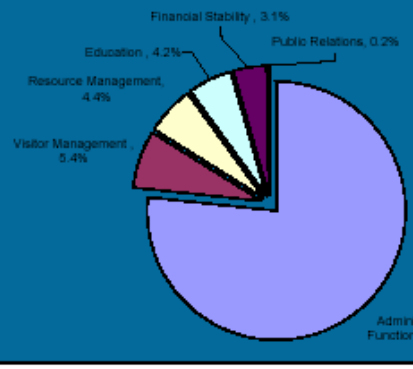
Background

- Major factor in the ability of the organization to carry out its functions
- May be an indicator of management priorities
- May determine the viability and sustainability of the management organization and the MPA

Methods

- Information was gathered through the analysis of existing documents made available by NCRPS.
- The documents included personnel records, budgets, the operations plan and equipment inventory/assets.

Management Programmes to be Implemented by NCRPS



G6 Availability and allocation of MPA administrative resource

- Lack of funding available to implement each programme as well as limited institutional capacity.
- Staffing needs may be addressed through creative processes such as the soliciting of volunteers or providing internships for students
- The Administrative Programme due to its pervasive and broad based nature has been allotted the largest portion of the required total budget of JA$30,002,511

G6 Availability and allocation of MPA administrative resource

- Difficult to gauge the management priorities of the NGO and say definitively how they fit into the long term strategic plans of the organization solely based on current funding, staffing and budget allocations
- Current resource allocation does not present an representative picture
- Current allocation of administrative resources is done in a reactive manner rather than proactive one where resources may not be allocated based on long term objectives but on the immediate needs of the NGO

Success of fundraising strategies (revenue and diversity of sources) that form part of the business plan

NMP Management Objectives

- Through fund raising efforts Heighten community awareness of the importance of financial sustainability as it relates to protection of the coral reef ecosystem, which is the tourism product

Methodology

- Audit team from NEPA analysed financial documents which covered the period of April 2004-March 2006
- Analysis of financial records and correspondence from donors.

Success of fundraising strategies (revenue and diversity of sources) that form part of the business plan

Objectives

- Ascertain whether fundraising activities embarked on were sound and productive
- Ascertain whether projected financial objectives were achieved

Success of fundraising strategies (revenue and diversity of sources) that form part of the business plan

- Financial goal was to generate a minimum of US$300,000.00 (approximately J$19,500,000.00) in revenue to support basic operating costs in the years 2004-2006
- Possible sources included user fees, government support and grants
- The operations plan indicated that the NCRPS also aimed, to raise J$50,000.00 to seed a Marine Park Trust Fund by December 2005
- Sales of souvenir items, educational tourism, private and cooperate donations and fundraising events.

Success of fundraising strategies (revenue and diversity of sources) that form part of the business plan

- That the implementation and success of these plans could not be substantiated or analysed
- The entity was successful in surpassing its set target of J$19,500,000.00 by J$10,429,336.18 (over 53%) achieving an actual intake of **J$29,929,336.18**

Success of fundraising strategies (revenue and diversity of sources) that form part of the business plan

- NCRPS needs to streamline its administrative management structure, by implementing measures to synchronize its administrative functions with the accounting functions
- Many of the income generating ventures that had been proposed have not done well enough to support the operational functions of the NCRPS
- Currents financial information could be misleading and may suggest that the NCRPS is doing better financially than in reality.

Success of fundraising strategies (revenue and diversity of sources) that form part of the business plan

- Information does not contain the relevant details on which to make informed management decisions and required changes to and diversification of financial strategies implemented.
- Imperative that the financial records highlight the sources of funds, how much each contributes to various management functions and the viability of each source
- Greater efforts need to be placed into making pre-existing programmes more lucrative. This may include improved and creative marketing strategies.
- Need to implement a committee or project team whose focus is solely on formulating, lobbying for and maintaining existing lucrative income generating strategies.

G12 level of stakeholder participation and satisfaction in management processes and activities

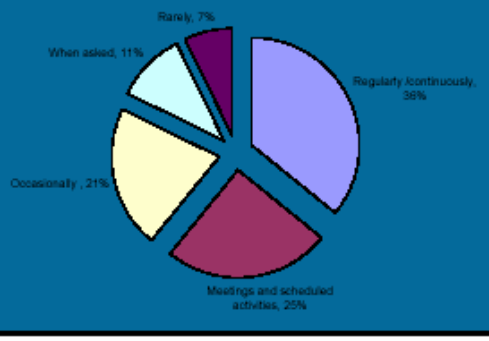
NMP Management Objectives

- Generate sufficient income to support the maintenance and sustainability of the park

Background

- Stakeholder groups within the EPA are numerous and diverse
- Each perceives and are affected by management processes differently
- Previous studies were used to obtain the opinion of community members within the NEPA
- This study seeks to solicit the view of
  - Management agencies
  - Regulatory bodies
  - Funding and donor organizations
- These are often viewed as having most knowledge and influence over the management process

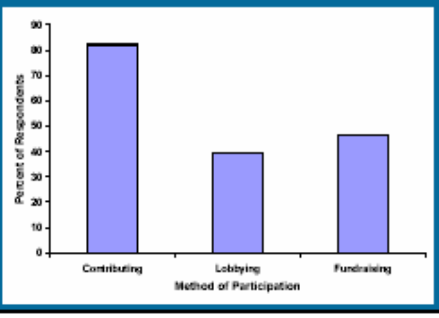
Frequency of stakeholder participation



G12 level of stakeholder participation and satisfaction in management processes and activities

- Many persons stated that they participated in management activities on a regular or continuous basis (35.71%).
- Most of the respondents (89.7%) claimed to have knowledge of the needs, financial and otherwise, of the organization.
- Most suggestions related to improvements financial stability
- Many persons were in favour of the implementation of user fees for the NMP and thought that greater efforts should be directed towards lobbying for this cause.
- Some respondents saw the organization as having only a participatory role in projects undertaken and initiated by other organizations.

The most common method of participation in the management process and activities of the NCRPS were done through contributing (82.14%) to the organization



The majority of the respondents (89%) were not satisfied with the amount of fundraising activities undertaken by the organization

Role of Organization	Funding Agency	NCRPS Board	Member Board
Funding	50	26.3	0.0
Lobbying	0	26.3	33.3
Contributing	50	47.4	66.7
Total	100	100	100

G12 level of stakeholder participation and satisfaction in management processes and activities

- The more distant the relation between respondents and the organization the lower the level of participation
- Greater efforts must be made to promote continued participation among stakeholders in management activities
- Lack of financial stability may seriously affect the success of the NMP and retard NCRPS ability to orchestrate effective management of the area.
- Sole dependency on donor and funding organizations has not afforded NCRPS the opportunity to achieve a level of financial independence.
- Creative ways must be sought to rectify this situation and greater effort made to lobby for more governmental assistance
- The organization needs to find a way to continuously generate funds independent of donations and grants.

Lessons Learnt

- Level of Understanding of the Requirements of the Evaluation
- Level of Technical Assistance Available During the Evaluation Process
- Data Collection Methods and Techniques
- The Influence of the Target Audience on Survey Design
- Availability of Secondary Data for Data Analysis
- The Need for Economic Incentives in the Data Collection and Evaluation Process
- Training for Members of the Evaluation Team
- Importance of a strong Financial base
- The Influence of Target Audience on the Formulation of Educational Materials

Appendix 6: SCMR evaluation indicator reports for indicators S14, G5 and G11

REPORT ON THE INDICATOR S14. 'DISTRIBUTION OF FORMAL KNOWLEDGE TO THE COMMUNITY'

Documents to be researched for this report requested at the preliminary workshop for Management effectiveness held on February 4th and 5th 2006, included the following:

- External Evaluation of COMPACT Education Project.
- Focus Group report for the same program
- Original survey results for TASTE 2002-2003
- Survey and analysis of Guatemalan Tour Operators and fishers plus Honduran Fishers who received workshop presentation from TASTE.

These documents are discovered for the most part and included as annexes to this report. However, in the process of discovery TASTE has not fully exercised its obligations as outlined in the workshop requests. In fact TASTE was to have made trips to Honduras and Guatemala to personally retrieve information. Instead TASTE attempted to achieve results via e mail with partners in TRIGOH. The results are not all in but are promised yet. Also, TASTE was asked to revisit schools in Toledo with a survey that would jog memory of the 2002-2003 and 2004-2005 deliveries of schools programs. This was not even attempted. With the 25 page report from Dr. Leandra Cho- Ricketts plus appendices and all the other information it seemed to be too much information for one minor aspect. (TASTE is presenting both orally and verbally at the 59th GCFI in Belize this November on this project – The poster and power point can be added to this report if necessary).

Whereas TASTE, who are a small community organization, has delivered quite a large amount of formal knowledge to the community over the six years of existence. It has been erratic and in bursts of concentrated effort. This is due to the way TASTE operates. Up to the present TASTE has functioned purely on project funding and with no core funding for organization support. This is the cause of the erratic delivery and is in its own way a criticism of TASTE. The community would be more comfortable with a solidly established organization whose core funding included an educational program. TASTE is planning to do that for 2007-2010.

From the documents presented it is clear that TASTE can deliver formal knowledge correctly and in good order. The workshop presentations to the Tour Operators and Fishers, actually delivered in Spanish, were well received. Retention of the knowledge seems to have been good as the surveys indicate. Comments in the surveys were interesting since they clearly show a wish to participate. The concern for the environment is clear.

The document that records the focus group commentaries is very clear in its recommendations:

- TASTE should formalize their education program so that all Toledo schools follow the course outlined with the field trip.
- The field trip could be expanded to include an overnight.
- Perhaps TASTE should take this program to National levels.
- Delivery was excellent with 100% young folks review to the positive. There are letters from youth in the files that express appreciation.

The report from Dr. Cho-Ricketts is a positive report with a high scoring on the scale provided. The Conclusions are that TASTE should carry on with an expanded program attempting to fully formalize the project into program. (see appendix)

In the second COMPACT project which has not been evaluated yet, TASTE repeated the success of the first COMPACT but in the villages of Toledo District. In addition TASTE focused to two other areas, Adult education through a series of workshops delivered to various interest groups in Toledo District and to Science clubs in five focus schools.
The adult education content was delivered in a two part power point presentation. The reception of this information led TASTE to be aware that the adults of Toledo are also starved for information of the world around them. The field trips produced as much positive response as for the youth. The Science club work was in two parts, Benthic Macro Invertebrate studies which required field trips to rivers and streams to find them and then, to discover what they are and a three day trip to the SCMR in order to teach youth the basic facts of monitoring and practical science. All was well received.

Since 2005 TASTE has only delivered a few extra adult workshops and no schools education program has emerged. This is not an indictment but it does show the weakness of TASTE in its organizational process. Changes one way or another are imminent.

CONCLUSIONS

- TASTE has done well in its delivery of formal knowledge.
- TASTE is erratic in this delivery
- TASTE's weaknesses in organizational structuring have affected continuity.

REPORT ON THE INDICATOR G5. 'EXISTENCE AND ADEQUACY OF ENABLING LEGISLATION'

There were two targets for this indicator; 1. Draft legislation for regulations concerning the SCMR and it's zoning. 2. Any legislation concerning waste management on Cayes of Belize.

As of date 21/10/06, the Department of Fisheries is unwilling to share the draft regulations. Perhaps they are not quite finished until they are finished. These draft regulations include the zoning maps and GPS coordinates for those zones. Only yesterday and the night before were two stakeholder meetings called to review changes in the National concept of conservation zone. When our (SCMR) zones were defined by the fishermen over two years ago the conservation zone allowed sport fishing (catch and release). The new standard will not allow even that. This news affects all our tour guides who have invested heavily in sport fishing. The conservation zone proposed is just the area where the bonefish and permits may be found. We need that area in conservation from the point of view of commercial species recovery and other species but we also need the access to sport fish, or we are trying to cheat our stakeholders. The decision taken yesterday included a two-strategy exercise in which we go for #1 first. This strategy involved a strong letter to the Department of Fisheries from all the stakeholders demanding that things remain the same as previously planned. We have a small window of opportunity to affect the situation since the politicians wish to pass this empowering legislation in November. The second

strategy means declaring a smaller conservation zone and then declaring a special management area to achieve the same result.

What we do have of those proposed zones is attached to this report as annex.

There are no regulations concerning waste management on the Cayes. The Coastal Zone Southern committee is a dead issue and no one is pursuing any of those goals and objectives. This is a statement (an indictment) of the state of affairs concerning real commitment to conservation principles.

TASTE has enacted three particular projects, which act towards the goals of this indicator. TASTE built a Bio/Phyto remediation public toilet facility on Hunting Caye along with public showers that use Phyto remediation and filtering of wastewater. A NOAA project has hired four community rangers on a part time basis. They have spent a lot of time cleaning up Hunting Caye. This is an impossible task since each storm brings in a significant amount of garbage. The source of this garbage is both Honduras and Guatemala. The rivers Motagua, Ulua and Chamelicon bring the accumulated wastes of many communities in floating debris.

TASTE has yet to get a project funded that deals with waste management in the Cayes. TASTE has submitted twice and failed. SW management is not a sexy subject.

That concludes this report for G5.

REPORT ON THE INDICATOR G11: LEVEL OF TRAINING PROVIDED TO STAKEHOLDERS IN PARTICIPATION.

An Inception-training workshop for Enhancing the Management Effectiveness of the Sapodilla Cays Marine Reserve, Sponsored by CERMES, was held on February 4th and 5th 2006 at the Sea Front Inn in Punta Gorda, Belize. Representatives of the management team, board members, TASTE staff and local stakeholders attended the workshop. Each team leader was assigned to specific indicators, which consisted of formulating several survey sheets and carrying them out.

Indicator G11 consisted of the level of training provided to stakeholders in participation. The purpose of this survey was to find out the level of training provided to stakeholders in participation. The people surveyed were the Advisory Committee, Fisheries Department, General Public, Donor Agencies, TASTE-SCMR and Fishers. Students of the University of Belize, Toledo Campus, interviewed twenty-four participants.

Although contact information was not obligatory but may be helpful for future references, most of the participants provided that personal data. When asked if they were familiar with the work TASTE is doing, 91.3% said yes, 4.3% said no and 4.3% said BOTH. When the respondents were asked to explain what TASTE does, 4.3% had no knowledge of the management plan, 4.3% had very little knowledge of the management plan, 21.7% had some basic knowledge, 52.2% had good amount of knowledge and 13% were fully aware of the management plan.

When asked what type of training have they received from TASTE, 30.4% had no answer,

43.5% received conflict resolution training, capacity building was 43.5%, board member's roles and responsibilities 30.4%, Outreach Educational Program 26.1%, other training's was 13%.

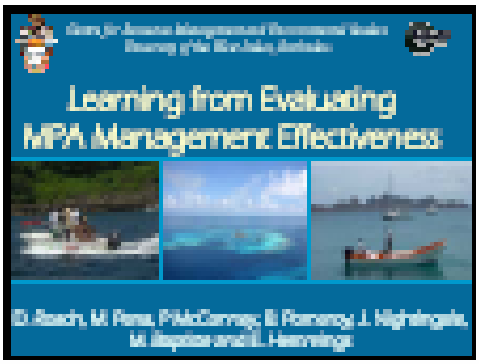
Following that question they were asked, how have those training's benefited them, 30.4% had no answer, 8.7% had no benefit, 21.7% was personally, 8.7% professionally, 13% was educationally, and 17.4% responded with *all of the above.*

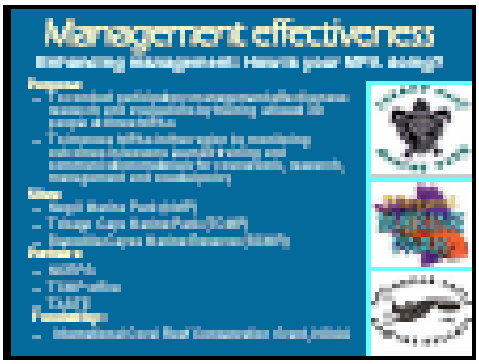
The next question was, do you think that receiving these training's help you to become more actively involved in the organization, 17.4% had no answer, 8.7% said no and 73.9% said yes. Next, the participants were asked if they thought that the level of training received was satisfactory. 17.4% of the participants had no answer, 13% said No, 69.6% said yes. When asked if they think that organizations such as TIDE, TASTE, and SATIM should have stakeholders more engaged in management decisions, if so why? 13% gave no answer, 0 said No, and 87% Yes. Most of the participants gave some comments in regards to these questions. The majority of them commented that stakeholders should play an active role in decision-making and their ideas are helpful and has a great impact on management of the reserve.

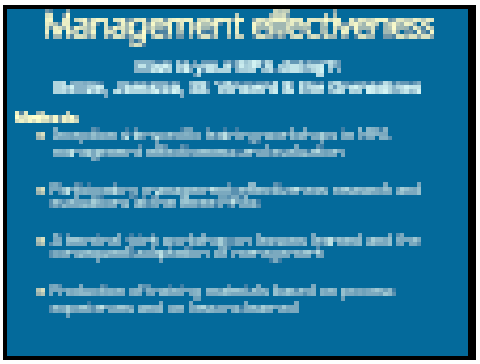
When asked how could others not involved in the activities of the SCMR get involved, they responded the following 13% had no answer, 47.8% were Aware, 34.8% were Aware + and 4.3% were fully aware.

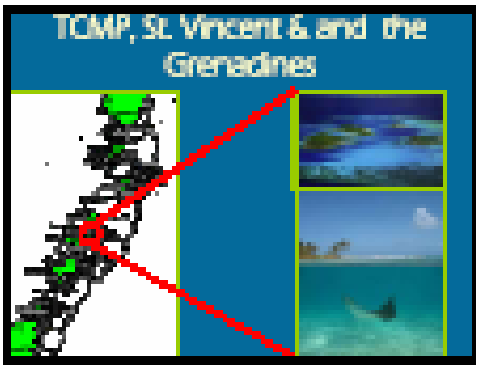
The final question was, is there anything else you want to comment? 34.8% had no answer, 17.4% said No and 47.8%, said yes with comments. The majority of the participants thought that TASTE needs proper management and leadership skills to become fully operational. TASTE needs a proper/stronger management team to become a better and stronger NGO. It also needs more funding and training for staff. TASTE should involve more youths and empower them.
The results indicate that stakeholders were not fully engaged in the trainings; however only a minority has actively participated or benefited in some kind of way from these activities. Although 59.5% of the participants were satisfied with TASTE management of the SCMR, a collective amount were either dissatisfied or neither satisfied nor dissatisfied with management due to a lack of information about management processes and activities and inadequate management resources, capacity and organization. Information regarding the NGO and the work it does needs to be distributed to these stakeholders so that they can actively participate in management decisions. The staff of TASTE-SCMR needs to conduct more Environmental Education Programs with these communities so as to educate them about the Marine Reserve and the organization itself. This lack of knowledge may be due to the fact that the organization does not have adequate funding to carry out these activities and to reach out to all these communities. Another reason might be the distance of the Reserve, not many stakeholders utilize the Park due to the far distance. The Sapodilla Cays Marine Reserve is located 36 miles away from Punta Gorda, not many fishermen could afford this. The reserve has been mostly impacted by Guatemalans and Honduras mainly because the reserve is closer to them.
If given Delegated Authority and adequate funding TASTE will be able to carry out all these activities and reach out to more people and find avenues to get these stakeholders to be more involved.

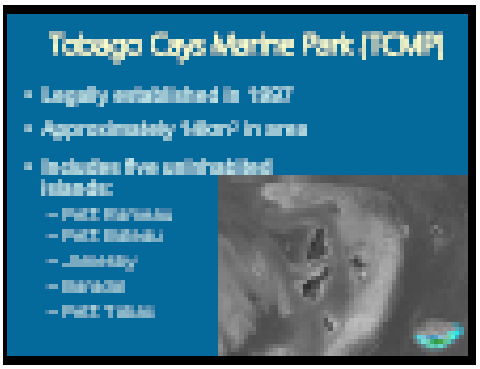
Appendix 7: MPA-ME presentation at GCFI











Management Effectiveness Indicators

Biophysical	Governance
B1 Focal species abundance (marine)	**G2** Existence of a decision-making and management body
B8 Water quality	**G3** Existence and adoption of a management plan
Socioeconomic	**G6** Availability and allocation of MPA administrative resources
S2 Local values and beliefs about marine resources	**G9** Degree of interaction between managers and stakeholders
S3 Level of understanding of human impacts on resources	**G12** Level of stakeholder participation and satisfaction in management process and activities
S7 Material style of life	**G14** Clearly defined enforcement procedures
S9 Household income distribution by source	**G15** Enforcement coverage

Management Effectiveness Indicators

Biophysical	Governance
B1 Focal species abundance (marine)	**G2** Existence of a decision-making and management body
	G3 Existence and adoption of a management plan
Socioeconomic	**G6** Availability and allocation of MPA administrative resources
S2 Local values and beliefs about marine resources	**G9** Degree of interaction between managers and stakeholders
S3 Level of understanding of human impacts on resources	**G12** Level of stakeholder participation and satisfaction in management process and activities
S7 Material style of life	**G14** Clearly defined enforcement procedures
S9 Household income distribution by source	**G15** Enforcement coverage

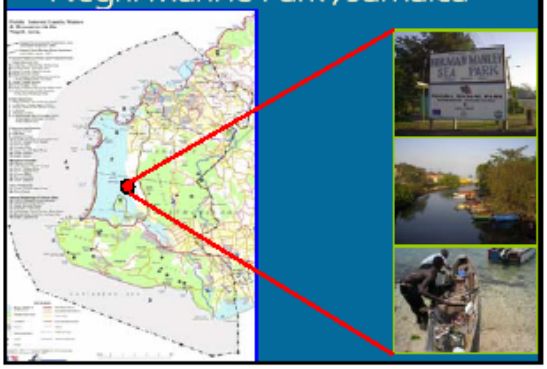
Major Findings (TCMP)

- **Biophysical**
  - Varying conditions in reef health
  - Water Quality results are doubtful
- Socio-economic
  - Respondents believe that the condition of marine resources have declined
  - Reasonable confidence in the ability of TCMP to manage the Marine Park
  - Human activities are damaging the Marine Park
  - Small household size and relatively high standard of living
  - 20 different occupations identified (water taxi>business>sales)

Major Findings (TCMP)

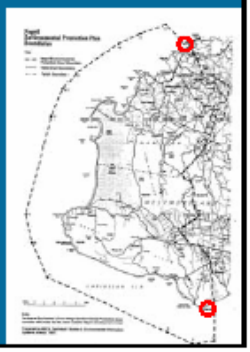
- Governance
  - TCMP Board responsible for the daily management of the park
  - Management activities: Administration, enforcement & surveillance, and education
  - Lack of institutional capacity and available funding for programmatic activities and administrative functions
  - Majority of respondents consider themselves to be stakeholders
  - Lack of interaction between TCMP staff and stakeholders
  - Enforcement coverage lacking; no patrol log books

Negril Marine Park , Jamaica



Negril Marine Park (NMP)

- Component of the Negril Environmental Protection Area (EPA)
- Legally established in 1998
- Approximately 160km² in area
- Boundaries extend from Davis Cove on the north coast to St. John's Point in the south



Management Effectiveness Indicators

Biophysical	Governance
B8 Water quality **B9** Area showing signs of recovery (total habitat level)	**G2** Existence of a decision-making and management body **G6** Availability and allocation of MPA administrative resources
Socioeconomic **S3** Level of understanding of human impacts on resources **S14** Distribution of formal knowledge to community	**G12** Level of stakeholder participation and satisfaction in management process and activities **[New]** Success of fundraising strategies (Revenue and diversity of sources) that form part of the business plan

Management Effectiveness Indicators

Biophysical	Governance
B8 Water quality **B9** Area showing signs of recovery (total habitat level)	**G2** Existence of a decision-making and management body **G6** Availability and allocation of MPA administrative resources
Socioeconomic **S3** Level of understanding of human impacts on resources **S14** Distribution of formal knowledge to community	**G12** Level of stakeholder participation and satisfaction in management process and activities **[New]** Success of fundraising strategies (Revenue and diversity of sources) that form part of the business plan

Major Findings (NMP)

- **Biophysical**
  - South and North Negril Rivers are major pathways for marine pollutants
  - Nutrient loading is exacerbated by the release of sewage effluent in the area
  - Coliform counts are highest at the mouth of the South Negril River
- Socio-economic
  - 90% of the tourists had no knowledge of the existence of the marine park
  - Effects of human impact in the environment recognised
  - Need for environmental education to mitigate impacts
  - Current educational material difficult to understand

Major Findings (NMP)

Governance

- The NCRPS has been delegated responsibility for management of the NMP
- Income generating strategies have not done well enough to support the operational functions of the NCRPS
- 36% participation in management activities on a regular/ continuous basis
- Participation levels decrease as the relationship between the NCRPS and the stakeholder became more distant
- Dissatisfaction with level of fundraising activities

Sapodilla Cayes Marine Reserve, Belize

Sapodilla Cayes Marine Reserve

- Southern terminus of the Belize Barrier Reef
- World Heritage site
- Legally established in 1996
- Approximately 125km^2 in area
- Comprised of 14 cayes and sand bores
- Boundaries
  - Tom Owens Cay (NE)
  - Seal Cay (NW)
  - Ragged Point (SE)

Management Effectiveness Indicators

Biophysical
B4 Comparison and structure of the community
B8 Water quality

Socioeconomic
S1 Local marine resource use patterns
S14 Distribution of formal knowledge to the community

Governance
G5 Existence and adequacy of enabling legislation

G11 Level of training provided to stakeholders in participation
G9 Degree of interaction between managers and stakeholders
G12 Level of stakeholder participation and satisfaction in management process and activities
G13 Level of stakeholder involvement in surveillance, monitoring and enforcement
G14 Clearly defined enforcement procedures
G15 Enforcement coverage

Management Effectiveness Indicators

Biophysical
B4 Comparison and structure of the community
B8 Water quality

Socioeconomic
S1 Local marine resource use patterns
S14 Distribution of formal knowledge to the community

Governance
G5 Existence and adequacy of enabling legislation

G11 Level of training provided to stakeholders in participation
G9 Degree of interaction between managers and stakeholders
G12 Level of stakeholder participation and satisfaction in management process and activities
G13 Level of stakeholder involvement in surveillance, monitoring and enforcement
G14 Clearly defined enforcement procedures
G15 Enforcement coverage

Major Findings (SCMR)

- Biophysical
  - Hard coral cover and recruitment rates are apparently low at the SCMR
  - Commercial species have been heavily impacted
  - Water quality monitoring is in the inception stage at the SCMR
- Socio-economic
  - Results for local resource use patterns to be analysed
  - Delivery of environmental education is good but sporadic
- Governance
  - Management plan has yet to be signed into law
  - There is a need for additional training programmes for stakeholders
  - More stakeholder participation needed in the management process
  - Enforcement procedures have been clearly defined
  - Operational cost (lack of fuel) has inhibited enforcement coverage

Lessons Learnt

- Appreciation of the importance of evaluating management
- Willingness to learn, to adapt and to improve management
- Reasonable capacity to conduct in-house evaluations
- Stronger science training or external support required
- Need for presentation and validation of results to community and stakeholders
- Understanding of the requirements to undertake the evaluation
- Acquisition of knowledge on stakeholder perception of management activities

Suggestions for Adaptive Management

- **Tobago Cay Marine Park**
  - Stakeholder engagement
  - Training in enforcement procedures
- **Negril Marine Park**
  - Stakeholder engagement
  - Conservation communication
- **Sapodilla Cayes Marine Reserve**
  - Finalisation of monitoring procedures and protocol

Appendix 7

Pena, M. and P. McConney. 2007. Report of the meetings to share TCMP evaluation results and lessons learned, 31 January 2007 on Union Island and 1 February 2007 in Kingstown, St. Vincent and the Grenadines.. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No. 6. 22 pp.

CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica & Belize

Report of the meetings to share TCMP evaluation results and lessons learned, 31 January 2007 on Union Island and 1 February 2007 in Kingstown, St. Vincent and the Grenadines

Centre for Resource Management and Environmental Studies (CERMES)
University of the West Indies, Faculty of Pure and Applied Sciences
Cave Hill Campus, Barbados

2007

CONTENTS

Citation
Pena, M. and P. McConney. 2007. Report of the meetings to share TCMP evaluation results and lessons learned, 31 January 2007 on Union Island and 1 February 2007 in Kingstown, St. Vincent and the Grenadines.. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No. 6. 22 pp.

Disclaimer
This report was prepared by the Centre for Resource Management and Environmental Studies (CERMES) under Coral Reef Conservation Grant NA05NOS4631049 from the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce. The statements, findings, conclusions and recommendations are those of the author(s) and do not necessarily reflect the views of NOAA or the U.S. Department of Commerce.

Contact

Dr. Patrick McConney
Senior Lecturer, CERMES
UWI Cave Hill Campus
St. Michael, Barbados

Tel: 246-417-4725
Fax: 246-424-4204
Email: pmcconney@caribsurf.com
Web site: www.cavehill.uwi.edu/cermes

1 BACKGROUND

These meetings were held to share information on the results and lessons learned from the CERMES project on evaluating management effectiveness of the Tobago Cays Marine Park (TCMP) as well as other marine protected areas in Jamaica and Belize (Appendix 1). The decision to hold three MPA site meetings to share information was taken at the Belize joint workshop where participants suggested that MPA stakeholders would benefit from direct communication with members of the CERMES research team in addition to the three MPA representatives attending the Belize workshop (Pena and Roach 2006).

Prior to the Union Island meeting on 31 January 2007 the CERMES team of Patrick McConney and Maria Pena met with Fr. Andrew Roache, Chairman of the Marine Parks Board that has direct oversight of the management of the TCMP, and Mr. Vibert Dublin, the Manager. They received paper copies of all project outputs to date. Fr. Andrew reiterated the need to ensure that all studies related to the TCMP contributed to the effective management of the Park. He added that in the future the Board may invite the various parties conducting research in the TCMP to share their key findings and recommendations for improvement. It was noted that the first draft of a management plan for the TCMP prepared under the OECS-ESDU OPAAL project was near completion and that it should serve as a focus for integrating research and recommendations.

2 WELCOME AND INTRODUCTIONS

The Union Island meeting, arranged by the TCMP office, was held at the Sustainable Grenadines conference room. The Kingstown meeting was arranged by the Fisheries Division and held in their conference room. At both meetings Patrick McConney (CERMES project manager) welcomed those present and outlined the agenda (Appendix 1). This included a short overview session of the CERMES regional marine protected area (MPA) project, a lengthier session detailing the results of the TCMP management evaluation, followed by information on the evaluation progress of the other MPAs, adaptive management and learning, and a concluding discussion of the results presented.

Participants were mainly persons who had attended the TCMP inception workshop meetings, had participated in the research or were otherwise considered stakeholders (Appendix 2). The Union Island meeting was poorly attended due, in part, to another meeting occurring simultaneously. Presentations were made twice in Union Island to accommodate this constraint. There was a better turnout at the meeting held in Kingstown.

3 OVERVIEW OF THE CERMES REGIONAL MPA PROJECT

An overview of the CERMES regional project on enhancing management effectiveness at three MPAs was provided by McConney (Appendix 3). Participants were informed that the project end date is 31 March 2007 but a no-cost extension to June 2007 may be requested to facilitate the production of training materials and allow enough time to see results from adaptive management. Specific objectives and components of the TCMP project were mentioned as well as information on project sites in Jamaica and Belize.

To date the following have occurred or are occurring:

- Inception training workshops for the TCMP, St. Vincent and the Grenadines; Negril Marine Park (NMP), Jamaica; and Sapodilla Cayes Marine Reserve (SCMR), Belize.
- Evaluations completed for the TCMP and NMP in October 2006. SCMR evaluations currently being conducted with some completed.
- Joint evaluation workshop in Punta Gorda, Belize, 4 November 2006, to review the products and process of management effectiveness.
- Recommendations for adaptive management.
- Production of the final evaluation report for the TCMP.
- Production of two issues of MPA-ME News.
- TCMP site meeting to share results (31 January – 1 February, 2007).
- Training materials to be produced (PowerPoint presentations etc)

4 RESULTS OF THE TCMP MANAGEMENT EVALUATION

Maria Pena (Project Officer, CERMES) presented indicator results for the TCMP management evaluation (Table 1; Appendix 4). The presentation included lessons learned and proposed activities for adaptive management. Hardcopies of the TCMP evaluation final report, ***Report on evaluating management effectiveness at the Tobago Cays Marine Park, St. Vincent and the Grenadines*** (Pena 2006)***,*** as well as the second issue of the MPA-ME News (available at http://cavehill.uwi.edu/cermes) were distributed to meeting participants.

Table 1 Summary of the TCMP evaluation results slide presentation

Indicator	Results
B1 Focal species abundance	• Shallow reef health at the four sites surveyed varies in condition but appears to be declining across all four sites. • Fish species diversity and hard coral cover is low while nutrient indicator algae coverage is increasing for all sites. • Biodiversity and key marine species in the TCMP appear to be under threat but more data are required to confirm this trend. • Reef Check should be continued in the long-term along with monitoring key species and coral bleaching. • The TCMP has trained human resources for Reef Check, but additional training is needed.
B8 Water quality	• The marine water quality monitoring implemented during this project is the first for the TCMP and in general for St. Vincent and the Grenadines. • It had the potential to provide baseline data which could be compared to future data from continued monitoring. • Water quality within the TCMP may generally be good since various parameters measured fall within accepted Blue Flag and Government of Barbados water quality standards. • However, due to problems with data collection and analysis, it is recommended that all of these results be discarded. • After appropriate re-training and procedures improvement, a monitoring programme should be implemented throughout the year to encompass both the high and low tourist seasons.

Indicator	Results
S2 Local values and beliefs about marine resources	• Declining condition of marine resources • Management of these resources is necessary in order to improve their condition. • They do not see tourists as more important drivers for managing the TCMP than the local communities. • Management efforts should be enhanced and supported by the existing beliefs and values. • Public education (TCMP objective), will reinforce these. • The TCMP has to improve the communities' confidence in its ability to properly manage the resources of the MPA since currently there is only reasonable confidence in TCMP management.
S3 Level of understanding of human impacts on resources	• Most people understand that human activities can have an impact on the TCMP, and that this is often negative • 12 activities thought to be causing damage to the TCMP have been identified – garbage, irresponsible fishing, general reef damage, anchor damage, marine pollution, abusing tourists, bad boating practices, poor use of space, bad management, bad tour guides, physical structures, illegal drugs. • The majority of people believe garbage to be the main problem affecting the resources.
S7 Material style of life	• Low income and land ownership in TCMP communities but a fairly high material style of life. • The majority of households live in substantial structures with modern conveniences. • The data in this project are baseline and cannot be currently used to determine the economic impact of the TCMP on the communities.
S9 Household income distribution by source	• Mean household size is 2 • 20 different occupations noted as main line of work: most important in terms of number involved – water taxiing, business and sales • 15 occupations of high importance in terms of household income: most important financially – business, water taxiing and teaching • Many people are multi-occupational. • Since the data are preliminary, rough and not necessarily representative, it is impossible at this time to identify if there have been any shifts in the sources of income with the establishment and operation of the TCMP. • TCMP management will need to be quite innovative and effective, working closely with the many people who depend on the park area if the objective is for livelihoods to be sustainable.
G2 Existence of a decision-making and management body	• Informally adopted management plan • Management structure outlined in the Marine Parks Act (1997) and Marine Parks (Tobago Cays) Regulations (1998) • TCMP Board (established 1998) responsible for daily park management • There is currently no prominent management along commercial lines (e.g. user fees, commercial leases, merchandising). • Some lengthy delays in making decisions regarding the operation of the TCMP, including the finalisation and operationalisation of a management plan. • Decisions need to be timely and perhaps could be better made if Board meetings were to be held regularly. • The situation in the TCMP is too complex for this superficial analysis to reach meaningful conclusions. It could be that Boards have performed to the best of their ability under difficult and changing circumstances, and without strategic planning guidance.

Indicator	Results
G3 Existence and adoption of a management plan	• Daily management of the TCMP is guided by the informally adopted management plan of Cordice (1998 updated 2000). • There are several important gaps in this plan. • For this plan to guide management it should contain clear objectives for the TCMP as well as financial, monitoring, training and administrative plans, all of which outline strategic directions and actions for implementing the TCMP. • The new management plan(s) being drafted should seek to address these issues, among others. • Business planning will be particularly important if tourism and other commercial uses are to be the focus of the TCMP as stated in law.
G6 Availability and allocation of MPA resources	• TCMP activities - Administration - Enforcement and surveillance - Education • Human and administrative resources of the TCMP are limited and in some cases scarce, but there is also little allocated to the other activities. • The budget for the operation of the TCMP has to be addressed in order to increase these resources. • Additional capacity and resources are needed to adequately and effectively manage the TCMP in almost every aspect.
G9 Degree of interaction between managers and stakeholders	• There is some degree of interaction between management and stakeholders but this needs improving. • Few meetings and consultations with stakeholders since 2005 with no records of minutes or attendance (except for the consultations). • Therefore there is very limited information on problems or issues arising from these interactions, or the dynamics of the interactions. • The TCMP office needs to improve its efforts to hold meetings with stakeholders and begin keeping records of participants, meeting dates and minutes. • Greater participation from stakeholders could enhance content, legitimacy and compliance with management measures leading to the increased success of the TCMP.
G12 Level of stakeholder participation and satisfaction in management processes and activities	• People consider themselves to be stakeholders in TCMP management • Low participation in management and satisfaction with management • TCMP management therefore has to find ways of encouraging people to participate in management if management is supposed to be participatory. • Stakeholders could become a possible threat to the TCMP if levels of dissatisfaction increase.
G14 Clearly defined enforcement procedures	• Enforcement procedures exist and rangers are aware of them, however no formal document outlining them exists. • Rangers enforce speed and anchoring regulations, undertake general monitoring of the area and educate users about park regulations. • This document should be produced defining the enforcement guidelines and procedures. This will allow the TCMP rangers to effectively conduct their duties and will inform the resource users of the consequences of non-compliance.

Indicator	Results
G15 Enforcement coverage	• Current TCMP management appears to be fairly efficient at surveillance and enforcement activities. • Coverage extends over the 14km^2 area of the MPA but is being hampered by an old patrol boat that is in need of maintenance. • No patrol records are kept. • Since the rangers do not keep patrol logbooks, trends in violations and non-compliance cannot be measured. • Patrols are varied in time and space.

At both meetings, there was general agreement among participants with the results presented. The discussions that followed the presentations at the two meetings are summarised below.

Union Island meeting
It was suggested to disseminate the evaluation results and lessons to the public via various media (mainly television and newspapers). The Sustainable Grenadines (SusGren) Project e-group and website are additional communication channels. The information could be made available both locally and regionally through Caribbean environmental reporters. Using the 'Compass', a newspaper, widely read in the Grenadines by yachting concerns was also suggested. The report of these TCMP evaluation results and lessons sharing meetings will be sent to all participants and other interested parties.

McConney was asked to comment on the new TCMP brochure. He stated that it was probably too wordy for the intended audience and suggested that perhaps an additional way be found to disseminate information about the TCMP. He gave the example of Negril where the Negril Marine Park (NMP) conducted a survey of tourists and workers to determine knowledge of the NMP. The results showed that brochures had not been effective at communicating information about the NMP to tourists since most were unaware that they were staying in a marine park. The NMP may test using a small information card in each hotel room with three main messages being location, rule compliance and where to obtain more information on the NMP. He suggested that perhaps SusGren could investigate the production of similar cards for the TCMP. Additionally McConney stated that perhaps a second, different, brochure might be needed for tourists.

Kingstown meeting
A participant, commenting on the results of the indicator on the existence of a decision-making and management body, stated that the report should be less critical of the TCMP Board since much of the ineffectiveness was beyond the Board's control. With respect to Board actions regarding user fees, feedback indicates that fees collection by the rangers is working. The TCMP office is primarily responsible for collection of fees. With respect to surveillance, the TCMP Board is trying to acquire a new, more appropriate, boat.

With respect to the continuation of Reef Check monitoring and the need for a more in-depth monitoring methodology, The Nature Conservancy (TNC) is going to conduct the Atlantic Gulf Rapid Reef Assessment (AGRRA) protocol with the Fisheries Division and perhaps this could be linked to the Reef Check monitoring conducted in the Tobago Cays for this project.

Sensitisation of the public to the TCMP, and projects and activities within the TCMP, was raised by participants. This issue had also been raised at the Union Island meeting. The fee structure was the most recent sensitisation undertaken regarding the TCMP and its regulations.

It was noted that the current TCMP management emphasis is on financial sustainability rather than science. A serious weakness of the TCMP is the lack of technical support in the form of an on-site science officer (both in terms of marine ecology and social sciences). The Fisheries Division might be able to help supplement capacity. The Fisheries Division is willing to help, but due to lack of human resources to cope with its own workload, is often unable to assist.

Participants were unsure if there was, or would be, a business plan for the TCMP. It is critical for the TCMP to have this given the emphasis on revenues from user fees that depend largely upon nautical tourism.

The Nature Conservancy is currently assisting with developing a sustainable financing plan for the TCMP. The TCMP is currently trying to raise around EC$400,000 in revenue. This amount is sufficient to only cover current expenditure and not capital, therefore there will still be a gap in financial resources. The width of this gap is also dependent on whether the revenue raised will easily be returned to the Park as and when required through government financing system. The revenue currently goes to a below-the-line account.

Capacity building is necessary in the TCMP Board and staff. The TCMP requires strategic and management plans. McConney asked whether there are plans for other MPAs in St. Vincent and the Grenadines and if there is a system into which they fit. There is a new National Parks Authority that may encompass both terrestrial and marine parks, but the latter may be excluded. There is funding available from the European Union to develop these sites and management plans. The Fisheries Division is currently reviewing conservation areas in St. Vincent and the Grenadines and assessing their viability.

The majority of participants stated that TCMP stakeholders need to see themselves as important in the management of the TCMP. The TCMP needs to show that the stakeholders can make a difference. Stakeholders need to see a benefit to them to be involved in managing the TCMP and there need to be incentives for participation. TCMP staff need to have decision-making abilities.

5 ADAPTIVE MANAGEMENT

The second halves of the meetings were dedicated to the discussion of adaptive management recommendations for the TCMP. Participants were informed that through this project, a sub-grant of up to US$1,500 will be made available to each project site (St. Vincent and the Grenadines, Jamaica and Belize) for adaptive management based on the results of the evaluation and lessons learned. Participants were further informed that at the workshop on MPA Evaluation Products and Process, Punta Gorda, Belize, on 4 November 2006, participants from each of the project sites were encouraged to propose at least two adaptive management activities that could be completed by mid-February 2007 for which the sub-grant could be used.

The TCMP representative present, Meritha Baptiste, made five recommendations for adaptive management -improving the TCMP brochure; training in MPA enforcement systems and patrol

log book use; training in water quality monitoring; training for administrative staff and determining how a Junior Ranger Programme could be implemented at the TCMP similar to the programme at Negril.

Union Island meeting discussion
The US$1,500 sub-grant had been disbursed to the TCMP on 31 January 2007. McConney required confirmation from those at the Union Island meeting (TCMP staff) on which of the proposed adaptive management activities would be implemented on a trial basis.

In terms of the recommendation for training in water quality monitoring, the main problem was transportation of samples to St. Vincent and their subsequent collection there. If the TCMP could do the analysis on the site this problem could be solved. McConney informed participants that water quality analysis for the TCMP is beyond the scope of the current project and stated that analysis of water quality would be difficult for the TCMP since even the St. Vincent Fisheries Division was unable to conduct some of the tests and was therefore reliant on the Bureau of Standards. He recommended that a more efficient way of communication between the relevant agencies was necessary and perhaps direct contact between the TCMP and the Bureau of Standards was required. He suggested that the TCMP office look into this.

The TCMP office was keen to continue monitoring and perhaps Kim Baldwin (of CERMES) who had previously trained the rangers in water collection and sampling procedures would be willing to re-train staff. McConney reminded that Ms. Baldwin is currently a PhD student and has limited time to undertake other activities at the moment with her availability dependent on her supervisors' authorisation. He did state that he would look into the possibility of more in-depth training with more documentation by Renata Goodridge or Ms. Baldwin (CERMES).

With respect to the adaptive management recommendation for training in enforcement systems and patrol log book use, currently the TCMP takes offenders to court but they are unable to get witnesses. The Chief Ranger should be given powers of arrest. Powers of arrest are included in the Marine Parks Act (1997) and not in the Marine Parks (Tobago Cays) Regulations (1998). Therefore amending the Act would be a longer process than simply amending the Regulations. The police and coast guard patrol the area only occasionally.

McConney asked if there was any reason to pursue enforcement systems. Training only in enforcement procedures and record-keeping would be simple but not sufficient. The rangers would like an agreement to have police accompany rangers on patrol. In terms of what can be done for adaptive management, the funds could be used to host a meeting on Union Island on TCMP enforcement with various enforcement agencies (immigration, customs, police, coast guard and Fisheries Division) at which recommendations to solve this issue could be discussed. He suggested that the head of these enforcement agencies could be flown into Union for a two-day meeting courtesy the project. On the first day of this meeting a trip to the Tobago Cays could be planned where officials would be shown the challenges facing the rangers and where patrol procedures, training and facilities could be observed. On the second day the observations could be discussed as well as potential solutions. A participant said that this should be possible but was doubtful that the relevant people would agree to it. He exemplified his statement by saying that most of the Board members had never been to the Tobago Cays and that only a few attended the

re-launch of the TCMP in December 2006. However, McConney encouraged the TCMP office to seriously consider this activity.

It was reiterated that enforcement can be challenging. Most of the time rangers warn offenders who consistently infringe on park regulations. Rangers are in agreement with an enforcement meeting, and are concerned about a situation arising in the park in which there may be a more serious confrontation. Another participant believed that rangers should have powers of arrest since they have been receiving resistance from locals and the coast guard does not have sufficient presence in the TCMP. He further added that a 24-hour system of security needs to be implemented.

McConney asked participants if they knew why the rangers were not empowered to arrest, or was it simply an oversight. It was believed to be the latter. McConney reiterated that it was worth trying to convene an enforcement meeting for which the sub-grant can be used to aid its funding.

He asked participants what other Acts provide the powers of arrest. Perhaps some background work on legislation paying attention to St. Vincent and the Grenadines but also looking at this in other places in the region and ways to get around it could be done. He suggested that instead of powers of arrest, perhaps public sanction might be another option. There could be an information board erected to name offenders. He however stated that he did not know if this would work culturally and socially in Union due to its small size.

It was also suggested that water taxi operators could be incorporated into enhancing enforcement in the Park. These operators can be sensitised about the marine environment and protecting their livelihoods. It would be possible to incorporate the water taxis since sometimes they inform on wrong-doers.

The suggestion to implement a Junior Ranger programme was deemed a good one. It is important to train boys and girls from secondary schools. The TCMP recruits rangers based on the possession of three subjects at CXC level. McConney explained that the Junior Ranger programme was not solely about training youngsters to pursue a ranger occupation but was also about public education for young people for marine stewardship. He suggested that Jean Brown (NMP Board Chairman) could be the best person to come to Union to explain the set up of a programme on a scale suitable to Union. The funds from the sub-grant could cover airfare for Ms. Brown and hosting of a workshop. McConney said that he would inform Ms. Brown about the TCMP interest in pursuing such a programme. SusGren would provide TCMP with the Junior Ranger booklet for review.

There has been some administrative staff training but more has to be done. Rangers require attachment overseas with established MPAs. The TCMP office has office space but lacks trained staff. Training for rangers in MPA monitoring has been included in the SusGren workplan for 2007. McConney agreed that training could be achieved through SusGren and also suggested that maybe the avenue for training could be explored through the OECS Protected Areas and Associated Livelihoods (OPAAL) project based on the inclusion of the need for career development and training in the TCMP management plan due to be completed next week.

Kingstown meeting discussion
McConney informed participants that rangers have no powers of arrest or powers of confinement so all rangers can do is to issue warnings to non-compliers. He stated that the marine police and coast guard are said not to be evident in the TCMP and that the rangers cannot be faulted for all of their constraints. He told participants that at the Union Island meeting he suggested holding an enforcement agencies meeting. He asked current participants for their thoughts on this.

The problems in the TCMP need to be communicated to the relevant agencies such as the coast guard. There has been apparently no communication between the TCMP office and coast guard to the effect that there is a need for ranger training. Coast guard patrols the TCMP and Customs is involved.

McConney informed participants of his recommendation to the TCMP to focus on this apparent deficiency in the Act and to host a two-day enforcement agencies meeting on Union for all enforcement agencies. He noted one response was that the agencies probably would not agree to such a meeting. Participants at the St. Vincent questioned this, and suggested that this would not be the case. The suggestion to hold an enforcement meeting was a good one.

Forestry rangers have powers of arrest under their legislation but work closely with the police for enforcement. At the recruitment stage the Forestry Department conducts an introduction to the forestry legislation. TCMP rangers should be made aware of the marine parks legislation and be given powers of arrest. McConney stated that it was a challenge to determine who would follow this up.

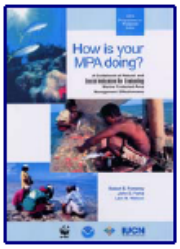
6 REFERENCES

Pena, M. 2006. Report on Evaluating Management Effectiveness at the Tobago Cays Marine Park (TCMP), St. Vincent and the Grenadines. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No. 5. 59 pp.

Pena, M and D. Roach. 2006. Report of the Workshop on MPA Evaluation Products and Process, Punta Gorda, Belize, 4 November 2006. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No. 4. 47pp.

7 APPENDICES

Appendix 1: Meeting announcements and agendas



CERMES regional project on: "Enhancing management effectiveness at three marine protected areas, in St. Vincent and the Grenadines, Jamaica and Belize"

Union Island meeting to share project results
Wednesday 31 January, 1:30pm to 4:00pm
Location to be confirmed

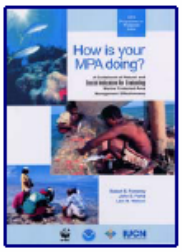
Agenda:

1:30 PM	Welcome and introductions
1:45 PM	Overview of CERMES regional MPA project
2:00 PM	Results of TCMP management evaluation
2:30 PM	Other MPAs, adaptive management, learning
3:00 PM	General discussion of results presentations
4:00 PM	Refreshments and close

The purpose of this meeting is to share information on the results of the CERMES project on evaluating the management effectiveness of the Tobago Cays Marine Park (TCMP) along with other marine protected areas in Jamaica and Belize. The evaluation results will be presented along with the lessons learned that suggest how to improve and adapt management. Training material will be developed from the experiences.

We want you to be there to hear what was done, what was found out and what was suggested to address the weaknesses and build upon the strengths of the TCMP management. Come hear for yourself. Join us.

For further information call the office of the Tobago Cays Marine Park



CERMES regional project on: "Enhancing management effectiveness at three marine protected areas, in St. Vincent and the Grenadines, Jamaica and Belize"

St Vincent meeting to share project results
Thursday 1 February, 9:30am to 12:00 noon
Fisheries Division Conference Room

Agenda:

09:30 AM Welcome and introductions

09:45 AM Overview of CERMES regional MPA project

10:00 AM Results of TCMP management evaluation

10:30 AM BREAK

10:45 AM Other MPAs, adaptive management, learning

11:00 AM General discussion of results presentations

12 NOON Close

The purpose of this meeting is to share information on the results of the CERMES project on evaluating the management effectiveness of the Tobago Cays Marine Park (TCMP) along with other marine protected areas in Jamaica and Belize. The evaluation results will be presented along with the lessons learned that suggest how to improve and adapt management. Training material will be developed from the experiences. We want you to be there to hear what was done, what was found out and what was suggested to address the weaknesses and build upon the strengths of the TCMP management. Come hear for yourself. Join us.

For further information call the Fisheries Division

Appendix 2: Participants

Name	Organisation	Contact
Union Island meeting (31 January 2007)		
Vibert Dublin	TCMP, St. Vincent and the Grenadines	784-485-8191 TCMP191@hotmail.com
Meritha Baptiste	TCMP, St. Vincent and the Grenadines	784-485-8191 meritha1@hotmail.com
Hyron Joseph	TCMP, St. Vincent and the Grenadines	784-485-8191
Jeremiah Jones	Community Development	784-533-4833
Alexcia Cooke	Sustainable Grenadines (SusGren) Project, St. Vincent and the Grenadines	784-485-8779 susgrenpa@vincysurf.com
Patrick McConney	CERMES, UWI	246-417-4725 patrick.mcconney@cavehill.uwi.edu
Maria Pena	CERMES, UWI	246-417-4727 maria.pena@cavehill.uwi.edu
St. Vincent meeting (1 February 2007)		
Herman Belmar	Grenadines Affairs	784-458-3510 humpback@caribsurf.com
Ruth Knights	Forestry Department	784-457-8594/495-9559 kemba59@hotmail.com
Lucine Edwards	Fisheries Division	784-456-2738 fishdiv@caribsurf.com
Lucille Grant	Fisheries Division	784-456-2738 fishdiv@caribsurf.com
Ralphie Ragguette	Coast Guard	784-457-4578/527-7447 damage700@hotmail.com
Neadine Defrietas	Ministry of Finance	office.finance@mail.gov.vc
Edmund Jackson	Environmental Services Unit	svgenv@vincysurf.com
Agathe Sector	The Nature Conservancy	alsector@yahoo.com
Doren Simmons	Ministry of National Security	pmsvg@vincysurf.com

Appendix 3: CERMES regional marine protected area management effectiveness (MPA-ME) project overview slide presentation

Enhancing management effectiveness at three marine protected areas in St. Vincent and the Grenadines, Jamaica and Belize

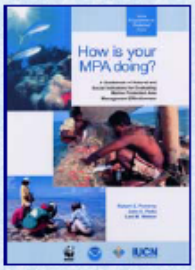
Project overview

International Coral Reef Conservation Grant

- MPA Management Effectiveness
  - Regional Capacity Building
- Duration: 1 October 2005 to 31 March 2007
  may be extended (no-cost) to 30 June 2007
- Total value: US$124,000 (half from the grant)
- Manager: Centre for Resource Management and Environmental Studies, Cave Hill Campus, University of the West Indies, Barbados

2

How is your MPA doing?



- Bio-physical
  - status of the resources, fish populations, water quality, environmental conditions, etc.
- Socio-economic
  - value of the area to various users, culture, livelihoods, sources of income, etc.
- Governance
  - achieving goals and objectives, capacity for management, stakeholder groups, etc.

Dr. Robert Pomeroy
Project trainer & adviser

3

Specific objectives

1. To conduct participatory management effectiveness research and evaluations by
   - training at least 30 people at three MPAs.
2. To improve MPAs in the region by
   - monitoring outcomes in lessons learned
   - training and communication materials for coursework, research, management and coastal policy.

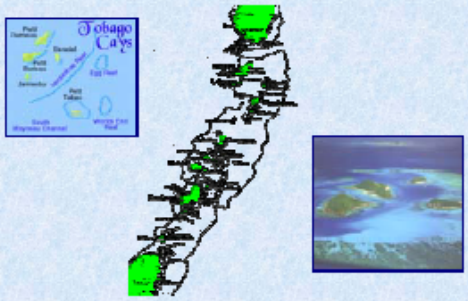
4

Main project components

1. Inception site-specific training workshops in MPA management effectiveness and evaluation
2. Participatory management effectiveness research and evaluations at the three MPAs
3. A joint evaluation workshop on lessons learned
4. Site meetings to communicate results, lessons
5. Implement activities for adaptive management
6. Production of training materials based on process experiences and on lessons learned

5

Tobago Cays Marine Park, St. Vincent and the Grenadines



6

TCMP possible goal

The TCMP has no management plan, but it has several draft plans under review

Participants came up with the following:

- To protect, conserve and sustainably utilise the natural resources of the Tobago Cays for future use

7

TCMP possible objectives

- Working with other relevant agencies using the media to promote the marine park as a tourist resort and attraction
- Ensuring that the park is managed along commercial lines
- Protect the biodiversity of the park
- To conserve the marine resources
- Public awareness and stakeholder participation
- Public education
- To protect sustainable livelihoods

8

INDICATORS - Tobago Cays Marine Park
Bio-physical
B1 Focal species abundance
B8 Water quality
Socio-economic
S2 Local values and beliefs about marine resources
S3 Level of understanding of human impacts on resource
S7 Material style of life
S9 Household income distribution by source
Governance
G2 Existence of a decision-making and management body
G3 Existence and adoption of a management plan
G6 Availability and allocation of MPA administrative resource
G9 Degree of interaction between managers and stakeholders
G12 Level of stakeholder participation, and satisfaction in management process and activities
G14 Clearly defined enforcement procedures
G15 Enforcement coverage

9

Target audiences for outputs

- TCMP Board of management
- Dept. of Grenadines Affairs, PMO
- Fisheries Division
- Stakeholder NGOs
- Public of S. Grenadines

Communication by:

- Reports, summaries, presentations …

10

Negril Marine Park, Jamaica

NMP goals from management plan

1. Achieve the mission of the Negril Marine Park through coordination of management programmes. (Administration Programme)
2. Mitigate negative impacts on the natural and infrastructural resources of the park in the event of a disaster or accident. (Disaster Preparedness and Emergency Management)
3. Provide the knowledge and skills needed for the development of appropriate attitudes and behaviour amongst park personnel, members of NCRPS and the general public, which will contribute to the conservation of coastal and marine resources within the Negril Marine Park. (Education Programme)
4. Achieve one hundred percent compliance with Marine Park regulations and other laws designed to protect the natural resources within the boundaries of the Negril Environmental Protection Area. (Enforcement Programme)

12

NMP goals from management plan

5. Develop and implement a financial sustainability plan which will ensure that adequate funds are available to manage the Negril Marine Park in a way that fulfils the objectives of the management plan. (Financial Sustainability Programme)
6. Influence the community and government to adopt policies that support the Marine Park's goals and objectives. (Lobbying Programme)
7. Create and maintain an awareness and understanding within the local community, among the tourist population, and throughout the international arena on the purpose, goals and objectives of the Negril Marine Park and Environmental Protection Area (EPA). (Public Relations Programme)
8. Gather, interpret and disseminate information pertinent to the Park on a continual, long term basis, so that changes can be noted over time, analyzed by appropriate scientific personnel and other technical experts, and used to make sound management decisions. (Research and Monitoring Programme)

13

NMP goals from management plan

9. Protect natural resources within the Marine Park, conserve existing biodiversity and wherever possible restore damaged ecosystems. (Resource Management Programme)
10. Implement programmes in collaboration with local citizens that benefit the community economically, while protecting the natural resources within the Marine Park. (Sustainable Community Development Programme)
11. Encourage the use of the Park by visitors while minimizing damage to its resources and conflict between resident and non-resident users. (Visitor Management Programme)
12. Maintain a zoning programme within the Marine Park that provides the best possible protection for the natural resources in perpetuity. (Zoning Programme)

14

INDICATORS - Negril Marine Park
Bio-physical
B8 Water quality
B9 Area showing signs of recovery (at habitat level)
Socio-economic
S3 Level of understanding of human impacts on resources
S14 Distribution of formal knowledge to community
Governance
G2 Existence of a decision-making and management body
G6 Availability and allocation of MPA administrative resource
[New] Success of fundraising strategies (revenue and diversity of sources) that form part of the business plan
G12 Level of stakeholder participation, and satisfaction in management process and activities

15

Target audiences for outputs

- NCRPS Board
- NEPA
- NEPT
- Chamber of Commerce
- Jamaica Hotel & Tourism Association
- TPDCO
- Fisheries Division
- Dive operators
- Montego Bay Marine Park
- Communities
- Tourism workers
- GCFI
- Mass media
- NGIALPA

16

Sapodilla Cayes Marine Reserve, Belize

17

SCMR goals and objectives

1) To develop sustainable fisheries in the SCMR through establishment of ownership by local southern Belizean fishers and user groups of the fisheries resources
   a) Establish and enforce zoning
   b) Eliminate poaching in Belize fishing grounds

2) To manage tourism within the carrying capacity of the SCMR
   a) Research carrying capacities in the SCMR and publish results
   b) Create tourism sub-committee in advisory committee to establish policies on carrying capacities in SCMR

3) To conserve and protect biodiversity and habitat in the SCMR for sustainable use of present and future generations of Belize
   a) Establish well managed monitoring of biodiversity
   b) Establish waste management practices and regulations

18

SCMR goals and objectives

4) To address uses and activities outside of the SCMR, which threaten conservation and protection of biodiversity within the SCMR
   a) Establish Tri-National understanding of the SCMR as a transboundary area; its goals and objectives, regulations and care
   b) Establish regional education and outreach programs

5) To ensure proper administration and implementation of the SCMR Management Plan
   a) Organize and implement multi-stakeholder meetings once per year to review progress
   b) Include community stakeholders in management decision making processes

19

INDICATORS - Sapodilla Cayes Marine Reserve
Bio-physical
B4 Composition and structure of the community
B8 Water quality
Socio-economic
S1 Local marine resource use patterns
S14 Distribution of formal knowledge to community
Governance
G5 Existence and adequacy of enabling legislation
G11 Level of training provided to stakeholders in participation
G12 Level of stakeholder participation. and satisfaction in management process and activities
G13 Level of stakeholder involvement in surveillance, monitoring and enforcement
G14 Clearly defined enforcement procedures
G15 Enforcement coverage

Target audiences for outputs

- TASTE-SCMR
- Advisory committee
- Fisheries Department
- Dept. of Environment
- Cayes residents
- General public
- Area representative
- Other NGOs
- Fishers

21

Summary of progress

- Inception training workshops were at :
  - Tobago Cays Marine Park (TCMP), St. Vincent and the Grenadines, on 19 - 21 Dec 2005 (17 participants)
  - Negril Marine Park (NMP), Negril, Jamaica, on 26 - 27 Jan 2006 (21 participants)
  - Sapodilla Cayes Marine Reserve (SCMR), Belize, on 4 - 5 Feb 2006 (15 participants)
- Evaluation activities were finished in Oct
- Joint evaluation workshop held in Nov, Belize
- Paper presented at 59th GCFI in Nov, Belize
- Recommendations made for adaptive management
- TCMP site report is done, others near done
- Two issues of MPA ME News produced
- Site meetings: TCMP 31 Jan, SCMR 24 Feb, NMP 5 Mar
- Preparing to monitor and evaluate adaptive management
- Planning for training materials in progress

22

Appendix 4: TCMP management evaluation results slide presentation

Centre for Resource Management and Environmental Studies, University of the West Indies, Cave Hill Campus, Barbados

Evaluating Management Effectiveness at the Tobago Cays Marine Park (TCMP), St. Vincent and the Grenadines

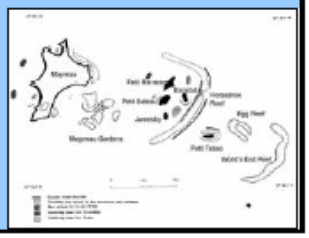
Major findings and lessons learned

Maria Pena and Patrick McConney

Presented at:
MPA Management Effectiveness information sharing meeting
31 January (Union Island) – 1 February (St. Vincent), 2007

TCMP Background

- Legally established in 1997
- Approximately 14km² in area
- Includes five uninhabited islands:
  - Petit Rameau
  - Petit Bateau
  - Jamesby
  - Baradal
  - Petit Tabac



Indicators

Relevant indicators identified	*Relevant indicators identified*
Biophysical	***Governance***
B1 Focal species abundance (marine)	G2 Existence of a decision-making and management body
B8 Water quality	G3 Existence and adoption of a management plan
Socioeconomic	G6 Availability and allocation of MPA administrative resources
S2 Local values and beliefs about marine resources	G9 Degree of interaction between managers and stakeholders
S3 Level of understanding of human impacts on resources	G12 Level of stakeholder participation and satisfaction in management process and activities
S7 Material style of life	G14 Clearly defined enforcement procedures
S9 Household income distribution by source	G15 Enforcement coverage

Focal species abundance (B1)

- Varying declining conditions of shallow reef health at all monitoring sites
- Low hard coral cover and fish species diversity across all sites
- Increasing nutrient indicator algae at surveyed sites
- Biodiversity and key species appear to under threat but more data required for confirmation

Long-term Reef Check monitoring should be continued.

TCMP has trained human resources of Reef Check – additional training required.

Water quality (B8)

- First marine water quality monitoring programme implemented for the TCMP and SVG
- Water quality within the TCMP may generally be good
- Various parameters measured fall within accepted Blue Flag and GOB standards
- Poor communication between TCMP and SVG Fisheries Division
- Poor adherence to water collecting protocol
- Invalid results

New monitoring programme (ecosystem and public health) needed

Constraints: capacity and communication

Local values and beliefs about marine resources (S2)

- The condition of marine resources in the TCMP have worsened in the five 5 years due to a number of factors
- Management of these resources is necessary in order to improve their condition
- Reasonable confidence in TCMP management
- Tourists are not viewed as more important drivers for managing the TCMP than the local communities

Management efforts need to be enhanced and supported by these existing beliefs and values

The TCMP has to improve the communities' confidence in its ability to effectively manage the resources of the MPA

Level of understanding of human impacts on resources (S3)

- Several human activities are perceived to be damaging the TCMP (74%)
- 12 potentially damaging activities identified- indiscriminate garbage disposal (30%) is the main offender

Research needed to increase understanding of the full range of activities affecting the TCMP

Material style of life (S7)

- Low income and land ownership in TCMP communities but a fairly high material style of life
- The majority of households live in substantial structures with modern conveniences (electricity, television, refrigeration)
  - concrete (78%)
  - galvanised roofs (81%)
  - tiled floors (43%)

POSSESSION	% OWNERSHIP
Electricity	96
TV	88
Telephone	77
Stereo	67
Washing machine	40
Refrigerator	87
Computer	34

Baseline data: determination of the economic impact of the TCMP on the communities cannot be currently made

Household income distribution by source (S9)

- Mean household size in TCMP communities = 2 persons
- 20 occupations = the main types of work
- Most important occupations (numbers involved): Water taxiing, business and sales
- 15 jobs of high importance for household income
- Business, water taxiing and teaching: highest importance to income
- Many people are multi-occupational

Currently impossible to identify any shifts in the sources of income with the establishment and operation of the TCMP.

TCMP management needs to be innovative and effective, if the objective is for livelihoods to be sustainable.

Existence of a decision-making and management body (G2)

- TCMP management structure: Marine Parks Act (1997) and Marine Parks (Tobago Cays) Regulations (1998).
- The TCMP Board (established 1998) is responsible for park management.
- Currently no prominent management along commercial lines (e.g. user fees, commercial leases, merchandising)
- Lengthy delays in decision-making *re:* TCMP operation

Complex situation for this superficial analysis to reach meaningful conclusions.

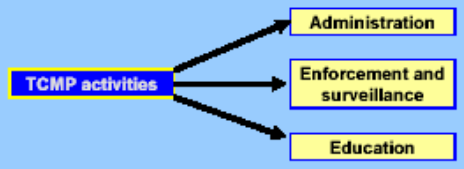
Boards may have performed to the best of their ability under difficult and changing circumstances, and without strategic planning guidance

Existence and adoption of a management plan (G3)

- Cordice (1998 updated 2000) management plan
- Several important gaps in this plan
- Clear objectives for the TCMP as well as financial, monitoring, training and administrative plans, all of which outline strategic directions and actions for implementing the TCMP should be included in the plan

The new management plan(s) being drafted should seek to address these issues, among others. Business planning will be particularly important if tourism and other commercial uses are to be the focus of the TCMP as stated in law.

Availability and allocation of MPA resources (G6)



Limited and scarce human and administrative resources

TCMP operational budget has to be addressed to increase these resources.

Additional capacity and resources are needed to adequately and effectively manage the TCMP in almost every aspect.

Degree of interaction between managers and stakeholders (G9)

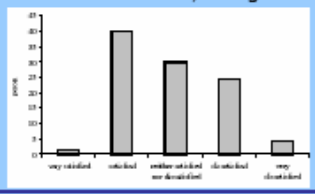
- Some degree of interaction between management and stakeholders: needs improving.
- Few meetings and consultations with stakeholders since 2005
- Very limited information on problems or issues arising from these interactions, or the dynamics of the interactions

The TCMP office needs to improve its efforts to hold meetings with stakeholders.

Greater participation from stakeholders could enhance content, legitimacy and compliance with management measures leading to the increased success of the TCMP.

Level of stakeholder participation and satisfaction in management processes and activities (G12)

People consider themselves to be stakeholders in TCMP management but there has been low participation in, and low satisfaction with, management



Stakeholders could become a possible threat to the TCMP if levels of dissatisfaction increase.

Encourage participatory management .

Clearly defined enforcement procedures (G14)

- Enforcement procedures exist
- Rangers are aware of them
- No formal document outlining procedures exists
- Rangers enforce speed and anchoring regulations, undertake general monitoring of the area and educate users about park regulations

Produce document defining enforcement guidelines and procedures.

TCMP rangers will be able to effectively conduct their duties and will inform the resource users of the consequences of non-compliance.

Enforcement coverage (G15)

- Fairly efficient surveillance and enforcement activities
- Coverage extends over the entire park area but is being hampered by an old patrol boat that is in need of maintenance
- No patrol records
- Trends in violations and non-compliance cannot be measured
- Patrols are varied in time and space
- Main infringements: spearfishing, out-of-season lobster harvesting, anchoring in restricted areas, speeding

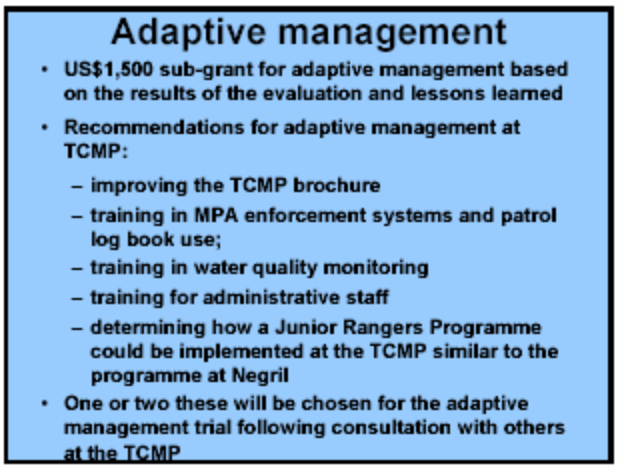
Patrols must be logged with appropriate information to provide baseline data necessary for observing trends in violations

Lessons learned

- TCMP office appreciates importance of evaluating management
- Reasonable capacity exists to conduct in-house evaluations
- Willingness to learn, to adapt and to improve management
- Weak agency culture of evaluating management
- Lack of systems to assess some bio-physical indicators
- TCMP staff training in data analysis and report writing is required

Lessons learned

- Longer training sessions necessary to build expertise
- Stakeholders are interested in the TCMP but need to be encouraged to participate in management
- Public awareness of TCMP and its value should be enhanced
- Critical to build and sustain the capacity to learn collectively and adapt management
- Need for well-structured management and business plans for the TCMP
- Staff and administrative resources lacking
- Procedure needs to be adhered to (in case of enforcement coverage)


Adaptive management
• US$1,500 sub-grant for adaptive management based on the results of the evaluation and lessons learned
• Recommendations for adaptive management at TCMP:
– improving the TCMP brochure
– training in MPA enforcement systems and patrol log book use;
– training in water quality monitoring
– training for administrative staff
– determining how a Junior Rangers Programme could be implemented at the TCMP similar to the programme at Negril
• One or two these will be chosen for the adaptive management trial following consultation with others at the TCMP

Appendix 8

Roach, D. 2007. Report of the meeting to share NMP evaluation results and lessons learned, 5 March 2007, Negril, Jamaica. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No. 8. 16 pp.

CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica & Belize

Report of the meeting to share NMP evaluation results and lessons learned, 5 March 2007, Negril, Jamaica

Centre for Resource Management and Environmental Studies (CERMES)
University of the West Indies, Faculty of Pure and Applied Sciences
Cave Hill Campus, Barbados

2007

CONTENTS

Citation
Roach, D. 2007. Report of the meeting to share NMP evaluation results and lessons learned, 5 March 2007, Negril, Jamaica. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No. 8. 16 pp.

Contact

Dr. Patrick McConney
Senior Lecturer, CERMES
UWI Cave Hill Campus
St. Michael, Barbados

Tel: 246-417-4725
Fax: 246-424-4204
Email: pmcconney@caribsurf.com
Web site: www.cavehill.uwi.edu/cermes

1 BACKGROUND

This meeting was held to share information on the results and lessons learned from the CERMES project on evaluating management effectiveness at the Negril Marine Park (NMP), and to a lesser extent the marine protected areas (MPAs) in Belize and St. Vincent and the Grenadines. The decision to hold three MPA site meetings to share information was taken at the Belize joint workshop where participants suggested that MPA stakeholders would benefit from direct communication with members of the CERMES research team in addition to the three MPA representatives attending the Belize workshop (Pena and Roach 2006).

The purpose of this meeting was to share the contents of the final draft of the NMP site report and to discuss the results if the evaluation. The remainder of this report describes the outcomes of this session held in the morning. A separate report is available on the afternoon session of fisheries management planning for the NMP (Appendix 1).

2 WELCOME AND INTRODUCTIONS

The Negril meeting, arranged by the Negril Coral Reef Preservation Society (NCRPS), was held at the Couples Swept Away hotel conference room. Jean Brown, President of the NCRPS, welcomed those present and reminded them of the importance of supporting MPA management..

Malden Miller, Project Manager for NCRPS and manager of the marine park, asked participants to introduce themselves (Appendix 2) after which he made a brief presentation, outlining the workshop objectives (Appendix 3).

3 OVERVIEW OF THE CERMES REGIONAL MPA PROJECT

An overview of the CERMES regional project on enhancing management effectiveness at three MPAs was then provided by Patrick McConney of CERMES (Appendix 4). Participants were informed of the proposed no-cost extension to July 2007 to facilitate the production of training materials and allow enough time to see results from adaptive management. Accomplishments and plans to date have included:

- Inception training workshops for the TCMP, NMP and SCMR.
- Evaluations completed for the TCMP and NMP in October 2006. SCMR almost completed.
- Joint evaluation workshop in Punta Gorda, Belize, 4 November 2006 (Pena and Roach 2006).
- Presentation at GCFI in Belize City on 9 November 2006.
- Recommendations for adaptive management.
- Production of the final site evaluation reports.
- Production of issues of MPA-ME News.
- Site meetings to share results (January – March 2007).
- Training materials to be produced (PowerPoint presentations etc).

4 RESULTS OF THE NMP MANAGEMENT EVALUATION

Donna Roach of CERMES presented a summary of the results from the NMP management evaluation. (Appendix 5). The presentation included lessons learned and proposed activities for adaptive management. Copies of the NMP-focused issue of the MPA-ME News (available at http://cavehill.uwi.edu/cermes) were distributed to participants. The results were discussed after the presentation of each indicator, and the points made are summarized below.

B8 Water quality

The results of the evaluation indicated that the discharge from the sewage treatment plant along the South Negril River course may be exacerbating nutrient loading in the NMP. In response to this it was noted that the NCRPS had started corrective measures for sewage treatment with financial assistance from the Environmental Foundation of Jamaica (EFJ). With this support the existing treatment facility will have the capability of treating effluent to tertiary level. Currently nutrients are not at a level high enough to impact negatively on human health, but they are above acceptable levels for coral reef health. Water quality and fish abundance were found to improve with distance from shore. However few fishing vessels now fish in deeper water due to vessel and gear limitations.

At present, NMP fishers face high input costs, especially for fuel, in order to sustain their livelihood. Mention was made of the project at the Discovery Bay Marine Lab geared towards encouraging offshore fishing of pelagics and demersals. Fishers present at this meeting expressed interest in undertaking such a project in the NMP. It was thought however that NMP fishers need to seek financing as groups in order to increase the potential of gaining financial support for investment from credit agencies. Additionally, thought should be given to fishing in groups which will reduce some core costs that fishers may incur. At present several fishers operate offshore and communicate in an informal fashion. If these efforts could be better coordinated it may lead to an increase in fishing efficiency.

Some concern was raised over the high faecal coliform counts recorded at the South Negril River mouth. However it was said that these counts rarely exceeded stipulated Blue Flag standards and high counts were found only in this area. Due to dilution, counts were lower in other areas within the NMP. Higher counts were generally seen in the wet season and associated with heavy rainfall events. Additionally there have been no reports by bathers of infection or illness related to contact with water of poor quality. It was felt that, of the three MPAs studied in the MPA ME project, the staff at the NMP had the most experience with water quality testing and monitoring and that they should lend their expertise to other sites that are currently in the developmental stages of these programmes.

S3 Level of understanding of human impacts on resources and S14 Distribution of formal knowledge to the community

The results of this evaluation indicated that many of the respondents to the socioeconomic surveys reported waste management and fishing as activities that impacted most on the resources of the NMP. This was thought to be so because they are also the most visible activities. The question was raised as to the how much more knowledgeable stakeholders in the NMP were than their Montego Bay counterparts. While no definitive answer could be given it was thought that the community members within the Negril EPA appeared to have more knowledge as a result of how the implementation of the MPA in that area was undertaken. A more top-down approach was used for the establishment of the Montego Bay Marine Park while there was more stakeholder participation in the formation of the NMP. Current user education in Montego Bay is still considered to be inadequate.

It was thought that the town crier approach was more effective for disseminating information to stakeholders than written correspondence in the Negril EPA. Additionally, tourism workers were

found to be very aware of conservation issues. Training opportunities were being offered to tourism workers. It was suggested that as much as 95% of the hotels along the NMP are environmentally friendly. Green Globe certification is partial evidence of this.

There is a need to place greater effort in, and employ more creative approaches to, information dissemination. One suggestion was to take the message to sports and school groups. These persons tend to be more comfortable when approached in their own environment rather than being asked to come into the NCRPS office or another chosen meeting place for discussion.

G2 Existence of a decision-making and management body

Participants asked for a comparison in the results from NMP and TCMP for this indicator as well as the differences between the ideal management structure illustrated in the presentation and the existing one. There was no discussion beyond a brief overview of the results and explanation of the NCRPS management structure.

G6 Availability and allocation of MPA administrative resources

The importance of attaining financial sustainability was highlighted. Although NCRPS had undertaken several projects in the past, these initiatives came to a halt when funding was exhausted. It was suggested that NCRPS approach The Nature Conservancy (TNC) for information on financial sustainability. It was revealed that NCRPS had met with the TNC on funding through the Caribbean Development Bank for protected areas. However there is a lack of understanding by the TNC and other financial sources about the importance of including core support as programme funding. It was recognized that the core costs of the of the organization needed to be covered either by user fees or by very large donor- funded projects such as those acquired by some NGOs in Belize.

Malden Miller described the present use of funds. He explained that although the former Project Manager had submitted annual budgets of 14 – 40 million Jamaican dollars to NEPA, the actual NCRPS annual income only amounted to 5 million Jamaican dollars. In addition, NCRPS is still negotiating the implementation of user fees. But even with this additional source of income the organization will still not be able to meet all financial obligations.

Mention was made of the demand for a Junior Rangers programme in the TCMP and the experience with environmental education in the SCMR. It was noted that there is a need for a mechanism through which these MPAs can share their different experiences and their formulae for success.

[NEW] Success of fundraising strategies (revenue and diversity of sources) that form part of the business plan

Malden Miller explained that the final audit does not always reflect the true financial situation at the NCRPS since incoming funds do not always equate to useable income. In many cases funds that are obtained are tied to specific projects and have been specified for use for stipulated programmatic activities only. In most cases funding is not allotted for the operational costs of the organization.

G12 Level of stakeholder participation and satisfaction in management processes and activities
The general consensus was that the NCRPS was managing the area as best as they could, given the financial constraints and lack of institutional capacity. The organisation is capable of adequately managing the NMP if given the right tools to do so.

Evaluation Summary
Questions were raised as to whether assessing coral cover would have been a more direct indicator of coral reef health than the use of water quality. It was noted that the indicator B9 was also to be used to assess the level to which NCRPS had established and maintained a reef restoration programme (CERMES 2006). Later, this indicator was omitted due to lack of time and persons needed to conduct the evaluation. It was suggested that the indicators were a poor fit in cases where the objectives were not being pursued by NCRPS. Additionally, evaluation tools such as questionnaire forms may need to be better designed in order to adequately measure the indicators.

5 LESSONS LEARNED

The discussion of the presentation continued into the lessons learned. The main focus of this discussion centred on the socio- economic questionnaires used in the evaluation. Queries were made as to whether the questionnaires had been pre-tested. Questions were also raised as to whether the surveys have been administered to a statistically representative portion of the target audience. However it was determined that although the results may not be statistically significant they were certainly indicative of trends in the target population. In some cases it may not be necessary or feasible to conduct a "proper" (i.e. entirely random sample) statistical survey as the cost may exceed the benefits of such an undertaking especially when the focus is only on the general trends and indicators. It was felt that the use of common sense in management extended to being able to interpret and use data that may not be statistically representative.

Management activities and income generating strategies should not be discarded if tried before with little success. Instead, the organisation should try to maintain flexibility when addressing these matters and employ different and creative approaches to improve the chances of success. Additionally, agencies charged with (co-)managing the NMP need to continue to do so in a participatory manner.

6 ADAPTIVE MANAGEMENT

Malden Miller gave a brief presentation (Appendix 6) on adaptive management and project follow up which reiterated many of the points made during the discussion of the results of the evaluation. The participants were reminded of the fact that they need to learn not only from the successes of management and evaluation activities but from the failures as well.

Greater effort will be made to increase public awareness of the NMP and its management body, including its management activities and projects**.** This will include scheduling regular meetings between managers and stakeholders as well as raising awareness among the tourist population through brochures to be placed in hotels. This will be a collaborative effort between community members within Negril and surrounding areas, tourists within the Negril EPA and NCRPS staff. Participants were reminded of the need to ensure adequate monitoring and evaluation so as to ensure that there was learning from the adaptive management.

7 REFERENCES

CERMES. 2006. Report of the Inception Training Workshop for Enhancing the Management Effectiveness of the Negril Marine Park, Jamaica, 26-27 January 2006. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No. 2. 31pp

Pena, M and D. Roach. 2006. Report of the Workshop on MPA Evaluation Products and Process, Punta Gorda, Belize, 4 November 2006. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No. 4. 47pp.

8 APPENDICES

Appendix 1: Meeting announcement and agenda

Workshop on Enhancing MPA Management Effectiveness and Fisheries Management Planning at the Negril Marine Park

Draft **PROGRAMME**

Time: 9:30am - 3:30pm
When: March 5, 2007
Where: Couples Swept Away, Negril, Jamaica

Workshop objectives

(1) To share findings on the process, results and lessons of the almost concluded project to evaluate the management effectiveness of the NMP using biophysical, socio-economic and governance indicators (including findings from MPAs in the Grenadines and Belize)

(2) To obtain participant perspectives and advice on plans for NMP adaptive management, teaching and training materials, and follow-up to the MPA management effectiveness project

(3) To share the contents of the first draft of the NMP Fisheries Management Plan for 2007-2009

(4) To obtain participant perspectives on how to proceed with development, communication, official approval and implementation of the draft FMP

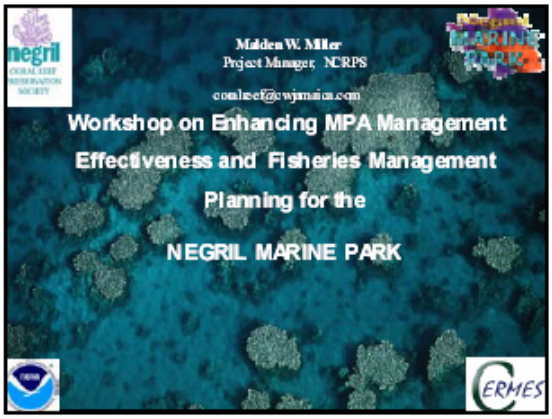
AGENDA

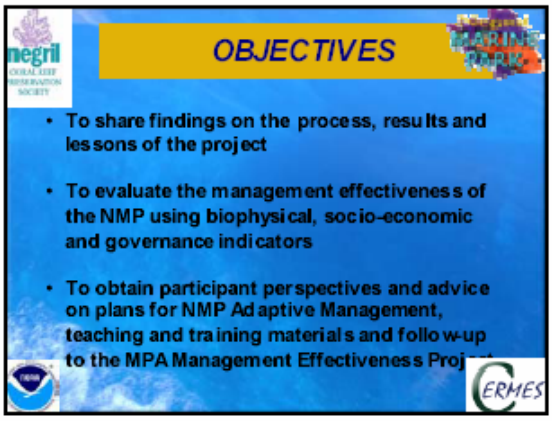
Time	
09:30	Welcome: Jean Brown, NCRPS
09:35	Workshop Objectives: Malden Miller, NCRPS
09:45	MPA evaluation process, results and lessons learned: Donna Roach, CERMES
10:15	Adaptive management and project follow-up: Malden Miller, NCRPS
10:45	*Break*
11:00	Advice on process, results, lessons and adaptive management: Participants
12:00	*Lunch*
13:00	How fisheries fit into the NMP MPA management plan: Malden Miller, NCRPS
13:30	Need for a NMP Fisheries Management Plan: Representative, Fisheries Division
14:00	Draft NMP Fisheries Management Plan 2007-2009: Patrick McConney, CERMES
14:30	Advice on how to proceed with development, communication, official approval and implementation of the draft Fisheries management Plan: Participants
15:30	Close

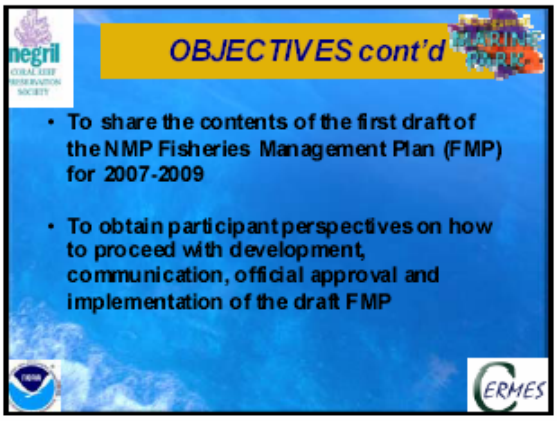
Appendix 2: Participants

Name	Organisation	Contact phone and email
Patrick McConney	UWI, CERMES	246-417-4725; pmcconney@caribsurf.com
Donna Roach	UWI, CERMES	246-417-4827; donna.roach@cavehill.uwi.edu
Tenile Grant	Fisheries Division	876-923-8811/2/3; tenile.grant@hotmail.com
Bernard Blue	NEPA	876-754-7540; bblue@nepa.gov.jm
Peter Gayle	UWI, Discovery Bay Marine Laboratory	
Keisha- Ann Mullings	Negril Area Social Development Commission	876-391-5778/ 876-955-4550 k_mulliings@yahoo.com
Malden Miller	NCRPS Project Manager	876-957-3735 coralreef@cwjamaica.com
Cecil Brown	Negril Water Sports Association	876-858-8426
Bridgette Williams	Negril Water Sports Association	876-872-9743
Dian Brown – Holgote	NEPT	876-957-3736 nept_negril@yahoo.com
Linval Getten	NCRPS	876-957-3735/ 876-450-8964 lgetten@hotmail.com
Brooke Anderson	PRO/PCV, NCRPS	876-843-5432 brooke.michele@gmail.com
Granville Johnson	NCRPS	876-957-3735
Vernon Sommerville	NCRPS	876-467-0962
Everton Frame	NCRPS	876-356-4353
Jean Brown	NCRPS Board	876-957-9805
Nicole O'Reggio	NCRPS Board	876-322-4873 norregio@sng.sandals.com
Lloyd Nelson	NCRPS Board	876-957-3735
Ceylon Clayton	NCRPS Board	876-443-9883
Oscar Reckord	NCRPS Board	876-428-0758
Paulette Peddie	NCRPS Board	876-410-1564
Pauline Thomas	NCRPS Administrative Manager	876-957-3735 pmunroethomas@yahoo.com

Appendix 3: Workshop objectives







Appendix 4: CERMES regional MPA management effectiveness (MPA-ME) overview

Enhancing management effectiveness at three marine protected areas in St. Vincent and the Grenadines, Jamaica and Belize

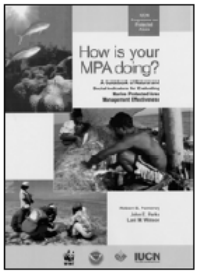
Project overview

International Coral Reef Conservation Grant

- MPA Management Effectiveness
  - Regional Capacity Building
- Duration: 1 October 2005 to 31 March 2007 may be extended (no-cost) to 31 July 2007
- Total value: US$124,000 (half from the grant)
- Manager: Centre for Resource Management and Environmental Studies, Cave Hill Campus, University of the West Indies, Barbados

2

How is your MPA doing?



Dr. Robert Pomeroy
Project trainer & adviser

- Bio-physical
  - status of the resources, fish populations, water quality, environmental conditions, etc.
- Socio-economic
  - value of the area to various users, culture, livelihoods, sources of income, etc.
- Governance
  - achieving goals and objectives, capacity for management, stakeholder groups, etc.

3

Specific objectives

1. To conduct participatory management effectiveness research and evaluations by
   - training at least 30 people at three MPAs.
2. To improve MPAs in the region by
   - monitoring outcomes in lessons learned
   - training and communication materials for coursework, research, management and coastal policy.

4

Main project components

1. Inception site-specific training workshops in MPA management effectiveness and evaluation
2. Participatory management effectiveness research and evaluations at the three MPAs
3. A joint evaluation workshop on lessons learned
4. Site meetings to communicate results, lessons
5. Implement activities for adaptive management
6. Production of training materials based on process experiences and on lessons learned

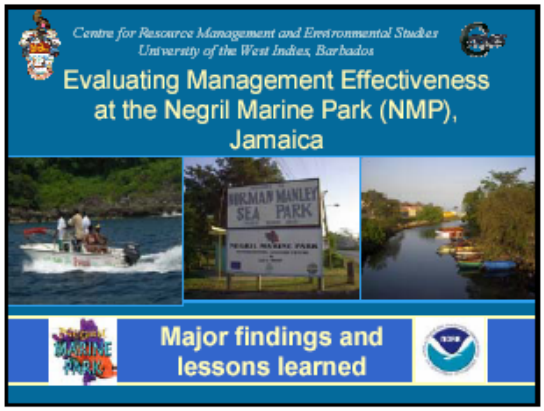
5

Summary of progress

- Inception training workshops were at :
  - Tobago Cays Marine Park (TCMP), St. Vincent and the Grenadines, on 19 - 21 Dec 2005 (17 participants)
  - Negril Marine Park (NMP), Negril, Jamaica, on 26 - 27 Jan 2006 (21 participants)
  - Sapodilla Cayes Marine Reserve (SCMR), Belize, on 4 - 5 Feb 2006 (15 participants)
- Evaluation activities were finished in Oct
- Joint evaluation workshop held in Nov, Belize
- Paper presented at 59th GCFI in Nov, Belize
- Recommendations made for adaptive management
- TCMP site report is done, others near done
- Two issues of MPA ME News produced
- Site meetings: TCMP 31 Jan, SCMR 24 Feb, NMP 5 Mar
- Preparing to monitor and evaluate adaptive management
- Planning for training materials in progress

6

Appendix 5: NMP management evaluation results slide presentation



Project structure

- Funding: Coral Reef Conservation Grant from the National Oceanic and Atmospheric Administration (NOAA); CERMES outreach
- Advisors on demand: Patrick McConney and Bob Pomeroy
- Site leaders: Carl Hanson, Elsa Hemmings, Malden Miller
- Report author: Donna Roach (CERMES)
- Evaluation teams: NCRPS staff and partners e.g. NEPA, Fisheries Department, etc.
- Focus: Evaluation products and processes

Negril Marine Park (NMP)

- Component of the Negril Environmental Protection Area (EPA)
- Legally established in 1998
- Approximately 160km² in area
- Boundaries extend from Davis Cove on the north coast to St. John's Point in the south

NMP Goals	NMP Objectives
Achieve the mission of the NMP through coordination of management programmes.	1.1 Accountability and transparency of administration and financial systems
	1.4 Develop an active volunteer programme to assist Marine Park staff
	1.6 Ensure that staff has the training, equipment and materials to facilitate their jobs
Create and maintain an awareness and understanding within the community, among the tourist population and throughout the international arena on the purpose, goals and objectives of the NMP and the EPA.	7.1 Keep the public aware of the status of the park through its educational programmes and media recesses
	7.4 Assist local groups and support their efforts with the understanding of the need for balanced well rounded community

NMP Goals	NMP Objectives
Develop and implement a financial sustainability plan which will ensure that adequate funds are available to manage the Negril Marine Park in a way that fulfils the objectives of the management plan.	5.1 Generate sufficient income to support the maintenance and sustainability of the park
	5.2 [Through fundraising efforts] Heighten community awareness of the importance of financial sustainability as it relates to the protection of the coral reef ecosystem which is the tourism product
Create and maintain an awareness and understanding within the community, among the tourist population and throughout the international arena on the purpose, goals and objectives of the NMP and the EPA.	7.1 Keep the public aware of the status of the park through its educational programmes and media recesses
	7.4 Assist local groups and support their efforts with the understanding of the need for balanced well rounded community
Protect natural resources within the Marine Park , conserve existing biodiversity and wherever possible restore damaged ecosystems	Establish and maintain a reef restoration programme

NMP Objectives	Indicators
1.1 Accountability and transparency of administration and financial systems	G2 Existence of a decision making and management body
1.4 Develop an active volunteer programme to assist Marine Park staff	G6 Availability and allocation of MPA administrative resources G12 Level of stakeholder participation and satisfaction
1.6 Ensure that staff has the training, equipment and materials to facilitate their jobs	G6 Availability and allocation of MPA administrative resources
7.1 Keep the public aware of the status of the park through its educational programmes and media recesses	S14 Distribution of knowledge to community
7.4 Assist local groups and support their efforts with the understanding of the need for balanced well rounded community	S3 Level of understanding of human impacts on resources S14 Distribution of knowledge to community

NMP Objectives	Indicators
5.1 Generate sufficient income to support the maintenance and sustainability of the park	G6 Availability and allocation of MPA administrative resources G12 Level of stakeholder participation and satisfaction
5.2 [Through fundraising efforts] Heighten community awareness of the importance of financial sustainability as it relates to the protection of the coral reef ecosystem which is the tourism product	[NEW] Success of fundraising strategies (revenue and diversity of sources) that for part of the management plan).
7.1 Keep the public aware of the status of the park through its educational programmes and media recesses	S14 Distribution of knowledge to community
7.4 Assist local groups and support their efforts with the understanding of the need for balanced well rounded community	S3 Level of understanding of human impacts on resources S14 Distribution of knowledge to community
Establish and maintain a reef restoration programme	B8 Water quality B9 Area showing signs of recovery

Management Effectiveness Indicators

Biophysical

B8 Water quality

B9 Area showing signs of recovery (total habitat level)

Socioeconomic

S3 Level of understanding of human impacts on resources

S14 Distribution of formal knowledge to community

Governance

G2 Existence of a decision-making and management body

G6 Availability and allocation of MPA administrative resources

G12 Level of stakeholder participation and satisfaction in management process and activities

[New] Success of fundraising strategies (Revenue and diversity of sources) that form part of the business plan

Water Quality (B8)

- South and North Negril Rivers major pathways for marine pollutants
- Nutrient levels well below national fresh water standards at all sites.
- Nutrient loading exacerbated by the release of sewage effluent in the area
- The highest nutrient concentrations and faecal coliform counts found at South Negril River mouth.

Greater use of data to inform policy and management decisions

Level of understanding of human impacts on resources(S3)

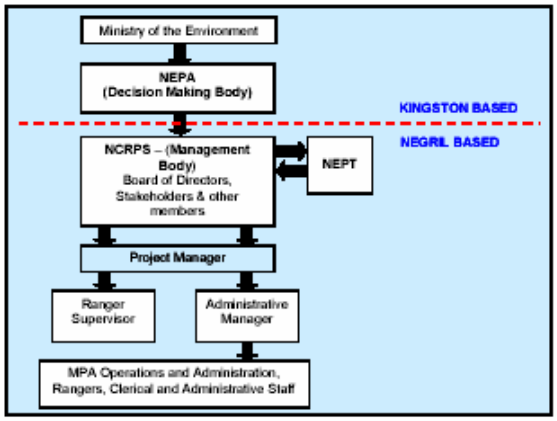
- Some understanding of the results of human impacts on the environment (waste management)
- Tourism workers had greater understanding of the impact of human activity on the environment than the other groups
- Some community members failed to recognise the significance of particular resources (seagrasses)

There is a need to tailor educational material to the target audience

Distribution of Formal Knowledge to the Community (S14)

- Community members and tourism workers had the most knowledge of the NMP and NCRPS
- 90% of the tourists had no knowledge of the existence of the marine park
- Dissemination of environmental education was most effective amongst community members and tourism workers
- Current educational material difficult to understand

Need for comprehensive education programme to help mitigate impacts of human activity on the MPA



Availability and allocation of MPA administrative resources (G6)

- Six management programmes to be implemented by NCRPS –
  - administrative functions
  - financial stability
  - public relations
  - education
  - resource management
  - visitor management
- Lack of funding available to implement each programme and limited institutional capacity

Greater emphasis should be placed on achieving financial stability

Existence of a decision-making and management body (G2)

- NCRPS and NEPT delegated management responsibility under NEPA
- Failure of state agencies to make genuine efforts towards true co-management
- Government agencies need to uphold both their political and financial obligations to these resource user groups

Greater support needed from government agencies in the management of the NMP

Success of fundraising strategies (Revenue and diversity of sources) that form part of the business plan [New]

- Many proposed income generating ventures have been unsuccessful in supporting the operational functions of the NCRPS
- Current financial information could be misleading and may suggest that the NCRPS is doing better financially than in reality

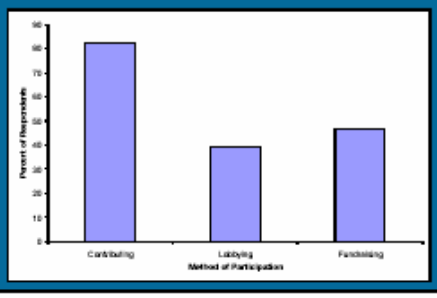
Improved and creative marketing strategies necessary, as well as a more focused effort on implementing new and maintaining existing income generating strategies

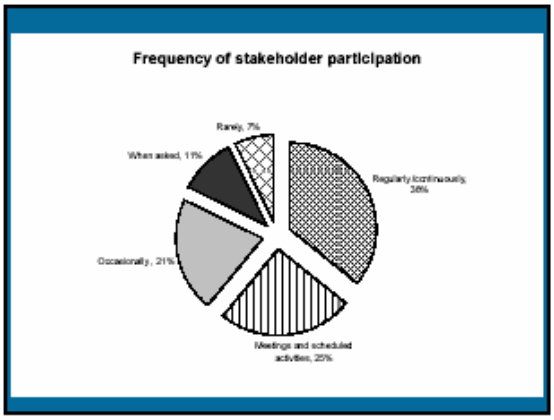
Level of Stakeholder Participation and Satisfaction in Management Processes and Activities (G12)

- Generally low frequency of stakeholder participation
- Majority claimed to have knowledge of the needs of the organization
- Most common method of participation in the management process and activities of the NCRPS - contribution to the organization

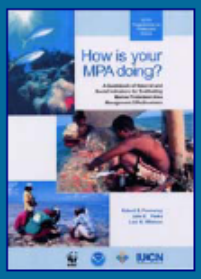
Greater effort must be made to promote continued participation among stakeholders in management activities

Level of Stakeholder Participation and Satisfaction in Management Processes and Activities (G12)





Evaluation summary



MPA goals

MPA objectives

Evaluation indicators

Evaluation Summary : Water Quality

- Establish and maintain a reef restoration programme

Good- Evaluation was able to highlight the successes and shortcomings of ongoing programmes

Evaluation Summary: Level of understanding of human impacts on resources(S3)

- Public kept abreast of status of the park

Good- Was able to give a picture of what educational material was being received by a variety of stakeholders

Evaluation Summary: Existence of a decision-making and management body (G2)

- Improved understanding of environmental and social sustainability

Poor

– Unable to ascertain whether there was improved understanding of environmental and social sustainability

– Subjective, highly conceptual, nature of objective made information difficult to quantify

Evaluation Summary: Existence of a decision-making and management body (G2)

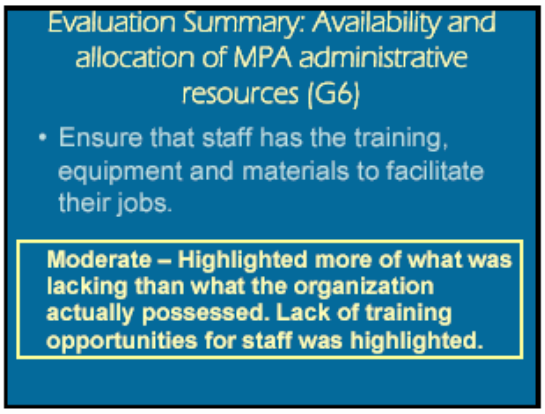
- Accountability and transparency of administrative and financial systems

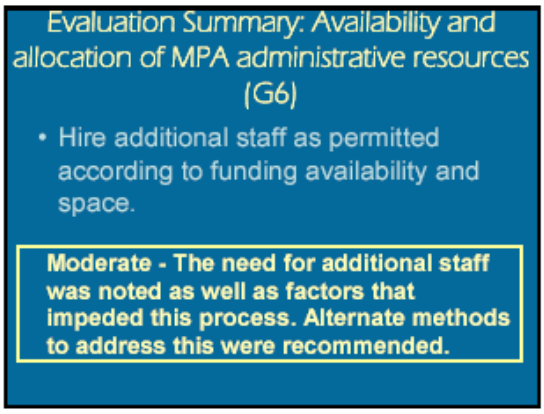
Poor- Results of the evaluation did not indicate the current level of transparency and accountability in these systems

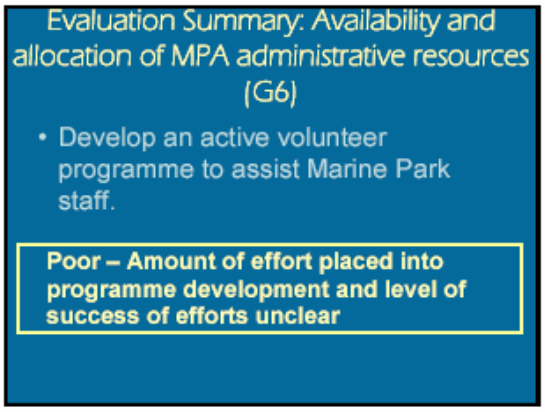
Evaluation Summary: Availability and allocation of MPA administrative resources (G6)

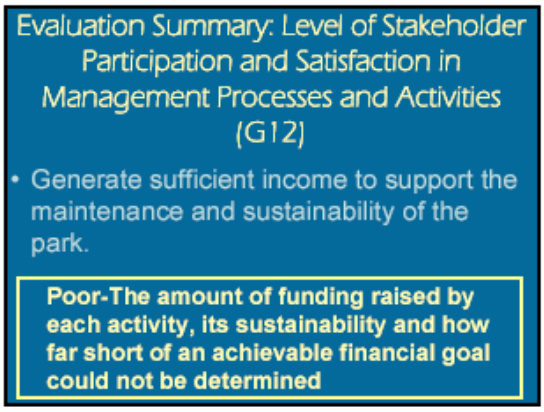
- Generate sufficient income to support the maintenance and sustainability of the park.

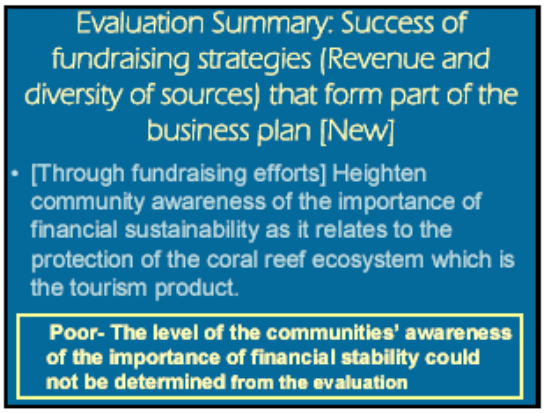
Good - How financial constraints impeded management activities and affected park management were highlighted.

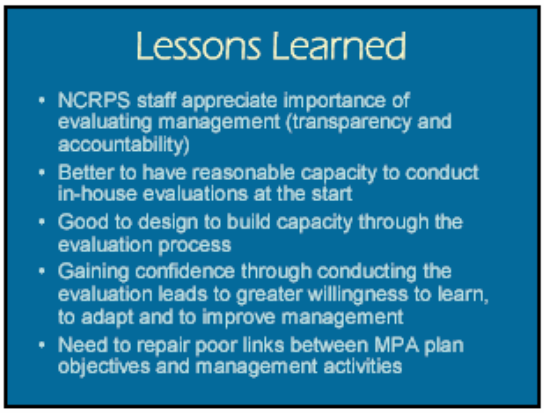

Evaluation Summary: Availability and allocation of MPA administrative resources (G6)
• Ensure that staff has the training, equipment and materials to facilitate their jobs.
Moderate – Highlighted more of what was lacking than what the organization actually possessed. Lack of training opportunities for staff was highlighted.

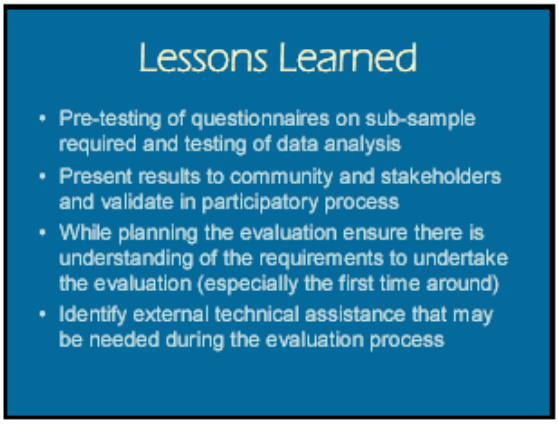

Evaluation Summary: Availability and allocation of MPA administrative resources (G6)
• Hire additional staff as permitted according to funding availability and space.
Moderate - The need for additional staff was noted as well as factors that impeded this process. Alternate methods to address this were recommended.

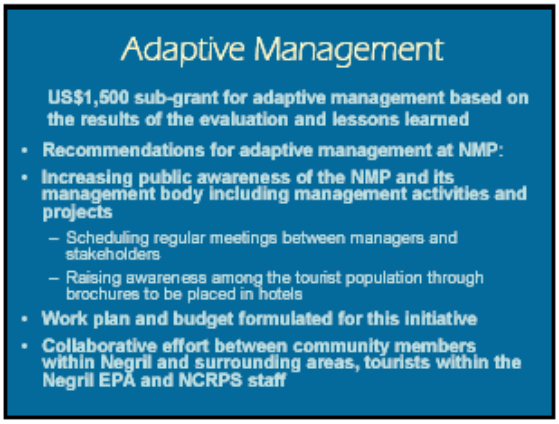

Evaluation Summary: Availability and allocation of MPA administrative resources (G6)
• Develop an active volunteer programme to assist Marine Park staff.
Poor – Amount of effort placed into programme development and level of success of efforts unclear


Evaluation Summary: Level of Stakeholder Participation and Satisfaction in Management Processes and Activities (G12)
• Generate sufficient income to support the maintenance and sustainability of the park.
Poor-The amount of funding raised by each activity, its sustainability and how far short of an achievable financial goal could not be determined

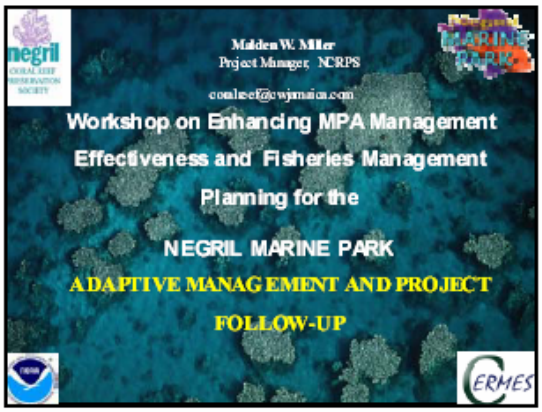

Evaluation Summary: Success of fundraising strategies (Revenue and diversity of sources) that form part of the business plan [New]
• [Through fundraising efforts] Heighten community awareness of the importance of financial sustainability as it relates to the protection of the coral reef ecosystem which is the tourism product.
Poor- The level of the communities' awareness of the importance of financial stability could not be determined from the evaluation

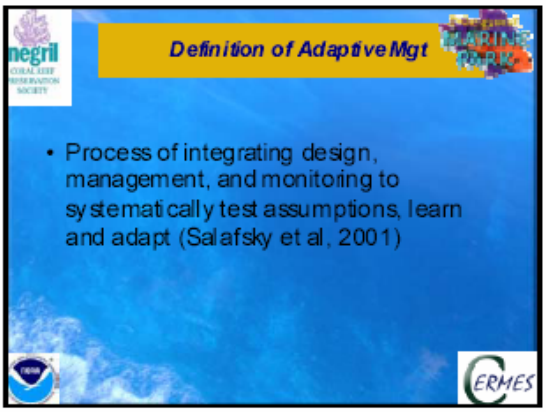

Lessons Learned
• NCRPS staff appreciate importance of evaluating management (transparency and accountability)
• Better to have reasonable capacity to conduct in-house evaluations at the start
• Good to design to build capacity through the evaluation process
• Gaining confidence through conducting the evaluation leads to greater willingness to learn, to adapt and to improve management
• Need to repair poor links between MPA plan objectives and management activities

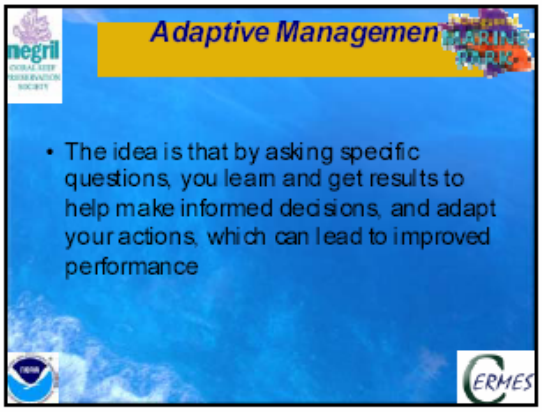

Lessons Learned
• Pre-testing of questionnaires on sub-sample required and testing of data analysis
• Present results to community and stakeholders and validate in participatory process
• While planning the evaluation ensure there is understanding of the requirements to undertake the evaluation (especially the first time around)
• Identify external technical assistance that may be needed during the evaluation process

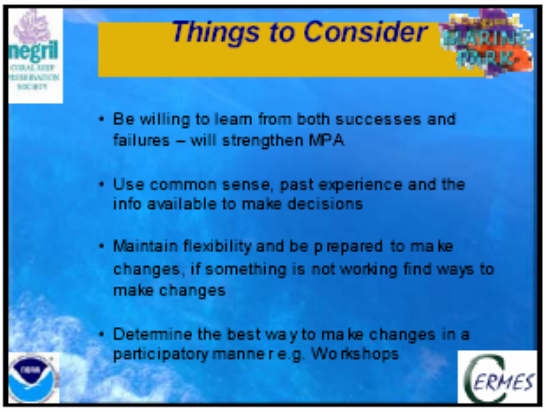

Adaptive Management
US$1,500 sub-grant for adaptive management based on the results of the evaluation and lessons learned
• Recommendations for adaptive management at NMP:
• Increasing public awareness of the NMP and its management body including management activities and projects
– Scheduling regular meetings between managers and stakeholders
– Raising awareness among the tourist population through brochures to be placed in hotels
• Work plan and budget formulated for this initiative
• Collaborative effort between community members within Negril and surrounding areas, tourists within the Negril EPA and NCRPS staff

Appendix 6: Adaptive management and project follow-up









Appendix 9

McConney, P. 2007. Report of the meeting to share SCMR evaluation results and lessons learned, 24 February 2007, Punta Gorda, Belize. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No. 9. 14 pp.

CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica & Belize

Report of the meeting to share SCMR evaluation results and lessons learned, 24 February 2007, Punta Gorda, Belize

Centre for Resource Management and Environmental Studies (CERMES)
University of the West Indies, Faculty of Pure and Applied Sciences
Cave Hill Campus, Barbados

2007

CONTENTS

Citation
McConney, P. 2007. Report of the meeting to share SCMR evaluation results and lessons learned, 24 February 2007, Punta Gorda, Belize. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No. 9. 14 pp.

Contact

Dr. Patrick McConney
Senior Lecturer, CERMES
UWI Cave Hill Campus
St. Michael, Barbados

Tel: 246-417-4725
Fax: 246-424-4204
Email: pmcconney@caribsurf.com
Web site: www.cavehill.uwi.edu/cermes

1 BACKGROUND

This meeting was held to share information on the results and lessons learned from the CERMES project on evaluating management effectiveness of the Sapodilla Cayes Marine Reserve (SCMR) and to a lesser extent the marine protected areas in Jamaica and St. Vincent and the Grenadines (Appendix 1). The decision to hold three MPA site meetings to share information was taken at the Belize joint workshop where participants suggested that MPA stakeholders would benefit from direct communication with members of the CERMES research team in addition to the three MPA representatives attending the Belize workshop (Pena and Roach 2006).

Prior to the Punta Gorda meeting on 24 February 2007 Patrick McConney (CERMES project manager) met with a few stakeholders in Belize City (at the Fisheries Department) and Belmopan (at the University of Belize). The SCMR site report was still in final draft by its co-authors Donna Roach of CERMES and Christina Garcia of TASTE-SCMR. The purpose of the main meeting and the prior informal presentations was to share the contents of the final draft and to fill the gaps in it through discussion. The remainder of this report describes these sessions, with discussion at the prior meetings incorporated into the main meeting report.

2 WELCOME AND INTRODUCTIONS

The Punta Gorda meeting, arranged by TASTE-SCMR, was held at the Sea Front Inn. After Patrick McConney briefly outlined the agenda (Appendix 1), Jack Nightingale of TASTE-SCMR and site leader for the project welcomed those present. He outlined the long association between CERMES and TASTE-SCMR, mainly through assistance from the Oak Foundation, and plans for the formation of the Southern Environmental Alliance (SEA). In keeping with the spirit of the SEA, Dwight Neal from Friends of Nature (FON) attended this meeting. Participants introduced themselves (Appendix 2).

3 OVERVIEW OF THE CERMES REGIONAL MPA PROJECT

An overview of the CERMES regional project on enhancing management effectiveness at three MPAs was provided by McConney (Appendix 3). Participants were informed of the proposed no-cost extension to July 2007 to facilitate the production of training materials and allow enough time to see results from adaptive management. Accomplishments and plans to date have included:

- Inception training workshops for the TCMP, NMP and SCMR.
- Evaluations completed for the TCMP and NMP in October 2006. SCMR almost completed.
- Joint evaluation workshop in Punta Gorda, Belize, 4 November 2006 (Pena and Roach 2006).
- Presentation at GCFI in Belize City on 9 November 2006.
- Recommendations for adaptive management.
- Production of the final site evaluation reports.
- Production of issues of MPA-ME News.
- Site meetings to share results (January – March 2007).
- Training materials to be produced (PowerPoint presentations etc).

4 RESULTS OF THE SCMR MANAGEMENT EVALUATION

Patrick McConney presented a summary of results for the SCMR management evaluation that had been prepared by Donna Roach with assistance from Christina Garcia (Appendix 4). The presentation included lessons learned and proposed activities for adaptive management. Copies of the SCMR-focused issue of the MPA-ME News (available at http://cavehill.uwi.edu/cermes) were distributed to participants. The results were discussed as they were presented and the points made are summarized below.

B4 Composition and structure of the community

The expectation at the inception workshop was that an analysis of data collected under the Mesoamerican Barrier Reef Systems (MBRS) programme would have been available by now via MBRS. TASTE-SCMR has raw data from MBRS synoptic monitoring since 2003, and grouper spawning aggregation (SPAG) data, but these have not been analysed. Even without quantitative analysis it is clear that conditions in the SCMR have been deteriorating. However, participants had noted some areas of improvement in recent times and attributed this to the implementation of the SCMR management plan as a co-management undertaking between TASTE and the Fisheries Department.

B8 Water quality

TASTE-SCMR viewed the Protected Areas Conservation Trust (PACT)-funded project as a process learning experience, and is quite aware of the data limitations. McConney reiterated the need for comprehensive water quality monitoring, noting that the MBRS monitoring plan focuses mainly on ecological standards and not public health. The latter may become important since the SCMR is a tourist destination, and it may be useful to consider Blue Flag certification as done at Negril.

Participants at this meeting, and at the prior Fisheries Department meeting, identified the cost of water sample analysis (possible at the Belize Agricultural Health Authority (BAHA) and some private labs) as a constraint. These labs are also not accustomed to seawater samples. FON has developed a water quality monitoring plan and thought to order an integrated 'hydrolab', but was recently advised to get several individual pieces of equipment at less cost and for greater versatility. The Toledo Institute for Development and Environment (TIDE) apparently also has no water quality monitoring in place. There was concern that this remained a problematic indicator.

S1 Local marine resource patterns

The results presented were accepted, and discussion turned to recent irresponsible fishing practices occurring just outside of the SCMR such as shark finning for export to Guatemala. There was concern that this would affect tourism and the environmental image of the SCMR. However, this practice is not illegal, and close commercial and family ties may reduce the likelihood of Belizean fishers informing on the persons involved in shark finning and export.

S14 Distribution of formal knowledge to the community

Analysis of the Community Management of Protected Areas for Conservation (COMPACT) projects results needs to be continued, as does the tri-national efforts at education and building awareness.

G5 Existence and adequacy of enabling legislation
The draft SCMR regulations were too recent to be incorporated into the evaluation, but they seem not to embody any notion of co-management. All authority is vested in the Fisheries Department. TASTE-SCMR has to hold further stakeholder meetings on the draft regulations, especially to inform commercial and sport fishers, and tour guides, about boundary changes. Most of the fishers who camp in the SCMR fish outside of its boundaries, but there is still the issue of proper licensing and management of non-Belizean fishers.

G11 Level of training provided to stakeholders in participation
There was no further discussion beyond noting that the results seemed appropriate.

G12 Level of stakeholder participation and satisfaction in management processes and activities
An overarching and persistent problem is differentiating the responsibilities of TASTE from the Fisheries Department. Some stakeholders are aware of the division of jurisdiction, but others are not. It was agreed that both TASTE-SCMR and the Fisheries Department need more capacity to effectively manage the SCMR. The NGOs that manage MPAs in Belize could be assisted more if they had direct access to the revenue generated by user fees. At present revenue apparently goes into the government's general accounting where even the Fisheries Department has to request and justify access to these funds.

G13 Level of stakeholder involvement in surveillance, monitoring and enforcement
The NOAA community rangers project was deemed a success by the SCMR enforcement agencies. Under the scheme more than 20 arrests were made and almost all of these were due to information from resource users. The benefits far outweighed the BZD$3,000/month paid for the 4 rangers including fuel. However, the Fisheries Department is concerned about the initiative due to sensitive relations in the tri-national arena that may escalate into larger disputes.

G14 Clearly defined enforcement procedures
Enforcement procedures were part of the basic training provided by the Fisheries Department via the Coastal Zone Management Authority and Institute (CZMAI) for many years. A procedure manual exists, and Christina is to supply this. The Fisheries Department is soon about to undertake additional enforcement training.

G15 Enforcement coverage
Fisheries Department has recently increased enforcement, giving fuel as an incentive. Fishers suggest that more night patrols are needed since this is when most arrests are made.

5 LESSONS LEARNED

The discussion of the presentation continued into the lessons learned. The main additional point was that until the co-management relationship between TASTE and the Fisheries Department is more collaborative or delegated, TASTE-SCMR does not effectively manage much since all of the authority lies with the government. TASTE-SCMR has responsibility without authority. It is therefore important that the lessons be learned by the Fisheries Department.

Based on the indicators evaluated by means of survey, it was suggested that TASTE-SCMR receive additional training in survey methods, perhaps from the University of Belize.

The SEA should start setting out its plans and indicators with a view to facilitating evaluation. In choosing indicators one has to be careful that they are appropriate. Some used in the MBRS, and hence promoted by Fisheries Department, may not be suitable for all MPAs in Belize.

Participants lamented the lack of exchanges with the TCMP and NMP even though communication had been encouraged by CERMES. At several points in the discussion, comparison to the other sites was sought. They suggested that it would be useful in the future to visit other MPAs if possible.

6 ADAPTIVE MANAGEMENT

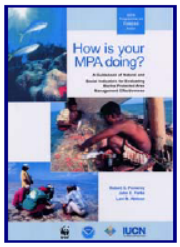
Workshops with stakeholders will replace surveys. Participants were reminded of the need to ensure adequate monitoring and evaluation so as to ensure that there was learning from the adaptive management. It was suggested that a tool that did not require high rates of literacy, which was used in the GEF small grants programme, could be suitable.

7 REFERENCES

Pena, M and D. Roach. 2006. Report of the Workshop on MPA Evaluation Products and Process, Punta Gorda, Belize, 4 November 2006. CERMES Regional Project on Enhancing Management Effectiveness at Three Marine Protected Areas in St. Vincent and the Grenadines, Jamaica and Belize. Report No. 4. 47pp.

8 APPENDICES

Appendix 1: Meeting announcement and agenda



CERMES regional project on: "Enhancing management effectiveness at three marine protected areas, in St. Vincent and the Grenadines, Jamaica and Belize"

TASTE-SCMR meeting to share project results
Saturday 24 February, 9:30am to 12:00 noon
Sea Front Inn, Punta Gorda, Belize

Agenda:

09:30 AM Welcome and introductions

09:45 AM Overview of CERMES regional MPA project

10:00 AM Results of SCMR management evaluation

10:30 AM BREAK

10:45 AM Other MPAs, adaptive management, learning

11:00 AM Discussion of presentations and way forward

12 NOON Close

The purpose of this meeting is to share information on the results of the CERMES project on evaluating the management effectiveness of the Sapodilla Cayes Marine Reserve (SCMR) along with other marine protected areas in Jamaica and the Grenadines. The evaluation results will be presented along with the lessons learned that suggest how to improve and adapt management. Training material will be developed from the experiences. We want you to be there to hear what was done, what was found out and what was suggested to address the weaknesses and build upon the strengths of the SCMR management.

Come hear for yourself. Join us.

For further information call TASTE-SCMR

Appendix 2: Participants

Name	Organisation	Contact phone and email
Patrick McConney	UWI, CERMES	246-417-4725; pmcconney@caribsurf.com
Punta Gorda 24 Feb		
Dwight Neal	Friends of Nature	523-3377 / 523- 3501; fon-tech@btl.net
Godwin Humes	Fish. Dept. -SCMR	702-0026; gads26@yahoo.com
Lyndon Rodney	Fish. Dept. -SCMR	722-2660; nodnyl_yendor@yahoo.com
Christina Garcia	TASTE-SCMR	722- 0191; taste_scmr@btl.net
Jocelyn Rae Finch	TASTE-SCMR	722- 0191; taste_scmr@btl.net
Jack Nightingale	TASTE-SCMR	722- 0191; taste_scmr@btl.net
Gabriella Palma	TASTE	722- 0191; taste_scmr@btl.net
Placida Requena	TASTE	722-2070; watertaxi@btl.net
Yvonne Villoria	TASTE	722-2470; demdatsdoin@btl.net
Denise Frank	TASTE/Peace Corps	dfdenise@earthlink.net
Danika Sierra	Toledo Devt. Corp.	
Jim Wentz	Visitor	USA
Belmopan 23 Feb		
Leandra Ricketts	University of Belize	822-3680 ext 446; lricketts@ub.edu.bz
Belize City 22 Feb		
Janet Gibson	WCS	Office 223-3271; jgibson@btl.net
James Azueta	Fisheries Department	224-4552; species@btl.net
Isais Majil	Fisheries Department	224-4552; isaismajil@yahoo.com

Appendix 3: CERMES regional marine protected area management effectiveness (MPA-ME) project overview slide presentation

Enhancing management effectiveness at three marine protected areas in St. Vincent and the Grenadines, Jamaica and Belize

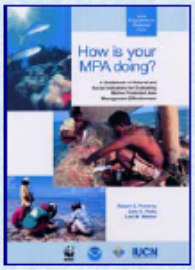
Project overview

International Coral Reef Conservation Grant

- MPA Management Effectiveness
  - Regional Capacity Building
- Duration: 1 October 2005 to 31 March 2007
  may be extended (no-cost) to 30 June 2007
- Total value: US$124,000 (half from the grant)
- Manager: Centre for Resource Management and Environmental Studies, Cave Hill Campus, University of the West Indies, Barbados

2

How is your MPA doing?



- Bio-physical
  - status of the resources, fish populations, water quality, environmental conditions, etc.
- Socio-economic
  - value of the area to various users, culture, livelihoods, sources of income, etc.
- Governance
  - achieving goals and objectives, capacity for management, stakeholder groups, etc.

Dr. Robert Pomeroy
Project trainer & adviser

3

Specific objectives

1. To conduct participatory management effectiveness research and evaluations by
   - training at least 30 people at three MPAs.
2. To improve MPAs in the region by
   - monitoring outcomes in lessons learned
   - training and communication materials for coursework, research, management and coastal policy.

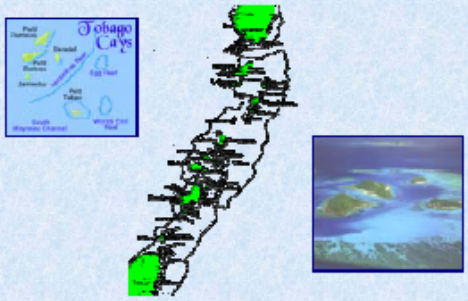
4

Main project components

1. Inception site-specific training workshops in MPA management effectiveness and evaluation
2. Participatory management effectiveness research and evaluations at the three MPAs
3. A joint evaluation workshop on lessons learned
4. Site meetings to communicate results, lessons
5. Implement activities for adaptive management
6. Production of training materials based on process experiences and on lessons learned

5

Tobago Cays Marine Park, St. Vincent and the Grenadines



6

TCMP possible goal

The TCMP has no management plan, but it has several draft plans under review

Participants came up with the following:

- To protect, conserve and sustainably utilise the natural resources of the Tobago Cays for future use

7

TCMP possible objectives

- Working with other relevant agencies using the media to promote the marine park as a tourist resort and attraction
- Ensuring that the park is managed along commercial lines
- Protect the biodiversity of the park
- To conserve the marine resources
- Public awareness and stakeholder participation
- Public education
- To protect sustainable livelihoods

8

INDICATORS - Tobago Cays Marine Park
Bio-physical
B1 Focal species abundance
B8 Water quality
Socio-economic
S2 Local values and beliefs about marine resources
S3 Level of understanding of human impacts on resource
S7 Material style of life
S9 Household income distribution by source
Governance
G2 Existence of a decision-making and management body
G3 Existence and adoption of a management plan
G6 Availability and allocation of MPA administrative resource
G9 Degree of interaction between managers and stakeholders
G12 Level of stakeholder participation, and satisfaction in management process and activities
G14 Clearly defined enforcement procedures
G15 Enforcement coverage

9

Target audiences for outputs

- TCMP Board of management
- Dept. of Grenadines Affairs, PMO
- Fisheries Division
- Stakeholder NGOs
- Public of S. Grenadines

Communication by:

- Reports, summaries, presentations …

10

Negril Marine Park, Jamaica

NMP goals from management plan

1. Achieve the mission of the Negril Marine Park through coordination of management programmes. (Administration Programme)
2. Mitigate negative impacts on the natural and infrastructural resources of the park in the event of a disaster or accident. (Disaster Preparedness and Emergency Management)
3. Provide the knowledge and skills needed for the development of appropriate attitudes and behaviour amongst park personnel, members of NCRPS and the general public, which will contribute to the conservation of coastal and marine resources within the Negril Marine Park. (Education Programme)
4. Achieve one hundred percent compliance with Marine Park regulations and other laws designed to protect the natural resources within the boundaries of the Negril Environmental Protection Area. (Enforcement Programme)

12

NMP goals from management plan

5. Develop and implement a financial sustainability plan which will ensure that adequate funds are available to manage the Negril Marine Park in a way that fulfils the objectives of the management plan. (Financial Sustainability Programme)
6. Influence the community and government to adopt policies that support the Marine Park's goals and objectives. (Lobbying Programme)
7. Create and maintain an awareness and understanding within the local community, among the tourist population, and throughout the international arena on the purpose, goals and objectives of the Negril Marine Park and Environmental Protection Area (EPA). (Public Relations Programme)
8. Gather, interpret and disseminate information pertinent to the Park on a continual, long term basis, so that changes can be noted over time, analyzed by appropriate scientific personnel and other technical experts, and used to make sound management decisions. (Research and Monitoring Programme)

13

NMP goals from management plan

9. Protect natural resources within the Marine Park, conserve existing biodiversity and wherever possible restore damaged ecosystems. (Resource Management Programme)
10. Implement programmes in collaboration with local citizens that benefit the community economically, while protecting the natural resources within the Marine Park. (Sustainable Community Development Programme)
11. Encourage the use of the Park by visitors while minimizing damage to its resources and conflict between resident and non-resident users. (Visitor Management Programme)
12. Maintain a zoning programme within the Marine Park that provides the best possible protection for the natural resources in perpetuity. (Zoning Programme)

14

INDICATORS - Negril Marine Park
Bio-physical
B8 Water quality
B9 Area showing signs of recovery (at habitat level)
Socio-economic
S3 Level of understanding of human impacts on resources
S14 Distribution of formal knowledge to community
Governance
G2 Existence of a decision-making and management body
G6 Availability and allocation of MPA administrative resource
[New] Success of fundraising strategies (revenue and diversity of sources) that form part of the business plan
G12 Level of stakeholder participation, and satisfaction in management process and activities

15

Target audiences for outputs

- NCRPS Board
- NEPA
- NEPT
- Chamber of Commerce
- Jamaica Hotel & Tourism Association
- TPDCO
- Fisheries Division
- Dive operators
- Montego Bay Marine Park
- Communities
- Tourism workers
- GCFI
- Mass media
- NGIALPA

16

Sapodilla Cayes Marine Reserve, Belize

17

SCMR goals and objectives

1) To develop sustainable fisheries in the SCMR through establishment of ownership by local southern Belizean fishers and user groups of the fisheries resources
   a) Establish and enforce zoning
   b) Eliminate poaching in Belize fishing grounds

2) To manage tourism within the carrying capacity of the SCMR
   a) Research carrying capacities in the SCMR and publish results
   b) Create tourism sub-committee in advisory committee to establish policies on carrying capacities in SCMR

3) To conserve and protect biodiversity and habitat in the SCMR for sustainable use of present and future generations of Belize
   a) Establish well managed monitoring of biodiversity
   b) Establish waste management practices and regulations

18

SCMR goals and objectives

4) To address uses and activities outside of the SCMR, which threaten conservation and protection of biodiversity within the SCMR
   a) Establish Tri-National understanding of the SCMR as a transboundary area; its goals and objectives, regulations and care
   b) Establish regional education and outreach programs

5) To ensure proper administration and implementation of the SCMR Management Plan
   a) Organize and implement multi-stakeholder meetings once per year to review progress
   b) Include community stakeholders in management decision making processes

19

INDICATORS - Sapodilla Cayes Marine Reserve
Bio-physical
B4 Composition and structure of the community
B8 Water quality
Socio-economic
S1 Local marine resource use patterns
S14 Distribution of formal knowledge to community
Governance
G5 Existence and adequacy of enabling legislation
G11 Level of training provided to stakeholders in participation
G12 Level of stakeholder participation. and satisfaction in management process and activities
G13 Level of stakeholder involvement in surveillance, monitoring and enforcement
G14 Clearly defined enforcement procedures
G15 Enforcement coverage

Target audiences for outputs

- TASTE-SCMR
- Advisory committee
- Fisheries Department
- Dept. of Environment
- Cayes residents
- General public
- Area representative
- Other NGOs
- Fishers

21

Summary of progress

- Inception training workshops were at :
  - Tobago Cays Marine Park (TCMP), St. Vincent and the Grenadines, on 19 - 21 Dec 2005 (17 participants)
  - Negril Marine Park (NMP), Negril, Jamaica, on 26 - 27 Jan 2006 (21 participants)
  - Sapodilla Cayes Marine Reserve (SCMR), Belize, on 4 - 5 Feb 2006 (15 participants)
- Evaluation activities were finished in Oct
- Joint evaluation workshop held in Nov, Belize
- Paper presented at 59th GCFI in Nov, Belize
- Recommendations made for adaptive management
- TCMP site report is done, others near done
- Two issues of MPA ME News produced
- Site meetings: TCMP 31 Jan, SCMR 24 Feb, NMP 5 Mar
- Preparing to monitor and evaluate adaptive management
- Planning for training materials in progress

22

Appendix 4: SCMR management evaluation results slide presentation

Project structure

- Funding: Coral Reef Conservation Grant from the National Oceanic and Atmospheric Administration (NOAA); CERMES outreach
- Advisors on demand: Patrick McConney and Bob Pomeroy
- Site leader: Jack Nightingale
- Report co-authors: Donna Roach (CERMES), Christina Garcia (TASTE-SCMR)
- Evaluation teams: TASTE-SCMR staff and partners e.g. Fisheries Department, UB etc.
- Focus: Evaluation products and processes

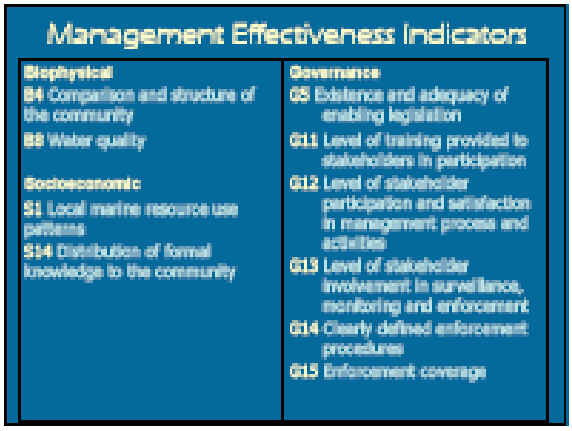
Sapodilla Cayes Marine Reserve

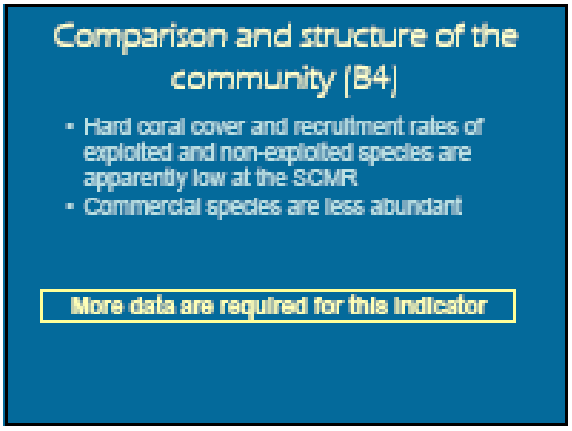
- Southern terminus of the Belize Barrier Reef
- World Heritage site
- Legally established in 1996
- Approximately 125km² in area
- Comprised of 14 cayes and sand bores
- Boundaries
  - Tom Owens Cay (NE)
  - Seal Cay (NW)
  - Ragged Point (SE)

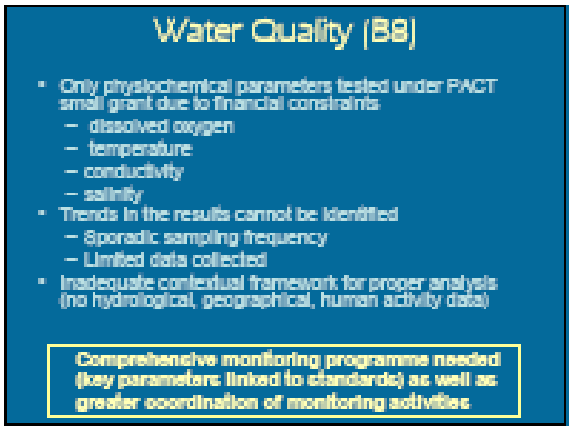
SCMR goal	SCMR objective
To develop sustainable fisheries in the SCMR through establishment of ownership by local southern Belizean fishers and user groups of the fisheries resources	• Establish and enforce zoning • Eliminate poaching in Belize fishing grounds
To conserve and protect biodiversity and habitat in the SCMR for sustainable use of present and future generations of Belize	• Establish well managed monitoring of biodiversity • Establish waste management practices and regulations
To address uses and activities outside of the SCMR, which threaten conservation and protection of biodiversity within the SCMR	• Establish TriNational understanding of the SCMR as a transboundary area; its goals and objectives, regulations and care • Establish regional education and outreach programs
To ensure proper administration and implementation of the SCMR management plan	• Organise and implement multistakeholder meetings once per year to review progress • Include community stakeholders in management decision-making processes

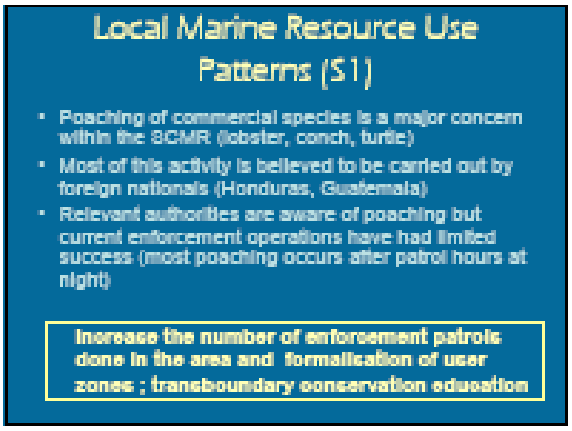
SCMR OBJECTIVES	INDICATORS
Establish well managed monitoring of biodiversity	B4 Composition and structure of the community
Establish waste management practices and regulations	B8 Water quality; G5 Existence and adequacy of enabling legislation; G13 Level of stakeholder involvement in surveillance, monitoring and enforcement; G14 Clearly defined enforcement procedures
Eliminate poaching in Belize fishing grounds	S1 Local marine resource use patterns; G5 Existence and adequacy of enabling legislation; G13 Level of stakeholder involvement in surveillance, monitoring and enforcement; G14 Clearly defined enforcement procedures; G15 Enforcement coverage
Establish TriNational understanding of the SCMR as a transboundary area; its goals and objectives, regulations and care	S14 Distribution of formal knowledge to community

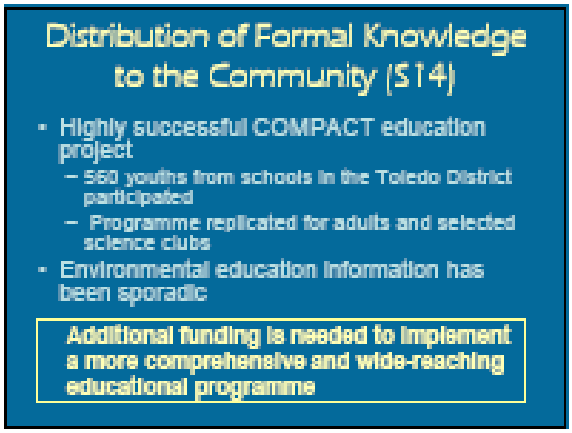
SCMR OBJECTIVES	INDICATORS
Establish regional education and outreach programs	S14 Distribution of formal knowledge to community
Establish and enforce zoning	G5 Existence and adequacy of enabling legislation; G13 Level of stakeholder involvement in surveillance, monitoring and enforcement; G14 Clearly defined enforcement procedures
Include community stakeholders in management decision-making processes	G11 Level of training provided to stakeholders in participation; G12 Level of stakeholder participation and satisfaction in management processes and activities
Organise and implement multi-stakeholder meetings once per year to review progress	G12 Level of stakeholder participation and satisfaction in management processes and activities

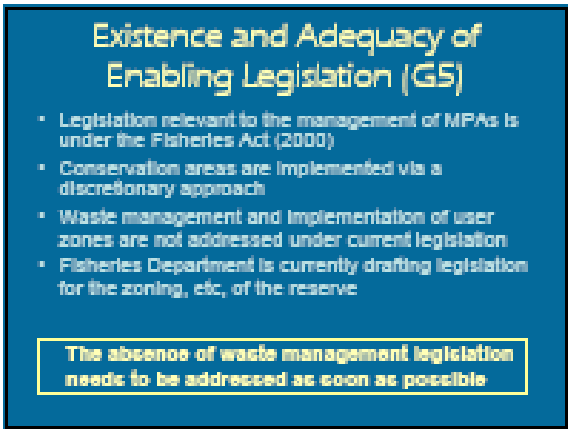

Management Effectiveness Indicators
Biophysical
B4 Comparison and structure of the community
B8 Water quality
Socioeconomic
S1 Local marine resource use patterns
S14 Distribution of formal knowledge to the community
Governance
G5 Existence and adequacy of enabling legislation
G11 Level of training provided to stakeholders in participation
G12 Level of stakeholder participation and satisfaction in management process and activities
G13 Level of stakeholder involvement in surveillance, monitoring and enforcement
G14 Clearly defined enforcement procedures
G15 Enforcement coverage


Comparison and structure of the community (B4)
• Hard coral cover and recruitment rates of exploited and non-exploited species are apparently low at the SCMR
• Commercial species are less abundant
More data are required for this indicator


Water Quality (B8)
• Only physiochemical parameters tested under PACT small grant due to financial constraints
– dissolved oxygen
– temperature
– conductivity
– salinity
• Trends in the results cannot be identified
– Sporadic sampling frequency
– Limited data collected
• Inadequate contextual framework for proper analysis (no hydrological, geographical, human activity data)
Comprehensive monitoring programme needed (key parameters linked to standards) as well as greater coordination of monitoring activities


Local Marine Resource Use Patterns (S1)
• Poaching of commercial species is a major concern within the SCMR (lobster, conch, turtle)
• Most of this activity is believed to be carried out by foreign nationals (Honduras, Guatemala)
• Relevant authorities are aware of poaching but current enforcement operations have had limited success (most poaching occurs after patrol hours at night)
Increase the number of enforcement patrols done in the area and formalization of user zones ; transboundary conservation education


Distribution of Formal Knowledge to the Community (S14)
• Highly successful COMPACT education project
– 560 youths from schools in the Toledo District participated
– Programme replicated for adults and selected science clubs
• Environmental education information has been sporadic
Additional funding is needed to implement a more comprehensive and wide-reaching educational programme

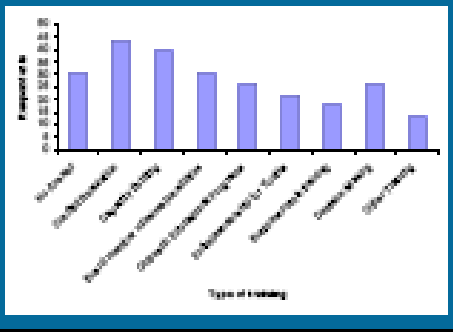

Existence and Adequacy of Enabling Legislation (G5)
• Legislation relevant to the management of MPAs is under the Fisheries Act (2000)
• Conservation areas are implemented via a discretionary approach
• Waste management and implementation of user zones are not addressed under current legislation
• Fisheries Department is currently drafting legislation for the zoning, etc, of the reserve
The absence of waste management legislation needs to be addressed as soon as possible

Level of Training Provided to Stakeholders in Participation (G11)

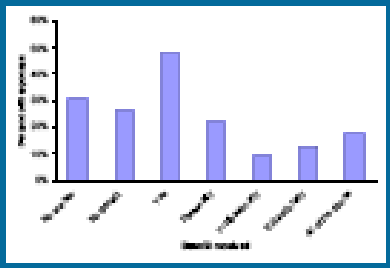
- Most of the participants have received training from TASTE, especially
  - conflict resolution
  - capacity building
- Some form of benefit derived from training
- NGOs such as TIDE, TASTE should make a greater effort to engage stakeholders in MPA management decisions

The need for additional training opportunities for both TASTE staff and stakeholders needs to be addressed

G11 Level of Training Provided to Stakeholders in Participation



G11 Level of Training Provided to Stakeholders in Participation



Level of Stakeholder Participation and Satisfaction in Management Processes and Activities (G12)

- Many respondents have been involved in the management activities of the organisation
- Lack of institutional capacity and funding have impeded the ability of the TASTE to fulfil management goals
- Performance is satisfactory in light of constraints
- Majority of respondents satisfied with management efforts

External support may be necessary for TASTE to attain the capacity necessary to manage the SCMR; partnerships to build, sustain capacity

Level of stakeholder involvement in surveillance, monitoring and enforcement (G13)

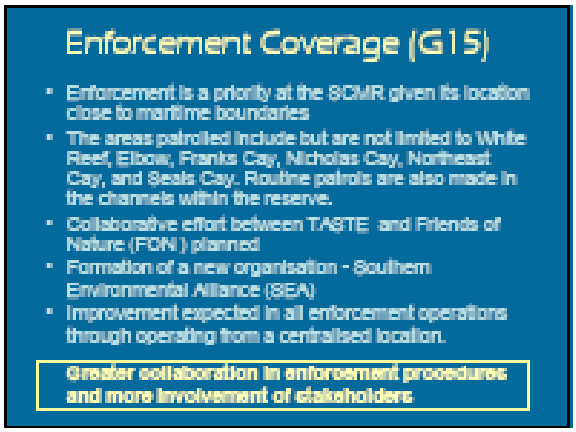
- Limited institutional capacity has inhibited enforcement operations
- Stakeholder involvement restricted
  - Observation and reporting of illegal activity by fishers
- Training workshops to be facilitated by TASTE partners
  - Participants will learn about the different methodologies used in the MPAs which they co-manage

Greater efforts are needed to involve stakeholders in enforcement efforts to manage the SCMR

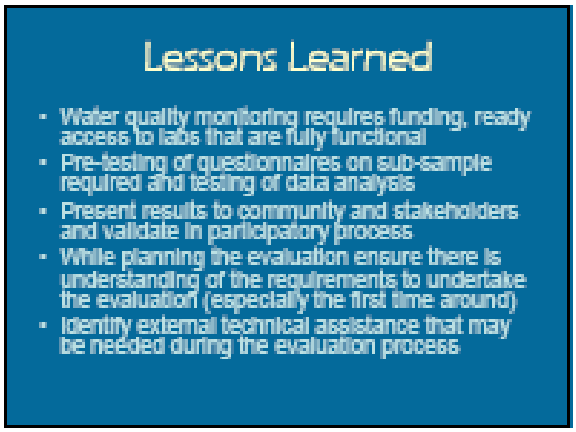
G14 Clearly Defined Enforcement Procedures

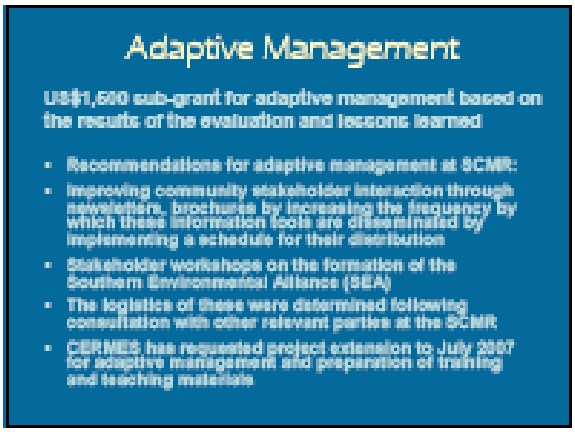
- Enforcement procedures have been generally defined for all MPAs

More data are required for this indicator


Enforcement Coverage (G15)
• Enforcement is a priority at the SCMR given its location close to maritime boundaries
• The areas patrolled include but are not limited to White Reef, Elbow, Franks Cay, Nicholas Cay, Northeast Cay, and Seals Cay. Routine patrols are also made in the channels within the reserve.
• Collaborative effort between TASTE and Friends of Nature (FON) planned
• Formation of a new organisation - Southern Environmental Alliance (SEA)
• Improvement expected in all enforcement operations through operating from a centralised location.
Greater collaboration in enforcement procedures and more involvement of stakeholders


Lessons Learned
• TASTE staff appreciate importance of evaluating management (transparency and accountability)
• Better to have reasonable capacity to conduct in-house evaluations at the start
• Good to design to build capacity through the evaluation process
• Gaining confidence through conducting the evaluation leads to greater willingness to learn, to adapt and to improve management
• Need to repair poor links between MPA plan objectives and management activities


Lessons Learned
• Water quality monitoring requires funding, ready access to labs that are fully functional
• Pre-testing of questionnaires on sub-sample required and testing of data analysis
• Present results to community and stakeholders and validate in participatory process
• While planning the evaluation ensure there is understanding of the requirements to undertake the evaluation (especially the first time around)
• Identify external technical assistance that may be needed during the evaluation process


Adaptive Management
US$1,500 sub-grant for adaptive management based on the results of the evaluation and lessons learned
• Recommendations for adaptive management at SCMR:
• Improving community stakeholder interaction through newsletters, brochures by increasing the frequency by which these information tools are disseminated by implementing a schedule for their distribution
• Stakeholder workshops on the formation of the Southern Environmental Alliance (SEA)
• The logistics of these were determined following consultation with other relevant parties at the SCMR
• CERMES has requested project extension to July 2007 for adaptive management and preparation of training and teaching materials