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Visitor impact management at Laughing Bird Caye National Park, Belize

A.S. MAHEIA

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

MPAs in Belize are known for their role in supporting sustainable livelihoods and socio-economic development of local communities through tourism. However, an increase in tourist visitation to marine recreation sites in Belize has grown to an extent where there are serious concerns about the negative impacts of the marine recreation sector on coral reefs. One such site is Laughing Bird Caye National Park (LBCNP), which is the most popular site that local tour operators in Placencia use for snorkelling. Snorkel surveys were conducted at LBCNP to identify impacts in the form of inappropriate snorkelling activities. The impacts were classified as intentional, which included activities such as touching marine organisms, and standing on corals while unintentional impacts included fin brushing and stirring sediments. Visitors, park rangers, managers and tour guides were surveyed to provide evaluation data on the likely effectiveness of current visitor management strategies in reducing the above-mentioned impacts at LBCNP. The results indicate that management strategies implemented by the Southern Environmental Association (SEA) have varying degrees of effectiveness in reducing visitor impacts. However, a significant improvement in interpretive and educational information at LBCNP may help to change visitor behaviour and reduce impacts. Environmental briefings given by tour guides have shown to include a good indication of park rules, but to a lesser extent, those activities classified as reef etiquette. The findings also indicate that tour guides vary in their administration skills, which is an important factor in minimizing visitor impacts. This further suggests that tour guides need to improve in areas such as correcting intentional and unintentional behaviour displayed by visitors. Consequently, this study identifies the importance of tourism as a key management issue for MPAs in Belize and the visitor impact management strategies and tools that are available.

Keywords:

Visitor impact management; visitor impacts; Laughing Bird Caye National Park; marine protected areas; marine recreation.

Photo source: http://farm4.static.flickr.com/3459/3384666112_2e71fbc50c_z.jpg

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1 INTRODUCTION

1.1 Research context

The World Conservation Union (IUCN) defines a marine protected area (MPA) as

> "any area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment" (WCPA, 1999).

MPAs are used to protect and manage marine and coastal resources and through this process, they have generated economic benefits through tourism (MBRS, 2003). Presently, there are 13 MPAs in Belize comprising marine reserves, wildlife sanctuaries, natural monuments, and national parks (CZMAI, 2001). MPAs in Belize play a major role in supporting sustainable livelihoods and socio-economic development of local communities through tourism (MBRS, 2003). In turn, the tourism industry contributes greatly to financing of MPAs through user fees, which is the most common form of income generation in protected areas (Farrell and Marion, 2002).

> "Protected areas need tourism, and tourism needs protected areas. Though the relationship is complex and sometimes adversarial, tourism is always a critical component to consider in the establishment and management of protected areas" (Eagles et al. 2002).

Consequently, tourism is a key management issue for many protected areas because the presence and actions of visitors can present serious problems for biodiversity conservation (Candrea and Ispas, 2009). The precautionary approach in protected areas management encourages managers to be extremely cautious of tourism in protected areas, given the risk of damage and destruction to the unique natural resources. Furthermore, managing tourism in a sustainable way requires a long-term perspective and careful consideration of the many ways in which tourist activities and the environment are interrelated (Candrea and Ispas, 2009).

Visitation not only to MPAs but also to other marine recreation sites in Belize has grown to an extent where there are serious concerns about the negative impacts of the marine recreation sector on coral reefs (HRI, 2009). LBCNP is an ideal site for evaluating visitor impact management since it is one of the most visited protected areas in southern Belize (SEA, 2008a). It is also actively co-managed through an agreement between the Forest Department and a non-governmental organisation, Southern Environmental Association (SEA).

1.2 Research questions and objectives

The primary objective of this study is to identify visitor impacts at LBCNP and to determine if the current management strategies implemented by SEA and tour guides/operators are likely to be effective in mitigating these impacts.

A set of secondary questions guide the detailed objectives of the research:

1 How prevalent is inappropriate snorkelling behaviour at LBCNP?

- To identify potentially important areas for management intervention
- To determine types of negative visitor behaviour that needs to be stressed in environmental briefings

2 Is the current level of tour guide briefing adequately providing visitor education to mitigate inappropriate snorkelling behaviour at LBCNP?

- To determine the extent of inclusion of information on park rules and best practices within the briefing
- To identify areas of weakness and strength in environmental briefings

3 How potentially effective are SEA's management strategies in mitigating visitor impacts?

- To identify the control measures used and extent of visitor education/education programme offered by SEA
- To determine if onsite management including day to day activities, brochure/pamphlets, etc. assist in mitigating visitor impacts

1.3 Research significance

Addressing visitor impacts is significant because impacts directly reflect the level of management success in two important areas, resource protection and recreation provision (Farrell and Marion, 2002). As tourism visitation to MPAs increase, managers must address undesirable physical impacts caused by tourism (Dixon et al. 1993). This study focuses on visitor impacts resulting from snorkelling at LBCNP, which is the most frequent recreational activity. In 2009, snorkelling represented 76% (4,655 out of 6,108 visitors) of the recreational activities at LBCNP (LBCNP visitation data, 2009). In an effort to control visitation at Laughing Bird Caye, a limit of 150 guests per day was designated in 2008; however, this is not currently enforced (SEA, 2008a). As identified in Paz et al. (2003), limiting numbers is not sufficient to manage visitor impacts. Problems associated with limits of acceptable use are frequently related to the behaviour of visitors rather than the actual visitor numbers (Eagles et al. 2001). MPAs need better visitor impact management practices because some impacts may be cumulative and cause resource degradation over time, which can lead to unfavorable consequences such as reduced visitation and economic benefits (Farrell and Marion, 2002).

This study is potentially important for LBCNP, as the coral reefs have already experienced deterioration due to hurricanes and bleaching events (BELIPO, 2004). As a result, a coral reef restoration project by an independent biologist is ongoing at LBCNP and involves transplanting Elkhorn coral (*Acropora palmata*) from other MPAs in southern Belize (International Coral Reef Symposium, 2008). Laughing Bird Caye National Park has also been identified as one of the sites most susceptible to future bleaching events (BELIPO, 2004). Thus, the notion of visitor impact management has the potential to assist in managing damaged reefs and ensuring optimal conditions for reef recovery through reducing negative impacts and improving conditions for recovery (Westmascott et al. 2000). Research has shown that damaged reefs within MPAs are likely to recover faster if they are well managed and are not subjected to additional stresses such as heavy tourist visitation (Westmascott et al. 2000). A visitor impact management framework allows identification of impacts before there is complete degradation of an area's important ecosystem and to prevent costly restoration and rehabilitation programs (Farrell and Marion, 2002).

LBCNP will substantially benefit from an evaluation of visitor impact management as well as recommendations for management actions that will anticipate and mitigate these impacts through a pro-active and precautionary approach (Farrell and Marion, 2002). Identification of visitor

impacts and evaluation of management strategies at LBCNP will also be beneficial in areas such as the following:

- Improved adaptive management of SEA
- Increased resource protection for coral reef ecosystem and associated marine species
- Sustainable marine tourism practices, especially with greater pressure from increased tourist arrivals to Placencia
- Improved stakeholder involvement in surveillance, monitoring and enforcement
- Improved participation of stakeholders through assisting with recommendations, selection of key monitoring indicators and standards, and input into management strategies, programs and plans

1.4 Overview of study site

1.4.1 Location

Laughing Bird Caye is located 12 miles east of Placencia village, and is situated in the Stann Creek District of Belize (Figure 1) (FOLBC, 2000).

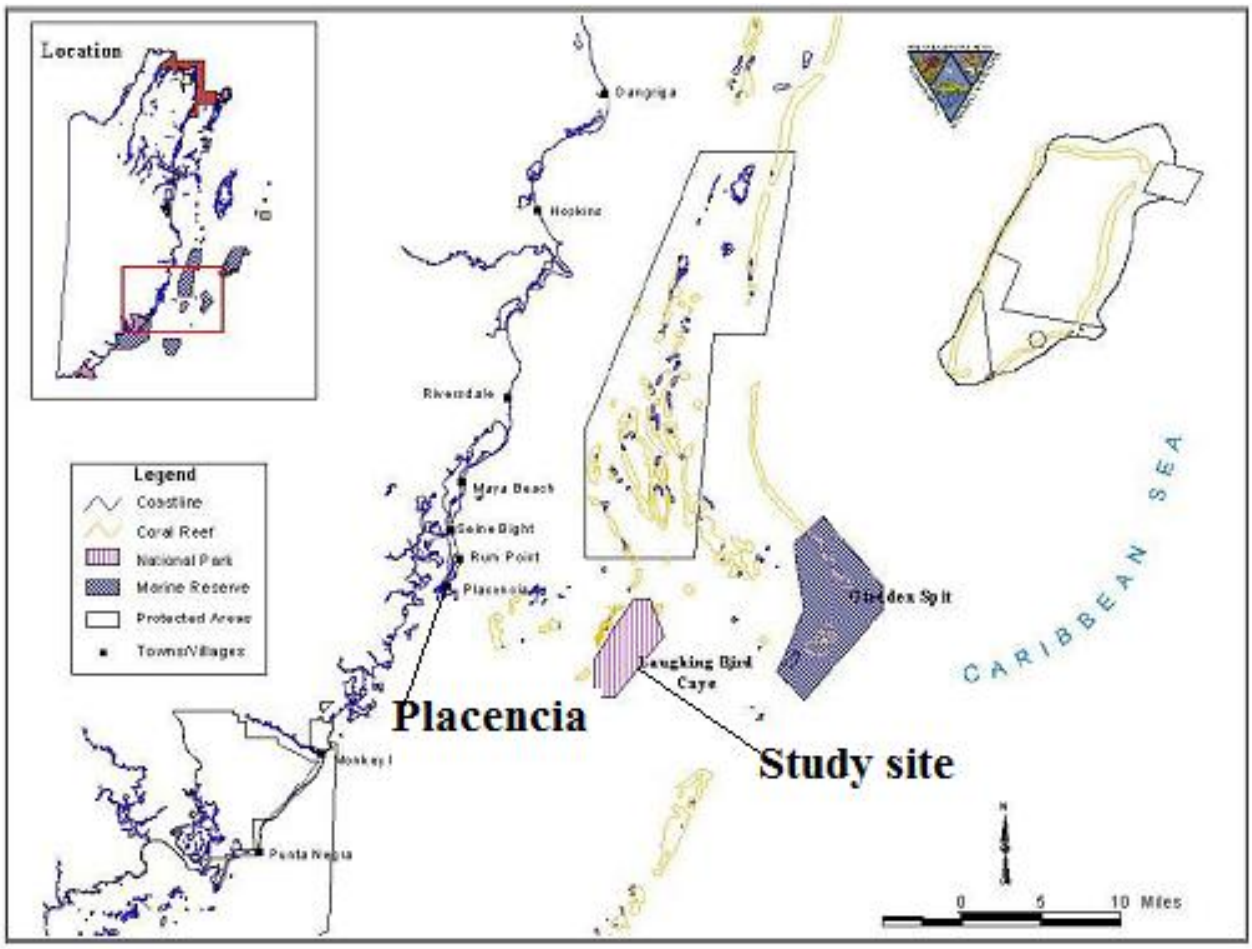

Figure 1: Location of Laughing Bird Caye National Park

Source: Perez, 2003

LBCNP is located in the Southern Belize Reef Complex (SBRC), which is characterized by a variety of reef structures and ecosystems with high biodiversity (TNC, 2010). The SBRC also encompasses other MPAs including Sapodilla Cayes Marine Reserve, Gladden Spit and Silk Cayes Marine Reserves, and South Water Caye Marine Reserve.

1.4.2 Historical timeline

The Caye was declared a protected area in 1981 under the National Parks System Act and in 1991, it was declared a 'national park,' which signifies an area established for the protection and preservation of natural and scenic values of national significance for the benefit and enjoyment of the public (Government of Belize, 2003). The general functions of a national park in Belize are for biodiversity protection, research, recreation and education (Meerman and Wilson, 2005). Laughing Bird Caye National Park also falls under Category II of IUCN's protected areas management category, which denotes areas managed mainly for ecosystem protection and recreation (WCPA, 1999).

Laughing Bird Caye National Park was designated as one of the seven MPAs along the Belize Barrier Reef System declared a collective World Heritage Site by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) in 1996 (Naturalight Productions, 2001). Originally, the park was 1.414 acres of land, sea and reef and the initial legislation in 1991 declared only the island as the national park. However, with the designation of the Belize Barrier Reef as a World Heritage Site, the entire Laughing Bird Faro and surrounding marine areas were declared as belonging to Laughing Bird Caye National Park, a total of 10,119 acres (FOLBC, 2000).

In 1996, a group of Placencia residents formed the Friends of Laughing Bird Caye Committee (FOLBCC), an NGO that sought to protect biodiversity and promote sustainability of the natural resources off the coast of Placencia (FOLBC, 2000). The group had a special focus on Laughing Bird Caye due to its unique marine ecosystems. Presently, Laughing Bird Caye is co-managed by a conservation-based nongovernmental organization in Placencia Village, Southern Environmental Association (SEA). SEA was developed through an amalgamation of Friends of Nature (FON) and the Toledo Association for Sustainable Tourism and Empowerment (TASTE) to ensure improved community involvement in the conservation and co-management of the natural resources in Southern Belize (SEA, 2008b).

1.4.3 Physical and biological attributes of LBCNP

The ringed reef at Laughing Bird Caye is divided into three main areas and includes the outer rim, the inner lagoon and inner patch reefs (Naturalight Productions, 2001). However, the most interesting features of the Laughing Bird Faro are the patch reefs where many varieties of corals, fishes and invertebrates can be found (Figure 2).

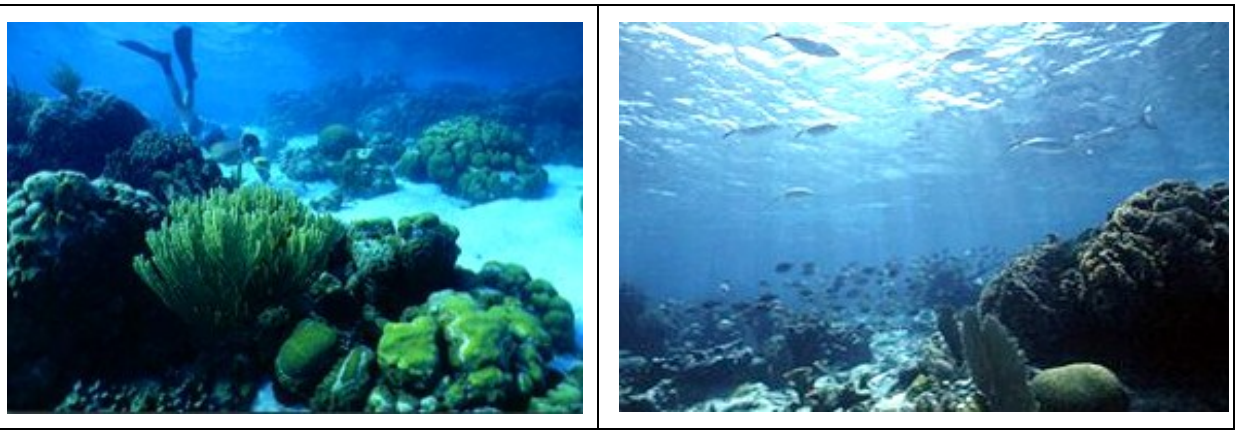

Figure 2: Marine areas at LBCNP used for snorkelling (Tony Rath photographs)

Much of the snorkelling is done in shallow depths around the island, ranging from less than 10 feet to a maximum of 25 feet in some areas (Naturalight Productions, 2001). As seen in Figure 3, the different coloured lines depict the various snorkelling routes used by tour guides.

Figure 3: Snorkelling routes at LBCNP (original image-Tony Rath photographs)

The reefs at LBCNP have undergone significant changes resulting from hurricanes including Hurricane Iris in 2001, which devastated the southern portion of Belize (Bood, 2001). Laughing Bird Caye lost significant vegetation on the island, infrastructure was destroyed, and changes occurred in the physical structure of the island. The damage to Laughing Bird Caye's reef was considerable and overall damage by Hurricane Iris was expected to have long-term ecological consequences for LBCNP (Bood, 2001). Coral surveys had been done one month before the storm and follow-up surveys after Iris showed an increase in recent mortality from 2.8% to 19.6% and an increase in mechanical damage from <1% to 70.7%. This damage coupled with past bleaching events has resulted in massive effects on the reefs at LBCNP events (BELIPO, 2004).

1.4.4 Socio-economic attributes of LBCNP

Placencia has been traditionally characterized as a fishing village, but shifted to a tourism-based economy since fisheries resources began to dwindle and tourism was being advocated as a more sustainable form of livelihood (Key, 2002). Recognizing the popularity of Laughing Bird Caye as a tourist attraction, several fishers became part-time tour guides or completely left the fishing industry behind and sought a new livelihood in the tourism sector (Clarke, 2009).

Laughing Bird Caye National Park was also designated as a protected area to help control overuse and maintain the caye for the tourism industry in Placencia (FOLBC, 2000). Laughing Bird Caye National Park is the closest MPA to Placencia and is one of the most visited MPAs in southern Belize (SEA, 2008a). Due to its proximity to Placencia village, LBCNP is a popular snorkelling destination marketed to tourists visiting Placencia. Ease of access to a site is generally thought to be a critical determinant of the recreational use of that site (Davis and Tisdell, 1996). It is also favoured especially during bad weather conditions when cayes on the outer reef cannot be reached or for short half-day trips. The provision of recreation facilities, which include restrooms, picnic tables, barbeque pits, hammocks and a palapa, also makes LBCNP a preferred choice in comparison to other snorkelling sites (D.Young, pers.comm). Laughing Bird Caye and Faro have been traditionally used for recreation (FOLBC, 2000). However, there has been considerable degradation of the reefs at LBCNP primarily due to high turbidity and physical damage from uncontrolled tourism activities that began in the early 1980s (Pomeroy and Goetz, 2003). In addition, overuse by tourists due to too many people at one time for proper supervision and damage to island vegetation and coral reefs were becoming evident (Pomeroy and Goetz, 2003).

The entire LBCNP is classified as "no take" and only non-extractive activities such as diving and snorkelling are allowed (Government of Belize, 2003). A range of tour operators including independent dive shops, resort dive shops and bare boat charter companies utilize LBCNP for diving and especially for snorkelling (Table 1). Some local tour operators estimate that as many as 75% of all tourists visiting Placencia also visit LBCNP (FOLBC, 2000). During the height of tourist season (December to April), it is not uncommon to see more than 100 people at a time on the caye (FOLBC, 2000). In 2004, there were 6,980 foreign visitors recorded with the highest occurrence of visitors in the months of March and December. Overall, in 2007 there were 10,526 visitors to the park, over 90% of which were foreign visitors. However, in 2008, there were 9,008 visitors slightly less than 2007(SEA, 2008b). Visitation in 2009 again decreased slightly as only 7,207 visitors were recorded.

A wide range of stakeholders including tour operators, tour guides, sailing-charters, and cruise ship companies utilize LBCNP for recreation, consequently, they should be key stakeholders in its management, protection and conservation.

Table 1: List of marine recreation providers who conduct tours at LBCNP

Type of Marine Recreation Provider	Name
Independent Tour operators/ Dive shops	Joy Tours
	Nite Wind Tours
	Ocean Motion Guide Service
	Seahorse Dive Shop
	Splash Dive Shop
	Placencia Dive School
Resort Dive shops	The Placencia Hotel and Residencies
	The Inn at Robert's Grove
	Turtle Inn
	Paradise Resort
Bareboat Charters	Moorings Belize Ltd
	Trade Winds
	TMM Charters

2 OVERVIEW OF VISITOR IMPACT STUDIES IN BELIZE

A visitor impact study was conducted for Hol Chan Marine Reserve in 2003 and resulted in visitor management recommendations for Hol Chan managers, tour operators and tour guides (Paz et al. 2003). This study highlighted that merely controlling the numbers of visitors is not likely to solve the problem of visitor impacts. More significantly, visitor behaviour, the level of environmental education and control strategies provided by the management, are important factors in mitigating visitor impacts (Paz et al. 2003).

In 2007, the Mesoamerican Reef Tourism Initiative (MARTI), an alliance of Conservation International (CI), Coral Reef Alliance (CORAL) and Amigos de Sian Ka'an through collaboration with Healthy Reefs for Healthy People's Initiative evaluated the extent to which environmental operating practices for the marine recreation sector influence tourism related impacts on coral reefs. This study targeted sites visited by tourists from cruise ships and the overnight sector, which included LBCNP. It aimed to help tourism leaders and resource managers understand the types of direct tourist impacts on reefs, and the effectiveness of voluntary codes of conduct and environmental business practices for protecting coral reefs from visitor impacts. The data showed that in all three zones northern, southern and central Belize in terms of direct impacts to the reef, stirring sediment was the most prevalent visitor behaviour followed by fin brushing, and standing on sand respectively (HRI, 2009). The results of this study were also envisioned to help tourism stakeholders make informed decisions about management of visitation in top marine recreation sites (HRI, 2009). This study filled a gap in the understanding of the types of direct tourist impacts on reefs and the effectiveness of voluntary codes of conduct, better management practices (BMPs) for protecting coral reefs from visitor impacts.

3 REVIEW OF VISITOR IMPACT MANAGEMENT APPROACHES, TOOLS AND FRAMEWORK

The extent to which a protected area can sustain viable tourism and recreational activities is dependent on the physical environment, the behaviour of visitors, and appropriate management and resources (Brown et al. 2006). Consequently, in response to the requirements of protected area managers, there have been numerous models and processes established to minimize the impact of visitor use in parks and reserves, while providing quality visitor experiences. The notion of 'visitor impact' in protected areas management is complex with little agreement on the modelling components that are most important in addressing sustainable tourism development (Brown et al. 2006). However, the variety of approaches available to planners and managers differ in their scope, focus, application and effectiveness (Brown et al. 2006).

Generally, the four strategic approaches, which can be used to reduce the negative impacts of visitors on protected areas, include (Adapted from Eagles et al. 2002):

1 Managing the supply of tourism or visitor opportunities, e.g. by increasing the space available or the time available to accommodate more use;

2 Managing the demand for visitation, e.g. through restrictions of length of stay, the total numbers, or type of use;

3 Managing the resource capabilities to handle use**,** e.g. through hardening the site or specific locations, or developing facilities; and

4 Managing the impact of use**,** e.g. reducing the negative impact of use by modifying the type of use, or dispersing or concentrating use.

3.1 Carrying Capacity

Adapted to tourism management, carrying capacity involves the number of people who can use a given area without an unacceptable alteration to the physical environment (MPA News, 2004). The concept of an unacceptable alteration has ecological and social aspects since too much pressure from visitors can degrade a site, thus making it less attractive as a tourism destination. Assessing the carrying capacity of an MPA involves a number of factors, though some scientists suggest there may be general capacity limits for particular habitat types, like coral reefs (MPA News, 2004).

However, the concept of carrying capacity can be difficult to implement within protected areas management, as hard limits on numbers of tourists can be politically difficult, especially when user fees are the main form of income generation (Paz et al. 2003). Therefore, this research project did not focus on the concept of carrying capacity; instead, emphasis was placed on the use of management strategies and approaches, which are directly used to reduce visitor impacts, thereby increasing the ecological carrying capacity. Some experts suggest an alternative way to manage tourism impacts by estimating the "limits of acceptable change" for protected sites instead (MPA News, 2004).

3.2 Limits of Acceptable Change (LAC)

Several studies indicate that problems of recreational use are a function not so much of numbers of people, but their behaviour (Eagles et al. 2002; McCool and Lime, 2001; McCool, 1996; MPA News, 2004). The LAC concept is based on the notion that protected areas managers should

determinewhich resource and social conditions are acceptable, and how those conditions may be attained. LAC is a set of biophysical and social conditions that managers investigate using appropriate indicators and standards to achieve management objectives (Brown et al. 2006). Thus, LAC as a planning system is viewed as a way for managers to confront and resolve the complex issues of managing visitors to not only provide for the experiences they seek, but to deal with the problems of their social and biophysical impacts (McCool, 1996).

3.3 Visitor Impact Management Process (VIM)

The VIM process was developed by researchers working for the U.S. National Parks and Conservation Association, a national non-government organisation to control or reduce undesirable impact arising from recreational use in a given environment (Jenkins and Pilgrim, 2003). The VIM process addresses three basic issues relating to impact including problem conditions, potential causal factors, and potential management strategies (Nielsen and Tayler, 1998). It places emphasis on the need to understand actual and probable causal factors when identifying management strategies. Thus, the decision-making process calls for an understanding of the root cause of the problem. This process provided the overarching framework for this study in identifying the likely effectiveness of visitor impact management strategies at LBCNP.

3.4 Protected Areas Visitor Impact Management Framework (PAVIM)

The Protected Areas Visitor Impact Management (PAVIM) is a visitor impact management framework developed for selected protected areas in Central and South America to assess visitor impact problems and identify management strategies, recognising the constraints affecting developing countries' protected area management (Farrell and Marion, 2002). The PAVIM framework, like carrying capacity, recognises management constraints, but like LAC, also incorporates impact problem analyses, the flexibility of multiple strategy selection and public involvement. PAVIM identifies management opportunities and visitor impact problems, and includes a problem analysis step employing an expert panel to replace indicators, monitoring and standards, and results in the selection, implementation, and evaluation of visitor impact management actions (Farrell and Marion, 2002).

4 METHODS

In order to answer the various research questions, this study employed a range of research methods, which included semi-structured interviews, group interviews, snorkel surveys, questionnaire surveys, and an evaluation checklist. Figure 4 shows the specific methods used to investigate key stakeholders, which include SEA, visitors and tour guides.

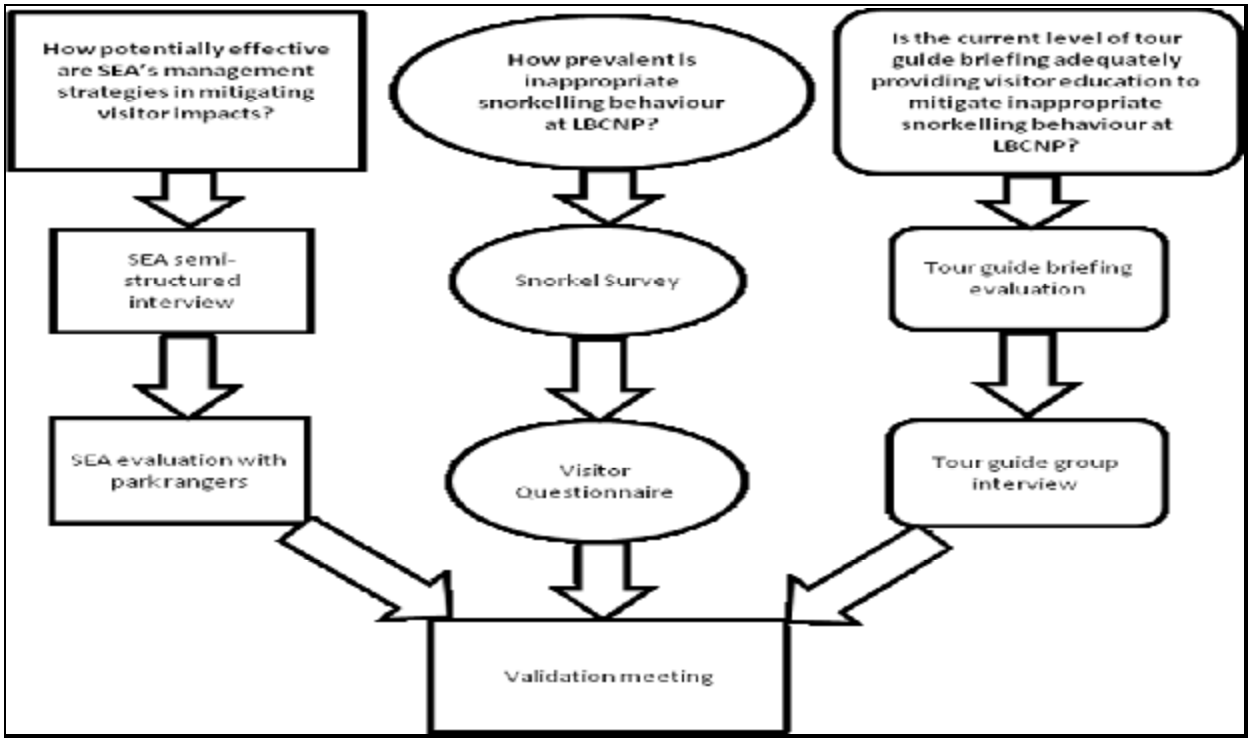

Figure 4: Research methods flowchart

The snorkel surveys and evaluations of tour guide briefing were conducted on the same trip with visitor questionnaires distributed at the end of the tour. Each trip to LBCNP was pre-arranged with tour companies (resort-owned dive shops and privately owned dive shops/tour operators) to ensure space on the boat. However, since the bareboat charters show up haphazardly at LBCNP and the visitors rarely participate in guided tours, no snorkel survey and tour guide briefing evaluation could have been conducted, but visitor questionnaires were distributed to the visitors.

4.1 Data collection and sampling techniques

4.1.1 SEA semi-structured interview and evaluation

The semi-structured interview and evaluation were conducted to answer the following research question and objectives:

How potentially effective are SEA's management strategies in mitigating visitor impacts?

- To identify the control measures used and extent of visitor education/education programme offered by SEA
- To determine if onsite management including day to day activities, brochure/pamphlets, etc. assist in mitigating visitor impacts

The semi-structured interview (See Appendix 1) was conducted using an interview guide to determine SEA's goals and objectives in relation to tourism and recreation at LBCNP. The management strategies implemented to reduce visitor impacts at LBCNP were also identified.

The management strategies identified in the semi-structured interview were evaluated by means of a questionnaire-based survey (See Appendix 2) conducted at LBCNP with park rangers. Park rangers were best placed to comment on management activities and associated outcomes since

they directly manage the site on a daily basis. The survey assessed outputs and outcomes concurrently through judgement of paired statements using a 5-point rating scale of 'strongly agree' to 'strongly disagree'. The first question of the pair established whether a particular management strategy (output) had been implemented, while the second established the associated outcome (Moore and Walker, 2008).

4.1.2 Snorkeler Survey

The snorkel survey method was used to answer the following research question and objectives:

How prevalent is inappropriate snorkelling behaviour at LBCNP?

- To identify potentially important areas for management intervention
- To determine types of negative visitor behaviour that needs to be stressed in environmental briefings

This methodology involved participant observation through *in situ* snorkel surveys (See Appendix 3) modelled after the Visitor Impact and Carrying Capacity Study conducted at Hol Chan Marine Reserve (Paz et al. 2003). The observer attempted to be inconspicuous by going on daily tours to LBCNP with tour operators to conduct snorkel surveys. The tour operators (n=10) which include resort-owned dive shops and privately owned dive shops/tour companies were confirmed by SEA as those which conduct snorkelling tours at LBCNP.

Tour guides informed visitors that the monitor was collecting biological data to prevent alteration of typical behaviour during snorkelling. The name of tour guide and tour operator, the number of snorkelers, time of day and weather conditions were recorded. General methodology entailed a timed swim during which tourists' behaviour while snorkelling were monitored unobtrusively. Data was recorded on an underwater slate for 30 minutes, during which the key location of the group in relation to the island, snorkeler activity, and the number of individual contacts with marine organisms and/or habitats were recorded. Contacts included eight categories of actions, some of which are specifically prohibited by park rules and others that should be discussed by tour guides in their briefings.

4.1.3 Visitor Questionnaire

The purpose of the questionnaire-based survey was for visitors to evaluate both SEA and tour guides, thus contributing to answering research questions two and three. Questions investigated tour guide briefings based on inclusion of park rules and reef etiquette and the outcome of management strategies that SEA has implemented (See Appendix 4). The visitor questionnaire was also used to investigate if the occurrence of prohibited actions related to failure of tour guides to inform visitors of specific guidelines or whether visitors failed to comply with park rules regardless of guide instructions.

A stratified random sampling method was used to distribute the visitor questionnaires at the end of the tour. Three hundred and twelve (312) visitors snorkelled at LBCNP in July 2009. Thus, for a 90 % confidence interval and 10% level of precision, a sample of 57 visitors was needed for the survey (Table 2). However, due to several limitations in the study, only ten percent of visitors (32) were actually surveyed.

Table 2: Design and actual sample proportions for visitor questionnaire

Sample proportions	Design	Actual
Resort dive shops	18	10
Private dive shops/tour operators	36	20
Bareboat charters	3	2
Total sample	57	32

4.1.4 Evaluation of tour guide briefing and tour guide group interview

These methods were conducted to answer the following research question and objectives:

Is the current level of tour guide briefing adequately providing visitor education to mitigate inappropriate snorkelling behaviour at LBCNP?

- To determine the extent of inclusion of information on park rules and best practices within the briefing
- To identify areas of weakness and strength in environmental briefings

Evaluations of tour guide environmental briefing were conducted for tours to LBCNP. This involved unobtrusively listening to the briefing being given to a tour group and using a checklist (See Appendix 5) to assess the inclusion of park regulations and best practices. The checklist was developed using the national tour guide training manual, best practices for marine recreation sector, and guidelines for environmentally friendly snorkelling and diving. The checklist included activities that are grouped into categories of actions that are prohibited by park rules. It also included other behaviour that should be discussed by tour guides in their briefings about best practices in the marine recreational sector, also known as 'reef etiquette'. Similar questions to those in the visitor questionnaire regarding tour guide briefing were included in this evaluation. Location where the briefing was given and duration of briefing were also recorded. The participants for the briefing evaluation was based on the randomness of the tour company since the selection of the lead guide who conducts briefing varied among tour operators.

The purpose of the group interview was to obtain additional information in regards to tour guide briefing through a series of open-ended and close-ended questions (See Appendix 6). Questions were aimed at determining the source of the content in the briefing and if standardization of briefings exist within and among tour operators. The group interview was also used to gain additional insight into visitor impact management from individual tour guides, including identification of challenges that tour guides encounter and recommendations for management intervention. The interview also assisted in determining the relationship between SEA and tour guides/operators in managing visitor impacts. The 'sticky dots' method of voting was used by tour guides to rate the answers to the questions using a 5-point scale. Participants were given a fixed number of sticky dots, and used them to vote for statements on posters by putting a dot next to their choice of answer.

A systematic random sampling method was used to identify the participants for the group interview. A list was compiled with names of all the tour guides who usually conduct the

environmental briefing for each of the tour operator/dive shop. One guide from each tour company/resort was randomly chosen based on the "drawing from a hat" method and was invited to participate in the group interview.

4.1.5 Validation meeting

A meeting was held to present the survey findings and to discuss recommendations and implementation of new management practices to address the problems identified in the study. Relevant stakeholders included SEA rangers/managers, members of Placencia Tour Guide Association, tour guides, tour operators, and other interested persons were also invited to validate the findings of the study.

4.2 Data analysis

4.2.1 Qualitative

The results from the semi-structured interview were presented in a table categorizing the current management strategies being implemented by SEA. Types of snorkeler activities categorized into park rules and reef etiquette were also displayed in a table. Snorkeler group activities were classified with respect to 10 specific actions; including compliance with reef etiquette and park rules. However, only eight prohibited activities were utilized for data analysis. Other qualitative data, including recommendations were listed in a bulleted form.

4.2.2 Quantitative

The questionnaires were reviewed to ensure all the questions were completely answered before the analysis started. Using the response codes on the survey instruments from the visitor questionnaire, SEA evaluation, and tour guide group interview, data was entered into Excel spreadsheets for analysis. Descriptive statistics, including frequency distribution tables, count, and other excel formulas were used. Findings were mainly summarized by means of charts including bar graphs, pie charts and histograms.

4.3 Limitations

As with most research studies, there are several limitations to note and avoid in future studies of this type. Although this research survey provides many answers and insights, there were unresolved issues that were inevitable:

1 The implication of participant observation during the snorkel survey is that the mere presence of the researcher may have altered the behaviour of those being studied, also known as the 'hawthorne effect'.

2 Although attempts to be inconspicuous were considered successful in regards to evaluation of tour guide briefing, some tour guides may have also been subject to the hawthorne effect' and perhaps altered their briefing to some extent.

3 Initial plans to record the briefing were unsuccessful as some of the briefings were conducted at the time of entry and it would have jeopardized the inconspicuousness of this method. Therefore, no recording of briefing was conducted and instead only the checklist was used to evaluate the briefings.

4 The distribution of trips among various sectors was greatly affected by the time of year. The study was conducted in July, which marks the beginning of the 'off' or 'slow' season in Placencia. In addition, the representative sample in which each tour operator would

have been surveyed in the snorkel survey was not met due to variability in trips going out to LBCNP based on bad weather.

5 Seven of the eleven invited tour guides who were randomly selected did not show up for the group interview for unknown reasons, despite receiving confirmation of their attendance. Some participants mentioned at the end of the interview that the particular day of the week might not have been the best day to conduct the group interview. As a result, better communication with participants in regards to the interview date should have occurred. As a result of this limitation, the information gathered from the group interview may be bias towards the views and experiences of the tour guides who participated.

6 The design sample proportions for the visitor questionnaire was greatly affected by the seasonality of the tourism sector as the resorts with visitors from accommodations tended to take larger groups as compared to the private tour operators, which had small groups from walk-in bookings. It is noted that private tour operators represent a higher percentage of those who conduct snorkelling tours at LBCNP.

7 Participation in the validation meeting was minimal as only 13 individuals showed up regardless of various methods used to advertise the meeting and invite locals. Flyers were posted around well known areas, sent via email and attempts were made to broadcast it on the local television channel. Discussion of recommendations with key stakeholders in a focus group should have been conducted before the validation meeting to increase chances of obtaining views and concerns.

8 The estimated time for the data collection in regards to snorkel survey and tour guide-briefing evaluations was three weeks (Figure 5). However, bad weather conditions, which are common in the summer months in southern Belize, delayed the start of data collection for over a week. More time would have also allowed better inclusion of respondents from bare boat charters and private tours since they do not frequent the island as much as other visitors do.

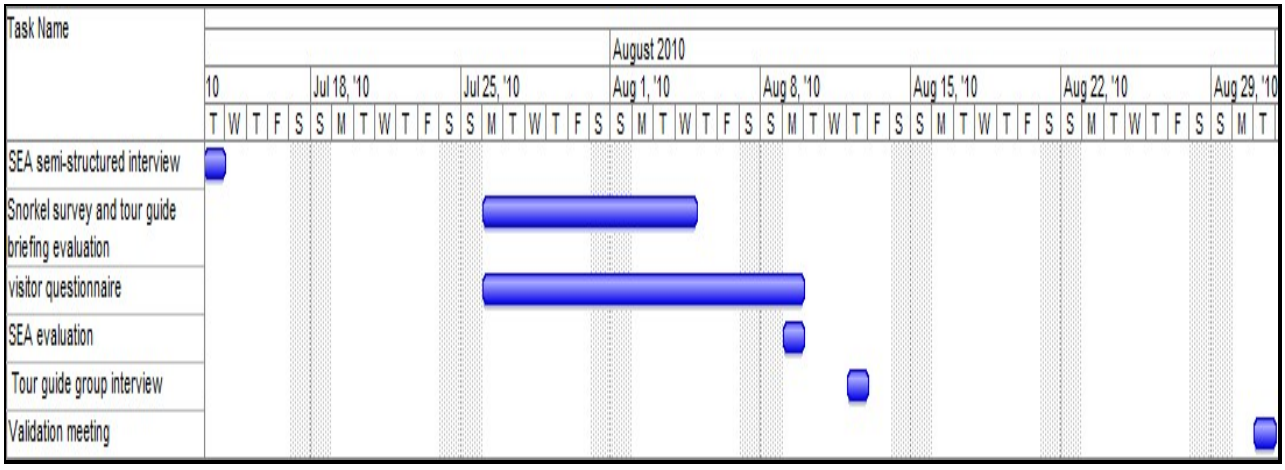

Figure 5: Gantt chart showing dates for various methods

5 RESULTS

5.1 Semi-structured interview

The semi-structured interview was conducted on 13th July 2010 with the Protected Areas Director of SEA who directly manages the three MPAs co-managed by SEA including LBCNP.

5.1.1 Goals and objectives

Meaningful evaluation of management effectiveness depends on the existence of specified management objectives (Hockings, 2003). However, specific objectives for tourism management at LBCNP are currently being drafted as a part of revision of the management plan. General objectives as defined by the Protected Areas Director centred on reduced physical impacts to the marine environment and increase in environmental awareness of visitors. Environmental conditions included physical impacts to the marine environment resulting from recreational activities including snorkelling and diving.

As a result of lack of identification of specified management objectives in the semi-structured interview, a review of the National Parks Act of 1981, revised edition 2003 and the 2000 Management Plan for LBCNP was conducted to identify goals and objectives in regards to recreation and tourism management at LBCNP. Consequently, it was identified in the National Parks System Act that the purpose of a National Park is for the "protection of nationally important recreation areas." It calls for "protection and preservation of natural and scenic values of national significance for the benefit and enjoyment of the general public (Government of Belize, 2003)." However, this provides broad guidance on the dual mandate of protected areas, namely conservation and recreation and is too broad to provide measurable objectives (Moore and Walker, 2008).

Based on the 2000 LBCNP Management Plan, three overall goals relating to tourism and recreational management were identified for the park (FOLBC, 2000):

- To protect and maintain natural and scenic values of Laughing Bird Caye National Park,
- To provide an excellent opportunity for recreation, and
- To educate surrounding communities and others about marine ecosystems and the importance of sustaining them.

5.1.2 Management strategies

The management strategies implemented by SEA are not directly focused on visitor impact management but constitute general protected areas management at LBCNP. Visitor impact management strategies are often categorized into site management; site design and information provision (Moore and Walker, 2008). The current management strategies implemented by SEA were identified in consultation with the Protected Areas Director and are categorized below (Table 3 and Figure 6).

Additional management issues relating to visitor impacts were discussed and are presented below:

<u>Site management</u>

Cruise ships are allowed at LBCNP, but they are required to strictly monitor their guests. For example, they must have corresponding tour guides for number of visitors and they must be in either kayaks or zodiacs to monitor visitor activities. In addition, park rangers either would

monitor from beach or in a boat to ensure park rules and guidelines are being adhered to. There is no management action in place to regulate the daily number of visitors entering the park and only daily recording of visitor numbers is conducted.

Site design

There is no zoning for the marine areas of LBCNP. The entire park can be used for recreational activities. However, for bare boat charters, rangers go out in their boat to meet visitors to ensure proper mooring and entry to the island.

Table 3: Management strategies implemented by SEA to reduce visitor impacts to LBCNP

Category	Management strategy	Description
Site management	Provision of facilities	8 mooring buoys have been installed to facilitate mooring by yachts and bare boat charters at LBCNP.
	Promoting compliance with park regulations	Two park rangers are employed at LBCNP and are on duty 24 hours and ensure that park rules are being adhered to.
	Regulating access	Only tour operators, and tour guides licensed with the Belize Tourism Board are allowed to conduct marine recreational activities at LBCNP.
	Length of stay limit	No length of stay limit is enforced during the day.
	Monitoring visitor numbers	Upon entry to the island, rangers record visitor information, which includes number of divers, snorkelers, name of tour company, name of boat, and number of crew.
	User fees	User fees do not regulate visitor use, but minimally reduces visitation by deterring use of LBCNP for those who refuse to pay fees to use the park.
	Regulating types of activities	The National Parks Act stipulates that the only non–extractive activities are allowed such as diving and snorkelling; this is enforced by park rangers.
Site design	Snorkel entry/exit regulations	Designated entry and exit points are implemented to protect coral reefs that encircle the shallow areas of the island.
Information provision	Palapa	A palapa (thatch-structure) was constructed on the island and is used as a point for rangers to collect entrance fees, and to communicate with visitors during this process.
	Pamphlets/posters	Pamphlets and posters in regards to proper use of mooring buoys, and information about the history, biology and importance of LBCNP are available.
	Signs	Take only pictures, leave only footprints, entry/exit signs, World Heritage site designation and no feeding of sharks.

Figure 6: Management actions implemented by SEA first row: signage indicating park rules, regulations, and second row: first, poster and information area, and second, palapa used for visitor/guide communication

5.2 SEA evaluation

Strategies were judged using an effectiveness scale, based on the rangers' response to both the output and outcome components of the paired statements. Where ranger responses averaged "1" based on "1= strongly agree" for both statements within a pair, this was interpreted to mean that the strategy has been implemented and/or has produced its desired outcome and was noted as effective. Where staff responses averaged "1.5" which showed a combination of "strongly agree and agree" with either or both statements within a pair, this suggested the strategy had been implemented but has not completely resulted in its desired outcome and was judged as competent (Table 4). If the response resulted in an average of "2", this shows that the answer to both statements was "agree" and was judged as needing development to improve its outcome.

Table 4: Effectiveness scale used to rate management strategies

Rating average	Code
1	Effective
1.5	Competent
2	Needs development

The responses for management strategies, provision of mooring buoys and entry/exit regulations indicated that they have produced desirable results in minimizing visitor impacts, therefore being judged as effective (Table 5). Two strategies that have not completely produced desirable results include monitoring visitor data and enforcement of park regulations. Park rangers identified that a lot more can be done to use the visitor data to improve management strategies and enforcement of park regulations. The final two strategies, establishment of the *palapa* and provision of information have produced some desirable results but needs the most development to improve effectiveness. Park rangers also commented that these two strategies need the most improvement in terms of providing more interpretive signage and better development of the *palapa* to educate visitors about their potential impacts to the park and how they can be reduced. Based on general observations, there was no provision of information concerning voluntary codes of conduct and good "reef etiquette" for diving and snorkelling.

Table 5: Summary of results from SEA evaluation

Number	Combined output/outcome statement	Rating average
1	Park regulations in regards to appropriate visitor behaviour/good reef etiquette are enforced at LBCNP.	1.5
	The enforcement of park regulations has minimized visitor impacts to the marine environment	1.5
2	Entry/Exit regulations in regards to use of marine areas for recreational activities are enforced.	1.5
	Entry/Exit regulations have resulted in reduced impacts to shallow marine habitats.	1
3	Visitor information about park regulations is being provided through education materials such as pamphlets, posters etc.	1.5
	Information provision has resulted in minimal impact visitor behaviour during activities at LBCNP.	2
4	The *palapa* is established as a means of providing education about conservation and best practices/regulations at LBCNP.	2
	The establishment of the *palapa* has increased conservation awareness in visitors and educated visitors about the importance of sustaining the park.	2
5	Mooring buoys are provided for use by bare boat charters and large vessels for mooring at LBCNP.	1
	The use of mooring buoys has reduced the instances of anchor damage to the marine environment.	1
6	Recording visitor data including activities and numbers on each vessel that enters the park is used to monitor visitor numbers and to determine level of use at LBCNP.	1
	Recording visitor data has provided information regarding the level of use of the park and is used to implement visitor management strategies to reduce impacts.	1.5

5.3 Snorkeler survey

Six snorkel surveys were conducted on different trips to LBCNP with various tour operators between 26th July to 4th August 2010. This encompassed a total of 25 snorkelers being observed for 360 survey minutes. Each tour group was observed for a total of 60 minutes, which included 30 minutes intervals in the morning and afternoon.

The morning and afternoon snorkel were conducted at different sites, based on the weather condition and level of swimming skills of the group. Snorkeling location was also strongly influenced by tour guides, who often have individual preferences for different sites (See Figure 3). However, the most common locations recorded for snorkelling activities were the north-eastern and north-western areas of the island.

A total of 19 incidents were observed in which snorkelers brushed corals and/or sea fans with fins, which constitutes the most frequent visitor impact. Additionally, 14 incidents where visitors were touching marine organisms were also observed (Figure 7). There were few (eight) incidents of stirring sediments which tended to occur early in the tour while visitors were getting oriented in the water. It was also observed that standing on coral occurred during this time; however, these were dead corals in shallow entry areas. There were no incidents in which snorkelers were observed feeding fish, collecting coral, breaking coral and touching corals during the surveys.

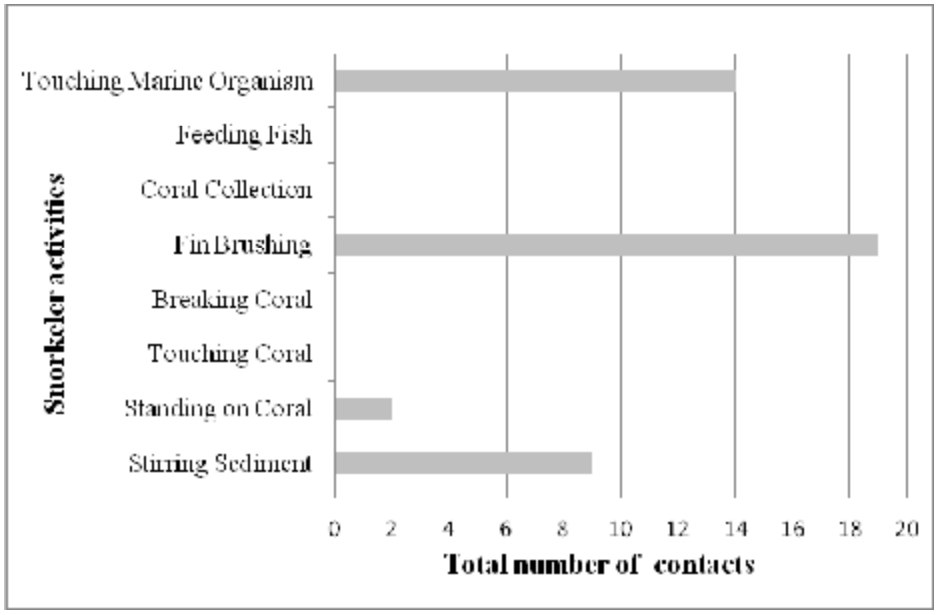

Figure 7: Total number of contacts for specific snorkeler activities

From general observations during snorkel surveys, some factors contributing to prohibited snorkeler contacts, including fin brushing and stirring sediments included:

1. Snorkelling in areas with shallow reefs and sea fans protruding
2. Visitors getting oriented in water and/or fixing mask
3. Visitors treading water and not observing the surroundings because of guide bringing organism to view or giving information about fish etc.

From general observation, in-water management plays a major role in reducing the number of incidents in which visitors display inappropriate snorkeler behaviour. As indicated in Figure 8,

under the supervision of guides B and C, three types of prohibited snorkeler activities were observed.

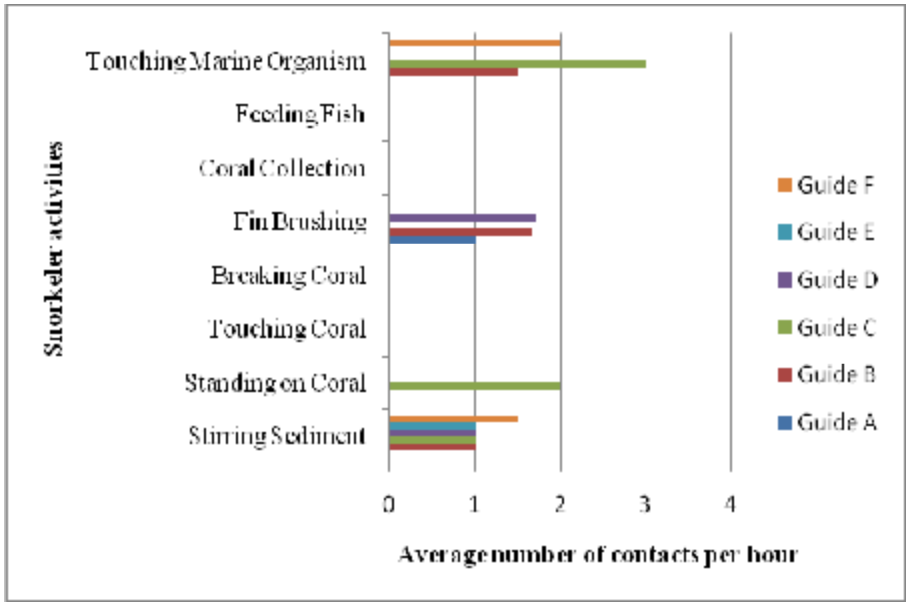

Figure 8: Average number of contacts per hour for individual tour guides

However, the results of the survey are not statistically representative of all tour guides who conduct tours at LBCNP and only indicate the potential relationship between inappropriate snorkeler behaviour and tour guide supervision. Additionally, other factors such as snorkelling in shallow areas, bad weather conditions and emergencies may have contributed to the number of inappropriate contacts by visitors under the supervision of these tour guides.

5.4 Visitor questionnaire

Visitors on snorkelling tour at LBCNP, which included resort dive shops (10), small dive shops (20) and bare boat charters (2), completed thirty-two questionnaires.

5.4.1 Visitor profile

Results of the questionnaire indicate a 50-50 ratio of male and female visitors who snorkelled at LBCNP. The age group with the highest number of visitors (16) was 28–38, followed by the age groups, 17-27, 39-49, 50-59 and over 59. More than half of the visitors (85%) were from the United States, followed by Canada (6 %) and Germany (3%). Fifty-three percent of visitors had a yearly income of over $US 70,000, followed by 18% with $US 50,000-59,000. Forty-four (44) percent of visitors held a postgraduate degree followed by 34% with an undergraduate degree and 22% with a secondary level education.

5.4.2 Snorkelling activities and compliance with park rules

In regards to visitors adhering to the park rules and reef etiquette, 78% responded that they were able to follow all and 22% were able to follow most. In addition, 100% of visitors responded that they used the designated entry/exit route.

In regards to ease in following the rules, 56% of visitors responded that they were very easy to follow (Table 6).

Table 6: Response for visitors' ease in following park rules

Ease in following park rules	response
very easy	56%
easy	38%
neither easy nor difficult	6%

Only one visitor stated that the rule, 'be careful of fins brushing coral' was difficult to follow. The reasons listed for difficulty in following this rule were passing shallow areas with corals and finding it hard to see where fins are in the depth of water. Another visitor also mentioned that it was difficult to prevent stirring sediments with fins in shallow areas.

Visitors were asked about their snorkelling skills to develop a visitor profile and to indicate the potential role it plays in contributing to the problem of inappropriate snorkeler behaviour. Forty-four percent of visitors rated their snorkelling competence as beginner while 34% were intermediate and only 22% classified themselves as expert (Figure 9).

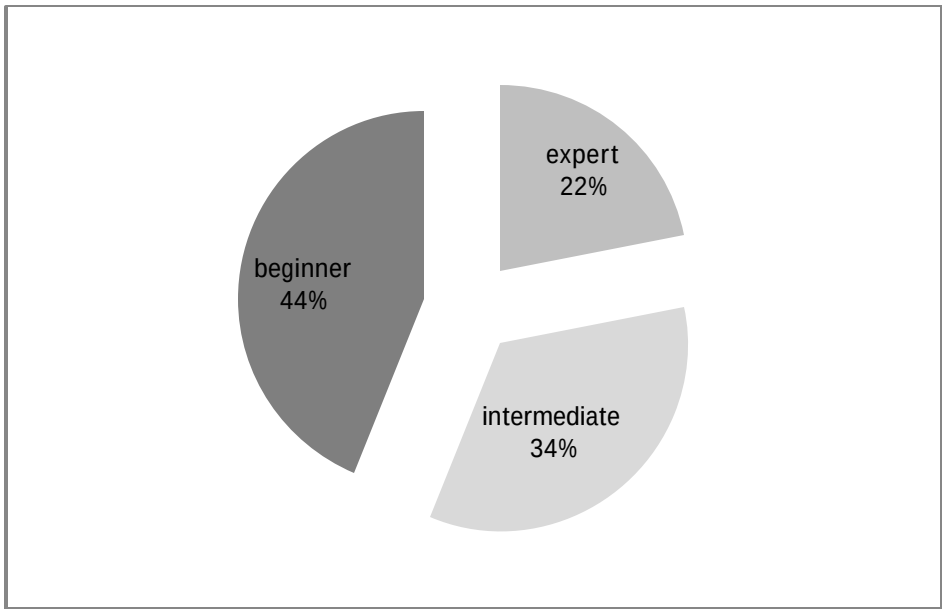

Figure 9: Level of snorkelling skill of visitors who participated in visitor survey

5.4.3 Evaluation of tour guides

Visitors were asked to rate the inclusion of park rules and best practices in environmental briefings and they generally indicated that they were well informed of the park rules (Figure 10). Ninety-seven percent of visitors indicated that tour guides mentioned that visitors were in a marine park. Furthermore, the following rules were the most commonly mentioned (100%) in the environmental briefings: visitors cannot remove any objects, not to touch corals and not to stand on corals. The least mentioned activity was to be careful not to stir up sediments (63%), which is one of activities classified as reef etiquette.

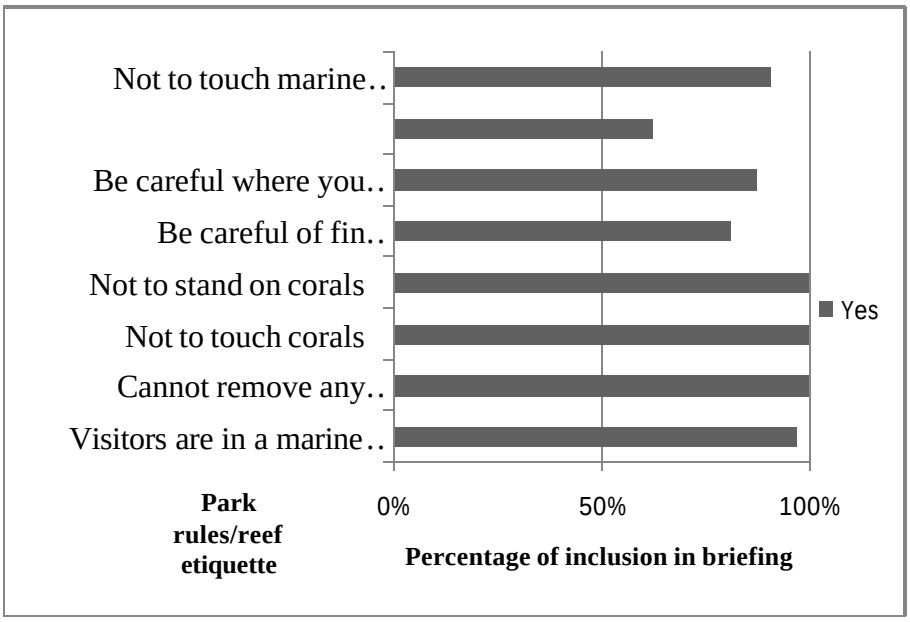

Figure 10: Visitor rating of inclusion of park rules//best practices in environmental briefings

Visitors were also asked to rate the extent to which tour guides adhered to park rules to assess if they set good examples of snorkeler etiquette for visitors (Figure 11). Seventy-five percent responded that the tour guide always followed the rules, while 6% responded sometimes and 19% chose not applicable. This is slightly lower than compliance with park rules by visitors (78%).

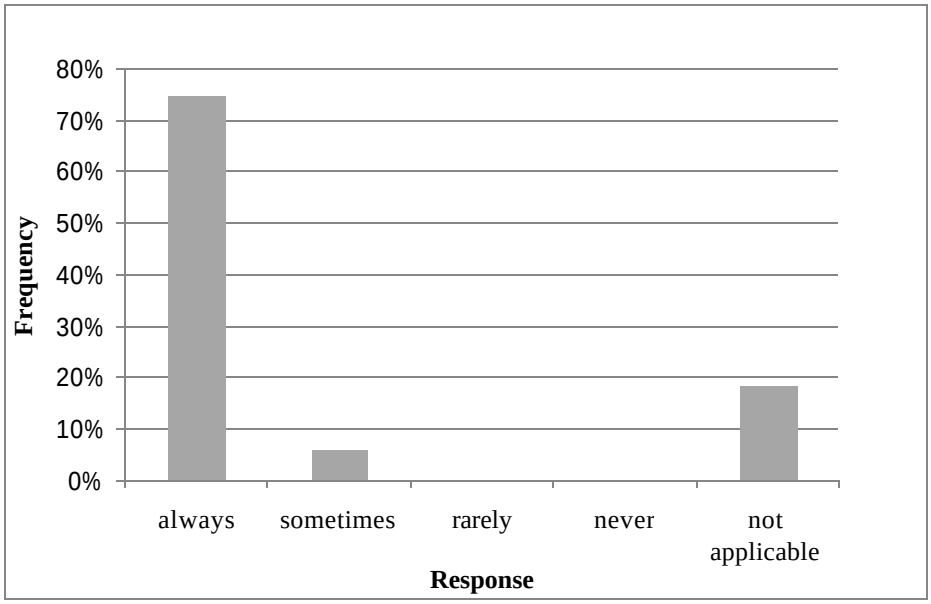

Figure 11: Visitor rating of extent of tour guides adhering to park rules

5.4.4 Ranger evaluation

Visitors were asked to rate the park rangers' enforcement of park regulations (Figure 12). Fifty-six percent chose no response; this was probably because visitors did not pay attention to ranger

activities and did want to comment on this issue. Twenty-five percent of visitors responded 'good' while 16% rated enforcement of regulations as 'excellent'.

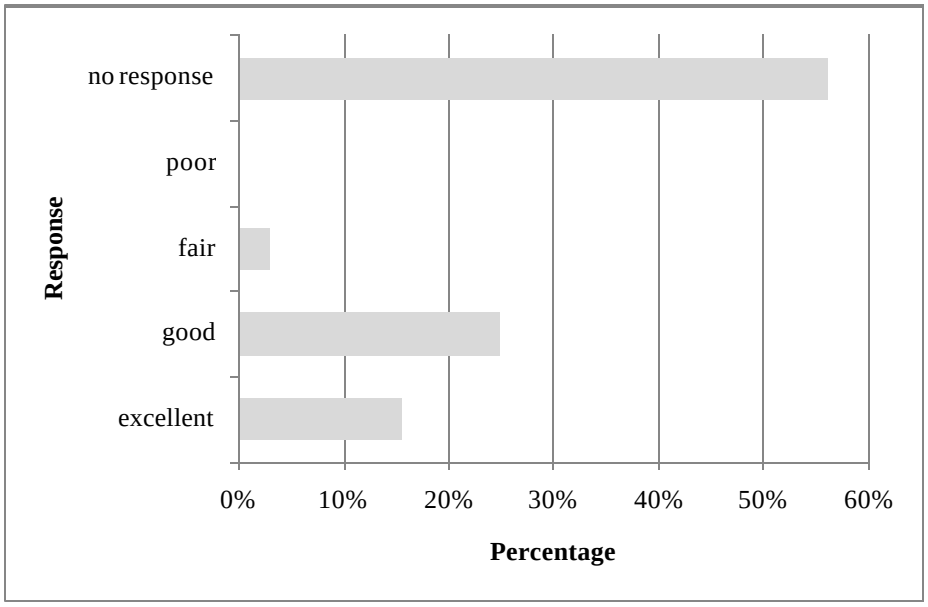

Figure 12: Visitor rating of park rangers' enforcement of park regulations

Visitors were also asked to rate park rangers' performance in site management, which includes monitoring visitor numbers, providing assistance and educational information. Sixty-six percent chose 'no response' probably because they were not directly focusing on park rangers' activities and again did not want to comment (Figure 13).

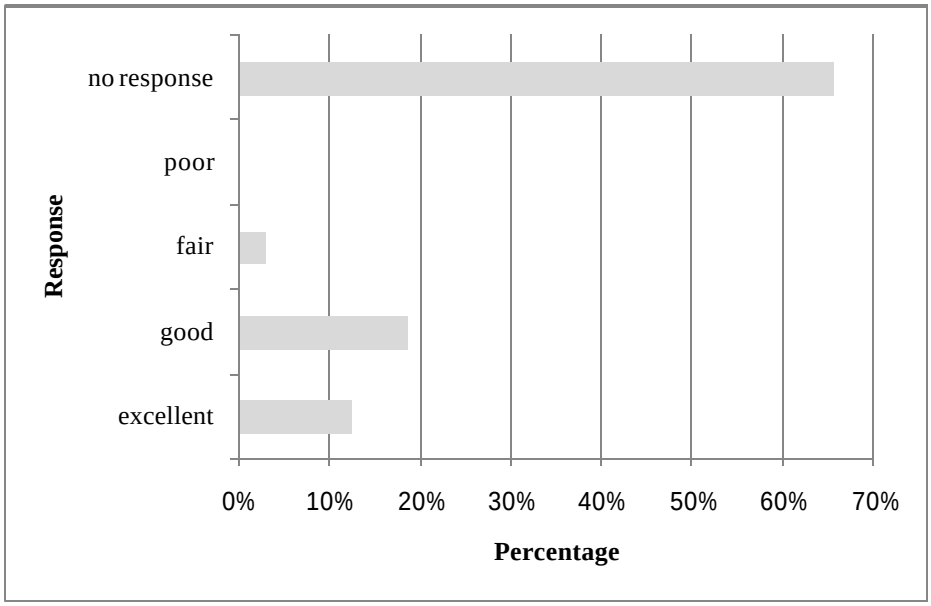

Figure 13: Visitor rating of park rangers' performance in site management

Visitors were asked if they had direct communication with park rangers for assistance, briefing, and information and 91% responded 'no' (Figure 14). When asked if rangers provided

information about visitor behaviour and proper reef etiquette, 50% of visitors chose no response, while 44% responded 'no.'

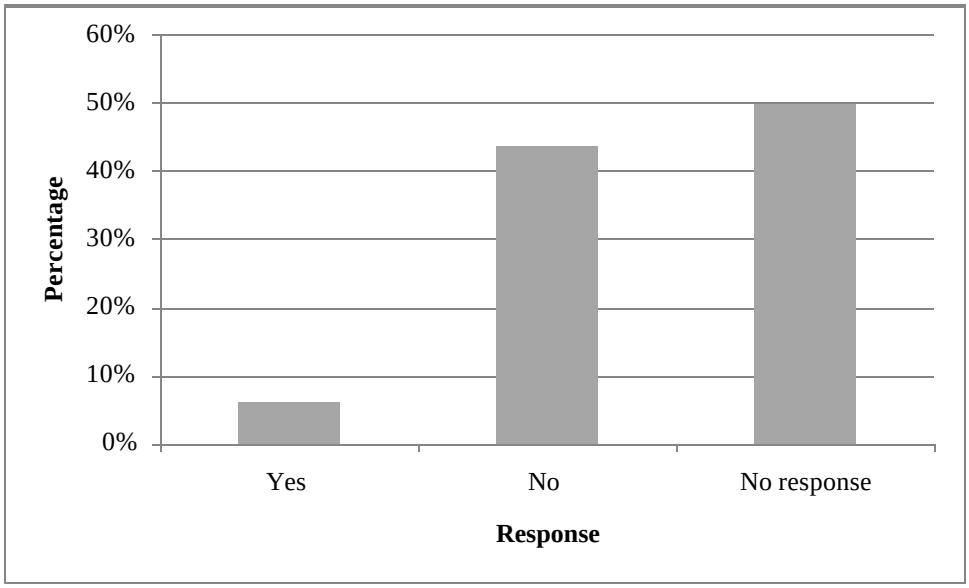

Figure 14: Visitor response to communication with park rangers

5.4.5 Questions relating to SEA's management strategies

With respect to information provision by SEA, visitors were asked if they visited the *palapa* (thatch structure) to get information about LBCNP (Figure 15).

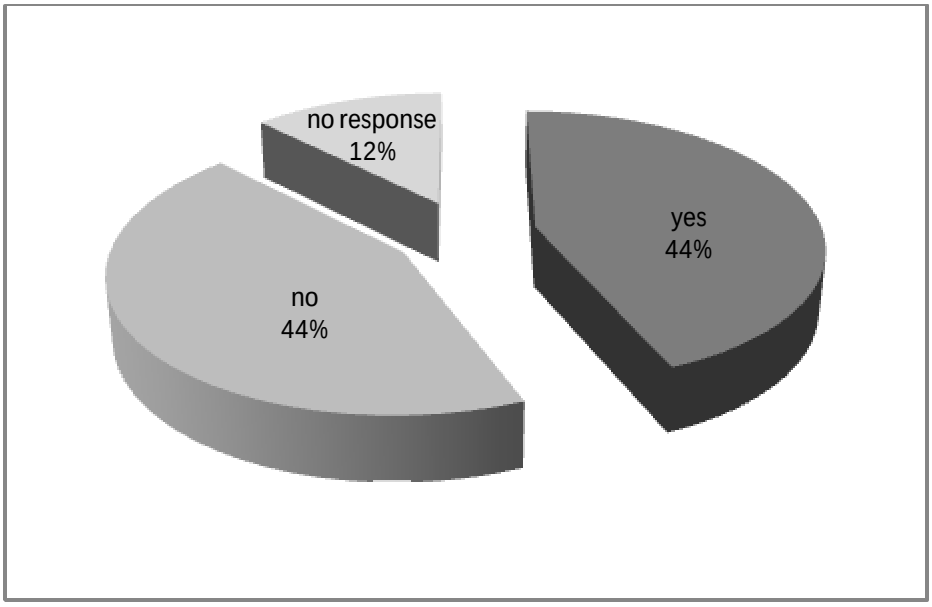

Figure 15: Visitors who went to the *palapa* to get information about LBCNP

Visitors were also asked to rate the level of information provided at LBCNP on its importance, history and conservation (Table 7). As indicated in table 7, 38% of respondents rated the provision of information at LBCNP as 'good'; however, a larger number of visitors chose not to respond.

Table 7: Visitor rating of educational information provided at LBCNP

Rating scale	Percentage (%) (n=32)
excellent	3
good	38
fair	13
poor	3
no response	43

5.5 Evaluation of tour guide briefing

Evaluations of tour guide environmental briefings were conducted for seven trips to LBCNP, each with tour guides (n=7) employed with different tour operators.

Table 8 shows the activities categorized as park rules and best practice/reef etiquette that were investigated for inclusion in the environmental briefings.

Table 8: Code names for activities categorized as park rules and best practices

Code	Activity	Category
NOTOMO	Not allowed to touch fish/marine organisms	Park rules
CANOST	Be careful not to stir sediments	Best practice/reef etiquette
CAWHST	Be careful of where standing	Best practice/reef etiquette
FIKNCO	Be careful of fins knocking corals	Best practice/ reef etiquette
NOTOCO	Not allowed to touch corals	Park rules
CAREOB	Cannot remove any object/organism	Park rules
NOTOST	Do not stand on corals	Park rules
VIMAPA	Visitors are in a marine park	Park rules

The two most mentioned park rules (100%) were (1) visitors are in a marine park and (2) visitors are not allowed to touch corals (Figure 16). These were followed by tour guides telling visitors that they cannot remove any object or organism from the national park (85%). The least mentioned activities were two best practices used in marine recreational activities including (1) not to stir sediments (29%) and (2) be careful of fins brushing corals (29%).

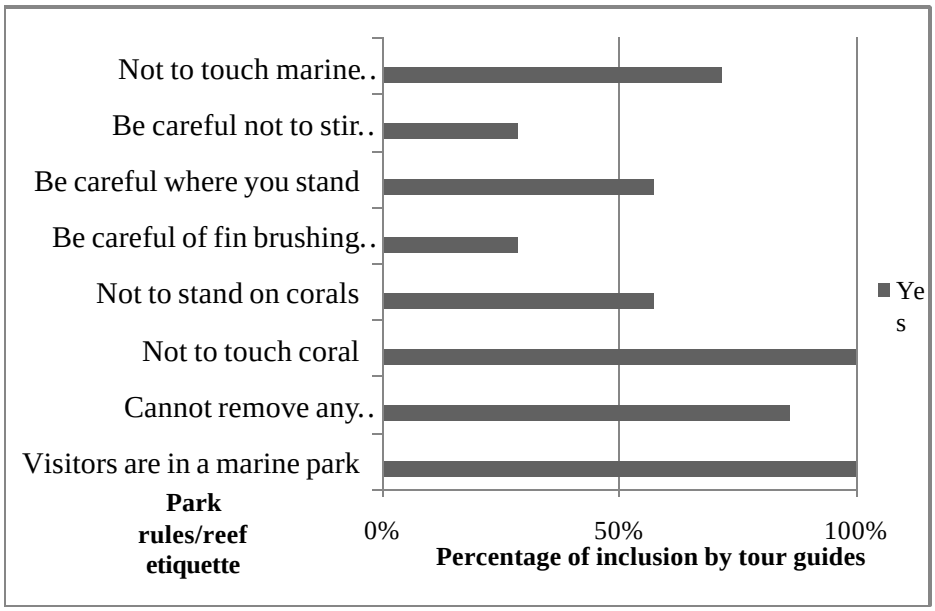

Figure 16: Inclusion of park rules and best practices in tour guide briefings

As indicated in Table 9, 100% of tour guides provided a briefing on appropriate behaviour prior to snorkelling and other recreational activities at LBCNP. However, tour guides failed to mention that they would point out inappropriate snorkelling behaviour (0%) and indicate management actions for visitors who disregard park rules (29%).

Besides those statements on the checklist, tour guides also included additional educational information to aid briefing. This information is categorized as coral reef biology and included explanation of their protective layer, coral reef formation, and various types of corals, including those that are harmful if touched.

Table 9: Tour guide briefing evaluation results summary

Question from tour guide briefing evaluation checklist	Results (%) n=7 YES
Did the guide provide instructional materials and/or briefing on appropriate behaviour/proper reef etiquette prior to snorkelling and other recreational activities at LBCNP?	100
Did the guide mention that he would point out inappropriate snorkelling behaviour?	0
Did the guide indicate management actions for visitors who disregard park rules or display inappropriate snorkelling behavior?	29
Did the guide mention that he would offer assistance in the case that any guest needs help	100
Did the guide give advice on proper navigation and snorkelling techniques specific to the marine environment in which snorkelling will take place, such as sandy bottoms, coral reef etc.?	100

Did the guide mention that there are specific entry/exit routes?	100
Did the guide use any additional educational information to aid oral briefing (besides those on checklist)?	71

In addition, the locations where tour guides gave their briefings varied and included the *palapa* (2), entry areas to water (3) and picnic tables around the park (2). In terms of the duration, the average length of a briefing was 5.4 minutes, regardless of tour size.

5.6 Tour Guide Group Interview

The tour guide group interview was conducted on 12th August 2010 with four participants. However, two tour guides who were not able to attend the interview answered the interview question individually. Thus, the total number of tour guides interviewed was six (n=6) out of the targeted eleven.

5.6.1 Identification of inappropriate snorkeler behaviour at LBCNP

All (100%) of the tour guides who participated in the group interview considered inappropriate snorkeler behaviour to be a threat to coral reefs at LBCNP. When asked to rate the problem of inappropriate snorkeler behaviour, 33% responded that it was a very small problem and 33% rated it as moderate problem. Similarly, 17% of tour guides rated it as both small and big problem (Figure 17). This response was probably due to the varying experiences that the tour guides have at LBCNP as tour guides expressed in the group interview that snorkelling competence varies among groups taken on tours and this may sometimes be a contributing factor to inappropriate snorkeler behaviour.

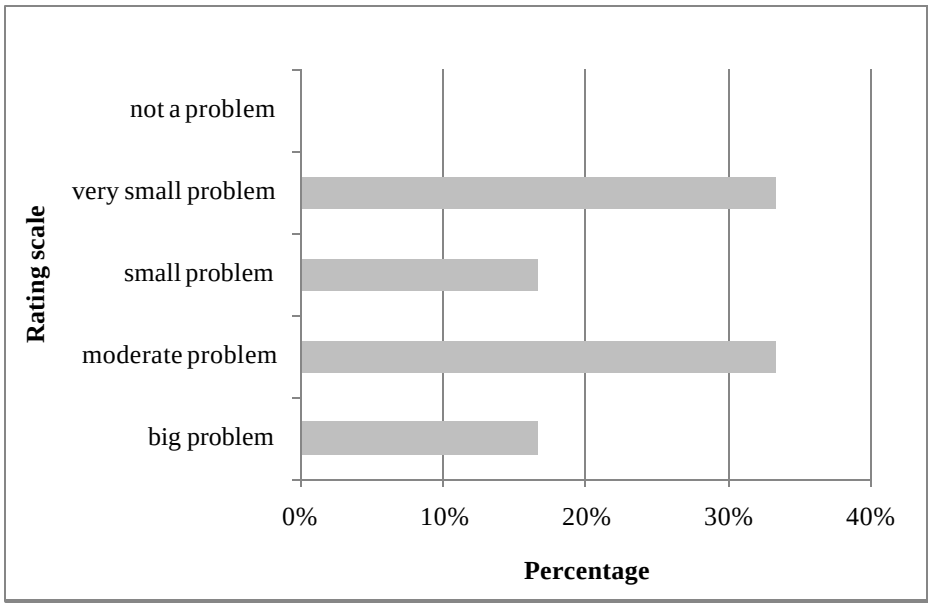

Figure 17: Rating of inappropriate snorkeler behaviour as a problem at LBCNP

Eighty-three percent of tour guides responded that they 'strongly agree' in regards to bare boat charters contributing to the problem of inappropriate snorkeler behaviour at LBCNP while 17% responded that they 'agree'.

Some reasons for inappropriate snorkeler behaviour identified by tour guides who participated in the group interview included the following:

- Emergency situations
- Weak swimmers who are not honest with guide about swimming skills
- Tour guides not being strict with snorkelers
- Snorkelers without tour guides

5.6.2 Effectiveness of environmental briefing

Seventeen percent 'strongly agree' and 83% 'agree' that the current level of environmental briefings help to reduce the occurrence of inappropriate snorkeler behaviour at LBCNP.

Tour guides responded that the information presented in environmental briefings is from a range of sources including:

- National tour guide training course
- Watching science programs on TV
- Day to day experiences at sea which includes traditional knowledge about the marine environment
- SEA studies, pamphlets, etc.
- Advanced marine tour guide training course

Eighty-three percent of tour guides responded that environmental briefings differed 'sometimes' among tour guides while 17% responded 'often'.

5.6.3 Effectiveness of SEA's management strategies

Of the tour guides who participated in the group interview, 100% agreed that SEA's management strategies are effective in reducing visitor impacts to LBCNP. Figure 18 shows tour guides' overall rating of rating of park management, with majority (83%) rating park management as 'good'.

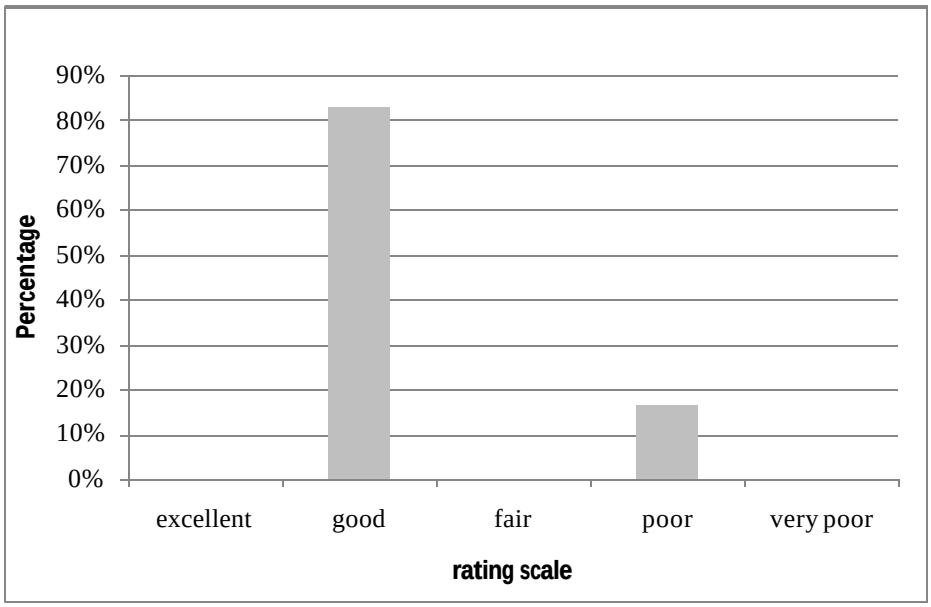

Figure 18: Tour guide rating of SEA's overall park management

However, with respect to tour guide/operator relationship with SEA for visitor management only 17 % considered the relationship to be 'good' while the majority (83%) rated it as fair.

When asked about reporting inappropriate snorkeler behaviour to park rangers or SEA staff, 67% of tour guides responded that they often do while 33% responded they sometimes do.

Some challenges in visitor management as identified by tour guides include:

- Balancing safety of guests with protection of coral reefs in emergency situations
- Language barriers which make communication of park rules and best practices difficult
- Weather conditions
- Stubborn visitors who do not stay with the group and tend to go off into their own direction

5.7 Validation Meeting

A meeting was held on Monday 31st August 2010 to present the results of the study to key stakeholders. A total of 13 persons attended and included SEA's Protected Areas Director and Science Program Director, members of Placencia Tour Guide Association, several tour guides, captains, tour operators, and the president of the Placencia Citizens for Sustainable Development (Figure 19).

Figure 19: Left: presenting at the validation meeting, Right: stakeholder discussion at the validation meeting

The meeting commenced with a presentation of the research project, which included introduction, methods, results, discussion and conclusion.

Inappropriate snorkeler behaviour as identified in the study was validated by tour guides who attended the meeting. Since it was supported that 'fin brushing' is one of the most common contacts, it was suggested that it should be made mandatory that all visitors wear snorkel vests, regardless of level of swimming skills. This was suggested after it was determined that some visitors are not honest about their swimming abilities and often need assistance while snorkelling.

The idea of conducting a carrying capacity study for LBCNP was raised in regards to the cruise ship potentially visiting Placencia and having interest in marine activities at LBCNP. Representatives from SEA also validated the findings of the study and identified that the issues are going to be addressed in the updated management plan.

6 DISCUSSION

6.1 Current Visitor Impact Management strategies at LBCNP

6.1.1 Southern Environmental Association (SEA) management strategies

A range of management strategies were identified as contributing to a reduction in visitor impacts at LBCNP, thus constituting some form of visitor impact management. The results of the various methodologies used in the study, specifically SEA evaluation, visitor questionnaire and tour guide group interview indicate that the current management strategies implemented by SEA has resulted in varying degrees of effectiveness. Based on the effectiveness scale, the management strategies ranges included (1) effective; (2) competent, effective but needs improvement; and (3) needs most development.

Rangers highlighted the effectiveness of the designated entry and exit points since they potentially reduce impacts to the surrounding marine environments by concentrating entry via shallow marine areas with corals that are already dead. Of substantial concern were the management strategies, which include the establishment of the *palapa* and provision of information. These were identified as those that require considerable development at LBCNP. This is further supported by the recommendation suggested in the tour guide group interview,

which indicates that the need for improvement in posters, pamphlets and signage at LBCNP. The current signage portrays minimal information in regards to specific prohibited behaviour and is only a general indication of the park rule "take only pictures, leave only footprints'. Although this signifies an interpretive message of reducing environmental impacts, specific behaviours need to be stressed on signs especially for visitors who may not be familiar with environmental phrases.

Consequently, there is the need for signage, which specifically identifies impacts resulting from recreational activities and educates visitors about the ecological and social implications. Interpretation that focuses on specific management issues has been shown in some studies to influence visitor behaviour toward compliance with those issues (Randall and Rollins, 2009). In addition, education is thought of as one of the most efficient tools to change visitor behaviour, and thereby reducing direct ecological impacts (Orams, 1995 and 1997). One of the first models that tried to explain how education may lead to behavioural changes can be seen in Figure 20. According to this, increased knowledge will lead to attitude change, and both are prerequisites for positive environmental behaviour (Petterson, 2009).

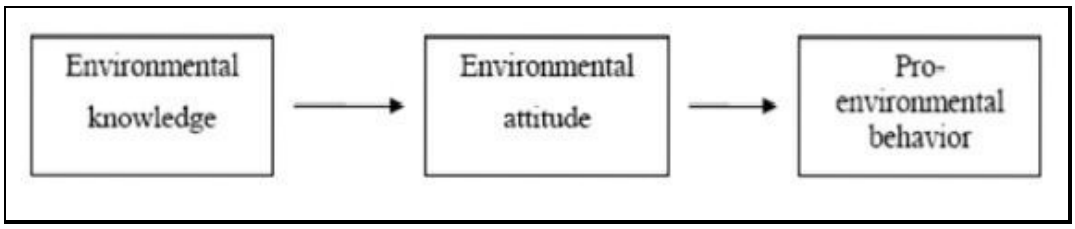

Figure 20: A model describing how education may lead to altered behaviour

Source: Petterson, 2009

Since only 44% of visitors responded that they visited the *palapa* to get information on LBCNP, strategically placing more signs around the islands would also improve environmental awareness in the visitors who do not care to visit the *palapa*. As a result, improved environmental awareness through interpretation and education programmes can assist by reducing the need for regulation and enforcement (Marion and Reid, 2007).

Additionally, there was minimal evidence of the communicative role of park rangers, which involves communicating information to visitors for the purposes of providing assistance, or briefing on park rules. During general observations at LBCNP, it was identified that the role of park rangers as communicators of park rules is not strongly implemented. Minimal activities in regards to visitor interaction and education were observed and daily ranger communications merely involved collection of park fees, which is only focused on interactions with tour guides. An instance of ranger and visitor interaction was observed when a bare boat entered the park, as rangers went out in boats to meet the vessels at a distance to give instructions for safe mooring.

It is common that agencies lack the financial resources to manage natural areas and are challenged to effectively enforce resource management regulations (Randall and Rollins, 2009). However, under these circumstances, the role of the tour guide can foster an important relationship with resource management agencies, a partnership that supports the agency, the guiding industry, the visitor experience and the environmental quality of the setting (Randall and Rollins, 2009).

6.1.2 Role of tour guides

It is important to consider the potential impact of the tour guides as they can play an influential role in information delivery, interpretation and act as conduits for natural resource management agencies (Randall and Rollins, 2009). Furthermore, the use of tour guides in protected areas offer the potential to reduce visitor impacts through their potential contribution to the protection of natural areas where they operate by educating the visitors through interpretation and modelling environmentally appropriate behaviour (Randall and Rollins, 2009).

The role of tour guide involves a resource management focus which includes the modification of tourist behaviour and on-site and the understanding and appreciation of environmental issues to facilitate responsible tourist behaviours in the long term (Randall and Rollins, 2009). This role is characterised by tour guides at LBCNP as they conduct environmental briefings mainly to reduce impacts by encouraging responsible behaviour. However, the environmental issues at LBCNP were not essentially indicated to visitors and warrants attention for inclusion in briefings.

A variety of mechanisms are used to improve and facilitate guides' performance of their various rolesincluding codes of conduct, professional associations, awards of excellence, training, certification and professional licensing (Randall and Rollins, 2009). These appear to offer the greatest potential to influence guiding standards and enhance performance across all roles. In Belize, tour guides obtain certification and professional licensing through a national tour guide-training course administered by the Belize Tourism Board (D.Vernon, pers.comm.). Professional associations, such as the Placencia Tour Guide Association also offers training and educational opportunities through grants, and other community initiatives (D.Young, pers.comm.).

6.1.3 Briefing and park rule/reef etiquette compliance

The results of the briefing evaluations indicate that 100% of the tour guides gave some level of briefing in regards to park rules and appropriate behaviour and reef etiquette prior to snorkelling and other recreational activities at LBCNP. The inclusion of specific information in the briefing did not vary greatly among the tour guides as the most commonly mentioned and least mentioned were similar. The briefings most frequently included activities classified as park rules.

Furthermore, those classified as reef etiquette and best practices in marine recreational activities were less frequently mentioned; for example, not to stir sediments and to be careful of fin brushing corals were the least mentioned. These activities are not directly prohibited in the park regulations (National Parks Act of 1981), but are classified as "reef etiquette" guidelines that are commonly provided to guides and tour operators in the marine recreational sector (Centre for Environmental Leadership in Business. n.d; CORAL, 2007). Furthermore, these activities were reflected in the snorkel surveys as fin-brushing coral/sea fans was the most frequent contact by visitors, while stirring sediments was also one of the most common types of impact observed. These activities were commonly attributed to the pattern of the tours taking place over shallow areas of the reef, leading the analysis that these impacts were unintentional. Unintentional impacts are classified as those that occur accidentally during snorkelling activities (HRI, 2009). However, it was observed that these behaviours sometimes result from carelessness and improper 'fin' techniques. However, if tour guides do not take visitors into shallow areas and monitorvisitors more closely, these unintentional impacts can be reduced or avoided. Additionally, it is important to note that there was no observed violation of the park rules that were always mentioned to visitors. However, the sample was too small to determine if there is a direct correlation with the type of contact and environmental briefing given by tour guides.

Another park rule violation was touching marine organisms, the second most frequent contact. Visitors were observed touching conch and sea cucumber, activities that were facilitated by tour guides who would dive to get them. This is one of the factors, which contribute to prohibited snorkeler contact and it is expressed by tour guides that it is a tactic used to get tips. "Touching of marine organisms" at LBCNP has been occurring for some time and no management strategy to address this behaviour has been implemented. However, through discussions with the Protected Areas Director on this topic, SEA is considering management options to address this issue in the future.

Furthermore, tour guides were observed to use their snorkel to coax lobsters out of patch reefs so that visitors could see and/or take photographs. This is classified as harassment of animals and was not investigated as a prohibited contact, but was recorded as an additional observation that needs to be addressed by management.

Visitors were asked to rate the inclusion of park rules and best practices in environmental briefings and they generally indicated that they were well informed of the park rules. However, similar to the results of the evaluation of tour guide briefings, the reef etiquette guidelines, specifically fin brushing and stirring sediments, were less frequently mentioned when compared to park rules. It is important for tour guides to stress both the park rules and best practices in environmental briefings as they can serve to increase the awareness of impacts to the coral reefs and may result in improved visitor behaviour. Alternatively, guide performance may be a consequence of the lack of monitoring and enforcement by SEA. Natural resources agencies should ensure that tour guides conducting tours in MPAs are prepared to deliver an experience that not only meets the needs of the visitor, but also assist in protecting the natural resources upon which tourism is based (Randall and Rollins, 2002).

6.2 Implications of visitor impacts

This study focused on direct human impacts resulting from inappropriate snorkeler behaviour in the form of physical contacts with marine organisms and the habitat in which they are found. In the case of snorkeler impacts, these are direct impacts resulting from physical contact with coral reefs, sponges, sea fans, marine organisms and other marine habitats. However, the extent of impact differs due to a multiplicity of factors including period of occurrence, site-specific characteristics, magnitude of activity, and the amount of stressors in addition to visitor impacts (Petterson, 2009). Furthermore, visitor impacts at all protected areas must be considered separately as there may be many contributing factors that make each site a unique case. However, certain impacts will occur in most marine protected areas, as evidenced in this study, Paz et al. 2003 and HRI, 2009. The benefit of this is that the management techniques used to mitigate these impacts at one site may also apply to another site or could be adapted slightly to suit that site (McCrone, 2001).

Based on observation during the snorkel surveys at LBCNP, the frequency of impacts was also affected by the degree of in-water supervision and management of visitors by tour guides. From observation, this entails monitoring visitor activities, correcting inappropriate snorkeler activities, and general group management.

A Sustainable Marine Recreation workshop held in March 2006 in Placencia village hosted by International Coral Reef Alert Network (ICRAN) for Mesoamerican region (MAR) focused on threats and solutions for sustainable business practices that also included discussions on marine recreation threats to reefs in southern Belize (ICRAN MAR. n.d.). The third most important

threat was identified as impacts resulting from inexperienced snorkelers and divers, for which the root causes were also identified. The root causes identified in the workshop were similar to the causes of visitor impacts identified in the tour guide group meeting and include lack of in-water supervision, no use of snorkel vest, poor training and management, inexperienced guide, poor site selection and lack of interest by the tour guide. Thus, the re-occurrence of these root causes in 2010 during this study is evidence that management has not adequately addressed these issues. However, it is likely that there will be some improvement as SEA is currently updating its management plan for LBCNP and intends to incorporate the recommendations of this study along with other recommendations for visitor impact management.

6.2.1 Ecological implications

The fact that all marine tourism activities depend on natural resources indicates that marine tourism results in impacts (Petterson, 2009). Therefore, the field of recreation ecology emerged in the 1970s in response to these growing threats, with a view to increase our understanding of ecological responses to visitors and to facilitate better management of natural resources (Leung and Marion, 2000). Ecological impacts include a range of different effects, from as little as minor disturbance through to mortality (Figure 21). These impacts can be the result of indirect and/or direct human action (Petterson, 2009). The direct impacts observed during the study included touching marine organisms, brushing corals with fins stirring sediments and standing on corals. It is known that stirring sediments may cause localized coral siltation, while direct scrapes to coral from fin brushing could potentially destroy the protective layer of some coral species ("Green fins guidelines", 2009). However, the actual ecological impacts relating to inappropriate visitor activities at LBCNP remain unknown.

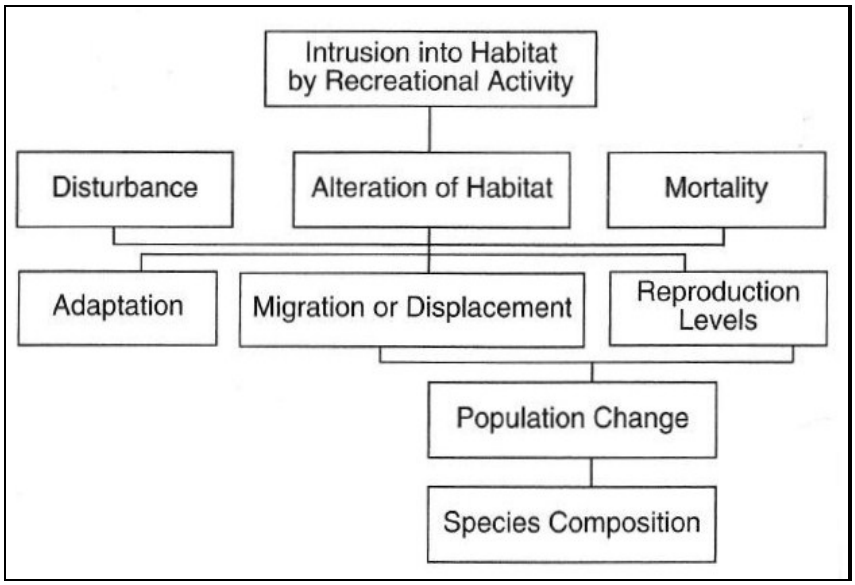

Figure 21: Potential ecological impacts resulting from marine tourism (Kuss et al. 1990)

Source: Petterson, 2009

6.2.2 Social implications

The quality of coral reef resources in tropical MPAs is a major determinant of the long-term viability of the tourism sector in protected areas (Brown et al. 2001). The degradation of reef areas can lead both to a decline in overall tourist revenue with consequences for local economies

associated with the recreational experience (Dixon et al. 1993). These linkages and feedbacks require interrogation and assessment to inform decision-making, the trade-offs between ecological, social, and economic impacts need to be evaluated (Brown et al. 2001).

In Placencia, the likely social impacts resulting from degradation of reefs at LBCNP would be a shift to the use of Silk Cayes as a more favoured snorkelling site. This is already occurring, as some tour operators mentioned that the reefs at LBCNP are severely degraded and the outer reefs, including the Silk Cayes offers a better snorkelling opportunity (D.Young, pers.comm). Although, there are many contributing factors to the deterioration of reefs at LBCNP, it is important that visitor impacts are effectively managed so as not to cause additional stress to the reefs. However, if visitor impacts are not addressed, it is likely that the Silk Cayes will result in the same demise.

Another important issue is allowing cruise ship passengers to participate in marine recreational activities at LBCNP. This potential use can have a huge impact on the park resources at Laughing Bird Caye. In addition, local tour operators in Placencia have traditionally used LBCNP. Already, in the high seasons, over 100 visitors can be seen on the island and cruise ship passengers would place additional pressure on management at LBCNP (A.Westby, pers.comm). Thus, a Limits of Acceptable Change study will need to be conducted before such decisions are made and recommendations for visitor impact management will need to be implemented as soon as possible.

Presumably, education can reduce this 'bad' behaviour. Dixon et al. (1993) noted the potential of education to reduce environmental damage and/or allow a larger number of consumers to use a site. While some progress has been made, much more attention is needed for management of visitor impacts at LBCNP. However, other key issues in MPA management such as illegal poaching make it difficult to focus on other impacts that may not be as obvious (ranger, pers.comm).

6.3 Linking VIM to protected areas management: implications

As a result of the increasing pressures of tourism, protected area management is evolving from one primarily focused on onsite management and conservation to one that more broadly encompasses a greater range of holistic recreation and tourism experiences (MPA News, 2004). In dealing with this evolution, national parks and protected area managers are now required to balance onsite interpretation activities with broader marketing and demand management activities (MPA News, 2004).

6.3.1 Hard and soft approaches

Visitor management has been viewed as a significant way to reduce the negative impacts of tourism (Mason, 2005). Traditionally, visitor management in protected areas has been focused on managing negative impacts through controlling visitor numbers, attempting to modify visitor behaviour and modifying the resource (Mason, 2005). This is evidenced at LBCNP by the various management strategies they have implemented as a part of park management. These approaches can be divided into 'hard' and 'soft' categories (Kuo, 2002 as cited in Mason 2005). 'Hard' visitor management approaches involve physical management, regulatory management and economic management while 'soft' approaches make use of education and interpretation (Mason, 2005).

The main strategy used to minimise direct anthropogenic impacts, within marine tourism, has been regulation; however, in most cases, these regulations are likely to be voluntary, self-regulatory, and unlikely to be supported by laws (Miller, 2007). This is true for sites in Belize, such as LBCNP as the National Parks Act only stipulates regulations for general activities and is not specifically focused on regulating tourism activities (Government of Belize, 2003). However, management at LBCNP utilizes a combination of soft and hard approaches in an attempt to manage visitors. The educational process at LBCNP involves the display of information about the site and environmental factors including habitats and species of marine organisms present, and conservation projects being implemented. At LBCNP, 'soft' approaches are also common as tour guides conduct environmental briefings that indicate the code of conduct and reef etiquette that should be displayed by visitors. However, the role of the park rangers are considered as a more regulatory role as enforcement is their key responsibility.

Conversely, instead of relying on mechanisms to force behavioural change, some indirect strategies e.g. education and code of conduct depend on behavioural change through voluntary decision (Orams, 1997). This is an essential component of 'soft' approaches, which are recognised as more efficient visitor management tools. However, as well as regulation, managing visitors can also involve education, which frequently involves the process of interpretation (Mason, 2005). Self-regulation is another 'soft' approach utilized and is characterized by codes of conduct and guidelines for both operators and visitors. Furthermore, these management tools can be used to increase the effective carrying capacity of an area (Dixon et al. 1993).

Well trained, culturally sensitive tour guides can make interpretation a more effective way of managing visitors, than the regulatory or 'hard' approaches (Randall and Rollins, 2009). In this study, it was identified that interpretation and education is especially important, but in-water monitoring and management plays also a major rule in soliciting appropriate behaviour from visitors.

Understanding visitors and visitor behaviours is a fundamental component of effective impact management ("Sustainable tourism online", 2010). Many park visitors tend to be first time visitors so education and strategic communication are important tools for soliciting appropriate behaviours. This is highlighted in the results of the study as most visitors were identified as having a beginner and intermediate level in snorkelling skills. Furthermore, identifying tourists' interests and seasonality is also useful for predicting which resources will be under greatest pressure and when monitoring is most needed. Consequently, planning, active management and monitoring and rapid response to unsustainable actions are the four basic elements of effective visitor management ("Sustainable tourism online", 2010).

6.3.2 Planning

Planning for tourism and recreation to minimise environmental impacts, requires careful consideration to provide desired experiences for visitors, achieve sustainable use and secure economic benefits for protected areas and local people ("Sustainable tourism online", 2010). The Belize National Protected Areas Policy and System Plan (NPAPSP) (2005) highlights the need for protected areas managers to make provisions for carrying capacity and/or limits of acceptable change based on sound technical and scientific criteria in order to ensure the cultural and ecological integrity of the areas (Meerman and Wilson, 2005). This offers the opportunity for inclusion of visitor impact management strategies, tools and frameworks in the management plan for protected areas with high visitation rates.

Planning must also include a clear indication of recreational activities that are acceptable and unacceptable (Eagles et al. 2001). It is important that management policies are developed which outline the criteria used to evaluate the acceptability of activities. In general, acceptable activities should be low impact, non-consumptive, promote education and awareness building, and fit with the goals and objectives of the protected area (Eagles et al. 2001).

6.3.3 Monitoring and evaluation

Another urgent need for destinations promoting sustainable tourism is the establishment of visitor impact monitoring programs that yield impact data that is useful in management decision-making processes (Eagles et al 2002). It is suggest that visitor impact monitoring be a routine part of management, although the complexity and types of monitoring will vary among different protected areas (Luang and Farrell, 2000).

To demonstrate the links between research and monitoring, a Visitor Assessment Flow Chart (Figure 22) has been developed which articulates a process that protected area managers can follow to implement strategies to assess visitor impacts in their protected areas (Hadwen et al. 2008). There are four key steps in the process: (1) identifying visitor activities; (2) researching visitor impacts; (3) monitoring visitor impacts; and (4) assessment of visitor impacts monitoring (Hadwen et al. 2008). The conceptual flow diagram shows the links and differences between visitor impacts research and visitor impacts monitoring in protected areas.

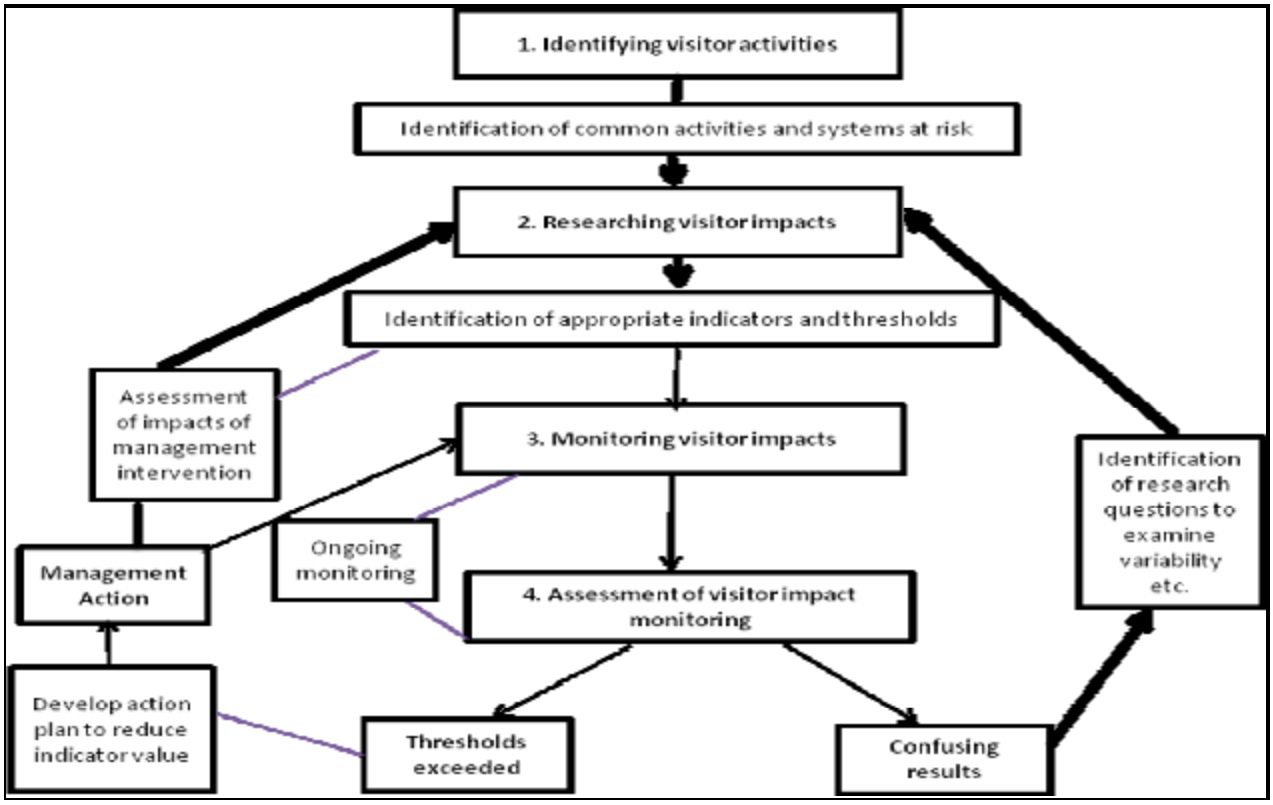

Figure 22: Visitor Impact Assessment flow chart (Adapted from Hadwen et al. 2008)

7 RECOMMENDATIONS AND CONCLUSION

Recommendations were obtained through the various methodologies used in the research project including the group interview with tour guides and the evaluation of SEA's management

strategies. Additional recommendations were included based on literature review of visitor impact management strategies used in MPAs around the world.

7.1 Southern Environmental Association (SEA)

7.1.1 Framework for VIM

The need to understand visitor impacts and their causes, along with when the resources will be under greatest pressure necessitates utilizing a framework, which allows for identification, evaluation and monitoring of visitor impacts (Hadwen et al. 2008). Therefore, implementation of a VIM framework will afford SEA the opportunity to contribute to its adaptive management of protected areas. Figure 23 is an example of a simplified framework that can be used to manage visitor-induced impacts and problems within protected areas (Ham et al. 2009).

The monitoring program for LBCNP could include quarterly or seasonal snorkel surveys, visitor questionnaires and evaluations of tour guide briefing to ensure that management interventions are effective in reducing visitor impacts.

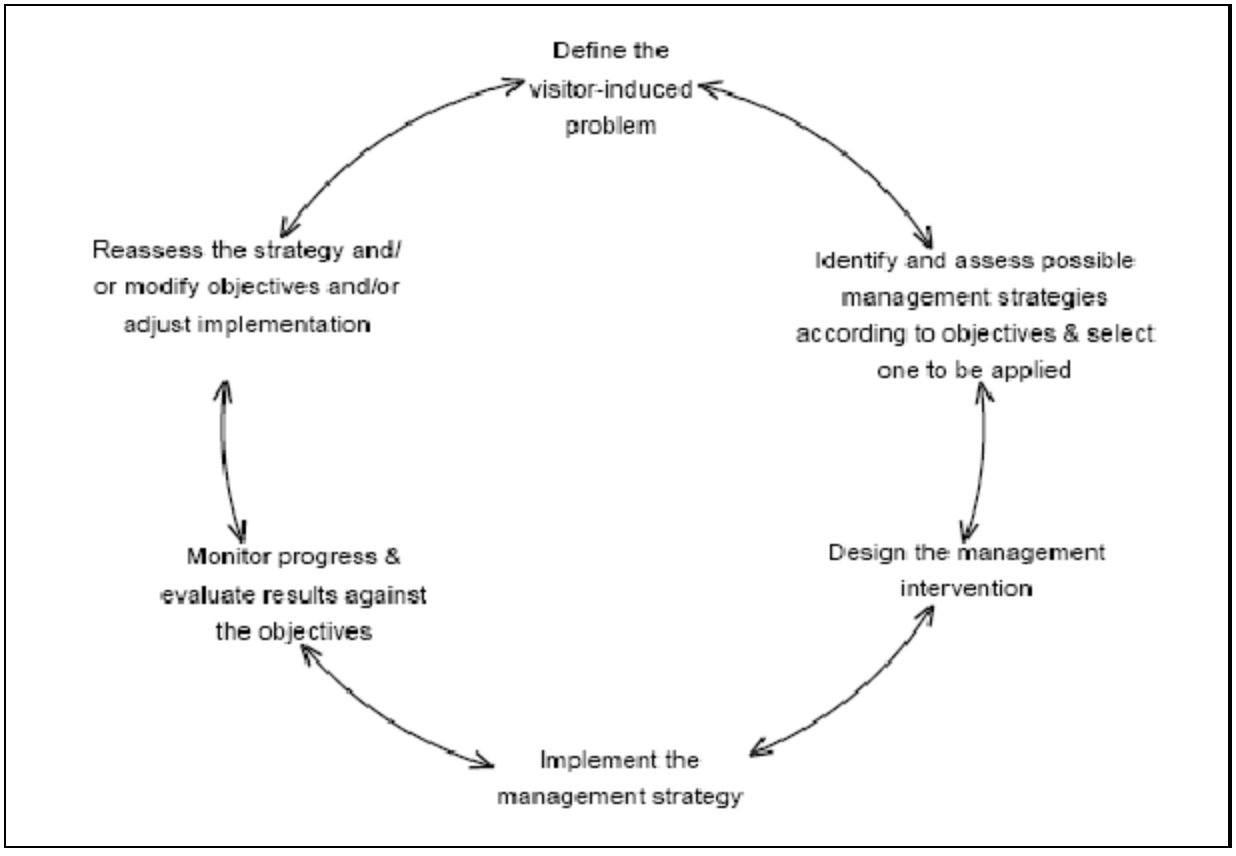

Figure 23: A protected area management planning cycle

Source: Ham et al.2009

7.1.2 Park rules and reef etiquette

Discussions with tour guides and tour operators should focus on implementation of a strict no-contact policy for visitors to LBCNP including, tour guides, recreational snorkelers, divers, and

other visitors. In addition to the 'no contact' policy, behaviours such as harassment of sharks, fish and other marine wildlife should be discussed. Improvement in communication of park rules and reef etiquette through the development of new interpretive signs, posters and brochures such as in Figure 24 can contribute to an increase in park rule compliance and a reduction in impacts due to improved environmental awareness and education. More messages that are powerful are needed especially for the self-guided visitors on bareboat charters. "Did you know" facts including the educational aspect of impacts resulting from snorkelling and diving can be portrayed via posters and pamphlets.

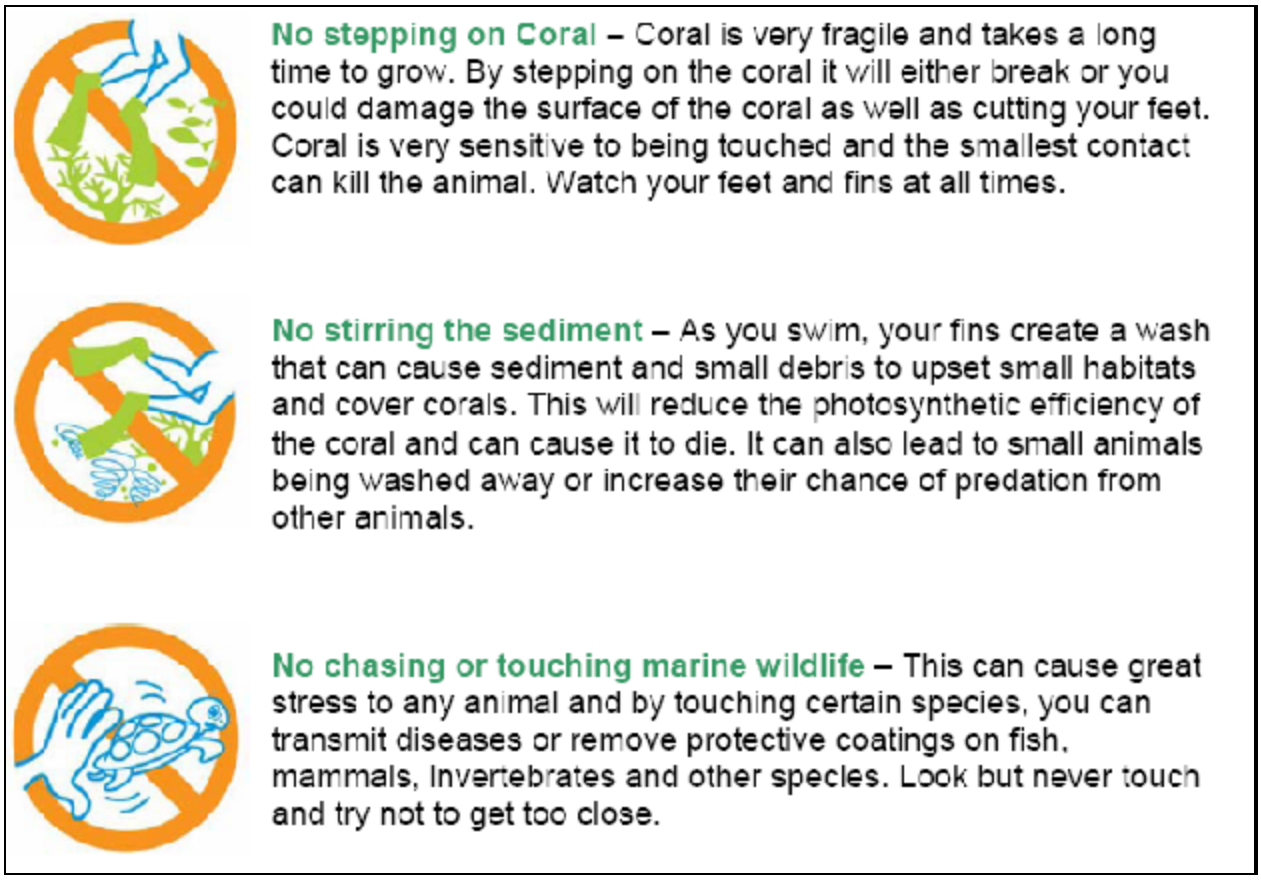

Figure 24: Green fins guidelines for environmentally friendly snorkelling and diving

Source: "Green fins guidelines", 2009

7.1.3 Visitor centre

Many park visitors are first time visitors and so education and strategic communication are important tools for eliciting appropriate behaviour and compliance with park rules. Interpretation and communication can be a powerful tool to mitigate the effects of visitor use on the natural environment and support management goals. Therefore, interpretation and communication programs should be included at LBCNP as an important part of management goals. In addition, research, monitoring and evaluation of interpretation programs are necessary for effective management.

Visitor centres can be used to alter behaviour through both compensation and reduction, thereby increasing visitor management efficiency, and should therefore be prioritized. Since the *palapa* at LBCNP is already used as an area for communication between visitors, rangers and tour guides, the area with posters can be improved to function as a mini interpretation/visitor centre. This will make it easier for visitors to obtain information, as it is currently not user friendly and not well maintained. A sign identifying the area as the interpretation/visitor centre as seen is Figure 25 should also be established.

Figure 25: Signage for interpretation/visitor centre

7.1.4 Pre-visit communication

SEA could possibly update its website to include visitor information including park rules, codes of conduct, map and photos of shallow habitats where impacts are most likely to occur. This will function as a form of pre-visit communication for visitors who intend to participate in marine recreational activities and may browse for activities through the internet.

The webpage can also have interactive elements based on marine species and habitats, thus acting as an instrument to provide information about conservation activities at LBCNP. This will establish a connection to LBCNP before people arrive, which would state the importance of marine conservation more clearly.

7.1.5 Ranger duties and responsibilities

Given the need for tourism management in MPAs, the duties and responsibilities of rangers should be expanded to incorporate aspects of visitor impact management. These will also foster interpretation and contact between rangers, visitors and tour guides. Some recommendations for ranger duties include:

- Being present when tour guides are conducting environmental briefing to ensure inclusion of park rules and reef etiquette
- Providing information (printed and spoken) about park rules to visitors especially to self-guided visitors and those accompanied by tour guides with identified problems of not properly informing visitors
- Monitoring and recording the distribution of visitors and use throughout the day as shallow reefs at LBCNP are heavily used for snorkelling

- Being trained as tour guides to take visitors on bare boat charters on snorkelling and diving tours-to provide supervision within the park

7.1.6 Tour guide training/workshop

Due to the limited financial and human resources of NGOs, it is suggested that the development of a professional association to support tour guides in the short term, followed by training, certification, licensing and award programs in the longer term (Randall and Rollins, 2009). However, in Placencia, this is observed to be vice-versa; a national training program functions in the short-term to support tour guides while professional associations are used in long-term support for tour guides. However, continuous and updated training for tour guides is of utmost importance and is the responsibility of all stakeholders involved.

Therefore, SEA, in collaboration with the Placencia Tour Guide Association should conduct annual training for tour guides who take tours to LBCNP and other marine recreational sites. This should include activities to improve briefing and encourage standardization to ensure all visitors are receiving the same level of information about park rules and reef etiquette. Tour guide education should develop not only the 'hard' skills traditionally emphasized, but also develop interpretation delivery skills and enhanced knowledge of environmentally responsible behaviours often missing in traditional leadership training (Randall and Rollins, 2009).

Through facilitation by the staff of SEA, tour guides can work together to create a model environmental briefing which can then be printed and distributed to all tour guides and tour operators. Another important concept is in-water management, which is defined as supervision, monitoring and proper management of a group while snorkelling or diving. This would include re-enforcing the park rules and reef etiquette while in the water when prohibited activities are observed, whether intentional or unintentional.

The following are key issues that should be highlighted in workshop:

- Encourage tour guides to restrict use of areas that show signs of degradation to allow for recovery
- Encourage guides/guests to restrict use of shallow areas as this increases likelihood of damage
- Ensure that visitors maintain a safe distance from corals and are not snorkelling directly above shallow reefs
- Encourage guests to stay horizontal in the water to prevent kicking or brushing corals with fins (This should especially be highlighted when tour guides are giving the names of fish while visitors are treading water).

7.1.7 Future research needs

As this research project merely represents a pilot study of the impact resulting from snorkelling, which was conducted in the 'slow' season, it is important that the magnitude and types of visitor impacts be investigated during the 'high' season.

SEA should also conduct a similar study to investigate the impacts resulting from diving. This is important, as diving is an activity that is considered more detrimental to reefs due to visitors being closer to coral reefs and the mechanisms associated with diving, such as controlling

buoyancy etc. (Davis and Tisdell, 1996). A LAC study needs to be conducted as visitation is expected to rise based on future development of the Placencia peninsula.

7.1.8 Additional recommendations for SEA

Additional recommendations solicited from tour guides included:

- Designate easier entry/exit pathway for emergency route
- Construct underwater signs which can be used to convey messages including warning for visitors to keep their distance from shallow corals
- Enforce a mandatory rule that all visitors have a guide with them when snorkelling and diving in the park

7.2 Tour guides and tour operators

Recommendations for tour guides include:

- Participate in tour guide workshop to improve the quality of briefing given to visitors and implement additional recommendations to reduce visitor impacts including:
- Provide snorkel vests to all visitors who will be snorkelling
- Administration skills (In-water management) – Tour guides should monitor visitors closely in the water and provide tips on improving skills and ensure that visitors follow rules of park and reinforce park rules when contacts are being observed
- Educate visitors about the sensitive nature of near-shore marine and reef ecosystems and the potential impacts that can result from irresponsible snorkelling and diving.
- Conduct snorkelling and diving skill refreshers including: basic snorkel and dive skills training for inexperienced, out-of-practice or infrequent visitors, addressing the importance of issues such as maintaining buoyancy, staying horizontal in areas with shallow corals, and proper 'fin techniques'
- Conduct de-briefing sessions before exiting LBCNP to raise issues and problems during recreational activities

7.3 Conclusion

The growing demand for natural area recreation and tourism has resulted in a constant rise in visitor numbers to MPAs. Given the dual function of marine protected areas, nature conservation and recreation provision, management strategies must focus on both. Nonetheless, the main objective for the majority of assigned marine protected areas is conservation of species and ecosystems. This further demonstrates that tourism must be sustainable for it to fulfil the above-mentioned objective. Furthermore, for sustainable tourism to occur in MPAs, stakeholders must identify and implement best practices and models of sustainability that support coral reef conservation. In addition, the extent to which a protected area can sustain viable tourism and recreational activities is dependent on the physical environment, the behaviour of visitors, and appropriate management and resources.

The first research question presented in this study aimed at identifying the prevalence of inappropriate snorkelling behaviour at LBCNP. Fin brushing was determined to be the most frequent contact, followed by touching marine organisms, and stirring sediments. Fin brushing

and stirring sediments are considered unintentional because they occur accidentally, particularly with less experienced snorkelers while touching marine organisms are considered intentional, as they are conscious decisions made by visitors. This intentional behaviour is a serious concern and needs to be immediately addressed by management, as harassment of marine life may result in detrimental ecological impacts. These findings indicate that management interventions by SEA and tour guides need to focus on the reef etiquette guidelines, which are important for reducing impacts to the marine environment at LBCNP. In addition, shallow and heavily used areas such as the north-eastern and north-western side of the island should be monitored, as they are likely to receive more damage from recreational activities.

This main purpose of this research was to determine if the current management strategies implemented by key stakeholders, including SEA and tour guides are likely to be effective in reducing visitor impacts to LBCNP. The results of the study indicate that management strategies implemented by SEA and tour guides are likely to result in reduced visitor impacts, but to varying extents.

Most tour guides gave a clear indication of the park rules in their environmental briefings, but to a lesser extent presented the necessary information on 'reef etiquette' guidelines especially fin brushing which was the most commonly noted impact in the snorkel survey. This further illustrates the potential relationship between visitor education and behaviour, in addition to the fact that the park rules, which were commonly mentioned, were not observed to be violated during the snorkel surveys. Tour guides also need to stress the importance of not stirring sediments considering the chronic stress that excess sedimentation has on corals.

Given the relatively good park rule awareness level of visitors to the LBCNP, the findings indicate that tour guides vary in their visitor administration skills. This further suggests that tour guides need to improve education of visitors in regards to the specific contacts identified in the snorkel survey. Previous studies have focused on determining if a briefing is given, but evidence from this study suggests that in-water supervision and management is of vital importance in actually reducing the number of impacts. This is partly due to the conditions, which the visitor may find themselves in, such as shallow areas or even emergency situations. Consequently, tour guides need to improve in areas such as monitoring and group management, which includes guiding visitors during snorkelling activities.

Management strategies implemented by SEA resulted in varying levels of effectiveness categorized by an effectiveness scale. The ranges of effectiveness of the management strategies included (1) effective; (2) competent, effective but needs improvement; and (3) needs most development. Effective management strategies included the designated entry and exit points for snorkelling and use of mooring buoys to prevent anchor damage. Recording visitor information and enforcement of park regulations were considered competent as they contributed to minimizing visitor impacts, but needs improvement. The communicative role of park rangers and establishment of interpretive and educational programmes targeted at visitor impacts were identified as needing the most development.

It is imperative that visitor impacts be identified, monitored and evaluated continuously at LBCNP. Carrying capacity frameworks have often failed to minimize visitor impacts, however maintaining site conditions is important, thus a LAC needs to be conducted at LBCNP. However, additional visitor impact management strategies by SEA and tour guides and operators need to be implemented in conjunction with these limits to site conditions.

This research fits into the growing body of visitor impacts resulting from marine tourism in Belize. It also addresses visitor impact management through modifying visitor behaviour through education and interpretation improvement in management by SEA, improvement in guide administration skills in the water, environmental briefings, and tour guide training.

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9 APPENDICES

9.1 Appendix 1: Semi-structured interview

SEA SEMI-STRUCTURED INTERVIEW QUESTION GUIDE

Visitor Impact Management at Laughing Bird Caye National Park

OBJECTIVE: To identify SEA's goals, objectives and management strategies in regards to visitor impact management at LBCNP.

Date_____ Location _____

Name of Interviewee _____ Time _____

Personal information:

- What are your roles and responsibilities as the Protected Areas Director?
- Whom do you report to/liaise with at SEA in regards to protected areas management?
- How long have you been in this position?

Questions:

1) What are the existing goals for tourism and recreation management at LBCNP?
2) What are the existing objectives for tourism and recreation management at LBCNP?
3) What are the management strategies used to achieve these objectives?
    a. Site management
    b. Site design
    c. Information provision
4) What are the likely outcomes of these management strategies?
    a. Site management

b. Site design

c. Information provision

5) What are the resources (including processes) associated with visitor impact management at LBCNP?

6) Are there signs of negative impacts to the marine environment resulting from inappropriate visitor behaviour at LBCNP?

7) Do tour guides/operators report inappropriate behaviour to park rangers/SEA? How often?

8) Has SEA implemented any management measures to facilitate reporting of such infractions?

9) Are penalties or management actions are applied when visitors display intentional inappropriate behaviour?

10) What are SEA's challenges in regards to visitor impact management at LBCNP?

11) Do you have any additional comments in regards to management strategies implemented by SEA in mitigating visitor impacts?

9.2 Appendix 2: SEA evaluation

EVALUATION OF MANAGEMENT STRATEGIES IMPLEMENTED BY SEA

Visitor Impact Management at Laughing Bird Caye National Park

OBJECTIVE: To determine the effectiveness of SEA's visitor impact management strategies (outputs) based on ability to produce desired outcome (reduced visitor impacts).

Date_____ Time _____

Name of Interviewee _____ Location _____

Position_____

Please use the key to indicate your response for each combined output/outcome statement on the line provided.

1	Strongly agree

2	agree
3	neither agree nor disagree
4	disagree
5	strongly disagree

1) _____ Park regulations in regards to appropriate visitor behavior/good reef etiquette are enforced at LBCNP.

a. ____The enforcement of park regulations has minimized visitor impacts to the marine environment.

2) _____Entry/Exit regulations in regards to use of marine areas for recreational activities are enforced.

a. ____ Entry/Exit regulations have resulted in reduced impacts to shallow marine habitats.

3) ____Visitor information about park regulations is being provided through education materials such as pamphlets, posters etc.

a. ____Information provision has resulted in minimal impact visitor behaviour during activities at LBCNP.

4) ____The palapa is established as a means of providing education about conservation and best practices/regulations at LBCNP.

a. ____The establishment of the palapa has increased conservation awareness in visitors and educated visitors about the importance of sustaining the park.

5) ____Mooring buoys are provided for use by bare boat charters and large vessels for anchoring at LBCNP.

a. ____The use of mooring buoys has reduced the instances of anchor damage to the marine environment.

6) ____Recording visitor data including activities and numbers on each vessel that enters the park is used to monitor visitor numbers and to determine level of use at LBCNP.

a. ____Recording visitor data has provided information regarding the level of use of the park and is used to implement visitor management strategies to reduce impacts.

9.3 Appendix 3: Snorkel survey

Snorkeler Survey Data Sheet For the Laughing Bird Caye National Park

Visitor Impact Management Study

Date:	**# snorkelers:**
Weather:	**Start Time:**
Tour operator:	**End Time:**
Guide in water:	**Duration (mins):**

	Activities										**Snorkelling Location**				**Comments**
Time (mins)	**SWIM**	**STSA**	**STSE**	**STCO**	**TOCO**	**BRCO**	**FIBR**	**COCO**	**FEFI**	**TOMO**	**N**	**S**	**E**	**W**	
1															
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Activity	**Key**
Swimming	SWIM
Standing on Sand	STSA
Stir Sediments	STSE
Standing on Coral	STCO
Touching Coral	TOCO
Breaking Coral	BRCO
Fin Brushing	FIBR
Coral Collection	COCO
Feed Fish	FEFI
Touching marine organism	TOMO

9.4 Appendix 4: Visitor questionnaire

VISITOR QUESTIONNAIRE

Visitor Impact Management at Laughing Bird Caye National Park (LBCNP)

Good day, I am a student of the University of the West Indies conducting a survey on the management strategies implemented by the Southern Environmental Association (SEA) and tour guides/operators in reducing visitor impacts on LBCNP. The questionnaire will only take 15 minutes and all information will be kept confidential. Kindly be sincere when answering the questions. I also ask that you do not reveal the content of this survey to tour guides and tour operator so that they do not change their behaviour during the study.

Name of lead guide (who conducted environmental briefing) _____

Name of tour company_____

Please provide some details about yourself. Circle the number code of your response.

Sex: 1. M 2. F

Age range:

1. 17-27 2. 28-38 3. 39-49 4. 50-59 5. Over 59

Country of residence:

1. United States 2. Canada 3. United Kingdom 4. Germany 5. Other _____

Highest level of education completed:

1. primary school 2. secondary school 3. undergraduate 4. postgraduate 5. no response

Yearly income: (Please state the currency) _____

1. <30,000 2. 30,000-49,000 3. 50,000-69,000 4. Over 70,000 5. no response

PLEASE CIRCLE **ONE** NUMBER CODE FOR YOUR ANSWER TO EACH QUESTION.

If you are **NOT** on a guided tour (sailing charters etc.), only answer the questions that apply.

1) How many snorkelers were in your group (including you)? _____

2) How would you rate your level of snorkelling skill?

   1. Expert 2. Intermediate 3. Beginner

3) Did the tour guide/operator provide you with instructional materials or briefings on appropriate behavior and conservation practices prior to snorkelling or other activities?

   1. YES 2. NO

4) Did the tour guide/operator inform you about the following for LBCNP:

a) That you were in a national park 1. YES 2.NO

b) That you cannot remove anything 1. YES 2.NO

c) Not to touch the corals 1. YES 2.NO

d) Not to stand on the corals 1. YES 2.NO

e) To be aware of your fins possibly knocking the corals 1. YES 2.NO

f) To be careful of where you stand 1. YES 2.NO

g) To be careful not to stir up sand 1. YES 2.NO

h) Not to touch the fish/marine organisms 1. YES 2.NO

5) In regards to the inclusion of the above rules, how would you rate the overall briefing given by your tour guide/operator?

1. excellent 2. good 3. fair 4. poor 5. not applicable

6) How many rules were you able to follow?

1. all 2. most 3. some 4. none 5. no response

7) How would you rate your level of ease/difficulty in following the rules?

1.very easy 2. easy 3. neither easy nor difficult 4. very difficult 5. difficult

8) If you found the rules in **Question 4** to be difficult/very difficult to follow, list the letter of the rule(s) for which you had difficulty following _____

9) If there was difficulty in following some of the rules, what is/are the reason(s) for this?

_____

10) To what extent did the guide leading the tour follow these rules?

1. always 2. sometimes 3. rarely 4. never 5. not applicable

11) Did the guide enforce best practices in instances when rules were broken, whether intentional or unintentional?

1.YES 2. NO 3. not applicable

12) How would you rate the park rangers' enforcement of park regulations?

1. excellent 2. good 3. fair 4. poor 5. no response

13) How would you rate the performance of park rangers in regards to site management, which includes monitoring visitor numbers, providing assistance and educational information?

1. excellent 2. good 3. fair 4. poor 5. no response

14) Did you visit the 'palapa' (thatch structure) to get information on LBCNP, read posters etc?

1. YES 2. NO 3. no response

15) How would you rate the level of information provided at LBCNP on its importance, history, and conservation?

1. excellent 2. good 3. fair 4. poor 5. no response

16) Did you have direct communication with the park ranger (for assistance, briefing, information etc)?

1. YES 2. NO

17) Did rangers provide information in regards to appropriate visitor behaviour/ proper reef etiquette during recreational activities at LBCNP?

1. YES 2. NO 3. no response

18) Did you use the designated entry/ exit route?

1. YES 2. NO

19) If you answered NO in **Question 18**, what was the reason for this?

1. did not know it existed 2. no response 3. other _____

THANK YOU FOR YOUR TIME! ENJOY THE REST OF YOUR DAY!

9.5 Appendix 5: Evaluation of tour guide briefing

CHECKLIST FOR EVALUATION OF TOUR GUIDE BRIFING

Visitor Impact Management at Laughing Bird Caye National Park

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Date_____

Time _____

Name of Dive shop/Resort _____

Name of guide _____

Number of snorkelers_____

Location where briefing is given_____

Duration of briefing _____

20) Did the guide provide instructional materials and/or briefing on appropriate behaviour/proper reef etiquette prior to snorkelling and other recreational activities at LBCNP?

1. YES 2. NO

21) Did the guide mention the following:

i)	That visitors are in a marine park	1. YES	2. NO
j)	That visitors cannot remove any object/organism	1. YES	2. NO
k)	Not to touch the corals	1. YES	2. NO
l)	Not to stand on the corals	1. YES	2. NO
m)	To be aware of fins possibly knocking the corals	1. YES	2. NO
n)	To be careful of where standing	1. YES	2. NO
o)	To be careful not to stir up sand	1. YES	2. NO
p)	Not to touch the fish/marine organisms	1. YES	2. NO

22) Did the guide mention that he will point out inappropriate snorkelling behavior?

1. YES 2. NO

23) Did the guide indicate management actions for visitors who disregard park rules or display inappropriate snorkelling behavior?

1. YES 2. NO

24) Did the guide mention that he would offer assistance in the case that any guest needs help?

1. YES 2. NO

25) Did the guide give advice on proper navigation and snorkeling techniques specific to the marine environment in which snorkeling will take place, such as sandy bottoms, coral reef etc.?

1. YES 2. NO

26) Did the guide mention that there are specific entry/exit routes?

1. YES 2. NO

27) Did the guide use any additional educational information to aid oral briefing?

1. YES 2. NO

28) What additional information did the guide give in the briefing?

_____

9.6 Appendix 6: Tour guide group interview

TOUR GUIDE GROUP INTERVIEW GUIDE

Visitor Impact Management at Laughing Bird Caye National Park (LBCNP)

OBJECTIVE: To obtain tour guides' views and concerns in relation to present and future visitor impact management strategies at LBCNP.

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1) Do you consider inappropriate snorkeler behaviour (for example, standing on corals, fin brushing, stirring sediments etc.) a threat to coral reefs at LBCNP?

1. Yes 2. No 3. Don't Know

2) How would you rate the problem of inappropriate snorkeler behaviour at LBCNP?

1	big problem
2	moderate problem
3	small problem
4	very small problem
5	not a problem

3) Do you think that bare boat charters visiting LBCNP contribute to this problem?

1	strongly agree
2	agree
3	neither agree nor disagree
4	disagree
5	strongly disagree

4) What are some reasons for inappropriate snorkeler behaviour at LBCNP?

5) Does the current level of environmental briefings help to reduce the occurrence of inappropriate snorkeler behaviour?

1	strongly agree
2	agree
3	neither agree nor disagree
4	disagree
5	strongly disagree

6) What is the source of the information presented in environmental briefings?

7) To what extent do environmental briefings differ among tour guides from different tour operators/dive shops?

1	always
2	often
3	sometimes
4	rarely
5	never

8) Are SEA's management strategies (enforcement of park rules/regulations by rangers, entry/exit signs, information provision-signs, posters and pamphlets) effective in reducing visitor impacts at LBCNP?

1	strongly agree
2	agree
3	neither agree nor disagree
4	disagree
5	strongly disagree

9) How do you rate SEA's overall park management in regards to visitor management and addressing inappropriate visitor behaviour?

1	excellent
2	good
3	fair
4	poor
5	very poor

10) How would you rate tour guide/operator relationship with SEA in regards to visitor impact management?

1	excellent
2	good
3	fair
4	poor
5	very poor

11) How common is reporting of inappropriate snorkeler behaviour to park rangers or SEA staff?

1	always
2	often
3	sometimes
4	rarely
5	never

12) What are some of the challenges that tour guides face in day-to-day management of visitors to reduce impacts to the marine environment?

13) What are some recommendations for tour guides and tour operators to improve visitor impact management during recreational activities?

14) What are some recommendations for SEA to improve visitor impact management at LBCNP?

15) Do you have any additional comments in regards to visitor impact management at LBCNP?