FINAL REPORT
OF THE MARINE PROTECTED AREA SPECIALIST TEAM FOR THE PROJECT:
"IMPROVING FOREST AND PROTECTED AREA MANAGEMENT IN TRINIDAD AND TOBAGO (GCP/TRI/004/GFF)"
RELATED TO A POSSIBLE MARINE PROTECTED AREA IN NORTH EAST TOBAGO
JUNE – JULY 2013







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We also would like to thank the stakeholders in Tobago for their insight, meaningful contributions and willingness to participate.

ABSTRACT

This report describes the activities and findings of the marine protected area specialist team engaged by the FAO Trinidad and Tobago Country Office in June and July 2013 to contribute to the overall project: "Improving Forest and Protected Area Management in Trinidad and Tobago (GCP/TRI/004/GFF)".

The activities of the team focused on a proposed marine protected area in North East Tobago.

The main areas of attention were: a literature review; evaluating the potential for ecotourism; strategies for management, monitoring and species conservation; threats, barriers and mitigation measures; stakeholders and impacts; capacity development needs; baseline data and support for development of the funding application.

Information was drawn from three sources, peer-reviewed and publically available literature, semi-structured interviews and consultations with community members and groups in North East Tobago, and expert assessments.

Nearly 100 grey and peer-reviewed literature sources were reviewed. Of these, 30 were selected for their relevance to the project: MPA management / mitigation, biodiversity, socio – economics, threats, and fisheries. Sources for baseline data relevant to an MPA in NE Tobago were summarised.

A total of 29 key-stakeholders, representing civil society organisations in the target area, were identified and 16 interviews conducted. Three informal focus group were conducted (Speyside, Charlotteville, Parlatuvier).

The potential for ecotourism was evaluated based on several criteria: a clear understanding of the main elements of a true eco–tourism product, existing natural resources, existing types of tourism, emerging human and organisational capacity, interest to develop the destination and, types of funding sources. The potential was rated as good and several ecotourism activities were recommended.

Ecosystem-based management was recommended as the preferred strategy for presently unprotected, endemic and threatened species and three resources are mentioned for reference. It was pointed out that EBM needs to be "place-based" in order to be successful. EBM for the proposed MPA integrates well with a wider Ecosystem Approach to sustainable development and conservation in NE Tobago. A table showing the conservation status of selected species was developed from which a list of indicator species can be selected through a participatory process. Proposed taxa of relevance to MPA management in NE Tobago included: hard corals, commercial fish species, reef grazing species, pelagic bird species, sharks and rays, marine mammals, marine turtles and the lionfish (an invasive species).

The key-stakeholders identified community participation, a functioning co-management arrangement and education / awareness activities at the community level as most important to improve management effectiveness for a future MPA in NE Tobago.

Four main species monitoring strategies, which are concomitant with the evolving capacities of local stakeholders, were recommended: a modified ReefCheck protocol, bird counts, a megafauna sightings database, and an incentive programme for fishermen to allow reliable catch monitoring. These should complement ongoing monitoring by government and community based organisations.

Mentioning several advantages, the stakeholders agreed that one to three fully equipped monitoring and patrol stations should be established in the MPA; a rough order of magnitude estimate to establish and operate three such a for three years was set at US$ 2,384,700.00

The relevant literature identified the main threats to MPA conservation including marine and land based pollution (e.g. nitrification), sedimentation, rising water temperatures, and disease outbreaks.

The stakeholders were of the opinion that ignorance on community and governmental levels, lack of collaboration / communication between governmental agencies and community stakeholders, and lack of law enforcement were the main threats / barriers.

The main stakeholders for the future MPA were identified as governmental agencies, community based civil society organisations, large land owners, Environment Tobago, and academic institutions which have been conducting research in the area for decades.

The civil society organisations currently fall into the category of most affected but least powerful, a status that needs to be changed to most affected and powerful, if the implementation of the MPA is to be successful.

Major user conflicts, especially between fishermen and other users, are not foreseen.

In the opinion of the stakeholders the potential positive impacts far outweigh potential negative impacts and include: increased direct and indirect revenue, user fees distributed to co-managing CBOs, increased conservation / biodiversity / biomass, increased tourism, pride in the community, increased commercial fish stocks, and community empowerment.

Capacity development needs for MPA staff were identified as mainly technical, while the needs for collaborating civil society organisations lean more towards organisational capacity building and creating community buy-in.

A rough order of magnitude estimate for capacity development during the first three years of operation was set at US $ 230,000.

The stakeholders also answered 22 sections of the biodiversity tracking tool, an average ranking was created.

Based on community consultations the MPA boundaries should reach from Kingsbay (Delaford) to Little Englishman’s Bay. The seaward boundaries remain vague; some of the important off-shore (fishing) banking grounds were identified.

An action plan is proposed to undertake a fully comprehensive, consultative participatory process for the implementation of an MPA in NE Tobago, treating all aspects raised in this report and any others that are identified during that process.

TABLE OF CONTENTS

1 Introduction 1
1.1 Background 1
1.2 Methods 2
1.2.1 Literature review 2
1.2.2 Community consultations 3
1.2.3 Expert assessment 3
2 Main Findings and Conclusions 4
2.1 Literature review 4
2.1.1 MPA management & mitigation 4
2.1.2 Biodiversity 6
2.1.3 Socio-Economics 7
2.1.4 Threats 9
2.2 Potential for ecotourism activities 10
2.2.1 Evaluation 10
2.2.2 Recommended types of tourism 13
2.3 Management needs, strategies and best practices potential 13
2.3.1 Ecosystem-based management 13
2.3.2 Stakeholder input 14
2.3.3 NE Tobago MPA as a Model 15
2.4 Strategies for species monitoring and conservation 16
2.4.1 Proposed monitoring strategies 16
2.4.2 Current conservation status & proposed indicator species 18
2.4.3 Proposed conservation strategies 18
2.5 Threats, Barriers and Mitigation Measures 19
2.5.1 Expert assessment 19
2.5.2 Stakeholder input 20
2.5.3 Mitigation Measures 20
2.6 Stakeholders & impacts 21
2.6.1 Expert assessment 21
2.6.2 Stakeholder input 23
2.7 Capacity Development Needs 23
2.8 Baseline data 24
2.9 Application support 24
2.9.1 Biodiversity tracking tool 24
2.9.2 Possible boundaries for an MPA 26

3 Recommendations 29
3.1 Action Plan 31
3.1.1 Fund and Facilitate a Participatory Process 31
3.1.2 Fund and Facilitate Pilot Initiatives 31
3.1.3 Re-evaluate Initiatives with a Funded and Facilitated Participatory Process 31
4 Annexes 32
4.1 Incomprehensive North East Tobago MPA stakeholder list 32
4.2 List of interviewees 33
4.3 ROM MPA establishment & operation cost estimate 34
4.4 Questionnaire for semi – structured interviews 35
4.5 Baseline data 39
4.6 Conservation status of selected NE Tobago species. 41
4.7 References 46

Figures

Figure 1: Terrestrial boundaries of a future NE Tobago MPA as suggested by community based stakeholders. There were no clear recommendations for marine boundaries (interrupted line of arrows). Measured in straight lines, the coastal zone distance for the MPA is approximately 34 km. 27

Tables

Table 1: Proposed potential ecotourism activities for an MPA in NE Tobago. 13
Table 2: Monitoring strategies for an MPA in NE Tobago. 17
Table 3: Taxa of relevance to MPA management in NE Tobago. 19
Table 4: Significant community stakeholder groups. 21
Table 5: Ranked positive and negative impacts identified by stakeholders. 23
Table 6: Capacity development needs for a proposed MPA. 24
Table 7: Average rankings of community stakeholder answers to modified questions from the biodiversity tracking tool. 25

ACRONYMS

BRMP	**B**uccoo **R**eef **M**arine **P**ark
CBO	**C**ommunity **B**ased **O**rganisation
CSO	**C**ivil **S**ociety **O**rganisation*
CT	**T**erms of **R**eference **C**onsultancy **T**ask
D	**T**erms of **R**eference **D**eliverable
EA	**E**cosystem **A**pproach
EBM	**E**cosystem-**B**ased **M**anagement
FAO	**F**ood and **A**griculture **O**rganization
GEF	**G**lobal **E**nvironment **F**acility
IUCN	**I**nternational **U**nion for **C**onservation of **N**ature
MPA	**M**arine **P**rotected **A**rea
MR	**M**arine **R**eserve
NE	**N**orth **E**ast
PVC	**P**arlatuvier **V**illage **C**ouncil
ROM	**R**ough **O**rder of **M**agnitude
SGP	**S**mall **G**rants **P**rogramme
SW	**S**outh **W**est
ToR	**T**erms **o**f **R**eference
UNDP	**U**nited **N**ations **D**evelopment **P**rogramme

* C*ommunity groups, non-governmental organizations (NGOs), labour unions, indigenous groups, charitable organizations, faith-based organizations, professional associations, and foundations.*

1 INTRODUCTION

1.1 Background

The Global Environment Facility (GEF) approved in June 2012 the concept note of the project titled 'Improving Forest and Protected Area (PA) Management in Trinidad and Tobago'. It intends to conserve biodiversity in Trinidad and Tobago by consolidating the protected area system and enhancing capacity and finance for PA management. Subsequently, GEF approved a project preparation grant of US$119,000 in September 2012. The Food and Agriculture Organization (FAO) is currently developing the full project document, in collaboration with relevant departments in Trinidad and Tobago and in consultation with diverse stakeholders for submission to GEF by August 2013 for endorsement. The consultancy's purpose is to study in detail various technical aspects of the project and provide inputs to design the project components as proposed in the Project Identification Form, and as agreed with the stakeholders at the Inception Workshop in Trinidad and Tobago during 31 October- 01 November 2012. The key results of the consultants' activities will provide the project's baseline data and constitute the foundation for developing the project document.

On the 19 April 2013 the Office of the FAO Country Representative, Trinidad and Tobago, contacted Mr Aljoscha Wothke to secure his services as a marine protected area specialist providing input related to the planned MPA in NE Tobago from Kingsbay to Parlatuvier.

The related Personal Service Agreement was signed by the consultant on the 16 June 2013.

Based on the ToR the consultancy tasks were described as follows:

The consultant is recruited as an expert in Marine Protected Area (MPA) management, but is also expected to contribute to the overall development of the full project document. Under the general supervision of the FAO Country Representative (Trinidad and Tobago), the technical supervision of the Regional Fisheries Officer, FAO (Barbados) and Forestry Officer (Economics), FAO (Rome), and in close collaboration with the Biodiversity Specialist and national counterparts, the consultant will perform every task below and submit the outputs mentioned under the deliverables to FAO-TT@fao.org with a copy to Illias.Animon@fao.org and Raymon.VanAnrooy@fao.org.

1. Conduct a literature review related to MPA management and biodiversity in Trinidad and Tobago in general and the North East Tobago MPA in particular.
2. Suggest potential for ecotourism activities in the North East Tobago MPA.
3. Propose how the project could conserve presently unprotected, endemic and threatened species in the North East Tobago MPA.
4. Propose the indicator species for monitoring and suggest practical ways and costs (rough order of magnitude) to stabilize the population of target species.
5. Based on published information and discussion with the stakeholders, assess needs for improvement and propose the measures required to enhance management effectiveness in the North East Tobago MPA.
6. Identify the main threats and barriers to conservation in the North East Tobago MPA and propose suitable mitigation measures to address them during project period.
7. Identify the stakeholders of the North East Tobago MPA and positive and negative impacts of the project on them.
8. Propose the capacity development needs for improving the management of North East Tobago MPA.
9. Provide published baseline data needed on the North East Tobago MPA for the project document.
10. Present the results of the technical assessment/review at the terminal workshop.

11. Help the Biodiversity Specialist to fill out sections I and II of the GEF tracking tool and provide necessary inputs to the Biodiversity Specialist and Economist to prepare the sections related to MPA in the GEF endorsement template and FAO project document.

Based on the ToR the deliverables were described as follows:

A brief note on the methodology pertaining to every task describing at least the work plan and schedule and the support expected from FAO and the Forestry Division.

(i) A report with the sections below describing the results of tasks above in a format mutually agreed with Dr Illias Animon.

(a) Literature review related to the North East Tobago MPA
(b) Potential ecotourism activities in the North East Tobago MPA
(c) Relevance of the North East Tobago as a model MPA
(d) Current conservation status of species in the North East Tobago MPA and ways and costs needed to stabilise population of target species
(e) Improvement needs for staff, infrastructure, facilities for staff and other needs including equipment, visitor facilities etc.
(f) Action plan to increase management effectiveness in the North East Tobago MPA
(g) Major threats to biodiversity conservation and barriers to effective MPA management and mitigation measures
(h) The plan for capacity development and its retention pertaining to MPA management
(i) Stakeholders of the North East Tobago MPA and positive and negative impacts of the project on them.

(ii) The text, as needed by the Biodiversity Specialist, to incorporate in various sections of the FAO project document .

(iii) Text/table, as needed by the Biodiversity Specialist, to incorporate in various sections of the GEF endorsement template.

Monthly status report (submitted on the 1 July 2013).

One digital presentation document and one in-person presentation

The above deliverables should be sent by email to FAO-TT@fao.org with a copy to Illias.Animon@fao.org and Raymon.VanAnrooy@fao.org.

1.2 Methods

To meet the deliverables, information was drawn from three sources; a literature review, community consultations and semi-structured interviews, and expert assessment.

1.2.1 Literature review

Nearly 100 grey and peer-reviewed literature sources were reviewed. Of these, 30 were selected for their relevance to the project. Literature was prioritised for its relevance to the social-ecological system of North East Tobago. Literature treating topics at a wider scale was reviewed where required to inform the project deliverables. For each selected source, a brief summary is provided detailing the relevance of that source to the project.

1.2.2 Community consultations

A community based stakeholder list for NE Tobago was developed. Interviewees were selected based on their availability and relevance to the planned MPA. Representatives of CBOs were preferentially selected. (Annex 4.1 and Annex 4.2).

Sixteen (16) semi-structured interviews and three (3) informal focus group meetings were conducted (only the open meeting in Parlatuvier had a satisfactory presence of 16 persons). Community consultations took place from the 8 July to the 11 July and from the 15 to the 16 July 2013.

The semi-structured interviews were based on 21 questions pre-selected by the client (Dr Howard Nelson, Biodiversity Specialist) from the GEF Biodiversity Tracking Tool. These questions were modified slightly by the consultants to maximise comprehension. They were posed to ensure that structured answers as well as comments were collected. A further four (4) open questions were included based on the ToR. The questionnaire is included in (Annex 4.4).

Consultations were designed as a study of the opinions and priorities of community members in NE Tobago. The scope of the consultations did not extend to the many other relevant stakeholders including responsible Government departments, whose leadership and input is critical should any formalised management be pursued.

1.2.3 Expert assessment

The consulting team has extensive experience implementing projects in NE Tobago, as well as technical expertise in marine science, protected areas management, species at risk management and ecotourism. This expertise was applied to the deliverables to ensure that recommendations are relevant to the unique circumstances of NE Tobago while incorporating the extensive relevant context of research and best practices available regionally and globally.

2 MAIN FINDINGS AND CONCLUSIONS

2.1 Literature review

CT1: Conduct a literature review related to MPA management in Trinidad and Tobago
D2(i)(a): Literature review related to the North East Tobago MPA

MPAs, particularly for coral reef ecosystems, are the subject of an extensive body of literature representing a wide range of research and practice. The following articles highlight a selection of literature references which are of particular relevance to the implementation of an MPA in NE Tobago.

2.1.1 MPA management & mitigation

According to the IUCN, an MPA can be described as "any area of intertidal or sub tidal 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" (Kelleher 1999)

MPAs are necessary in order to maintain productivity in the oceans as well as for biological conservation of varying species. The NE Tobago area is fragile and sensitive and is increasingly threatened by activities such as overfishing, deforestation as well as climate change which threatens the overall ecosystem of the area and the ecosystem services provided (EDG and Kairi Consultants Ltd. 2003)

D' Abadie (2011): Marine Protected Areas - Zoning for Conservation and Rehabilitation of Coral Reefs in Data Poor Areas - A Case Study of North-Eastern Tobago

This paper highlights the drastic decline in the coral cover in Tobago's reef systems in recent years (from 22% in 2005 to 16% in 2008 and many sites across the island's fringing reef systems are showing less than 5% live hard coral cover). It discusses the application of the principles of Systematic Conservation Planning through the use of Marxan (software designed to aid systematic reserve design on conservation planning) with zones in order to develop a strategy and methodology for the establishment of a marine park zoning plan in a data poor area and also to determine the most viable areas to implement marine rehabilitation projects which will contribute to the overall conservation targets which have been set.

Duda (2002): A New Imperative for Improving Management of Large Marine Ecosystems

This article describes the degradation of coastal and marine ecosystems mainly due to continuous overfishing and despite scientific warning as well as the destruction of habitat and pollution loading. The article discusses the Global Environment Facility (GEF) supported processes that are used to assist in adopting a more science-driven, ecosystem based approach to the management of human activities that affect marine and coastal ecosystems. The processes show that holistic, ecosystem-based approaches to managing human activities are critical, and provide a needed place-based area within which to focus on multiple benefits to be gained from multiple global instruments. NE Tobago MPA management can benefit through the use of these holistic and ecosystem based approaches.

FAO (2011): FAO Technical Guidelines for Responsible Fisheries

This report discusses the necessity of increased coordination across various sectors and agencies/departments with regard to MPA fisheries management. It signals the need for the merging of a variety of interests and viewpoints in order to successfully manage an MPA and its resources. Fisheries management in MPAs require adequate stakeholder participation in order to produce successful and equitable management outcomes.

Flower (2011): Tobagan Fishers' Livelihood Security and Attitudes to Coastal Management in the Context of Declining Catches

This report describes fisheries management measures and suggests a proposed MPA could be implemented with little impact on most fishers in Tobago; it further outlines the impacts of the loss of fish stocks and biodiversity in Tobago specifically on the livelihood of local fishermen. It examines how fishers' perception of change in their catches compares to fish landings data on the island of Tobago. The report suggests that fisheries management measures should first focus on the external causes of decline in fish stocks. Occupational multiplicity provides a buffer against declining fish catches but greater employment opportunities would allow fishers to reduce their livelihood failure risk.

Guarderas et al. (2008): Current Status of Marine Protected Areas in Latin America and the Caribbean

The status of MPAs in the Caribbean is documented in this paper outlining differing management categories used throughout the area which include: no take, limited take and mixed use zones. The paper reveals multiple opportunities to strengthen marine conservation in Latin America and the Caribbean by improving implementation, management, and enforcement of existing MPAs; adding new MPAs and Marine Reserves (MRs) strategically to enhance connectivity and sustainability of existing protection and establishing new networks of MPAs and marine reserves or combinations thereof to enhance protection where little currently exists. These strategies can therefore be applied to NE Tobago in order to strengthen marine conservation within the area and enhance sustainability.

McClanahan & Graham (2005): Recovery Trajectories of Coral Reef Fish Assemblages within Kenyan Marine Protected Areas

The size, density and biomass of coral reef fish in four fully closed MPAs with different ages were studied over a 17 year period. This suggests that full recovery of coral reef fish assemblages in terms of abundance–biomass takes considerably longer than generally believed. The study suggests that beyond 25 years, there can be a small loss in biomass, which may be due to reduced net primary production associated with the increased abundance of calcifying algae attributable to intense grazing. The most provocative finding was that three of the four sites that had a greater average size and biomass of fishes within the managed areas were the self-governing, traditional management regimes. Contrary to the widely accepted idea that permanent closures are the most effective ways to improve reef ecosystem health none of the traditional management regimes involved permanent reef closures. Each involved periodic closures, whereby protected reefs were periodically opened to fishing, either briefly or for extended periods of time, and one of these systems actually allowed line fishing inside the protected area throughout the entire year. These management strategies should be carefully considered in the establishment of a MPA in NE Tobago. Consideration should be given to establishing multiple zones using various management strategies depending on the nature of the reef ecology which could include permanent closures as well as periodic closures in order to enhance fisheries management as well as recovery.

McClanahan et al. (2006): A Comparison of Marine Protected Areas and Alternative Approaches to Coral-reef Management

MPAs have been predominantly used as the leading tool for coral-reef conservation. This study objectively and simultaneously examines the types of MPAs that are most effective in conserving reef resources and the socioeconomic factors responsible for effective conservation. Underwater visual censuses of key ecological indicators revealed that the average size and biomass of fishes were higher in all areas under traditional management and at one co-managed reserve when compared to nearby unmanaged areas. Socioeconomic assessments also revealed that this ''effective conservation'' was positively related to compliance, visibility of the reserve, and length of time the management had been in place but negatively related to market integration, wealth, and village

population size. It is therefore suggested that in cases where the resources for enforcement are lacking, management regimes that are designed to meet community goals can achieve greater compliance and subsequent conservation success than regimes designed primarily for biodiversity conservation. Therefore this multidisciplinary integration of management strategies is ideal for the establishment of a MPA in NE Tobago.

Mukhida (2003): Opportunities and Constraints of Co-Management: Cases of the Buccoo Reef Marine Park and the Speyside Reefs Marine Park, Tobago

This paper outlines the benefits of co-management for marine areas in Tobago specifically areas of Buccoo and Speyside. This report discusses the value of increasing stakeholder involvement with regards to the BRMP which could be influential in helping to ensure successful implementation and management of the future MPA in NE Tobago. It is argued that management and conservation of marine natural resources such as those in NE Tobago requires a multidisciplinary approach that considers the cultural, social, economic, political, and ecological context

Soma (2003): How to Involve Stakeholders in Fisheries Management - a Country Case Study in Trinidad and Tobago

This article describes how the analytic hierarchy process (AHP) methodology can be applied to prepare and facilitate desired changes within the fisheries sector in Trinidad and Tobago. The AHP was found to be an ‘‘empowering, educating, focusing, facilitating and quantifying tool’’, with potential to more generally support fisheries management also in the future.

Srinivasan et al. (2010): Food Security Implications of Global Marine Catch Losses Due to Overfishing

This article describes the potential catch losses due to unsustainable fishing in all countries' exclusive economic zones (EEZs) and on the high seas over 1950–2004. It is suggested that fisheries management must be strengthened by establishing or re-establishing requirements such as catch quotas and no-take zones; by improving monitoring capabilities using targeted aid to developing countries; by giving fishing communities incentives for good stewardship; and by providing sound, precautionary scientific analysis.

U.S. Coral Reef Task Force Working Group on Ecosystem Science and Conservation (2000): Coral Reef Protected Areas: A Guide for Management

This document outlines 13 elements as a guide for marine area management which include: coral reef ecosystems and values, planning and stakeholder co-operation, management, enforcement, marine wilderness, mapping, monitoring, restoration, research, training, education and outreach, resource needs and sources, and plan revision and reporting. All these combined elements can serve to significantly contribute to efficient and sustainable management of the NE Tobago MPA.

2.1.2 Biodiversity

Biodiversity monitoring is necessary for the preservation of endemic and keystone marine species in reefs such as those in NE Tobago (Armstrong et al. 2009).

Armstrong et al. (2009): Speyside Marine Area Community-based Management Project (SMACMP)

This report highlights the ecological issues within the marine areas of NE Tobago where coral reefs are being adversely affected by both natural and anthropogenic factors including overfishing, habitat degradation, land-based pollution stresses and climate change induced events. The widespread overfishing of reefs has also removed many of the herbivorous fish that keep algae in check, upsetting the competitive balance between corals and seaweeds, often leading to a fundamental change in the community.

Eckert & Hemphill (2005): Sea Turtles as Flagships for Protection of the Wider Caribbean Region

This paper highlights sea turtles as an important icon of marine environments and therefore the great value in capitalising on sea turtles as a flagship for conservation in the Caribbean. The paper indicates that the use of sea turtles as flagship species can allow a multidimensional consideration of complex contemporary management and policy issues, including those associated with protected areas, fisheries, multilateral conservation of shared species and seascapes, and tourism.

Hodgson (1999): A Global Assessment of Human Effects on Coral Reefs

This article investigates a variety of indicator organisms for various human activities through the use of Reef Check. It indicates that in future years, by increasing the number of reefs and the frequency of surveys, the Reef Check programme could provide a valuable method to detect broad-brush changes on a local, regional and global scale, as well as increasing public support for coral reef conservation. This is a useful management tool for biological monitoring and conservation within NE Tobago.

van Bochove & McVee (2012): Tobago Coastal Ecosystems Mapping Project Final Report: Results of Community and Scientific Work April 2007 - June 2011

This report highlights the degradation to the coral reefs in Tobago following the coral bleaching events that occurred in 2005 and 2101. Coral disease outbreaks have also occurred due to these bleaching events and there are some reef sites that are considered severely stressed such as Englishman's Bay, Mt. Irvine and Speyside. However, these areas show signs of resilience in spite of disease. It is recommended that there should be the creation of several no-take MPAs with an appropriate management plan. This can aid in biodiversity conservation as well as in increasing fish stock for local fisheries. The report also recommends that there should be governmental aid in the reduction of coastal development and sewage pollution. In addition, there is a recommendation for a long-term marine monitoring programme with regular data collection of environmental health parameters such as water quality, temperature, biodiversity, coral diseases and fish abundance at fixed sites around Tobago's coastline. In order to improve awareness among locals, the report recommends that there should be continued participation from the community as well as education and capacity development. Using these strategies, the coral reefs around Tobago's waters have a good chance of flourishing.

Wilkinson et al. (2003): Monitoring Coral Reef Marine Protected Areas

This book demonstrates how biodiversity monitoring can play a major role in the effective management of MPAs. Monitoring assists through the following tasks: resource assessment and mapping, resource status and long-term trends, status and long-term trends of user groups, impacts of large-scale disturbances, impacts of human activities, performance evaluation and adaptive management, education and awareness raising, building resilience into MPAs, and contributing to regional and global networks. The awareness of these monitoring strategies is important in the effective management of MPAs especially in vulnerable Caribbean regions such as Tobago.

2.1.3 Socio-Economics

Socio-economic factors play an important role in the establishment of MPAs and should therefore be appropriated adequate consideration (Geoghegan et al. 2001)

Adger et al. (2005): The Political Economy of Cross-scale Networks in Resource Co-management

This article discusses the linkages between stakeholders and resource management and its relation to socio-economical system governance with specific reference given to Trinidad and Tobago. It shows that cross-scale interactions by powerful stakeholders have the potential to undermine trust in resource management arrangements. Therefore if government regulators were able

to mobilise information and resources from cross-level interactions to reinforce their authority, this would then disempower other stakeholders such as resource users. Offsetting such impacts, some cross-scale interactions can be empowering for local level user groups in creating social and political capital. These issues are illustrated in this article with observations on resource management in a marine protected area in Tobago in the Caribbean. The case study demonstrates that the structure of the cross-scale interplay, in terms of relative winners and losers, determines its contribution to the resilience of social-ecological systems. The role of knowledge and information is imperative in the exercise of power within co-management efforts and cross-scale interactions. The access to relevant information is a key aspect of the power relations between various stakeholders. Local user groups can gain major benefits through engaging in dialogues with other reef users within the Caribbean region and the gain in information can henceforth become a major source for the linkage between government agencies and local level user groups.

Alban et al. (2006): Economic Analysis of Marine Protected Areas: A Literature Review

This review describes the socio-economic literature with respect to MPAs in particular ecosystem preservation, fisheries management, recreational activities and distributional consequences of MPAs. It also discusses the cost-benefit analysis of MPAs and economic valuations of non-market values. The review highlights the use of bio-economic modelling as a methodology of viewing the impacts of an MPA on natural resources. The review suggests that MPAs significantly contributes to the ecosystem preservation, ecotourism and fisheries management.

Burke et al. (2008): Coastal Capital: Economic Valuation of Coral Reefs in Tobago and St. Lucia

This report discusses the economic benefits of coral reefs to the small island states in the Caribbean; specifically Tobago. In addition, a summary of the valuation method and results are provided from two pilot sites in St. Lucia and Tobago. The methodology used focuses on three specific goods and services which are coral reef-associated tourism, fisheries, and shoreline protection services. These were found to be important to the respective local economies. Coral reef-associated tourism was found to contribute significantly to the economies of both pilot sites (40% of visitors to Tobago and 25% in St. Lucia). Fisheries was shown to have a smaller economic impact with a total economic impact of about US$ 0.8 – 1.1 million per year in Tobago and US$ 0.5 – 0.8 million per year in St. Lucia. Coral reefs contribute to the protection of over 40 % of the shoreline of both islands (about 44 % for St. Lucia and nearly 50 % for Tobago) however only approximately 10 sq km are protected by coral reefs for both islands—about 3 % of Tobago's total land area and 1.5 % of land in St. Lucia. These results indicate the need for increased shoreline protection in Tobago which can be provided through the establishment of a well-managed MPA.

Brown et al. (2001): Trade-off Analysis for Marine Protected Area Management

The article applies trade-off analysis to the case of BRMP in Tobago. Stakeholder analysis is undertaken, and social, economic and ecological criteria were identified. In the BRMP, the analysis suggests consensus around development options characterised as limited tourism development for the area surrounding the park in association with the implementation of complementary environmental management. The approach has been used to enhance stakeholder involvement in decision-making and develop consensus-based approaches to management of the MPA. The criteria could be integrated into the participatory assessment process in the ongoing development of the MPA in NE Tobago.

Dharmaratne et al. (2000): Tourism Potentials for Financing Protected Areas

This paper outlines the value of ecotourism as a major source of revenue for protected areas especially in developing countries. This can be done through the recovery of use and non-use values. The results of this article signify that use values are able to provide a consideration amount of income whereas non-use values also show significant generation of income but it would depend on the nature of the protected area.

EDG and Kairi Consultants Ltd. (2003): Tobago North East Management Plan

This report describes the various socio-economic issues within NE Tobago and the proposed management strategies which include the targeting of tourism as an economic driver. It is suggested that economic development should occur elsewhere in Tobago while the resources of NE Tobago could be utilised in other sectors such as tourism, fisheries and agriculture all in a sustainable manner.

Geoghegan et al. (2001): Characterization of Caribbean Marine Protected Areas: An Analysis of Ecological, Organizational and Socio-economic Factors

This report describes the socio-economic importance of MPAs with reference given to Buccoo Reef in Tobago. The reefs in many MPAs (e.g., BRMP in Tobago, Negril Marine Park in Jamaica, Soufriere Marine Management Area in Saint Lucia) are considered to have been degraded by human impacts including overfishing, sedimentation from land-based development, land-based nutrient pollution, and anchoring. Zoning and regulations are often justified as a means to halt or reverse such degradation.

Pelletier et al. (2005): Designing Indicators for Assessing the Effects of Marine Protected Areas on Coral Reef Ecosystems: A Multidisciplinary Standpoint

This article identified and assessed indicators of the effects of MPAs in coral reef regions, based on a bibliography review in ecology, economics and social sciences. The results suggested that there was the need for protocols and methodologies which include controls in order to assess MPA effects as well as an important proportion of ecological indicators with low effectiveness. There was also a large number of ecological effects still not studied or not demonstrated at present.

2.1.4 Threats

Marine systems are increasingly directly and indirectly threatened by anthropogenic activities which need to be identified and considered in the establishment of appropriate management strategies (Hodgson, 1999).

Albins & Hixon (2011): Worst Case Scenario: Potential Long-term Effects of Invasive Predatory Lionfish (*Pterois volitans*) on Atlantic and Caribbean Coral-reef Communities

This article discusses the recent invasion of the Lionfish (*Pterois volitans)* to the Western Atlantic and the Caribbean. This species is highly invasive and can potentially cause harm to the marine ecology of the area. The paper discusses possible “worst case scenario” situations with the Lionfish in relation to other various pre-existing stressors such as overfishing. The management strategies suggested include the development of targeted lionfish fishers and local removals as well as enhancing native biotic resistance through the use of marine reserves. This issue is of particular importance since a Lionfish population is established in NE Tobago.

Ali (2011): Understanding the Lionfish Invasion in Bonaire to Develop the Best Strategy for Trinidad and Tobago

This report describes Lionfish management strategies used elsewhere that can be applied to the Caribbean and Tobago in particular. The article suggests that the best strategy for Trinidad and Tobago will be to focus on popular areas and marine parks. Instead of spreading resources to monitor the entire island, focusing more of the sampling effort on the BRMP would be the best strategy for immediate implementation.

Burke & Maidens (2004): *Reefs at Risk in the Caribbean*

This book outlines the specific threats to reefs in the Caribbean which include coastal development the ineffective management of protected area, sedimentation and pollution from inland

sources and overfishing. The book indicates that with the growth of tourism, fisheries, and other development in coral reef areas, MPAs are an important tool for safeguarding coral reefs. It is the understanding of the extent of these threats and the corresponding economic impacts on the future productivity of reefs in the Caribbean that is of core importance to conservation, management and planning efforts. These multifactorial impacts need to be taken into consideration in the management of proposed MPAs.

Burke et al. (2011): Reefs at Risk Revisited

This report is an update of Reefs at Risk (Burke & Maidens 2004) and uses more detailed analyses and resolutions than the previous report. It evaluates the various threats to coral reefs due to a wide range of human activities; however for the first time it also includes climate related threats to coral reefs. It emphasizes the damage already caused by warming seas such as coral bleaching. It emphasises the need for monitoring and protection of vulnerable reef area.

Fisher et al. (2011): Global Mismatch Between Research Effort and Conservation Needs of Tropical Coral Reefs

This paper discusses the need for sound biological knowledge in regions where coral reef biodiversity and/or the threats to it are the greatest. Google Maps™ is used to examine the spatial coverage of scientific papers on coral reefs listed in Web of Science. The results indicate that there is a mismatch between conservation needs and the knowledge required for effective marine area management. The report suggests that priority allocation of resources to fill knowledge gaps would be an ideal strategy to support greater adaptive management capacity through the development of an improved knowledge base for reef managers.

Hodgson (1999): A Global Assessment of Human Effects on Coral Reefs

This article outlines and describes anthropogenic effects on reef ecology. A global survey of over 300 reefs in 31 countries and territories was done and results indicated that few reefs remain unaffected by man, even very remote sites. In future years, by increasing the number of reefs and the frequency of surveys, the Reef Check programme could provide a valuable method to detect broad-brush changes on a local, regional and global scale, as well as increasing public support for coral reef conservation.

Hughes et al. (2010): Rising to the Challenge of Sustaining Coral Reef Resilience

This article discusses the insufficient attention paid to the underlying processes causing degradation in coral reefs and suggests that a more productive way forward is to harness new theoretical insights and empirical information on why some reefs degrade and others do not.

2.2 Potential for ecotourism activities

CT2 - Suggest potential for ecotourism activities in the North East Tobago MPA.
D2(i)(b) –Potential ecotourism activities in the North East Tobago MPA

2.2.1 Evaluation

This assessment of the potential for ecotourism in the NE Tobago MPA is based on:

a. a clear understanding of the main elements of a true ecotourism product;
b. existing natural resources in the target area;
c. existing types of tourism in the target area;
d. emerging human and organisational capacity in the target area;
e. interest to develop the destination in the target area and
f. potential types of funding sources.

Ecotourism is characterised by five main elements: nature based activities, conservation, community benefit, sustainability, and education/interpretation. Each of these elements must be part of an ecotourism operation/destination and of the clients' experience and memories; none should be left out. Each of the below proposed ecotourism activities shall contribute to conservation (financially and in-kind), benefit the community financially as well overall quality of life, be planned and executed with a long term strategy in mind and implement educational (edutainment) activities for residents and visitors alike.

It should be noted that the current main economic drivers in NE Tobago are: fisheries, tourism, agriculture, employment in the public sector, and governmental unemployment relief programmes.

The main terrestrial attractions in the NE Tobago MPA are: Little Tobago, Saint Giles Island (both currently protected), the Kingsbay mangrove wetland, Goat Island, Bloody Bay River, Sisters and Brothers islets, the Englishman's Bays and some uninhabited beaches. These locations are associated with excellent bird watching, high biodiversity, a relatively pristine environment, turtle activity, and rare / endemic species. Aall sites are easily accessible.

The main marine attractions are surface water sport activities, renowned coral reefs and underwater features that attract (large) epipelagic species. The overall quality of underwater marine life observation experiences has declined considerably in Tobago (similar to many places in the Caribbean) over the last 20 years; nevertheless in comparison the planned MPA still will include some of the best sites for underwater observation in the Southern Caribbean.

Currently there is no comprehensive ecotourism product (based on the above criteria) available in NE Tobago; no user fees are charged. Most tourism activities can be classified as nature based soft and hard adventure tourism (e.g. glass bottom boat tours, turtle watching, bird watching, sport fishing, SCUBA diving). Charlotteville has a long history of science and voluntourism; Speyside has a well-developed glass bottom boat and SCUBA diving sector. Nevertheless, most of the existing tourism activities already display some aspects (e.g. education/awareness) of an ecotourism product and could be upgraded to a full ecotourism product once the right incentives are provided. This will require preparing an inventory of existing tourism activities including a need and willingness assessment and a subsequent financial cost benefit analysis. Initially, enterprises that have quick – win and demonstration potential should then be financially and in-kind supported.

There was always a considerable involvement of residents in the glass bottom boat and SCUBA diving sector (especially in Speyside). Remarkably, in recent years human capacity and organisations are emerging that are striving towards the implementation of ecotourism activities within the planned MPA e.g. Speyside Eco-Marine Park Rangers, North East Sea Turtles (Charlotteville), ERIC (Environmental Research Institute Charlotteville), Parlatuvier Village Council. All these groups have undergone capacity building initiatives and implemented projects; the UNDP, GEF, SGP has been a major funder of such interventions. For the development of a blooming community based ecotourism sector further technical and human capacity building interventions will be necessary for several years.

Site specific (as well as national) ecotourism policies must be developed allowing full participation in decision making by community-based stakeholders; however this will require previous training to facilitate informed decision making. The engagement of a conflict resolution management strategy is recommended. Therefore, the initial project should include a series of awareness/information workshops for key stakeholders, the facilitation of a participatory policy development process which needs to include an aspect of conflict resolution.

Currently the only obvious user conflict in the designated area is between spear-fishers and divers / glass bottom boat operators off Goat Island and Little Tobago. Commercial fishing in the near coastal zone is minimal and major conflicts should not be anticipated.

For many years NE Tobago was considered "behind God's back", too far from the major tourism hub in SW Tobago for attracting attention. This concept has changed dramatically within the past three to five years. NE Tobago is listed by the Ministry of Planning and Sustainable Development as one of the five major growth poles for Trinidad and Tobago, specific attention is directed towards "tourism including development of the diving industry, community events, agriculture and horticulture" (Ministry of Planning & Sustainable Development 2011). Private initiatives of estate owners and community groups (e.g. Charlotteville Estate) are gaining momentum and the Tobago House of Assembly is investing in infrastructural development. Cleary, the interest to develop NE Tobago has never been so high and ecotourism plays an important role according to stakeholder interest and strategic documents (EDG and Kairi Consultants Ltd. 2003).

(Eco) "Tourism could be a major source of revenue (…) for self-financing of protected areas through the recovery of use and non-use values" (Dharmaratne et al. 2000). Use values are user fees that are collected when a visitor uses a site (i.e. gains access), non-use values are contributions / donations persons make toward the maintenance of a natural resource, whether the site was visited or not. Yielding to lobby groups and the fear that higher user fees would distract visitors often resulted in overly low user fees for MPAs. Examples show that higher user fees from local as well as international visitors are not necessarily detracting and can assist in the self-financing of protected areas. The impact of non-use values was often underestimated and once tapped into considerably added to the potential of self-financing (Dharmaratne et al. 2000). It is our opinion that the proposed MPA in NE Tobago has a high potential of raising use and non-use values to contribute to its financing requirements. A study identifying the potential use and non-use revenue streams including "willingness to pay" should be conducted within the first year of the project (ROM estimate: US $ 15,000).

User fees in this MPA could be charged for recreational fishing, SCUBA diving, mooring of boats, bird watching tours, visits to Little Tobago, St. Giles, glass bottom boat tours, kayaking and turtle watching, just to name some revenue sources. The scope of this assignment did not allow recommending a user fee structure; nevertheless there are good examples in Trinidad and the wider Caribbean which indicate that a day-trip user fee above US$ 3.00 is conceivable (Uyarra et al 2010). Coral reef-associated tourism was found to contribute significantly to the economies of South Tobago (Burke 2008). Regarding the evaluation of pilot protected area sites, the potential for revenue generation from the Main Ridge Reserve and from a NE Tobago MPA should be carefully compared. In our opinion, the potential for ecotourism activities that contribute to financing a future NE Tobago MPA is a good one based on:

- The terrestrial and marine attractions are diverse, in relatively good condition, renowned and easily accessible;
- Visitors have been frequenting the site for many years because of these attractions and not only as an additional experience (such as a trip to the forest reserve);
- Existing tourism operations could be upgraded to true ecotourism operations with moderate effort;
- Documented emerging human and organisational capacity to implement ecotourism activities;
- NE Tobago is earmarked as a sustainable development area according to national strategies and by private initiatives; ecotourism plays an important role in this approach;
- Ecotourism contribution to MPA self-financing can be sustainable and considerable once properly managed.

2.2.2 Recommended types of tourism

Ecotourism activities that have potential in the future NE Tobago MPA are those associated with nature based hard and soft adventure tourism, voluntourism and science tourism. Only activities that already have an existing base in the future MPA area are listed below; some of them have developed an informal brand which is partly rooted in the communities' perception (e.g. Brain Coral, Mantas, Little Tobago Bird Sanctuary, Englishman's Bay). The development of new tourism activities/attractions should be approached with care. Next to entirely private enterprise development a special focus should be directed towards the establishment of joint ventures between the private sector and CSOs as well as activities that are entirely managed by CSOs. It is further recommended that various management frameworks are assessed and implemented such as, but not limited to: Limits of Acceptable Change, Visitor Impact Management, Visitor Experience and Resource Protection (Eagles et al. 2002). Establishment of business plans for the potential ecotourism activities to identify potential and risk and allow for faster implementation are recommended.

Table 1: Proposed potential ecotourism activities for an MPA in NE Tobago.

- Community based voluntourism (also to assist with MPA management and implementation of conservation and restoration activities);
- Science tourism (also to assist with research and publications, supporting informed decision making processes);
- SCUBA diving (specialty diving certificates should be developed that can be earned in the MPA e.g. science diver);
- Free diving / snorkelling;
- Turtle watching;
- Non-motorised boating (e.g. kayaking);
- Glass bottom boat operations
- Catch and release sport – fishing, especially fly-fishing;
- Traditional small, wooden sail boat building and regattas;
- Carefully managed, small scale yachting;
- Bird watching;
- Terrestrial tours at the Kingsbay and Speyside wetlands as well at Bloody Bay River and river courses;

In conclusion our team sees high potential for ecotourism and recommends the NE Tobago MPA as an ecotourism pilot site. An economic evaluation of ecotourism activities in the area should be conducted at the beginning of the overall project (ROM estimate: US$ 15,000).

2.3 Management needs, strategies and best practices potential

CT5 - Based on published information and discussion with the stakeholders, assess needs for improvement and propose the measures required to enhance management effectiveness in the North East Tobago MPA.
D2(i)(e) – Improvement needs for staff, infrastructure, facilities for staff and other needs including equipment, visitor facilities etc.
D2(i)(c): Relevance of the North East Tobago as a model MPA

Annex 4.3 lists an initial estimate of the improvement needs for staff, infrastructure, facilities for staff and other needs including equipment to begin addressing enhancing management effectiveness as discussed in this report. The list must be treated as preliminary; its purpose being to foster frank discussion among stakeholders in a participatory process to establish needs, opportunities and constraints.

2.3.1 Ecosystem-based management

Conservation goals for the proposed MPA can best be met by means of EBM (Agardy et al. 2011; Duda 2002). This is particularly the case for the conservation of presently unprotected, endemic and

threatened species in NE Tobago. EBM for resilience is widely accepted as a viable approach to the conservation of threatened marine ecosystems such as coral reefs and their constituent species. This strategy is founded on the logic that if an ecosystem is resilient to predicted and unpredicted threats, constituent species and ecosystem services will be sustained (Hughes et al. 2010; Levin & Lubchenco 2008). EBM encompasses the conservation of presently unprotected, endemic and threatened species in NE Tobago's marine and coastal environment.

There are excellent resources and precedents available to guide EBM for marine ecosystem resilience, particularly on coral reefs. Of note are the following:

- Caribbean Marine Protected Area Management Network (CamPAM)
- Reef Resilience (R^2)
- SeaWeb Marine EBM

All of these provide resources, training opportunities, and extensive networks of experience and practice.

A critical conservation strategy for many MPAs is zoning. This involves spatial and temporal regulation of human activities along a continuum of use (Guarderas et al. 2008). Zoning recommendations are available for NE Tobago (d'Abadie 2011; van Bochove & McVee 2012).

EBM emphasises the connectivity of ecosystems. From this perspective, it becomes critical to include management of adjacent, connected ecosystems of the coastal zone. In NE Tobago, these include beaches, wetlands, rivers and streams. It is also important to include socio-economic indicators to acknowledge the connectivity of socio-ecological systems.

EBM can only work if it is 'place-based'. "By focusing on the distinctive features of individual places, tailoring management regimes to regional circumstances, and encouraging adaptive management and social learning, place-based management of marine ecosystems offers a constructive means for dealing with the uncertainties associated with complex, heterogeneous, and dynamic systems" (Young et al. 2007). For NE Tobago, this means that the details of governance must emerge from an ongoing collaborative, consultative process where stakeholders are included in all stages of development and implementation of management strategies.

EBM integrates well with a wider Ecosystem Approach to sustainable conservation and development in NE Tobago. EA is an approach widely advocated by international agencies (CBD 2013; FAO 2003). It involves conservation and sustainable use of living, land and water resources through integrative management in an equitable way. It explicitly addresses the integrated nature of human-natural systems and the uncertainty inherent in such systems. Elements of an EA are evident in integrative initiatives of the national government and local government for NE Tobago (Kairi Consultants Ltd. 2012; Ministry of Planning & Sustainable Development 2011). The proposed MPA could both advocate for and contribute to an emerging EA to sustainable development in NE Tobago.

2.3.2 Stakeholder input

Based on stakeholder interviews the two most outstanding needs to improve management effectiveness in the NE Tobago MPA are:

- community participation in planning and co-management arrangement with strong CSOs, and
- education / awareness on community (events) and governmental level to generate buy-in.

Of further importance are (ranked):

- enforcement of regulations through trained and certified game wardens / reef patrols / terrestrial and marine rangers / higher fines.
- three monitoring posts: Speyside, Charlotteville, Parlatuvier;
- government buy –in / lobbying at governmental level;
- close collaboration/communication with and between governmental agencies (Forestry, Fisheries, Police);
- establishment of an area headquarter / science centre;
- quick benefits for the community / generation of employment;
- collaboration between CSOs in the MPA;
- financial support;
- zoning;
- compensation for fishermen that loose income.

To fulfil the CSOs' expectations to play an active role in the planning and operation of a future MPA, a facilitated, fully implemented co-management agreement is clearly the key to community buy-in and day-today management of the area. As much as the CSOs want to play an important role, they also are clear that even the best management intentions will be brought to naught if educational and capacity building activities within the communities are neglected and community pride and understanding of the importance of conservation is not created.

The stakeholders identified well trained staff, 1-3 monitoring / patrol stations (office, transport, boat, equipment) as an important need to facilitate effective implementation of an MPA (for details see 2.4.1 and Annex 4.3).

Regarding visitor facilities the following was suggested:

- establishment of a boardwalk / edutainment trail at Kingsbay Mangrove Wetland. A beach facility including toilets and vendor facilities exist, but might require upgrading;
- establishment of a small interpretation booth / centre in Speyside;
- upgrading of visitor facilities on Little Tobago, especially a secure mooring site and interpretation centre;
- visitor facility with interpretation at Pirates Bay;
- interpretation at the existing beach facility in Bloody Bay
- interpretation and visitor booth at the Parlatuvier River mouth;
- Visitor facility including interpretation and toilets at Englishman's Bay.

Based on previous disappointing experiences, the stakeholders emphasised on the need for participatory design of the facilities with the assistance of a re-known expert. The ROM budget for the participatory design costs is US$ 10,000 for each site.

Estimates for the above construction activities cannot be provided at this point and should be based on expert opinion (e.g. architect, quantity surveyor).

2.3.3 NE Tobago MPA as a Model

The proximity of the Tobago Main Ridge Forest Reserve and the biodiverse coastal marine environment in NE Tobago provide the ecological makings of a globally relevant model protected area. The prioritisation within the wider regulatory environment of management initiatives concomitant with an EA, including the broader project context for this MPA initiative, offer the conditions for a synergistic model of sustainable conservation and development that would be globally significant (Kairi Consultants Ltd. 2012; Ministry of Planning & Sustainable Development 2011). The findings of this study, however, emphasise the

importance of rigorous and sustained support of a fully collaborative co-management approach to successfully capitalise on this opportunity to implement such a model.

2.4 Strategies for species monitoring and conservation

CT4 – Propose the indicator species for monitoring and suggest practical ways and costs (rough order of magnitude) to stabilize the population of target species.
CT3 - Propose how the project could conserve presently unprotected, endemic and threatened species in the North East Tobago MPA
D2(i)(d) – Current conservation status of species in the North East Tobago MPA and ways and costs needed to stabilise population of target species.

Globally, coral reef ecosystems are in crisis. Tobago's coral reefs are no exception. The results of extensive recent surveying show that the health of Tobago's coral reefs is deteriorating (van Bochove & McVee, 2012). In face of dramatic, systemic declines, expert consensus calls for a systemic approach to understanding and managing such systems with an emphasis on avoiding phase shifts (Hughes et al 2010). As discussed above, EBM is one such approach. A systemic view acknowledges that individual species both drive and are driven by their relationships in a system. Further, ecological systems are intimately connected to human systems through, for example, fishing pressure or sewage pollution. In these circumstances species conservation becomes a means of influencing socio-ecological system dynamics (e.g. through promoting coral recruitment) and an indicator of socio-ecological system dynamics (e.g. through decreased parrotfish abundance).

It is important to note that many species have value beyond the ecological. Species may have cultural or economic value (e.g. marine turtles; commercial fish species) or be a significant threat to ecosystems and people (e.g. lionfish).

2.4.1 Proposed monitoring strategies

Monitoring strategies should be concomitant with the evolving capacities of local stakeholders. Although ecosystem monitoring should eventually target indicators of ecosystem resilience corresponding to EBM principles, such demands are ambitious for the initial stages of an MPA in NE Tobago.

An initial ecosystem monitoring strategy could include the following elements:

First, an adapted ReefCheck survey protocol will allow regular and rapid assessment of the marine environment (Hodgson 1999). ReefCheck has several advantages. There is an existing network of trained individuals in Tobago. Training is relatively rapid, straightforward and non-technical. Little specialised equipment is required. Citizen scientists can be involved. Transects can be run rapidly. Data can be readily aggregated with regional and international datasets. Adaptations should include recordings of lionfish (*Pterois volitans*) sightings and can be further adjusted as necessary.

Second, similar protocols of regular transects could be implemented for avian fauna on Goat Island, Little Tobago and Saint Giles. Such transects could be adapted from the existing annual bird counts, incorporating flora and other fauna (e.g. small mammals) as deemed necessary. As with ReefCheck, similar advantages apply.

Third, a hotline and sightings database for megafauna, rare and cryptic species would allow monitoring of species for which regular transects are a poor sampling strategy. These should include sharks, rays, marine mammals, marine turtles, and rare and cryptic fish species such as sea horses. Sightings from

recreational (glass bottom boat, divers, sport fishers) and commercial sources (fishermen) should be considered.

Fourth, a programme of incentives and training for fishermen to record and analyse their catches regularly and reliably would allow catch monitoring that could later be integrated with local government fisheries monitoring programmes. Such a programme would also build local capacity to monitor in general which could later be applied to other aspects of EBM monitoring. Collaboration with and training for relevant authorities in such a programme are essential. Gathered data should be used for Tobago and national higher level fisheries management.

Monitoring is most effective if it is consistent. Subsequent programmes could expand monitoring to include more nuanced and technical measures of ecosystem resilience or water quality, and more participatory monitoring. Such additional programmes would require extensive capacity building and additional funding. Initial monitoring strategies should be as simple as possible to allow for consistency and more critically, to foster among stakeholders a positive culture of monitoring and success.

Finally, MPA monitoring initiatives should support existing conservation and monitoring efforts in NE Tobago such as the annual bird count and, ongoing sea-turtle conservation work.

Table 2: Monitoring strategies for an MPA in NE Tobago.

- a modified ReefCheck protocol for marine species monitoring
- a customised, transect-based protocol for terrestrial monitoring on near-shore islands compatible with annual bird-count transects
- a sightings hotline and database for mega fauna, rare and cryptic species
- training and incentives for locals to undertake fisheries monitoring in collaboration with authorities
- support for ongoing conservation and monitoring work (bird-counts; fisheries; sea-turtle monitoring)
- other monitoring (e.g. water quality) developed as MPA management capacity develops and funding becomes available

The stakeholders in Tobago, especially those involved in conservation activities, already have quite a clear understanding of the needs for effective monitoring and primary data processing.

Consultation revealed a general consensus that effective monitoring can only be achieved through CSOs in the area. SEMPR (Speyside Eco-Marine Park Rangers), NEST (North East Sea Turtle, Charlotteville) and ERIC (Environmental Research Institute Charlotteville) are active conservation oriented groups that have already gained experience in monitoring activities and a foundation regarding the management of their organisations. Nevertheless, these organisations are clearly aware of the need to build the capacities of these (or similar, emerging) organisations on the hard asset side (office, boat, transport) as well as on the soft asset side (organisational and individual capacity building).

The most frequent suggestion was that three operational stations should be erected; Speyside, Charlotteville and Parlatuvier. Each station should comprise an administrative office with two staff (manager, secretary) and a patrol / monitoring data collection / search and rescue crew of four persons. A ROM estimate (+- 50%) of establishing of these three bases and operating them for three years is US$ 2,384,700. Should this amount not be affordable, the cost for two stations is estimated at US$ 1,589,800 and for one station at US$ 794,900 (see Annex 4.3).

The advantages of more than one station are:

- higher monitoring / data collection frequency;

- higher patrolling, law enforcement frequency;
- increased community buy-in through education/awareness, employment, provision of related community services (e.g. search and rescue);
- mutual support in case of emergency, staff or equipment needs;
- avoiding conflict between CSOs / communities
- increased control of user fee collection.

2.4.2 Current conservation status & proposed indicator species

Species-based conservation must be concomitant with the capacities of the implementing organisations as well as with the EBM priorities for the socio-ecological system. Appendix 4.6 lists the current conservation status of species that are present in NE Tobago, worthy of conservation attention, and which could be tracked through one or more of the proposed monitoring strategies. The list should serve as a starting point both for species of concern, and the status of species on the list. The list can be elaborated on with further consultation, research and monitoring, particularly for local trends in NE Tobago where local knowledge is critical.

A list of indicator species can be drawn from this larger list. Target indicator species should be chosen through a collaborative process that gives equal value to EBM priorities, local knowledge, and administrative priorities (e.g. fisheries data). This acknowledges the existing capacity and site-based knowledge and experience of CSOs and other stakeholders.

The following five (5) taxa drawn from Appendix 4.6 comprise a provisional list of species of global relevance that fall within the proposed monitoring protocols:

- Scleractinia - Hard Corals
- *Manta birostris* - Manta Ray
- *Dermochelys coriacea* - Leatherback Turtle
- *Eretmochelys imbricata* - Hawksbill Turtle
- *Panulirus argus* - Caribbean Spiny Lobster

2.4.3 Proposed conservation strategies

Conservation of presently unprotected, endemic and threatened species in NE Tobago and practical ways and costs to stabilise populations of target species can be quantified and achieved through EBM. Conservation strategies should follow from monitoring strategies which match current or readily achievable stakeholder capacities. Although EBM is a comprehensive approach, certain taxa warrant particular attention. The initial list proposed here must be treated as a starting point for discussion and adjusted as necessary through a collaborative process to meet the priorities of stakeholders.

Conservation strategies should address: hard coral species that are critical to reef resilience (van Bochove & McVee 2012); commercial fish species, including groupers and snappers with low biomass and density in Tobago (van Bochove & McVee 2012); reef grazers such as parrotfish and long-spined sea urchins which are a functional group of species on coral reefs that fulfil a critical resilience function in preventing a phase shift from a coral to an algal reef (Hughes et al 2010); shark and ray species which are declining globally (Camhi et al. 2009); lionfish as an invasive species (Ali 2011); marine turtles through support of on-going conservation efforts by local CSOs (Eckert & Hemphill 2005); pelagic birds on near-shore islands; and marine mammals given their potential sensitivity to industrial activities. These taxa can be managed through strategies including EBM best practices, responsible use, MPA zoning, and targeted management protocols (e.g. lion fish management) as discussed in the literature review.

Table 3: Taxa of relevance to MPA management in NE Tobago.

- hard corals
- commercial fish species
- reef grazing species
- pelagic bird species
- sharks and rays
- marine mammals
- lionfish
- marine turtles

2.5 Threats, Barriers and Mitigation Measures

CT6 – Identify the main threats and barriers to conservation in the North East Tobago MPA and propose suitable mitigation measures to address them during project period.
D2(i)(g) – Major threats to biodiversity conservation and barriers to effective MPA management and mitigation measures.

2.5.1 Expert assessment

The coral reefs of Tobago are an integral part of the economy and cultural heritage of the island where they provide an array of ecosystem services such as food and livelihood for fishermen as well as tourism and protection against coastal erosion. In addition, coral reefs provide shelter and act as nursery grounds for many species of commercially important fish. Reefs also play an integral role in the chemical cycles in our oceans (van Bochove & McVee, 2011). Despite their necessity and myriad of benefits, most Caribbean coral reefs are threatened (Burke et al. 2008). According to Burke and Maidens (2004), approximately 70% (nearly two thirds) of Caribbean coral reefs are threatened by anthropogenic activities such as sedimentation, overfishing, nitrification and coastal development.

Burke and Maidens (2004) identify specific threats to Caribbean reefs as follows:

- Coastal development
- Sedimentation and pollution from inland sources
- Overfishing
- Diseases and rising sea temperatures
- Ineffective management of protected areas

Tobago's coral reefs are threatened by a number of anthropogenic and natural factors. The anthropogenic threats include land and marine based pollution, coastal development, sedimentation, nitrification, overfishing and unsustainable tourism. The major natural threats are climate change related occurrences such as hurricanes and tropical storms as well as coral bleaching such as the large-scale bleaching event that occurred in 2005 and 2010 (van Bochove & McVee 2011).

In Tobago's reefs, nitrification is of major concern to the reef systems. This is a result of the addition of nutrients from land-based agricultural runoff and or/ untreated sewage which enters the reefs and which can eventually modify the subtle dynamics of the reef ecosystem by creating an increase in the growth of phytoplankton and seaweeds which compete with corals for space and light. This can be further exacerbated by overfishing in Tobago's waters which removes key herbivores that normally aid in the algal population control (van Bochove and McVee, 2011).

Sedimentation is also a threat of concern in Tobago's waters which can be caused due to coastal development and affects the coral polyps' ability to filter feed due to an overload of marine sediment. There is a substantial increase in sediment loads due to construction, deforestation and increased sediment loading from the Orinoco and Amazon River system. One of the main land based characteristics of Tobago is the

presence of numerous steep sloping hills which have been cleared for agriculture and urbanization leading to an increase in runoff into marine ecosystems (Burke & Maidens 2004; van Bochove & McVee 2011).

In the Caribbean there have been increasingly widespread impacts to reefs due to overfishing where most of the important herbivorous reefs fish have been removed leading to noticeable changes in ecosystem communities. Overfishing in Tobago is of major concern since fisheries management is necessary in order to prevent phase shifts in reefs and in managing reef resilience (van Bochove & McVee 2011).

One of the major causes of reef degradation in the Caribbean has been due to an increase in disease outbreaks as well as rising sea temperatures (Burke & Maidens 2004). Following the coral bleaching events in 2005 and 2010 in Tobago's reefs, coral disease has been considered a major contributor to coral reef degradation and decline (van Bochove & McVee 2011). Coral disease incidents have been closely linked to thermal stresses such as those due to rising sea temperatures which coincided with the local disease outbreaks to Tobago's corals following the bleaching events. In addition, there is a need for the increased effectiveness in waste management schemes which can serve to reduce the disease impacts on coral reefs (Burke and Maidens 2004; van Bochove & McVee 2011).

Marine protected areas can serve to contribute to proper and improved reef health, however if improperly or ineffectively managed, this can further exacerbate reef degradation. The Reefs at Risk Project, according to Burke & Maidens (2004), found that even though there were approximately 285 MPAs declared in the Caribbean only about 6% are rated as effectively managed with 13% having partially effective management. There are approximately 20% coral reefs located inside MPAs however of this 20% only 4% are rated as effectively managed. Properly managed MPAs can serve to reduce threats to Tobago's reef and can act as a tool for the reduction of stresses to coastal resources (Burke & Maidens 2004).

2.5.2 Stakeholder input

The above mentioned needs for effective management are directly related to the interviewees' opinion on mitigation methods (which are the same as those activities that facilitate effective management) to address the main barriers to conservation which are (ranked):

- ignorance on community and governmental levels,
- lack of collaboration/communication between governmental agencies and community stakeholders;
- lack of law enforcement;
- lack of technical support;
- lack of organisational capacity on CSO and governmental agency level.

While some of the mitigation activities will require a more formal approach and will take time, there is a clear opportunity for governmental agencies to create a quick-win situation during the programme initiation phase and open communication channels with the CSOs (at the terms of the CSOs) as well as initiate some simple but effective educational/awareness activities with the already existing environmental NGOs/CSOs in the target area. The simple recognition by governmental agencies that existing CSOs already commit much effort and time toward conservation (which is a public service) would go a long way.

2.5.3 Mitigation Measures

To reduce local stress factors on corals in NE Tobago, in addition to suggestions provided above, the following is recommended: strict enforcement of existing water pollution rules, support of organic agriculture initiatives in the related watershed areas, minimisation of construction related sedimentation through strict enforcement of requirements outlined in EIAs for non-residential projects, establishment and enforcement of

visitor regulations at reefs. In the medium term sustainable solutions for domestic grey and black-water disposal must be found for Speyside, Charlotteville and Parlatuvier.

2.6 Stakeholders & impacts

CT7 – Identify the stakeholders of the North East Tobago MPA and positive and negative impacts of the project on them.
D2(i)(i) – Stakeholders of the North East Tobago MPA and positive and negative impacts of the project on them.

2.6.1 Expert assessment

This assignment focused on community based stakeholders, therefore governmental agencies are not listed below but include and are not limited to the various Departments of the Tobago House of Assembly (especially, Agriculture, Marine Resources and Fisheries, Natural Resources and Environment, Community Development, Education and Youth Affairs, and Tourism) as well as some national governmental agencies such as the Ministry of Housing and the Environment, the Environmental Management Authority, the Institute of Marine Affairs, the University of the West Indies etc.

It is critical to recognize that a considerable amount of the coastal zone in the target area belongs to large, private estates, which also need to be considered in the future planning process: e.g. Speyside Estate, Belmont Estate, Starwood Estate, Charlotteville Estate (one of the interviewees), Cambelton Estate, Hermitage Estate and Lanse Fourmi Estate. The State is the major land owner alongside Bloody Bay River, which is one of the main reasons why this area remained relatively pristine.

Environment Tobago (NGO) is island wide active and should also be considered as an important stakeholder.

It is further recommended to include as stakeholders universities that have been vising Charlotteville for field trips for decades.

The most significant community based stakeholders (groups) are identified in the table below:

Table 4: Significant community stakeholder groups.

Area	Stakeholder
Speyside	Village Council
	Speyside Eco Marine Park Rangers
	Fishermen
	High school
	Primary Schools
	Church Groups
	Accommodation and Restaurant Sector
	Glass Bottom Boat Sector
	Tour Guides
	Charlotteville Speyside Farmers' Cooperative Society Limited
	Arts and Craft Sector
	SCUBA Diving Sector
Charlotteville	Village Council
	Tobago Fishermen Association

Table 4: Significant community stakeholder groups.

Area	Stakeholder
	Charlotteville Speyside Farmers' Cooperative Society Limited
	North East Sea Turtles
	Primary School
	Church Groups
	Accommodation and Restaurant Sector
	Tour Guides
	SCUBA Diving Sector
	Charlotteville Beachfront Movement
	Arts and Craft Sector
	Environmental Research Institute Charlotteville
	Blue Caribbean Environmental Conservation
Wider Parlatuvier Area	Lanse Fourmi Village Council
	Accommodation and Restaurant Sector
	Bloody Bay Village Council
	Parlatuvier Village Council
	Church Groups
	Parlatuvier Fishermen Association
	Tour Guides
	Primary School
	Arts and Craft Sector

Regarding the stakeholder ranking, all of the above groups currently fall into the category of most affected but least powerful, a status that needs to be changed to most affected and powerful (moderate to high), if the implementation of the MPA is to be successful. This can be achieved by adopting a participatory planning process which fully includes the stakeholder groups in the decision making process.

The scope of this assignment only allowed identifying (29, Annex 4.1) and interviewing (16, Annex 4.2) representatives of a selection of the above key stakeholders.

Based on stakeholders' preferences, it is the opinion of our team that the major risk of user conflict can be minimised through a highly participatory planning process resulting in a functioning co-management arrangement.

Consultations showed that fishermen are much less averse than many studies anticipate, mainly because fishing in the near shore coastal zone (4km seawards) is very limited and the MPA would have limited negative impact on their livelihood.

It should be noted that the term: "Marine Protected Area" is often associated with a restriction of freedom of residents, imposed by "outsiders", therefore the term "Marine Managed Area" is preferable during the initial stages.

As discussed, the positive effects of MPAs on stakeholders are well documented (Geoghegan et al. 2001; McClanahan et al. 2005; Wilkinson et al. 2003) and include an increase of biomass, biodiversity, economic activity, community empowerment and pride. No further positive impacts that would be specifically attributed to the NE Tobago MPA were identified.

2.6.2 Stakeholder input

All stakeholders identified more positive impacts with higher benefits than negative impacts; nevertheless this was often conditional to community participation in MPA management.

Table 5: Ranked positive and negative impacts identified by stakeholders.

Positive Impacts	Negative Impacts
• increased direct and indirect revenue, user fees distributed to co-managing CBOs; • increased conservation / biodiversity / biomass; • increased tourism; • pride in the community; • increased commercial fish stocks; • community empowerment; • enforcement of legislation and regulations; • increased education and awareness; • capacity building of CSOs; • protection of fish stocks from foreign poachers; and • search and rescue for lost seafarers.	• possible user conflict; • poaching might increase; • less fishing; and • restriction of freedom.

It should be noted that the availability of a functioning patrol vessel in NE Tobago, would be seen as a highly valued asset for search and rescue missions; creating stakeholder and especially fishermen buy-in.

Minimising potential negative impacts:

- user conflict can be minimised by a participatory planning process and awareness programmes;
- poaching can be minimised by stringent enforcement of regulations, regular patrols and awreness programmes;
- impact of less fishing can be minimised by realistic fishermen compensation (against eco-system services) and sustainably managed stocks after an initial recuperation phase;
- the perceived and actual feeling of restriction of freedom can be minimised by offering recreational and occupational alternatives as well as awareness programmes.

2.7 Capacity Development Needs

CT8 –Propose the capacity development needs for improving the management of the NE Tobago MPA.
D2(i)(h) - The plan for capacity development and its retention pertaining to MPA management.

The interviewed key-stakeholders are considerably self-reflective regarding the capacity development needs of the CSOs in the future NE Tobago MPA. The need for office(s), boat(s), vehicular transport, staff, material and equipment is described in 2.4.1 and Annex 4.3. The need for human capacity building relates to (a) future co-management staff, (b) collaborating CSOs in the target area, and (c) governmental agencies.

Table 6: Capacity development needs for a proposed MPA.

(a) Technical training needs for future co-management staff (recruited from the area):	(b) Training needs for collaborating CSOs:	(c) Capacity needs for government agencies:
• Programme Management • Project Management • Administration • Transparency • Accountability • Conservation • Data Collection and Processing • Safety / Security • Search and Rescue • Boat Captain and Engineer • SCUBA Diving • Small Boat Repairs • Regulations and Law Enforcement • Communication • Conflict Management	• Communication • Awareness Creation • Conservation • Leadership Development • Conflict Management • Literacy • Learning journeys to successful Caribbean MPAs were recommended several times, based on previous positive experiences.	The evaluation of capacity building needs of governmental agencies was not part of this assignment, nevertheless training in communication; participatory planning and stakeholder engagement seem to be necessary.

The initial costs for training of co-management staff was estimated (ROM) at US$ 12,000 and annually (3 years) at US$ 10,000 (Annex 4.3). The costs to build the capacity of nine key CSOs to engage meaningfully in the co-management process and create well founded community buy-in over a period of three years is estimated at US$ 189,000. It is recommended that a thorough needs assessment is conducted at the start of the implementation period (ROM estimate: US$ 15,000).

2.8 Baseline data

CT9 – Provide published baseline data needed on the NE Tobago MPA for the project document.

Baseline data are summarised in Annex 4.5. Data are drawn from a variety of sources relevant to planning and implementation of an MPA in NE Tobago. In collaboration with the Biodiversity Specialist, data can be interpreted as needed to support the project document (see section 2.9).

2.9 Application support

CT11 –Help the Biodiversity Specialist to fill out sections I and II of the GEF tracking tool.

2.9.1 Biodiversity tracking tool

Twenty-two (22) questions from the biodiversity tracking tool were selected by the biodiversity specialist and used to gather information on the perception of key 16 stakeholders regarding the current status of the future MPA area. These stakeholders were identical to those who answered the open questions. The questions had to be modified, since the biodiversity tracking tool relates to an existing protected area and not to one in the making. Answers were categorised into 0: N/A, 1: Low, 2: Medium, and 3: High. The average ranking for each answer was calculated. A spread sheet is available that shows the calculation formula, which provides an idea of the distribution of answers. The results are as follows:

Table 7: Average rankings of community stakeholder answers to modified questions from the biodiversity tracking tool.

No.	Question	Average Ranking	Comment
1.2	What is the extent of commercial and industrial areas?	2.00	Mainly small scale commercial fishing
1.3	How developed is the tourism and recreation infrastructure?	1.38	Only one good facility at Bloody Bay
2	Protected area regulations: Are appropriate regulations in place to control land use and activities (e.g. hunting)?	1.75	Regulations are existing but not enforced
3.1	How does oil and gas drilling affect the site ?	1.94	At the moment only surveys, which distract fish
5.1	How intense is the hunting, killing and collecting terrestrial animals (including killing of animals as a result of human/wildlife conflict)?	2.50	Wild meat is a highly sought after product
5.4	How intense is the fishing, killing and harvesting aquatic resources?	2.13	Environmentalists are of the opinion that there is high overfishing; fishermen and others think this is moderate to low.
6.1	How developed are recreational activities and tourism?	1.31	Tourism is between exploration and involvement stage
6.5	What is the rate of deliberate vandalism, destructive activities or threats to conservation staff and visitors?	1.06	
7	Management plan: Is there a management plan and is it being implemented?	0.88	While there is the NE Tobago management plan only few persons are aware of it
7.a	Planning process: The planning process allows adequate opportunity for key stakeholders to influence the management plan	0.63	10 yes, 6 no
8.1a	To what extent are there invasive non-native/alien animals?	0.56	Lion Fish, Grenada Dove (?)
9.1	How much affects household sewage and village waste water the site?	1.75	Most people are not aware of the high coliform concentration in village bays;
9.1a	How much does sewage and waste water from protected area facilities (e.g. toilets, hotels etc.) affect the site?	1.38	Only in Speyside pollution from hotels/restaurants was considered an issue
10.4	How much does erosion and siltation/ deposition (e.g. shoreline or riverbed changes) affect the site?	1.94	Mainly during the rainy season and construction activities
11.1	To what degree did habitat shifting and alteration occur?	1.31	

Table 7: Average rankings of community stakeholder answers to modified questions from the biodiversity tracking tool.

No.	Question	Average Ranking	Comment
22	State and commercial neighbours: Is there co-operation with adjacent land and water users?	0.13	22, 24 and 24.a show the perception of very low participation
23	Indigenous people: do indigenous and traditional peoples resident or regularly use the area have input to management decisions	0.00	There are no indigenous people in NE Tobago
24	Local communities: Do local communities resident or near the protected area have input to management decisions?	0.31	
24.a	Impact on communities: There is open communication and trust between local stakeholders and protected area managers?	0.44	7 yes, 9 no
25	Economic benefit: Is the protected area providing economic benefits to local communities, e.g. income, employment, payment for environmental services?	2.50	Mainly through fishing and tourism
27	Visitor facilities: Are visitor facilities adequate?	1.50	
30	Condition of values: What is the condition of the important values of the area as compared to 10 years ago?	1.63	While degradation is observed by all, it is not considered dramatic

Upon request our team will assist the biodiversity specialist to fill out the remaining questions of sections I and II of the GEF tracking tool.

2.9.2 Possible boundaries for an MPA

As per the request of the Biodiversity Specialist, the following sources of justification for boundaries of a proposed MPA have been identified. Such boundaries are proposals only, reflecting a range of perspectives. The formal proposal and designation of boundaries can only be undertaken by the relevant authorities in close collaboration with stakeholders and citizens of NE Tobago and must be sensitive to jurisdictional boundaries; ecological considerations; and stakeholder priorities. The land indicated below, as well as potential marine boundaries, should be scrutinised and finalised in the first year of project implementation.

2.9.2.1 Stakeholder Input

All interviewed stakeholders agreed that a future MPA should reach beyond the Speyside area. The overall consensus was:

- The MPA should include important wetlands in NE Tobago;
- The MPA should include the islets in NE Tobago;
- All water courses that flow into a future MPA should also be under protection, especially those that originate in the Tobago Main Ridge.

The Charlotteville stakeholders recommended including both Englishman Bays because of the beauty of their pristine nature and their function as a natural harbour for yachts. A mooring fee system implemented

in Man-o-War Bay and not in Englishman's Bay would cause a migration of yachts to Englishman's Bay and unmanaged mooring.

There were no clear statements on how far out to sea the boundaries of the MPA should be drawn. Fishermen mostly use areas between 2 to 20-30 miles off shore. Important banking (fishing) grounds mentioned were: Africa, Australia, Betty Bank, Book Ends, Shark Bank and Rockstone Top, some of which are seasonal and can only be fished for five to six months a year at times of low currents. The exact location of these banking grounds could not be established within the scope of this assignment.

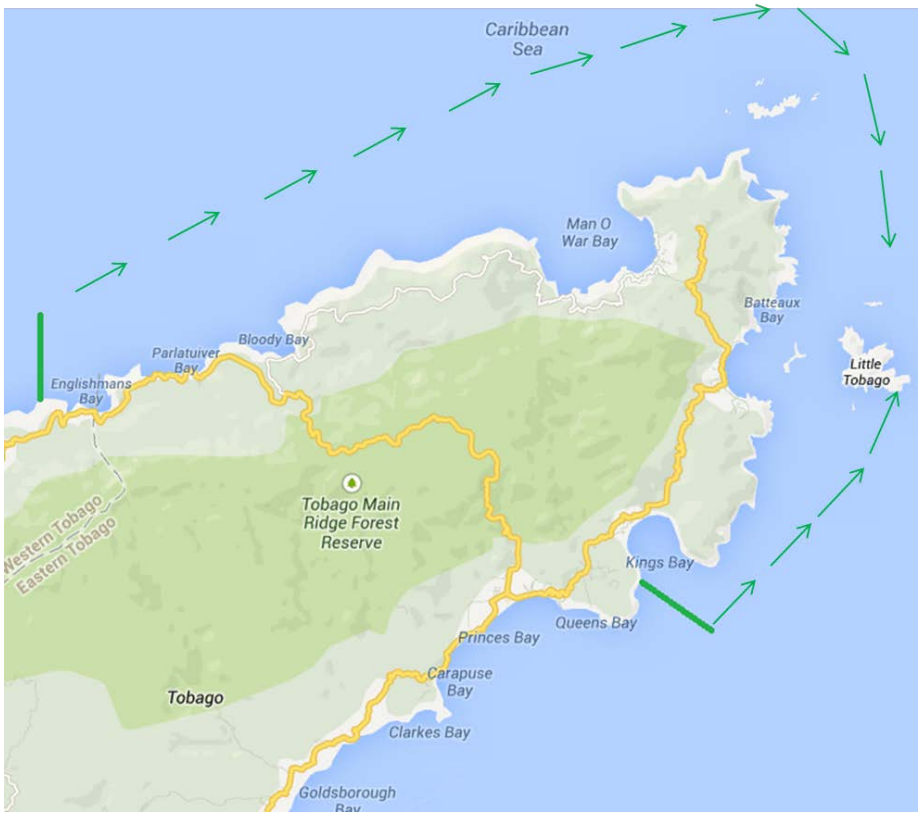


Figure 1: Terrestrial boundaries of a future NE Tobago MPA as suggested by community based stakeholders. There were no clear recommendations for marine boundaries (interrupted line of arrows). Measured in straight lines, the coastal zone distance for the MPA is approximately 34 km.

2.9.2.2 Previously Published Recommendations

Van Bochove & McVee's (2012) analysis proposes management of a series of marine areas with high conservation value around Tobago. The areas that fall within NE Tobago are as follows:

- Englishman's Bay (46 Ha)
- Sister's Rocks (69 Ha)
- Charlotteville (112 Ha)
- Anse Bateau (50 Ha)
- Goat Island (72 Ha)
- Little Tobago (53 Ha)

D'Abadie's (2011) analysis proposes zoning in the area from Speyside to Charlotteville, including Pirate's Bay, Batteaux Bay, Charlotteville, Speyside, Goat Island and Little Tobago.

3 RECOMMENDATIONS

Summary of all CT & D

The results of the consultant's analyses are summarised in the following recommendations:

- Given the extensive on-going research and best practices being published regarding MPA management, CamPAM and other knowledge networks will be essential to filter relevant information and to support informed development and management of an MPA in NE Tobago.

- There is ample scope and emerging local capacity for full ecotourism products in NE Tobago that could complement and benefit from an MPA, including financing through user fees, but such initiatives will require broad, explicit and ongoing support.

- An economic evaluation of ecotourism activities in the area should be conducted at the beginning of the overall project.

- EBM should be adopted as an overall management strategy (Agardy et al. 2011).

- Community surveys indicate that community participation in any management is a priority but that co-management must be supported with capacity building and ongoing education of the wider community.

- Well-trained staff and 1-3 monitoring/patrol stations were identified through consultations as priorities for implementation.

- Monitoring strategies must be concomitant with the evolving capacities of local stakeholders and could include: an adapted ReefCheck transect protocol to monitor coral reefs; transects to monitor avian populations and associated fauna and flora on near-shore islands; a hotline and sightings database for marine megafauna, rare and cryptic species; a programme of incentives for self-monitoring of fish catch by fishermen; and support of ongoing conservation monitoring including sea turtle patrols and bird counts.

- Monitoring should be led by local CSOs in the area and their requests for support and capacity building should be addressed through the project.

- Initial monitoring strategies should be as simple as possible to allow for consistency and more critically, to foster among stakeholders a positive culture of monitoring and success. Socio-economic monitoring can be added as both need and capacity develop.

- Indicator species can be drawn, in a collaborative process that includes all stakeholders, from a list of species in NE Tobago that could be monitored using proposed protocols.

- Conservation strategies can be drawn from EBM and should be concomitant with priority taxa groups which must be identified through collaborative processes; several initial groupings are proposed.

- Threats to Caribbean reefs include coastal development, sedimentation and pollution from inland sources, overfishing, disease and rising sea temperature and ineffective management (Burke & Maidens 2004); Tobago's coral reefs are under particular threat from disease, coral bleaching, nitrification, and sedimentation (van Bochove & McVee 2012).

- To reduce local stress factors on corals in NE Tobago the following is recommended: strict enforcement of existing water pollution rules, support of organic agriculture initiatives in the related watershed areas, minimisation of construction related sedimentation through strict enforcement of requirements outlined in EIAs for non-residential projects, establishment and enforcement of visitor regulations at reefs. In the medium term sustainable solutions for domestic grey and black-water disposal must be found for Speyside, Charlotteville and Parlatuvier.

- Consultations yielded a call for effective management and the need for support to promote education, collaboration (especially from government agencies), law enforcement, technical support and capacity building for CSOs and government agencies; exposing many opportunities for prompt win-win initiatives in the early phases of the project.

- The scope of this study included consultation with several community stakeholders who are most affected but least powerful in the process; a broader, facilitated, collaborative process will need to include the many other local and national stakeholders with powerful influence over the project.

- A highly participatory, facilitated planning process and co-management agreement could dramatically minimise the risk of catastrophic conflict in the process and project.

- Consultations indicated CSOs anticipate many positive impacts, including increased revenue and livelihood opportunities, these are contingent on a collaborative process and co-management.

- Capacity development needs based on consultations and expert assessments are proposed for: (a) future co-management staff from the area; (b) collaborating CSOs and; (c) government agencies although the latter is outside the scope of this assessment.

- ROM costs are proposed here but a thorough need assessment is recommended before the initiation of implementation.

- Community representatives consulted felt an MPA should reach beyond Speyside, and several advocated including Englishman's Bay; many advocated for inclusion of wetlands, water courses and islets.

- Published recommendations of boundaries support the pro-active management of an extensive marine area in NE Tobago with zoning as an integral component.

- The proximity of the Tobago Main Ridge Forest Reserve and the biodiverse coastal marine environment in NE Tobago provide the ecological makings of a globally relevant model protected area. The findings of this study emphasise the importance of rigorous and sustained support of a fully collaborative co-management approach to implement such a model.

3.1 Action Plan

D2(i)(f): Action plan to increase management effectiveness in the North East Tobago MPA

The results of this study, collected in the above recommendations, form the constituents of an action plan which should be formalised collaboratively with all relevant stakeholders once funding is available to support such a process. The following steps are proposed:

3.1.1 Fund and Facilitate a Participatory Process

The process would actively include all interested stakeholders, including government and industries, in a discussion and prioritisation of all the points covered in this report and others that are raised in discussion (research needs, co-management options, zoning options, implementation strategies, pressures, conflicts, constraints etc.). The process would involve ongoing, consistent support to network between various interest groups. The process would further identify consensus pilot projects.

3.1.2 Fund and Facilitate Pilot Initiatives

Provide funding and facilitation for selected small scale, short term pilot initiatives selected by consensus in the preceding step and support or synergise with ongoing initiatives. Initiatives must be numerous, well-funded, well-facilitated, short-term (on the scale of weeks or months), and be drawn from various components of MPA implementation mentioned in this report (e.g. monitoring, capacity building, collaborative research, collaborative MPA design, collaborative management trials etc.). Opportunities for collaboration between stakeholders, either individuals or organisations, should be encouraged, funded and facilitated.

3.1.3 Re-evaluate Initiatives with a Funded and Facilitated Participatory Process

Repeat a funded, facilitated participatory process to evaluate challenges, successes, and emerging opportunities, including opportunities for new funding and collaborations. Based on experiences with pilot projects, an informed plan could be developed, identifying concrete steps to pursue the implementation of an MPA.

4 ANNEXES

4.1 Incomprehensive North East Tobago MPA stakeholder list

		Speyside	
	Name	**Organisation / Industry**	**Phone (1-868)**
1	Mr Jace Bishop	Speyside Eco Marine Park Rangers, PRO	344-2259
2	Mr Farley Augustine	Speyside High School	660-6805
3	Mr Rupert McKenna	Speyside Eco Marine Park Rangers, President	762-2202
4	Ms Trotman	Speyside Village Council, President	320-0885
5	Mr Newton George	Tour Operator	754-7881
6	Mr Redman	Dive Shop	383-5655
7	Wayn Palmer	Manager Blue Waters Inn Dive Shop	395-9343
8	Manta Lodge	Dive Shop	660-5268
9	Mr Frank	Glass Bottom Boat Operator	766-0093
10	Mr Zolany Frank	Glass Bottom Boat Operator	304-8513
11	Jason Radix	Manager Blue Waters Inn Hotel	731-0759
12	Mr Smith	Fisherman	
		Charlotteville	
13	Mr Jaba Hercules	Charlotteville Beachfront Movement	327-1605
14	Ms Judith Burris-Clarke	Charlotteville Village Council	765-3889
15	Mr Dexter Hackett	Charlotteville Village Council	776-5326
16	Mr WilfriedAsby	Fishing Cooperative, Manager	683-3372
17	Mr Arthurius Brown	Charlotteville Village Council	485-6006
18	Mr Devon Eastman	North East Sea Turtles, President	293-6962
19	Mr Ansyl Kent	North East Sea Turtles, Vice-President	
20	Ms Patricia Turpin	Environment Tobago, President	685-8308
21	Ms Caroline Hardie	Dive Operator, Shark Shacks	767-6420
		Parlatuvier, Bloody Bay, Lanse Fourmi	
22	Mr Len Carrington	Fishermen Association, Board Member	791-3920
23	Ms Stacy Herbert	Parlatuvier Village Council, Secretary	363-9401
24	Mr Rawle Thomas	Fisherman	339-9092
25	Mr Darlington Chance	Wetland Tour-guide	318-8034
26	Mr Junior Henry	Fisherman	366-4902
27	Mr Barton Burris	Fisherman	378-8965
28	"Singh"	Fisherman (Corner Bloody Bay, Roxborough Road)	
29	Mr Lawrell	Fisherman (daily at Parlatuvier jetty)	

4.2 List of interviewees

		Speyside	
	Name	**Organisation / Industry**	**Phone (1-868)**
1	Mr Jace Bishop	Speyside Eco Marine Park Rangers, PRO	344-2259
2	Mr Rupert McKenna	Speyside Eco Marine Park Rangers, President	762-2202
3	Ms Trotman	Speyside Village Council, President	320-0885
4	Mr Frank	Glass Bottom Boat Operator	766-0093
5	Jason Radix	Manager Blue Waters Inn Hotel	731-0759
		Charlotteville	
6	Mr Jaba Hercules	Charlotteville Beachfront Movement	327-1605
7	Mr Dexter Hackett	Charlotteville Village Council	776-5326
8	Mr WilfriedAsby	Fishing Cooperative, Manager	683-3372
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11	Ms Patricia Turpin	Environment Tobago, President	685-8308
12	Ms Caroline Hardie	Dive Operator, Shark Shacks	767-6420
		Parlatuvier, Bloody Bay, Lanse Fourmi	
13	Mr Len Carrington	Fishermen Association, Board Member	791-3920
14	Ms Stacy Herbert	Parlatuvier Village Council, Secretary	363-9401
15	Mr Darlington Chance	Wetland Tour guide	318-8034
16	Mr Barton Burris	Fisherman	378-8965

4.3 ROM MPA establishment & operation cost estimate

The following table contains a rough order of magnitude (ROM) estimate for the establishment and operation of MPA station(s), initial studies, and capacity building for CSOs in NE Tobago. It does not contain the cost for governmental staff training! Studies should be conducted in year 1 of the project. The implementation should run from year 2 – 4.

Item	Amount	Unit Cost [USD]	Subtotal [USD]
Patrol Boat	1	$50,000.00	$50,000.00
Annual Maintenance Patrol Boat	3	$5,000.00	$15,000.00
Inflatable Boat	1	$15,000.00	$15,000.00
Monthly Boat Fuel	36	$1,500.00	$54,000.00
Monitoring Equipment	1	$10,000.00	$10,000.00
SCUBA Equipment	9	$1,500.00	$13,500.00
Annual Equipment Maintenance	3	$4,700.00	$14,100.00
Office Rent, Telecommunication	36	$500.00	$18,000.00
Office Set Up	1	$5,000.00	$5,000.00
Interpretive Material	1	$25,000.00	$25,000.00
Monthly Office Material	36	$200.00	$7,200.00
Administrative Staff (2)	36	$4,000.00	$144,000.00
Outreach, Visibility	36	$500.00	$18,000.00
Patrol Staff (4)	36	$8,000.00	$288,000.00
4*4 Vehicle	1	$50,000.00	$50,000.00
Annual Vehicle Maintenance	3	$7,500.00	$22,500.00
Monthly Vehicle Fuel (Diesel)	36	$100.00	$3,600.00
Annual Staff Capacity Building	3	$10,000.00	$30,000.00
Initial Staff Capacity Building	6	$2,000.00	$12,000.00
Total (ROM) 1 Station			**$794,900.00**
Total (ROM) 2 Stations			**$1,589,800.00**
Total (ROM) 3 Stations			**$2,384,700.00**

- Study for potential use and non-use revenue streams: US$ 15,000
- Study on CSO capacity needs assessment US$ 15,000
- NE Tobago CSO capacity building, 3 years US$ 189,000
- Study on economic potential for eco-tourism in NE Tobago US$ 15,000
- Design of visitor facilities US$ 70,000
- Construction of visitor facilities to be determined

4.4 Questionnaire for semi – structured interviews

1.2 What is the extent of commercial and industrial areas?		0: N/A 1: Low 2: Medium 3: High
1.3 How developed is the tourism and recreation infrastructure		0: N/A 1: Low 2: Medium 3: High
3.1 How does Oil and gas drilling affect the site		0: N/A 1: Low 2: Medium 3: High
5.1 How intense is the hunting, killing and collecting terrestrial animals (including killing of animals as a result of human/wildlife conflict)?		0: N/A 1: Low 2: Medium 3: High
5.4 How intense is the fishing, killing and harvesting aquatic resources?		0: N/A 1: Low 2: Medium 3: High
6.1 How developed are recreational activities and tourism?		0: N/A 1: Low 2: Medium 3: High
6.5 What is the rate of deliberate vandalism, destructive activities or threats to conservation staff and visitors?		0: N/A 1: Low 2: Medium 3: High
8.1a To what extent are there invasive non-native/alien animals?		0: N/A 1: Low 2: Medium 3: High

9.1 How much does household sewage and village waste water affect the site?		0: N/A 1: Low 2: Medium 3: High
9.1a How much does sewage and waste water from protected area facilities (e.g. toilets, hotels etc) affect the site?		0: N/A 1: Low 2: Medium 3: High
10.4 How much does erosion and siltation/ deposition (e.g. shoreline or riverbed changes)affect the site?		0: N/A 1: Low 2: Medium 3: High
11.1 To what degree did habitat shifting and alteration occur?		0: N/A 1: Low 2: Medium 3: High
2. Protected area regulations: Are appropriate regulations in place to control land use and activities (e.g. hunting)?		0: There are no regulations for controlling land use and activities in the protected area 1: Some regulations for controlling land use and activities in the protected area exist but these are major weaknesses 2: Regulations for controlling land use and activities in the protected area exist but there are some weaknesses or gaps 3: Regulations for controlling inappropriate land use and activities in the protected area exist and provide an excellent basis for management
7. Management plan: Is there a management plan and is it being implemented?		0: There is no management plan for the protected area 1: A management plan is being prepared or has been prepared but is not being implemented 2: A management plan exists but it is only being partially implemented because of funding constraints or other problems 3: A management plan exists and is being implemented
7.a Planning process: The planning process allows adequate opportunity for key stakeholders to influence the management plan		0: No 1: Yes

22. State and commercial neighbours: Is there co-operation with adjacent land and water users?		0: There is no contact between managers and neighbouring official or corporate land and water users 1: There is contact between managers and neighbouring official or corporate land and water users but little or no cooperation 2: There is contact between managers and neighbouring official or corporate land and water users, but only some co-operation 3: There is regular contact between managers and neighbouring official or corporate land and water users, and substantial co-operation on management
23. Indigenous people: do indigenous and traditional peoples resident or regularly use the area have input to management decisions		0: Indigenous and traditional peoples have no input into decisions relating to the management of the protected area 1: Indigenous and traditional peoples have some input into discussions relating to management but no direct role in management 2: Indigenous and traditional peoples directly contribute to some relevant decisions relating to management but their involvement could be improved 3: Indigenous and traditional peoples directly participate in all relevant decisions relating to management, e.g. co-management
24. Local communities: Do local communities resident or near the protected area have input to management decisions?		0: Local communities have no input into decisions relating to the management of the protected area 1: Local communities have some input into discussions relating to management but no direct role in management 2: Local communities directly contribute to some relevant decisions relating to management but their involvement could be improved 3: Local communities directly participate in all relevant decisions relating to management, e.g. co-management
24 a. Impact on communities: There is open communication and trust between local stakeholders and protected area managers?		0: No 1: Yes

25. Economic benefit: Is the protected area providing economic benefits to local communities, e.g. income, employment, payment for environmental services?		0: The protected area does not deliver any economic benefits to local communities 1: Potential economic benefits are recognised and plans to realise these are being developed 2: There is some flow of economic benefits to local communities 3: There is a major flow of economic benefits to local communities from activities associated with the protected area
27. Visitor facilities: Are visitor facilities adequate?		0: There are no visitor facilities and services despite an identified need 1: Visitor facilities and services are inappropriate for current levels of visitation 2: Visitor facilities and services are adequate for current levels of visitation but could be improved 3: Visitor facilities and services are excellent for current levels of visitation
30. Condition of values: What is the condition of the important values of the protected area as compared to 10 years ago?		0: Many important biodiversity, ecological or cultural values are being severely degraded 1: Some biodiversity, ecological or cultural values are being severely degraded 2: Some biodiversity, ecological and cultural values are being partially degraded but the most important values have not been significantly impacted 3: Biodiversity, ecological and cultural values are predominantly intact

Open Questions:

1. What would be needed to improve the management effectiveness of the marine area?
2. What do you think are the main barriers to conservation and how could they be overcome?
3. What would be the main positive and negative impacts of a marine managed area?
4. Please identify the capacity development needs for NGOs in the area in order to participate in marine park co-management.

4.5 Baseline data

Annex 4.5: Data sources for baseline data relevant to a proposed MPA in NE Tobago.

Source	Title	Pp	Data Description
Mukhida (2003)	Opportunities and Constraints of Co-Management: Cases of the BRMP and the Speyside Reefs Marine Park, Tobago	130	Distribution of Reefs within the Speyside Marine Area
		131	Boundary of the Proposed Speyside Reefs Marine Park, Tobago
Flower (2011)	Tobagan Fishers' Livelihood Security and Attitudes to Coastal Management in the Context of Declining Catches	6	Description of the three most common fishing methods, including usage, target species and seasons
D' Abadie (2011)	Marine Protected Areas - Zoning for Conservation and Rehabilitation of Coral Reefs in Data Poor Areas - A Case Study of North-Eastern Tobago	16	Description of Conservation Features, Representation Targets for each Feature Class
		17	Zone Contributions for each Feature Class
		18	Benthic Cover Distribution Hard Coral Cover
		19	Species Diversity – values in number of species coral and other biota total
		20	Benthic Distribution Damaged Coral Cover p21 Distribution of Commercial Biomass
		22	Total Cost of Planning Units
		23	Selection Frequency of Planning Units in the Conservation Zone
		24	Selection Frequency of Planning Units in the Rehabilitation Zone
		25	Best Solution Output from Marxan with zones.
Armstrong et al. (2009)	Speyside Marine Area Community-based Management Project (SMACMP)	35-50	Ecological surveys conducted including benthic, coral cover and reef fish,
		62	Conservation Management Values for coral reef habitats for the fringing reefs surveyed around Tobago between April 2007 - August 2009
		67-69	Target species
EDG and Kairi Consultants Ltd.	Tobago North East Management Plan	45	The strengths, weaknesses, opportunities and threats to the development of NE Tobago from a socio-

Annex 4.5: Data sources for baseline data relevant to a proposed MPA in NE Tobago.

Source	Title	Pp	Data Description
(2003)			economic perspective
Burke et al. (2008)	Coastal Capital: Economic Valuation of Coral Reefs in Tobago and St. Lucia	ix	Coral Reef Valuation Results
		7	Economic Losses from Coral Reef Degradation in the Wider Caribbean
		15	Coastal Protection Factors
		19	Coral Reef-Associated Tourism Impact for Tobago 2006
		22	Reef-Related Tourism and Recreation Sensitivity Analysis for Tobago
		32-33	Coral Reef-Associated Fisheries Impact for Tobago
		35-36	Consumptive and non-Consumptive use of Sea Turtles in Tobago
		45	Shoreline Protection Valuation Summary for Tobago
		51	Coral Reef-associated Tourism and Recreation Valuation Summary - Tobago and St. Lucia
van Bochove & McVee (2012)	Tobago Coastal Ecosystems Mapping Project Final Report: Results of Community and Scientific Work April 2007 - June 2011	30-49	Data on various reef species

4.6 Conservation status of selected NE Tobago species.

Conservation status of selected NE Tobago species. [Category] refers to Table 3 in this report. [Monitoring] refers to table 2. In the [Source(s)] column, 'IUCN' refers to the IUCN Red List (www.iucnredlist.org). 'T&T CDB refers to the Convention on Biological Diversity Trinidad & Tobago (www.biodiversity.gov.tt/home/trinidad-a-tobago-biodiversity/endemic-species.html).

Taxonomy		**Global**		**Regional / National / Local**		**Notes**			
Taxa /Species	**Common Name**	**Status**	**Trend**	**Status**	**Trend**	**Category**	**Monitoring**	**Comments**	**Source(s)**
Corals									
Scleractinia	Hard Corals					Hard Corals	ReefCheck		
Acropora cervicornis	Stag/Elk horn corals	Cr En A2ace ver 3.1	Stable			Hard Corals	ReefCheck		IUCN
Montastraea	Brain corals	En A2ace ver3.1	Decreasing			Hard Corals	ReefCheck		IUCN
Porites	Finger corals	Le Co ver 3.1	Stable			Hard Corals	ReefCheck		IUCN
Millepora.	Fire corals								
Gorgonia ventalina	Common seafan						ReefCheck		
Antipatharia	Black Coral								
Marine Mammals									
Balenopter aedeni	Bryde's Whale	Da De ver 3.1	Unknown			Marine Mammals	Sightings Hotline		IUCN
Mesoplodon europaeus	Gervais' Beaked Whale	Da De ver 3.1	Unknown			Marine mammal	Sightings Hotline		IUCN
Steno bredanensis	Rough-toothed Dolphin	Le Co ver 3.1	Unknown			Marine mammal	Sightings Hotline		IUCN
Sotalia guianensis	Guiana Dolphin	Da De ver 3.1	Unknown			Marine mammal	Sightings Hotline		IUCN
Lagenodelphis hosei	Fraser's Dolphin	Le Co ver 3.1	Unknown			Marine mammal	Sightings Hotline		IUCN
Grampus griseus	Risso's Dolphin	Le Co ver 3.1	Unknown			Marine mammal	Sightings Hotline		IUCN
Birds									
Phaethon aethereus	Red-billed tropicbird	Le Co ver 3.1	Decreasing	Protected		Pelagic Birds	Terrestrial Transects / Ongoing		IUCN

Conservation status of selected NE Tobago species. [Category] refers to Table 3 in this report. [Monitoring] refers to table 2. In the [Source(s)] column, 'IUCN' refers to the IUCN Red List (www.iucnredlist.org). 'T&T CDB refers to the Convention on Biological Diversity Trinidad & Tobago (www.biodiversity.gov.tt/home/trinidad-a-tobago-biodiversity/endemic-species.html).

Taxonomy		**Global**		**Regional / National / Local**		**Notes**			
Taxa /Species	**Common Name**	**Status**	**Trend**	**Status**	**Trend**	**Category**	**Monitoring**	**Comments**	**Source(s)**
							Conservation		
Phaeton lepturus	White tailed tropicbird	Le Co ver 3.1	Decreasing	Protected		Pelagic Bird	Terrestrial Transects / Ongoing Conservation		IUCN
Sula leucogaster	Brown booby	Le Co ver 3.1	Decreasing	Protected		Pelagic Bird	Terrestrial Transects / Ongoing Conservation		IUCN
Fregata magnificens	Magnificent frigate-bird	Le Co ver 3.1	Increasing	Protected		Pelagic Bird	Terrestrial Transects / Ongoing Conservation		IUCN
Puffinuslherminieri	Audubon's shearwater	Le Co ver 3.1	Stable	Protected		Pelagic Bird	Terrestrial Transects / Ongoing Conservation		IUCN
Sterna dougallii	Roseate tern	Le Co ver 3.1	Unknown	Protected		Epipelagic Bird	Terrestrial Transects / Ongoing Conservation		IUCN
Sula sula	Red-footed booby	Le Co ver 3.1	Decreasing	Protected		Pelagic Bird	Terrestrial Transects / Ongoing Conservation		IUCN
Anousstolidus	Brown noddy	Le Co ver 3.1	Stable	Protected		Epipelagic Bird	Terrestrial Transects / Ongoing Conservation		IUCN
Pandionhaliaetus	Osprey	Le Co ver 3.1	Increasing			Epipelagic Bird	Sightings Hotline		IUCN
Other Invertebrates									
Diadema antillarum	Long-spined sea urchin					Reef Grazing Species	ReefCheck		

Conservation status of selected NE Tobago species. [Category] refers to Table 3 in this report. [Monitoring] refers to table 2. In the [Source(s)] column, 'IUCN' refers to the IUCN Red List (www.iucnredlist.org). 'T&T CDB refers to the Convention on Biological Diversity Trinidad & Tobago (www.biodiversity.gov.tt/home/trinidad-a-tobago-biodiversity/endemic-species.html).

Taxonomy		**Global**		**Regional / National / Local**		**Notes**			
Taxa /Species	**Common Name**	**Status**	**Trend**	**Status**	**Trend**	**Category**	**Monitoring**	**Comments**	**Source(s)**
Eucid aristribuloides	Pencil urchin						ReefCheck		
Tripneus tesventricosus	Sea egg						ReefCheck		
Charonia variegata	Triton trumpet						ReefCheck		
Cyphoma gibbosum	Flamingo tongue						ReefCheck		
Panulirus sp.	Spiny lobster	Da De ver 3.1	Decreasing				ReefCheck		IUCN
Scyllarides aequinoctialis	Slipper lobster						ReefCheck		
Strombus gigas	Queen conch								
Stenopus hispidus	Banded coral shrimp						ReefCheck		
	Sponges						ReefCheck		
Marine Turtles									
Dermochelys coriacea	Leatherback turtle	Cr En A1abd ver 2.3	Decreasing			Marine Turtles	Ongoing Conservation		ICUN
Eretmochelys imbricata	Hawksbill turtle	Cr En A2bd	extensive subpopulation declines				Ongoing Conservation		IUCN
Chelonia mydas	Green turtle	En A2bd ver 3.1	Decreasing				Ongoing Conservation		IUCN
Caretta caretta	Loggerhead turtle	En A1abd ver 2.3	Unknown				Ongoing Conservation		IUCN
Lepidochelys olivacea	Olive Ridley turtle	Vu A2bd ver 3.1	Decreasing				Ongoing Conservation		IUCN
Fish									
Scaridae	Parrot fish	Ne Th ver 3.1	Decreasing			Reef Grazing Species	Fisheries Monitoring / ReefCheck		IUCN

Conservation status of selected NE Tobago species. [Category] refers to Table 3 in this report. [Monitoring] refers to table 2. In the [Source(s)] column, 'IUCN' refers to the IUCN Red List (www.iucnredlist.org). 'T&T CDB refers to the Convention on Biological Diversity Trinidad & Tobago (www.biodiversity.gov.tt/home/trinidad-a-tobago-biodiversity/endemic-species.html).

Taxonomy		**Global**		**Regional / National / Local**		**Notes**			
Taxa /Species	**Common Name**	**Status**	**Trend**	**Status**	**Trend**	**Category**	**Monitoring**	**Comments**	**Source(s)**
Serranidae	Groupers					Commercial Fish Species	Fisheries Monitoring / ReefCheck		
Epinephelus striatus	Nassau Grouper	En A2ad ver 3.1	Decreasing			Commercial Fish Species	Sightings Hotline		IUCN
Scombridae	Carites	Le Co ver 3.1	Decreasing			Commercial Fish Species	Fisheries Monitoring		IUCN
Scomberomorus brasiliensis		Le Co ver 3.1	Decreasing			Commercial Fish Species	Fisheries Monitoring		IUCN
Thunnus thynnus	Tuna	En A2bd ver 3.1	Decreasing			Commercial Fish Species	Fisheries Monitoring		IUCN
Lutjanus sp.	Snappers					Commercial Fish Species	Fisheries Monitoring/ ReefCheck		IUCN
Lutjanus cyanopterus	Canteen Snapper	Vu A2d ver 2.3	unknown			Commercial Fish Species	Fisheries Monitoring/ ReefCheck		IUCN
Lutjanus analis	Mutton Snapper	Vu A2d B1+2e ver 2.3	unknown			Commercial Fish Species	Fisheries Monitoring/ ReefCheck		IUCN
Hippocampus reidi	Slender seahorse	Da De ver 3.1	unknown				Sightings Hotline		IUCN
Muraenidae	Moray eels								
Haemulidae sp.	Grunts	Le Co	unknown				ReefCheck		IUCN
Acanthurus bahianus	Surgeonfish	Le Co ver 3.1	Stable						IUCN
Chaetodon sp.	Butterfly Fish	Le Co ver 3.1	Stable						IUCN
Ogilbichthys tobagoensis	Tobago coralbrotula	Unknown					Sightings Hotline		T&T CBD

Conservation status of selected NE Tobago species. [Category] refers to Table 3 in this report. [Monitoring] refers to table 2. In the [Source(s)] column, 'IUCN' refers to the IUCN Red List (www.iucnredlist.org). 'T&T CDB refers to the Convention on Biological Diversity Trinidad & Tobago (www.biodiversity.gov.tt/home/trinidad-a-tobago-biodiversity/endemic-species.html).

Taxonomy		**Global**		**Regional / National / Local**		**Notes**			
Taxa /Species	**Common Name**	**Status**	**Trend**	**Status**	**Trend**	**Category**	**Monitoring**	**Comments**	**Source(s)**
Starksiarava	Tawny Blenny	Unknown					Sightings Hotline		T&T CBD
Starksiasella	Darksaddle Blenny	Unknown					Sightings Hotline		
Pteroisvolitans	Lionfish					Lionfish	ReefCheck		
Sharks & Rays									
Carcharhinuslimbatus	Blacktip shark	Ne Th ver 3.1	Unknown			Sharks & Rays	Sightings Hotline		IUCN
Carcharhinusperezi	Caribbean reef shark	Ne Th ver 3.1	Decreasing			Sharks & Rays	Sightings Hotline		IUCN
Manta birostris	Manta ray	Vu A2abd+ 3bd+ 4abd ver 3.1	Decreasing			Sharks & Rays	Sightings Hotline		IUCN
Aetobatusnarinari	Spotted eagle ray	Ne Th ver 3.1	Decreasing			Sharks & Rays	Sightings Hotline		IUCN
Carcharhinus leucas	Bull shark	Ne Th ver 3.1	Unknown			Sharks & Rays			IUCN
Negaprion brevirostris	Lemon Shark	Ne Th ver 3.1	Unknown			Sharks & Rays			IUCN
Pristis pristis	Largetooth Sawfish	Cr En A2cd ver 3.1	Decreasing			Sharks & Rays			IUCN
Ginglymostoma cirratum	Nurse Shark	Da De ver 3.1	Unknown			Sharks & Rays			IUCN
Other Relevant Species									
Iguana iguana	Green iguana						Terrestrial Transects	present on islets	
Zygodontomysbrevicauda	Cane mouse	Le Co ver 3.1	Stable	Vermin			Terrestrial Transects		IUCN

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